

**ADDIS ABABA UNIVERSITY
COLLEGE OF SOCIAL SCIENCES
DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES**

**HOUSEHOLD RESILIENCE TO ‘GREEN FAMINE’:
DIMENSIONS, MAGNITUDE AND ETHNO-CULTURE DISPARITY IN
BELO-JIGANFOY DISTRICT, BENISHANGUL-GUMUZ REGION,
ETHIOPIA**



PHD THESIS

GUYU FEREDÉ (M.A.)

MARCH 2016

ADDIS ABABA, ETHIOPIA

**ADDIS ABABA UNIVERSITY
COLLEGE OF SOCIAL SCIENCES
DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES**

**HOUSEHOLD RESILIENCE TO ‘*GREEN FAMINE*’:
DIMENSIONS, MAGNITUDE AND ETHNO-CULTURE DISPARITY IN
BELO-JIGANFOY DISTRICT, BENISHANGUL-GUMUZ REGION,
ETHIOPIA**

**A Dissertation Submitted to the Department of Geography and
Environmental Studies in Partial Fulfillment of the Requirements for the
Degree of Doctor of Philosophy (PhD)**

Guyu Ferede (M.A.)

Supervisor: Dr. Muluneh Wold-Tsadik (PhD)

**March 2016
Addis Ababa, Ethiopia**

Dedication

Dedicated to the memory of my heavenly father, Ferede Daie whom I did not see and, heavenly brother, Ejeta Ferede who lost his life during the revolution of October 1994 in Pawe

Statement of the Author

By my signature below, I declare that this thesis is my own work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis and completion of this dissertation. I have given all scholarly matter recognition through citation and reference. I affirm that I have cited and referenced all sources used in this document. I have made every effort to avoid plagiarism.

I submit this dissertation in partial fulfillment of the requirement for a PhD from this university. This PhD thesis is available from the university library to borrowers under the rules of the library. I declare that I have not submitted this dissertation to any other institution anywhere for the award of any academic degree, diploma, or certificate.

Scholars may use brief quotations from this dissertation without special permission if they make an accurate and complete acknowledgement of the source.

Name: _____ Signature: _____ Date: _____

Acknowledgements

I found writing a PhD dissertation is both complex process and a means to find oneself in an academic arena. Specifically, one can imagine how writing an article-based dissertation further extends the complexity and academic position of the PhD candidate engaged in the task. For the audiences, especially who have not passed through the process of writing dissertation, it may seem an easy task as articles stand alone in separate chapters. In practice, I found it the most tiresome exercise because preparing an article is almost equivalent to preparation of monograph-based dissertation as it requires patience when engaged in a debate with the reviewers and editors of journals. Despite these features of the article-based dissertation writing, I did it with love and tirelessly as I was too ambitious to learn more. However, the successful completion of the study is not only due to my strong efforts but also due to assistances from numerous individuals and institutions. Individual households involved in the questionnaire survey, focus group discussions, key informant interviews as well as enumerators deserve special acknowledgement. They are enormous in number so that listing all of them is impossible. The reality is that the study has been successfully completed as a result of their willingness to participate in the study when required and special supports to me during my stay for semi-participant observation in sample villages hosting and sharing me their beds, food and drinks. As part of that community, I know the communities in the Benishangul-gumuz region in general and the indigenous ones in particular are generous and embrace me warmly, and I really benefited from their humanly welcoming. Thus, I thank all of them for supporting me throughout my study period in one way or another.

My special gratitude goes to my dissertation supervisor, Dr. Muluneh Wold-tsadik Abshare, for shaping my study beginning from the early stage up to the completion of the dissertation. His critical comments began during the designing phase of the research, which provided me with a clear road map of the study. Above all, the encouragement and insightful guidance of Dr. Muluneh in preparing published and publishable articles of the dissertation helped me learn a lot from a repeated reviews and editing processes of each article. His patience and unreserved assistance in evaluating and commenting each article thoroughly helped me publish the articles. I thank you very much Dr. Muluneh.

My heartfelt gratitude also goes to the ‘*kebele*’, district, zone, and regional authorities, development agents, and, food security and settlement experts. All of you had really facilitated the progress of the study especially during my field work.

I would also like to extend my thanks to the staff members of college of social sciences (CSS) of Wollega University for their supports morally and material assistances. I am grateful to Mr. Firdisa Sadeta, the then vice dean of the college, who really facilitated the process to help me become one of the potential candidates from the department of Geography and Environmental Studies (GeES) when amidst of critical objections from the main dean of the college. Mr. Temesgen Soresa, the then head of department, helped me in duplicating the questionnaire. Mr. Abrham Tefera, staff member of GeES contributed some pieces of papers for questionnaire duplication. The later dean of the CSS, Mr. Gameda, the then dean of college of social sciences, facilitated the duplication process. Mr. Daba Dube and Mr. Bekere Gemech duplicated the draft paper for the defense. The moral support by Mr. Getnet Kebede, the staff member of the department of GeES, is always memorable. The moral support and occasional visits made by Mr. Sileshi Tamene, the staff member of GeES, when I was sick due to a stress as a result of continuous sitting and struggles with my laptop, was also an engine for my study. I am also grateful to all staff members of the CSS for their supports in one way or another.

My special appreciation goes to my family for encouraging my efforts when sometimes I became hopeless for financial and moral stresses. My lovely wife, Worknesh Regassa had taken most of the burden of family chore as I was not with her for the study in Addis and the study area when I was engaged in field work. In fact, you were my sole supporter even during my study for MA degree. Above all, your strengths and courage to always look after our children amidst of riot in the town of Nekemt and its surroundings especially in 2015 and 2016, which set our family at risks, was appreciable and you are my hero! Thank you Worknesh, now everything is alright. I also would like to extend my thanks to my mother, Wokete Bemano Tewachew, for her occasional visits when certain inconveniencies and wrong goes in my family. Really, you were with me and I wish you live longer. Special thanks to my children Daniel Guyu, Samrawit Guyu and Selam Guyu for sharing my burden during the study period. You had not really enjoyed your childhood wants and affections you have to me as I had preferred to struggle with my laptop to giving affection to you. Thank you for your patience.

Abbreviations

ABS	Access to Basic Services
AC	Adaptive Capacity
ADE	Adult Equivalent
ADLI	Agricultural-Development-Led-Industrialization
AFP	Agence France-Press
ANOVA	Analysis of Variance
AP	Asset Possession
ASP	Aspiration to Change
BGR	Benishangul Gumuz Region
BGRFSS	Benishangul-gumuz Region Food Security Strategy
CLRBP	Cultural relation, Bond and Practice
CSI	Coping Strategies Index
DD	Dietary Diversity
DDS	Dietary Diversity Score
DES	Dietary Energy Supply
DRM/FSS	Disaster Risk Management/Food Security Sector
EHNRI	Ethiopian Health and Nutrition Research Institute
EPRDF	Ethiopian People’s Revolutionary Democratic Front
EWS	Early Warning System
FAD	Food Availability Decline
FAO	Food and Agricultural Organization
FDRE	Federal Democratic Republic of Ethiopia
FDRE-ERA	Federal Democratic republic of Ethiopia-Ethiopian Road Authority
FDSP	Food Disposed
FED	Food Entitlement Decline
FID	Food Intervention Decline
FSF/S	Food Shortfall/surplus
GAF	Gross Available Food
GDP	Gross Domestic Product
GFB	Green Famine Belt

GoE	Government of Ethiopia
HCR	Head Count Ratio
HFBM	Household Food Balance Model
HFIAP	Household Food Insecurity Access Prevalence
HFIAS	Household Food Insecurity Access Scale
HHS	Household Hunger Scale
HIV/AIDS	Human immune-virus/Acquired-immuno-deficiency syndrome
IFA	Income and Food Access
IFSPC	Integrated Food Security Phase Classification
KMO	Kaiser-Meyer-Olkin
NAF	Net Available Food
NCFSE	New Coalition for Food Security Ethiopia
PASDEP	Plan for Accelerated and Sustainable Development to End Poverty
PSNP	Productive Safety Net Programme
RA	Resilience Approach
RF	Resilience Framework
RI	Resilience Index
S	Stability
SLA	Sustainable Livelihoods Approach
SLF	Sustainable Livelihood Framework
SNNP	Southern Nations, Nationalities and Peoples
SPSS	Statistical Package for Social Sciences
SSA	Sub Sahara Africa
SSN	Social Safety Net
STD	Standard Deviation
TLU	Tropical Livestock Unit
WEAs	Wild Edible Animals
WEPs	Wild Edible Plants

Table of Content	Page
Statement of the Author-----	i
Acknowledgements -----	ii
Abbreviations-----	iv
Table of Contents -----	vi
Abstract -----	viii
1. General Introduction-----	1
1.1. Background-----	1
1.2. The ‘green famine’ belt-----	7
1.3. When Does Food Insecurity become Famine and ‘Green Famine’? -----	7
1.4. Why Resilience Approach and the Need for Merging with Livelihoods Approach? -----	10
1.5. Research Methodology-----	16
1.6. Analytical Framework -----	20
2. Household Vulnerability to ‘Green Famine’: Component Based Analysis of Indicators in Belo-jiganfoy District (Case Study Area), Benishangul-gumuz Region, Ethiopia-----	29
3. Determinants of Seasonal Food Insecurity in the ‘Green Famine’ <i>Belt</i> of Ethiopia: The Case of Households in Belo-jiganfoy District, Benishangul-gumuz Region-----	64
4. ‘Green Famine’: Underlying Shocks and Stresses Triggering Household Vulnerability in the ‘Green Famine’ Belt of Ethiopia-----	96
5. Household Resilience to Seasonal Food Insecurity: Dimensions and Magnitudes in the “Green Famine” Belt of Ethiopia-----	116
6. Effect of Access to Livelihood Resources on Household Resilience to ‘Green Famine’ in Belo-jiganfoy District, Benishangul-gumuz Region, Ethiopia-----	158
7. Wild foods (plants and animals) in the ‘Green Famine’ Belt of Ethiopia: Do they contribute to household resilience to seasonal food insecurity? -----	181
8. Villagization as a Policy Response to Enhancing Household- Resilience to Food Insecurity: Effects, Constraints and Consequences in- Belo-jiganfoy District, Western Ethiopia-----	204
9. Summary and Discussion of Main Findings, Conclusion and Contributions -----	232

9.1. Summary and Discussion of Main Findings -----	232
9.1.1. Vulnerability to Seasonal Food Insecurity, a Proxy indicator of ‘Green famine’-----	232
9.1.2. Determinants of ‘Green Famine’-----	235
9.1.3. Underlying Shocks and Stresses Triggering ‘Green Famine’ -----	239
9.1.4. Household Resilience to ‘Green Famine’-----	241
9.1.5. Livelihoods and Household Resilience to Food Insecurity -----	242
9.1.6. Wild Foods and Household Resilience to Food Insecurity-----	246
9.1.7. Villagization Scheme and Household Resilience to Food Insecurity -----	247
9.2. Conclusion-----	248
9.3. Contribution of the Study -----	251
9.3.1. Contribution toward the Formulation of ‘Green Famine’ Theory-----	252
9.3.2. Contribution toward Broadening the Theoretical Base of Resilience to- Food Insecurity-----	255
9.4. Policy Implications-----	257
9.5. Implications for Future Research-----	263
Reference -----	265
APPENDICES-----	270
Appendix (A): Questionnaire-----	270
Appendix (B): Checklist for Focus Group Discussion (FGD) -----	299
Appendix (C): Checklist to Conduct Key Informant Interviews (KII) -----	302
Appendix (D): Checklist to Conduct Case Studies (CS) -----	311
Appendix (E): Guide to Conduct Field Observation-----	320

Abstract

Up-to-date, theories of famine in Ethiopia have mainly focused on factors related to drought due to sustained moisture stresses. In contrast, theories meant to explaining and understanding the ‘green famine’ situation have never been formulated and employed. The ‘green famine belt’ (GFB) has been generally overlooked by the government, humanitarian agents and researchers. The overall purpose of this study was to increase insights into the vulnerability context and establish theories about the ‘green famine’ and households’ resilience to it based on cross-sectional study of households based on Belo-jiganfoy district, a case study area located in the GFB. The study revealed that the impact of ‘green famine’ and hunger, amidst of flourishing green vegetation and ample rainfall, was as severe as that of the conventional famines. Cultural, institutional, socio-economic, and climate-induced shocks other than drought, biophysical and demographic factors were found to have triggered ‘green famine’. Aspiration to change, social safety net, cultural bond and practices, income and food access, stability, access to basic services, asset possession, and adaptive capacity were observed locally relevant dimensions of household resilience to ‘green famine’ shocks/stresses. The study also established and proposed a theory and approach that may be universally applied to explain and understand ‘green famine’. The famine (severe food insecurity) that has had prevailed in most parts of Ethiopia was largely due to drought though observations show this cannot be an explanation to the ‘green famine’ of the green belt. Hence, policies of intervention should take into account those factors which can minimize vulnerability and enhance resilience of households or communities to ‘green famine’.

Keywords: ‘Green famine’, vulnerability, resilience, ethno-culture, shocks/stresses, livelihoods, wild foods, villagization, Ethiopia

1. General Introduction

1.1. Background

“The sudden collapse into starvation that has been identified with the famine condition ... is only the final phase of famine ... Famine is not, however, an event marked by the death of the victim”

(Rangasami, 1985: 8).

“People who experience a threat to their food consumption should not necessarily have to face death too”

(Sarracino, 2010:6).

Famine theories evolve out a long period of intellectual processing under different paradigms, which influenced time by time proposed analysis and policies (Sarracino, 2010). An attempt to establish the theory of ‘green famine’ in this dissertation for understanding its nature and causes is an aspect of such intellectual movements and shifts in viewing famines and food insecurity. Acute/severe food insecurity, termed as famine by Degefa (2005) in the drought-prone areas is termed as ‘green famine’ in the present dissertation. Their difference lies mainly in the fact that drought is not assumed to be the primary cause of ‘green famine’. ‘Green famine’ is generally characterized by absence of sudden flare-up of famines that cause mass deaths, relatively favourable climate for agricultural and food production (i.e., absence of drought), better green vegetation cover, better fertility of lands, lesser land degradation, lower population density and, adequate per capita landholding size (Guyu, 2015; Guyu and Muluneh, 2015).

The above defining features of ‘green famine’ belt is drawn up on Rangasami’s (1985) and Ravallion’s (1997) theoretical foundations and arguments that clearly show definitional inadequacy in the use of the concept of conventional famine, after criticized earlier definitions especially Sen’s (1981). Rangasami observed the conventional definition of famine is unsatisfactory on two grounds (Rangasami, 1985). First, famine is a process (not a one-time shoot that end with mass death) and can be seen as a biological culmination of starvation as well as a politico-socio-economic process. But, the culmination of the politico-socio-economic process comes well before the slide into diseases and death (i.e. biological). In this regard, a state can intervene and retard or halt famine mortalities. Thus, based on the above premises, it is concluded that death is not a necessary condition of famine (Rangasami, 1985; Ravallion, 1997). Second, the famine process cannot be defined with reference to the victims of starvation alone as it is a process in which benefits accrue to one section of the community while losses flow to the

other. Thus, defining it only with reference to victims may obscure the study of the process (Rangasami, 1985). This shows the inadequacy of the conventional definition of famines that have been given as a virulent manifestation of starvation causing sudden mass death (Sen, 1981), or seen as a “discrete event that is triggered by food shortage resulting in mass death by starvation” (Devereux, 2000b:4) is partly incorrect as some sections of the community survive. Although Rangasami’s (1985) arguments are applicable to both types of famine conditions (i.e. conventional and green), they do not mention a word about ‘green famine’. Rather, they may be regarded as paving a way to redefining famine for the greener environments termed as “green famine” (Guyu, 2015; Guyu and Muluneh, 2015a). The conclusion of Rangasami that conventional famine scholars failed to recognize the social, economic and political factors (rather than drought) reminded the writer of this dissertation to rethink new definition in the greener environments.

In fact, food insecurity is a worldwide phenomenon and affects all countries. In contrast, conventional famines have been observed in some nations of different regions of the world (Sarracino, 2010). Historically, developed nations such as Switzerland, Hungary, Italy, and Ireland (Devereux, 2000b) and “developing countries such as Russia, China, India and Bangladesh” (Sarracino, 2010:2) were hit hard by famines. It should be noted that, as opposed to Sarracino (2010), World Bank categorizes these countries under middle income nations’ group except Bangladesh, a low income nation. While ending in these historically famine-prone areas, it is likely to persist, as warned by researchers such as Omotesho et al. (2006), in many developing regions and countries of the Sub Sahara Africa (SSA). Specifically, it has remained endemic to the Horn of Africa (Devereux, 2000a; FAO, 2014) where Ethiopia is a part. This recent huge gap in the extent of vulnerability to food insecurity and famines between the developed and developing nations is described as “plenty and hunger,” the phrase being used to divide the world into two general camps of food security statuses (Degefa, 2005).

Writers have also documented huge body of literature on historical famines and food insecurity in Ethiopia. The country can be regarded as a typical nation in the SSA that has suffered a lot from famine shocks perhaps since 250 BC (Sen, 1981; Webb and Von Braun, 1994 cited in Devereux, 2000b; Degefa, 2005; Mulugeta, 2014). Since then, it is believed that famines that recur every 7 – 10 years have become unavoidable events. Focusing on the recent situations, the biggest killer of all the 20thc African famines belongs to the mid-1980s Ethiopian famine that

killed up to 1 million people (Devereux, 2000a). Similarly, the worst of all famines of the country that had occurred over the past 60 years is the 21st c East African famine catastrophe that occurred during 2011/2012 and eroded hard the pastoral areas of the region (UNECA, 2012). Today, famine and food insecurity seem to have become the identity of the country (Guyu, 2014).

The historical famines of Ethiopia are characterized by specialization of geographical (spatial) extent and casual factors. Up-to-date, famine scholars have generally attributed the causes of Ethiopia's famine and starvation to drought, land resource degradation and, high population pressure, which are geographically limited to what is conventionally known as "famine-prone" areas (Mesfin, 1984; Pankhrust, 1985; Alemayehu, 2001; Degefa, 2005; Mulugeta, 2014). These areas are divided into two broad "famine-prone" region of the country (Degefa, 2005; Canali and Slaviero, 2010; Mulugeta, 2014). The first includes the famine-prone highland region located in northern Shewa, Oromiya, South and North Wollo and parts of Tigray. These are characterized by sedentary mixed farming, high population density and land fragmentation, and severe land degradation due to over utilization of land resources as well as inappropriate farmer-state relations (Degefa, 2005; Amdisa, 2006; Frankenberger et al., 2007). The second famine-prone area includes the drought-prone lowland part of the country located in the northeastern, eastern, southeastern and southern parts characterized by dominantly pastoral and agro-pastoral activities. This includes northern Shewa, low lands of Oromiya, Afar and Somali regions, and some parts of southern region. Drought is the main cause of famine and starvation, and drought itself is exacerbated by degradation due to misuse of pasture land use (Degefa, 2005).

The above division of Ethiopia into two broad famine-prone areas implies that the remaining regions of the country are endowed with sufficient rainfall and fertile and large per capita landholding size, which may result in high level of crop productivity making the area free from food insecurity and famine. This is probably why Sen (1981) and Alemayehu (2001) divided Ethiopia into two broad "feast-fast" areas. Such a division of Ethiopia into "feast-fast" situations attributed the causes of hunger and famines to distributional problems. The idea is that while some part of the world (mainly developed regions) and Ethiopia (i.e., generally western half) are enjoying excess food supply from own production, the other parts are starving merely due to limited distribution of food from the surplus areas to deficient ones. In simple words, the "feast-

fast” co-existence in food security situation between the two parts of Ethiopia is attributed to conditions of market, consumption pattern, and entitlement problems but not to production problems (Alemayehu, 2001). In Alemayehu’s opinion, future policy direction of food security would focus on distributional aspects, rather than production, that would improve access to food by all communities mainly in the food deficit part of the country.

The question is that, does surplus food in some parts of Ethiopia that would be distributed to the food deficient areas really exist? The general observation shows that Alemayehu (2001) seems to have overstated the availability of surplus food in one part of Ethiopia and food shortage in the other part. This view that attributes the causes of food insecurity to market or distributional factors seems inappropriate because after a decade and half from Alemayehu’s (2001) observation, transport infrastructures have been more dramatically improved and commodities are better distributed than ever before. Nonetheless, empirical studies showed that the challenges of food insecurity are likely to have been expanded faster than the previous situations even into the so-called food surplus western part of Ethiopia (Dagnachew, 2004; BGRFSS, 2004; Eshetu, 2007; Guyu, 2012, 2014, 2015; Guyu and Muluneh, 2015a; Seyoum, 2012). When arguing about the causes of the 1973/74 Wollo famine, Sen (1981) himself, considering Ethiopia as a unit, also indicated that famines can take place in situations of moderate to good food availability attributing the Wollo famine to factors related to distribution or market, which were more responsible for food insecurity in the country. However, both Sen and Alemayehu did not observe some of the factors related to market such as the weak purchasing power at grassroots level (households and individuals) even if surplus food would have been supplied in markets. In this respect, a study from Bullen district located in the ‘green famine’ belt (GFB) indicates and proposes that factors related to ethno-cultures were more responsible for the occurrence of food insecurity than other factors (Guyu, 2014). In this regard, factors related to socioeconomic and cultural characteristics of different ethno-cultures that result in extravagant post-harvest consumption should not be underestimated. Thus, policy strategies that address culture-related factors that would improve food security should not be overlooked. Simply, Alemayehu’s (2001) work may be seen as part of scholarly dialogue that contributed to debates about why food insecurity and famine occurs in one part of Ethiopia but, according to him, not in another part, which is contested in the present dissertation.

In short, until the publication of the article (one of the chapters of this dissertation) entitled “*Household Vulnerability to ‘Green Famine’: Component Based Analysis of Indicators in Belo-jiganfoy District (Case Study Area), Benishangul-gumuz Region, Ethiopia*” (Guyu, 2015), famine scholars had attributed famines of Ethiopia to, droughts due to sustained moisture stresses and sudden mass deaths of people and destruction of livelihoods. The thesis in the present dissertation however questiones the above views and argues that famines have ever occurred in the GFB. Following the foot-steps of Rangasami (1985), it is argued that fmine should not necessarily result in flare-up of starvation and sudden mass deaths and, drought should not be a primary cause of famine. As an evidence, a scholarly study conducted at national level implicitly indicattes the absence of drought in the GFB of Ethiopia (Temesgen, 2010)

Unfortunately, neither literature mentions nor research about any famine event has been conducted in the western half of Ethiopia (i.e. GFB) perhaps perceiving the region as more resilient or less vulnerable to famine and food insecurities. As far as my reading is concerned, Only Mulugeta (2014) uses the term ‘green famine’ in analyzing a conventional type of famine in the southern highlands of Ethiopia. Similarly, (Temesgen, 2010) in his dissertation on vulnerability to climate chnge in Ethiopia, attempts to implicitly show whether drought spells had occurred in the GFB of the country but did not mention the term green famine. This dissertation however argues that the use of green famine concept by Mulugeta (2014) is partly inappropriate for various conceptual flaws. Mulugeta (2014) uses the concept of green famine to understand the effects of the 2007/08 national drought that resulted in a sudden flare-up of famine causing some deaths, which is obviously a feature of conventional famines. However, such a mass death is the final stage of famine and famines may not always end with mass deaths (Rangasami, 1985). The application of the green famine concept is probably due to the fact that southern highlands are green in terms of vegetation cover and due to adequacy of both surface and underground waters (Alemayehu, 2001; Amdissa, 2006; Mulugeta, 2014).

Rather the central thesis of the present study follows the line of argument held by Rangasami (1985) who contends that the famine people face may take the form of moderate, severe or extremely severe hunger and starvation while deaths may happen due to associated diseases and malnutrition if it is prolonged. It argues that the ‘green famine’ should be defined primarily for climatically favorable conditions for agriculture and food production. Then, demographically low

population density and availability of adequate farmland size and low level of land fragmentation and degradation can be used as secondary defining criteria for ‘green famine’. But, ‘green famine’ may not always end with mass deaths unless natural disasters such as earthquakes, volcanic eruptions or landslides occur simultaneously along with acute food shortages (Guyu, 2015; Guyu and Muluneh, 2015a). Nevertheless, this dissertation reserves a room for the incorporation (in the definition of ‘green famine’) of areas with demographically high population density where land degradations are severe and per capita landholdings are diminishing if and only if climatically conducive for agriculture and food production. Biophysical, cultural, socioeconomic and demographic factors are believed to cause ‘green famine’ while climate-related factors except drought may also partly cause it. This is one of the most important contributions of this dissertation which may serve as a conceptual framework for green famine analysis.

In light of the above general background, the main objective of this study was to examine and understand the extent of households’ vulnerability to acute food insecurity so as to prove the occurrence of green famine in the GFB of Ethiopia. This was followed by exploring and understanding the dimensions of household resilience to green famine relevant to local contexts and examining the disparity between the indigenous and the non-indigenous ethno-cultures in their vulnerability and resilience statuses based on the case study district, Belo-jiganfoy, Benishangul-gumuz region (BGR).

The following specific objectives were focused in order to achieve the above general objective:

Measuring the extent of household’s vulnerability to acute seasonal food insecurity (a proxy indicator of green famine) using the components of food security/insecurity (Chapter 2),
Identifying the main determinants of household vulnerability to green famine (Chapter 3),
Investigating the underlying shocks/stresses triggering acute seasonal food shortages (Chapter 4),
Determining the dimensions of, and measuring household, resilience to green famine (Chapter 5),
Analyzing the effect of livelihoods on the resilience of households to green famine (Chapter 6),
Measuring the contribution of wild foods to household resilience to green famine (Chapter 7)
and,
Analyzing the impacts of villagization, as a policy response to food insecurity, on household resilience to green famine (Chapter 8)

1.2. The 'green famine' belt

'Green famine', the writer believes, could be found in different parts of the world and the areas where it occurs are termed as the GFB. The GFB can also be identified for each nation and region. However, it is impossible to exactly delineate and map the belt both at global and national levels as it is dynamic over time and space. Likewise, the GFB of Ethiopia cannot be exactly mapped as its areal extent might change over time. In other words, the area which is presently free from 'green famine' may be affected by the event as time goes. With this premise, the present GFB of Ethiopia roughly covers areas in the western half stretching from northwestern in the Amhara region through the whole, BGR, Gambella region, and western parts of Oromiya region to areas in the western parts of Southern Nations, Nationalities and Peoples (SNNP) region (Guyu, 2015; Guyu and Muluneh, 2015a). The general unifying features of all of these areas should include at least a relative abundance of green vegetation cover, adequate rainfall and surface water resources (e.g. rivers) for agricultural and food production. Moreover, absence of drought is the main unifying feature of all green famine areas although the impacts of its occurrence at a region of globe or part of a nation could be felt in the GFB. For example, although it is a global phenomenon that is conceptually wider than drought, BGR and SNNP region had been less vulnerable to climate change effects (Temesgen, 2010). As a result, while the impacts of climate change might be felt, drought should never characterize the GFB. This study was conducted based on Belo-jiganfoy district, a case study area selected to understand the problem in detail (Figure 1, Chapter 5, page 113 and Figure 1, Chapter 7, page 166) for the location map of the district). The empirical context of the study area is given in each paper of the dissertation.

1.3. When Does Food Insecurity become Famine and 'Green Famine'?

This can be answered by critically reviewing the evolving discourses and explanations of the definitions and causation of famines. According to Sarracino (2010:3), "famine theories evolve out a long period of intellectual processing under different paradigms which influenced, time by time, proposed analysis and policies". Such an evolution in famine thinking and discourses held among different writers that has led to the shifts in the analysis and models of food insecurity and famines is reviewed and clearly shown by different social scientists (Rangassami, 1985; Devereux, 2000b; Degefa, 2005; Sarracino, 2010). Views about 'green famine' as another face of

food insecurity can therefore be seen as the outcome of such dynamic but still competing paradigms explaining famine causation and is believed to further famine discourses a little more than the previous thoughts.

Literature shows that almost all famine scholars and researchers have similar understanding about the conventional famines. They viewed famine as a discrete and sudden emmersion of people into starvation and emaciation resulting in mass deaths (Sen, 1981; Mesfin, 1984; Pankhurst, 1985; Devereux, 2001; Degefa, 2005; Sarracino, 2010; Mulugeta, 2014). Such a narrow view that famine is triggered solely due to food shortages and results in mass mortality has been seriously criticized by other famine authors (Iliffe, 1979 cited in Devereux, 2000; Rangasami, 1985; De Waal, 1989; Ravallion, 1997; Guyu, 2015).

The earliest influential theory of famine is the Malthusian view that attributes famines to climatic and demographic related shocks and stresses (Degefa, 2005; Sarracino, 2010). These are used as a geographic theory explanation to food insecurity and famines based on the food availability decline (FAD) model which was picked up in the 1960s and 1970s (Yaro, 2004; Degefa, 2005; Sarracino, 2010). However, the FAD model used to explain the Neo-Malthusian climatic and demographic factors that determine food availability has been mainly criticized on a number of grounds since the 1980s, by Sen (1981). Sen indicated the inadequacy of the FAD approach as famine and food insecurity might occur for distributional problems and lack of entitlement failure and proposed the food entitlement decline (FED) as an alternative approach. This argument was later held and applied by Alemayehu (2001) to analyze the famine condition of Ethiopia. Ravallion (1997) also indicates that famines are not strictly linked to a contraction in the aggregate availability of food. Despite this, the FAD approach has still practical relevance in some developing countries including Ethiopia (Degefa, 2005).

The FED approach which is established around the food access variables as a determinant of famines and the FAD model in turn were criticized by Rangasami (1985) for they miss the politico-socio-economic dimension of famine. In contrast to conventional views, Devereux (2000b) reviewed that, famines should be seen as intensification of normal process rather than an abrupt event (Rangasami, 1985); they are not always triggered by a decline in food availability but as entitlement failure (Sen, 1981; Young et al., 2001); excess death should not be regarded as

a prerequisite for famine to have occurred (Iliffe, 1979 cited in Devereux, 2000b) and, the deaths during famine are related more to epidemic diseases than to starvation (De Waal, 1989).

The overall implication of the above arguments is that the correlation between famine and mass death should be contested for its inadequacy. Rather, it should be seen in a dynamic sense over time and across space. Accordingly, the present dissertation follows the foot-steps of scholars that attributed famines as a process involving different stages rather than being sudden events. For example, Sarracino (2010) clearly argued that people who experience a threat to their food consumption not necessarily have to face death too. Iliffe (1979) cited in Devereux (2000b) divides famine into an ordinary food shortages and famine that results in mortality. De Waal (1989) divides famine into three clusters: minor famines causing hunger, severe famines causing destitution and, catastrophic famines resulting in mass deaths. Rangassami (1985) sees famines into three different states: low food consumption, declining consumption and, a sharp collapse in food consumption, the later being indicator of the conventional famines. All these imply that famine is not a once off event rather a process. Wisner et al (2003) confirmed this fact by strongly arguing that there are people that may not die of famines and related shock. In other words, death is not a necessary condition for famine to exist (De Waal, 1989). In general, the concept of famine is dynamic and evolving, 'green famine' being the outcome of such an evolution.

As to why 'green famine', the line of argument held in this dissertation conforms to scholars that contest the views of scholars of conventional famines. Sen (1981:433) himself points out that "famines often take place in situations of moderate to good availability, without any significant decline in food supply per head" although he still maintains that famines end with virulent starvation and widespread deaths. This view is also maintained by Sarracino (2010) who perceives famine as a process. Ravallion (1997) viewed that people who experience a threat to their food consumption should not necessarily have to face (mass) death. More importantly, Rangasami's (1985) views of famine having three stages is the core line of argument held seriously in this dissertation. Unlike Sen's understanding that famine is a sudden and virulent starvation causing mass mortality, death or mortality is only the last stage of famine process but such a death may not be always the case (Rangasami, 1985).

Added to the above attempts to characterizing 'green famine', this dissertation argues that drought never be the primary cause of the famine conditions in the GFB of Ethiopia. However, most of the natural disasters for example: flood and pest infestations are maintained in defining 'green famine'. Even a pioneering academic work that directly picks up the concept of 'green famine' to analyze famine in southern highlands of Ethiopia (Mulugeta, 2014) is partly rejected in this dissertation for it was applied to drought-induced 2007/2008 Ethiopian famine. The fact that acute seasonal food insecurity (a proxy indicator of 'green famine') occurs without a drought related shocks, that the GFB is covered by relatively dense green vegetation and, that it has adequate surface water resources and rainfall, the famine condition is termed as 'green famine'. In conclusion, De Waal's (1989) idea that famines could be better understood if we discard the 'traditional' notion of famines, by adopting the concept used by the people who have experience of suffering from famine shocks, is appropriate and adopted in this study. The issue here is that famine can be caused by multiple factors other than drought.

1.4. Why Resilience Approach and the Need for Merging with Livelihoods Approach?

Vulnerability, sustainability, and resilience are the three main characteristics of a system (in this dissertation food system and household as a sub-system). Different approaches and models have been employed to analyze and understand these characteristics of food system and households. Theories on famines and food security are likely to have proceeded in a somewhat linear fashion from the Malthusian analytical scenarios based on demographic and climatic theories explanations involving shortfalls in food availability to theories of poverty that stress entitlement failures, and eventually to livelihood framework that maintain entitlements as the core explanatory force (Yaro, 2004) and, then more recently resilience theories. The emergence of resilience approach (RA) and model can therefore be regarded as an aspect of such linear shift in the concept and models of food security/insecurity and famines over the past decades.

The traditional approach to famines looks for the FAD model (Sen, 1981). It is founded on both the Malthusian/neo-Malthusians demographic theories and the conventional climatic theories that primarily focus on increases in population size and natural disasters respectively (Sarracino, 2010). The FAD approach to famines also fits well with the Malthusian analysis of increased mortality as food supply falls relative to the size of population (Sen, 1981). In contrast to Malthus, the Boserupian theory of agrarian change argues that large family size is one of the

solutions to famines and food insecurity through increased innovation as the number of labor force per household increases (Boserup, 1965; Marquatte, 1997). The FAD model assumes that famines are primarily caused by a sudden decline in per capita food supply attributing insufficient production and availability as the main causes of famines and starvation (Yaro, 2004; Sarracino, 2010). Availability is therefore the concept at the center of the FAD model that officially started in the 1960s and 1970s emphasizing on aggregate supply of food (Erickson, 2007). Food availability refers to the physical presence of food at an aggregate level (most often national), through domestic production, food stocks, commercial imports and food aid (Lebeda et al., 2012). The FAD emphasizes supply factors at aggregate and macro-level while focusing less on the demand factors and people's ability to access food at disaggregate and micro-level level (Degefa, 2005; Yaro, 2004). The decline in food supply is usually triggered by natural disasters: for example drought, floods and pest infestation, wars, and epidemics (Sarracino, 2010). This approach had been dominantly employed by researchers and policy makers mainly in the 1970s (Degefa, 2005; Lebeda et al., 2012). But with the emergence of the entitlement approach in the early 1980s, its importance has begun to decline (Sen, 1981; Lima, 2008; Faridi and Wadood, 2010). In this dissertation, the availability of food at household level (i.e. an aspect of the food entitlement) from different sources was analyzed to understand the contribution of food supply to household resilience.

The decline in the importance of the FAD model has begun as the result of the observation that many developing countries have more than enough supplies of food while millions go hungry every day. The FED model therefore emerged as an alternative approach to FAD as the FAD approach cannot explain this paradox (Yaro, 2004). Availability at aggregate level is a necessary condition, but not enough to guarantee access of households and individuals to food leading to the decline of the FAD model and the emergence of FED approach (Yaro, 2004; Lima, 2008; Lebeda et al., 2012). This is because famines may have many causes including a decline in availability and may occur in the regions that had not experienced a decline in food production or availability in the past (Sen, 1981). Even Sen observed that famines have been occurring (for example, the 1943 famine in Bengal, the 1973 famine in Ethiopia, and the 1974 famine in Bangladesh) in regions or countries which had food surpluses (Sarracino, 2010). Accessibility is a concept that constitutes the core of the FED model. Access is therefore determined by how well people can convert their various financial, political, and other assets into food, whether produced

or purchased (Ericksen, 2007). Food accessibility is therefore concerned with households' and individuals' physical and economic ability to acquire a sufficient quantity of food (Yaro, 2004; Degefa, 2005; Lebeda et al., 2012). Access can be ensured by a combination of factors such as own production, stocks, purchases, gifts, borrowing or aid. Access as a perspective explains inequity in food distribution and allocation, based upon income, political and social power (Ericksen, 2007). With its advent in the influential works of Sen (1981), the FED approach that focuses much on the factors of accessibility has still become better choice in a food security and famine research and policy analysis since the 1980s. In short, according to Sen's (1981) entitlement approach, famine occurs when a large number of people suffer a complete collapse in their exchange entitlements: production-based entitlements (crops and livestock), own-labor entitlements (waged labor and professions), trade-based entitlements (trading artisan products and natural resources like forestry products) and, inheritance and transfer entitlements (from the state, or private gifts and loans) (Young et al., 2000). While focusing on the FED approach, Sen does not completely reject availability component rather he recognizes that famines can be caused by FAD as well as he subsumes this hypothesis in his entitlement approach (Bowbrick, 1999; Sarracino, 2010). The FED approach, however, is criticized on different grounds.

Access to food (as a central component of the FED model), like availability (in the FAD model), is a necessity but not sufficient for ensuring utilization/consumption at individual level (Lebeda et al., 2012). In addition to utilization/consumption, the stability and sovereignty components of food security should be considered in determining the extent to which households are resilient (otherwise vulnerable) to famine or food insecurity (Gross et al., 2000). Food utilization refers to nutritional and safety aspects of food security; hereby the food is consumed in an adequate manner thanks to clean water, proper sanitation and health care (Gross et al, 2000; Lebeda et al., 2012). It is the public health that emphasizes on nutritional outcomes and further amplified the food security framework by adding utilization as a component of food security (Ericksen, 2007). This insight highlights the influence of age, health and disease on how the human body utilizes food and its needs for different nutrients, calories and protein (Young et al., 2001). Utilization is therefore affected by poor hygiene, food preferences and the physiological condition affecting food absorption (Ericksen, 2007). Households' knowledge of nutrition and childcare techniques are also central to utilization. At this point, the health situation of the household members or

head, safe food, social rehabilitation programmes (FAO, 2006) can be used as a component of utilization and is used for estimating household resilience to food insecurity.

Food stability (another implicit component of FED model) is the concept which entails that food should be available, accessible, affordable and properly utilized on a continuous basis, long term basis (Gross et al., 2000; Lebeda et al., 2012). Stability of a food system can be influenced by multiple socio-economic and ecological factors such as political upheavals, unemployment, and volatile food prices, as well as ecological services such as pollination, water regulation, and pest control (Methot, 2013). The concept of stability therefore refers to the sustainability of food systems due to the stability of all dimensions of food security: availability, accessibility and consumption (FAO, 2006). Thus, the place where this stability is used in the dissertation for analyzing household resilience is clear. The length of consumption of produce of a household during research year, diversifying agriculture and employment, risk analysis, access to credit institutions and savings, etc can be employed as components of stability to estimate resilience index (FAO, 2006). In this dissertation, only the trend in agricultural productivity in the district is employed as an indicator of food security/insecurity.

The concept of food sovereignty first appeared publicly at the 1996 World Food Summit in Rome (Suppan, 2008). It refers to the right of humans to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems (Nyeleni, 2007; Patel, 2009; Burnett and Murphy, 2013). Accordingly, this approach can be regarded as the rights-based approach to food and development although suggested as an alternative to sustainable livelihoods approach (Yaro, 2004). Food sovereignty as a policy framework, as an alternative to an international trade-driven industrialized agriculture system, is hostile to import and technological dependency precisely because that system condemns peasant agriculture to extinction (Suppan, 2008). Rather it puts a value on using farmer knowledge and technology to develop indigenous crop and livestock varieties. Since recent past, food sovereignty has been seen as one of the components of food security (Patel, 2009; Messay, 2013). Despite the growing debate about the need for food sovereignty to ensure sustainable development and food security, the food intervention decline (FID) approach to famine as a new model has emerged most recently (Sarracino, 2010). This

approach advocates the importance of food intervention by governments and non-governments in combating famines.

In general, Yaro (2004) reviewed and showed clearly the limitations of the FED approach to famine and food insecurity. Fuzziness (vagueness and multiplicity) as Sen (1981) views it variously as a specific hypothesis which stresses on that FAD is not an important model for explaining modern famines; as a general hypothesis that stresses on entitlement failure theories for understanding famine and; as a general framework for analyzing famine in an economy (Yaro, 2004). Other criticisms include that the entitlement approach narrows the perception that victims are passive. It focuses on the analysis of food and the famine victims are interpreted politically but not in economic terms (Yaro, 2004). As a result, the sustainable livelihoods approach (SLA) emerged.

SLA is a holistic approach that is based on two main concepts (sustainability and livelihoods) and gives an overall picture of food situation at a given level of analysis and explains a process leading to livelihood outcomes (Scoones, 1998; Yaro, 2004). The sustainable livelihoods framework (SLF) is therefore a tool to improve our understanding of livelihoods, particularly the livelihoods of the poor (DFID, 1999). Enhanced vulnerability or resilience is one of the outcomes of the SLF (Scoones, 1998). The fact that vulnerability context, livelihood assets, transforming structures and processes, livelihood strategies and outcomes are involved in the framework (see Figure 1, Chapter 6, page 143), the other approaches can be seen as part and parcel of the SLA. For example, livelihoods are made up of a combination of exchange entitlements (Young et al., 2001). In other words, the entitlement approach (i.e. the FED model) does not reject the FAD approach rather intuitively incorporates food availability at local, household or individual levels (Sarracino, 2010). The transforming structures and processes of the SLF may mean the incorporation of the recently growing emphasis on the sovereignty model of famine and food insecurity.

The basic assumption of the SLA is that if livelihoods are exposed to shocks and stresses, they are vulnerable to those shocks, if not sustainable. Accordingly, the SLA therefore seeks to investigate how a person or a community in a socio-politico-economic situation devises livelihood strategies for achieving a sustainable livelihoods using a range of resources with given institutions and social norms (Yaro, 2004). The SLA approach has been adapted to the Ethiopian

context and used to investigate the condition households or communities (Degefa, 2005; Arega et al., 2013). Despite its holistic nature, the SLA, is however, criticized for certain limitations. It is criticized for its component (structures and processes) which might emphasize the meso-and-macro-policy that might be difficult to apply the methodology at the micro-realities at local, household, and individual levels, thus shows a methodological flaws; it is also criticized for having little to say distributional issues despite its implicit concern for the poorest (Yaro, 2004). This implies that scholarly efforts of seeking better approach and theories to explain famines and food insecurity is inevitable and is likely to become a continuous process.

The interest herein is to consider properties of a system (vulnerability, sustainability and, resilience) as approaches/models to understand the status of households under a given context. Vulnerability of a system to a given shock or stress implies that the system is losing its sustainability and resilience. The choice between applying vulnerability or resilience of a community or a household to declines in availability, entitlements, utilization (consumption), stability, sovereignty and livelihoods is the intent of this discussion. The FAD, FED and FID as well as other declines approaches to famines do not entail a holistic approach that provides a full understanding of a situation of household food insecurity and famine. In this regard, SLA attributes livelihood declines to famine and starvation. Nevertheless, in this dissertation, as a prerequisite for analyzing and understanding the resilience of households to ‘green famine’, all approaches (including the FID implicitly) are employed in one way or another.

Because the SLA tries to investigate and determine whether livelihoods are vulnerable to shocks/stresses or sustainable. Accordingly, it is preoccupied with analysis of vulnerability of livelihoods to shocks. In other words, vulnerability approach to understand famines and food insecurity so as to design policies and strategies to minimize their challenges have been traditionally employed theory (Ellis, 2003; Lautze et al., 2003; Marsland, 2004; Luers, 2003,2005; Scaramozzino, 2006; Babatunde et al., 2008; Hart, 2009). However, more recently a new concept has been proposed, i.e., resilience to food insecurity (Frankenberger et al., 2007; Alinovi et al., 2008; Alinovi et al., 2010; Niemisto, 2011; Ciani, 2012). This dissertation applied the concept of resilience to analyze and understand household resilience to ‘green famine’ following the foot-steps of these writers. But, why resilience approach?

Resilience and vulnerability represent two related but different approaches to understanding systems change (Miller et al., 2010; Alinovi et al., 2010). But, the relative importance of resilience over vulnerability makes it more appropriate for application in this dissertation. Vulnerability analysis often tends to measure only the susceptibility of an individual/household to harm and the immediate coping mechanisms adopted and, its methods of analysis try to predict ex-ant more accurately the likelihood of experiencing future loss of adequate food (Alinovi et al., 2008; Ciani, 2012). But, the ability to predict the future in any meaningful way is jeopardized because the natural and social-ecological systems are dynamic so that prediction may be uncertain (Ciani, 2012). Resilience, on the other hand, tries to analyze the current status and property of a system. It refers to the ability of the households to maintain a certain level of well-being (for example, food security) withstanding shocks and stresses (in this paper green famine and its underlying shocks), depending on the options available to them to make a living and its ability to handle risks (Alinovi et al., 2010). The idea implicit to this is that this concept could complement the early warning system (EWS) approach, which is inherent to vulnerability approach. Indeed, the EWS approach tries to predict crisis, while the resilience framework tries to assess the current state of health of a food system, and hence its ability to withstand shocks when they occur (Alinovi et al., 2008; Ciani, 2012). However, vulnerability is the flip side of resilience (Alinovi et al., 2008). This means that when a system loses its resilience it becomes vulnerable to change that previously could be absorbed. Because of these advantages of resilience over vulnerability approach (although used as a flip side of each other), resilience framework (RF) is employed to analyze and understand household resilience to ‘green famine’ in this study (Figure 1, Chapter 5, page 111). Unlike vulnerability approach that emphasizes on ex-ant prediction of future occurrence of famines and food insecurity that may not capture well the most important dynamic components, resilience approach captures better the dynamics of famine and food security ex-post. The specific methods for data generation and analysis are provided under each paper of the dissertation.

1.5. Research Methodology

This research is intended to study the situation of food insecurity and the capability of households to cope with and recover from food insecurity shock (i.e. resilience) in western part of Ethiopia in general and BGR in particular by taking a case study of Belo Jiganfoy district. This requires appropriate philosophical and methodological underpinnings that guide the whole

research process, which in turn requires predetermination of the nature/type of data that would be employed. This sub-section provides a brief account of the methodology employed and the details are given in each paper of the dissertation.

The data across indigenous and non-indigenous ethno-cultures in the area were required for investigating the dimensions of household resilience to food insecurity. The data were needed at one point in the fiscal year under consideration (i.e. in 2012/13). The structured questionnaire was found to be most appropriate tool that would be dominantly employed for data collection. A cross-sectional survey is relevant for the study in which descriptive research is a typical method of inquiry (Kelley et al., 2003). Thus, data were retrospectively collected from households selected to represent the ethno-cultures of the region, the indigenous and the non-indigenous. Data collection and analysis were performed through both statistical and non-statistical techniques.

Understanding the existing worldviews and their respective stances on what should be considered as an acceptable knowledge, i.e. epistemology (Spratt et al., 2004; Broom and Wills, 2007) and their understanding of World reality, i.e. ontology is also essential. This helps identify appropriate methodology relevant to various fields and sub-fields of studies. Moreover, an overarching philosophical, i.e. commonly-held beliefs or values within a research or scientific community about the nature of the world (a paradigm), is an undeniable fact. It shapes or dictates how scientists and researchers should proceed in carrying out research in terms of what methods to use and how the results should be interpreted (Spratt et al., 2004; Broom and Wills, 2007). As choices can be made from the paradigms (positivism, constructivism or their mix), because they differ in their philosophical stances, and serves as a foundation for quantitative, qualitative and mixed methods approaches (Ridenour and Newman, 2008) respectively, this dissertation is founded on the Mixed methods approach.

While a constructivist paradigm and then researcher maintains that knowledge is socially constructed and reality is ultimately subjective, a positivist maintains that knowledge is produced through rigorous methodology, and reality is ultimately objective and fixed. Thus, methods employed by the former are referred to as qualitative and those by the latter are quantitative and, a combination of the two is a mixed methods approach (Creswell, 2003; Broom and Wills, 2007). Mixed methods paradigm has growing importance in most recent researches. However,

opponents of this paradigm argue that social reality cannot be both objective and a social construction simultaneously in nature. Because they are philosophically incompatible, their combination is logically impossible, and each considers different methodology (Kim, 2003; Bazeley, 2004; Broom and Wills, 2007). In harmonizing this argument, many mixed methods are usually applied in a sequential manner while there is a ground for simultaneous use although difficult as there is no sophisticated software for analysis. Therefore, quantitative and qualitative methods are employed in a mixed fashion for achieving the goal of this dissertation.

Data required for this study were obtained from different primary sources including sample households, key and case study informants, focus group discussants, field facts observed as well as documents reviewed. Secondary data sources are very limited in the study although records of socioeconomic and demographic data are employed as a supplementary to primary sources. They were obtained from official documents reports mainly district official reports).

Questionnaire is appropriate and valuable tool to acquire information on demographic, cultural, social and economic characteristics of sample households. Almost the entire quantitative data (except secondary sources) and some qualitative data were collected through questionnaire survey. It was administered to 220 sample households that were selected through stratified random sampling techniques. Qualitative information on the perception of households about their family size, food security and livelihood conditions, poverty or wealth, wild foods, villagization, and environment was also guaranteed through questionnaire. In addition to questionnaire, focus group discussion, key informant interview, case study and semi-participant field observations were conducted to enrich the data. Although limited in amount, secondary data were also obtained from official reports of the government. Before the commencement of actual data collection, the questionnaire was translated from English into Amharic (i.e., currently the working language of the Benishangul-gumuz regional state. It does not mean however that all the people of the district can communicate in Amharic. Rather, the enumerators can further translate it to the language a particular household communicates with.

The questionnaire was tested for its validity and reliability before addressing it through enumerators. In fact, the reliability and validity was well addressed as most items in the questionnaire are derived from related literatures after intensive reviewing. In this regard, some of the instruments of the questionnaire like the household food insecurity access scale (HFIAS),

household hunger scale (HHS), coping strategies index (CSI) and, dietary diversity (DD) score are already tested in several studies (Coates et al., 2006/2007; FAO-WFP, 2008; Babatunde et al., 2008; Ballard et al., 2011; Messay, 2013). However, to see the validity and reliability of the tool in the study area, the test-retest method of estimating reliability and repeated field tests for validity as suggested by Kelley et al. (2003) was conducted. Accordingly, the questionnaire that was thought to have been well prepared was first administered to ten household heads. Really there were vague items that created confusion to respondents. These were revised and the items were written as clear as possible so as to be understood by all respondents. It was administered to five household heads for the second time. Then, it was easily understandable by all the respondent as no complain arose from five of the households interviewed. But, because of statistical software limitations, the Chronbach alpha was not applied although theory suggests that it is a statistical method of estimating these qualities of a questionnaire as a minimum alpha statistic of 0.7 for a scale to be considered consistent.

Eight enumerators were selected based on their cultural backgrounds, mainly their ability to communicate the local languages. Of these, two were BA degree holders while the remaining six were diploma holders. They were oriented on how to approach the sample households and maintain their confidentiality and other precondition for generating reliable and valid information. The orientation also included the explanation of each item in the questionnaire and how to explain some unclear choices such as those in HFIAS. Then, they were deployed to conduct the enumeration process according to the plan. They were also oriented to administer the questionnaire through face-to-face interview technique as it increases response rates recognizing its limitations such as time consumption, costly (Kelley et al, 2003), and subject to response bias due to the presence of interviewer. Thus, the face-to-face technique was conducted by oriented enumerators owing to these limitations. The researcher made a close supervision for ensuring the quality of data gathering by enumerators.

Finally, both quantitative and qualitative techniques of data analysis were employed. In most cases it involved complex statistical procedures and supplemented by qualitative techniques of data analysis. The details of the procedures are clearly indicated in each paper of the dissertation.

1.6. Analytical Framework

Livelihoods Approaches to resilience uses the SLF in understanding households resilience to food insecurity (Maxwell et al., 2013; Arega et al., 2013). This approach treats resilience to food insecurity as an outcome of sustainable livelihoods. This holistic framework consists of assets possessed by households, livelihoods strategies, vulnerability context, policies, institutions and processes, and finally livelihood outcomes (DFID, 1999; Maxwell et al., 2013). In the current study, this approach, in a combination with RF, is employed as an analytical framework to evaluate the contribution of livelihoods to household resilience to green famine because it considers resilience as an outcome of sustainable livelihoods.

Researchers and development agents such as Food and Agricultural Organization (FAO) most often employ all or some components of SLF for analyzing resilience of households, communities or nations to risks and shocks. As the goal of FAO, through its disaster risk reduction activities, is to protect livelihood from shocks to make food production systems more resilient and capable of absorbing the impacts of, and recovering from, disruptive events (FAO, 2011), it uses livelihoods approach to assess resilience of food system. Researchers for example, Turunen et al. (2011) in their study showed how resilient livelihoods yield resilient food security at household level in Cambodia by using SLF.

The advantage of employing livelihoods approach to resilience is that the SLF itself is a holistic and integrative approach (DFID, 1999; Degefa, 2005; Turunen et al., 2011). It is a holistic approach because it involves livelihood assets and activities, vulnerability and coping strategies, policies, institutions and processes, and livelihood outcomes (Degefa, 2005) in relation to the full supply system (production, processing, storage, transport and marketing) (FAO, 2011). It is an integrating concept and approach because it binds together the ecological and economic aspects of living (Turunen et al., 2011). Thus, the outcomes from all building blocks of a SLF can be used to analyze resilience of an individual, a household or a community. As a result, livelihoods approach is employed as an overarching framework for understanding household resilience to 'green famine' in this dissertation. The reason for combining the SLF and RF is to overcome the limitations of SLA stated earlier in this sub-section as the SLF less considers the micro-level (household or individual) analysis of food insecurity situations.

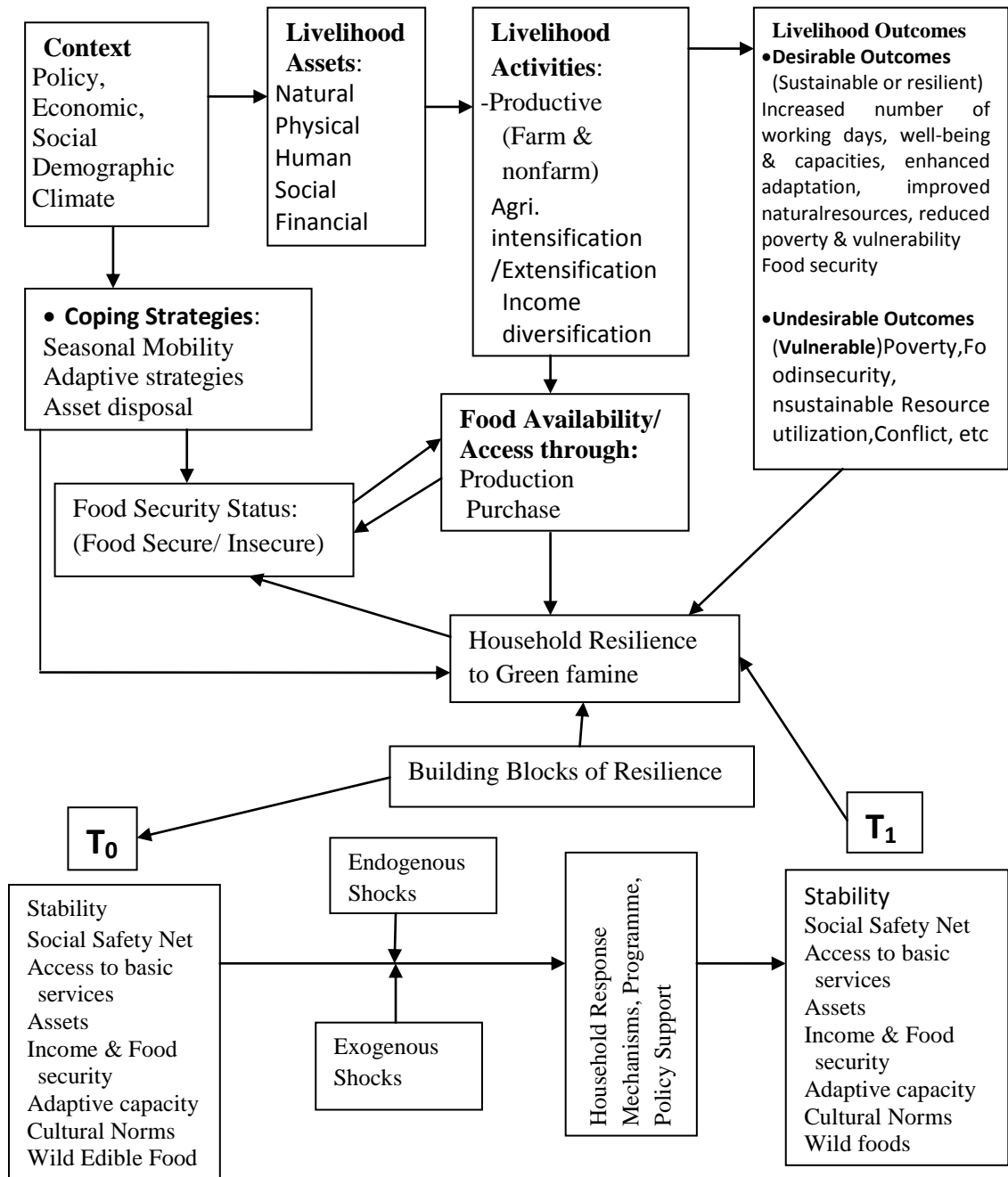


Figure 1. Analytical Framework for Current Study Based on DFID (1999) and Alinovi et al. (2008)

It is noted that adopting a resilience-based approach to the management of food systems presupposes a framework for analyzing resilience and enhancing people to discover how the food system in which they reside must be made more resilient to shocks, and more able to renew or reorganize itself when such shocks occur (Alinovi et al., 2009). This requires understanding of where resilience resides in the system, when and how it can be lost or gained in the system and the point where intervention is required. This study therefore employed the following analytical

framework (Figure 1), which is a product of combining dimensions of resilience from the resilience framework (Alinovi et al., 2008) and the SLF (DFID, 1999).

As livelihoods approach to resilience is the main approach to understand the whole situation of household resilience, the SLF is found to be appropriate for capturing the livelihood strategies of the studied area. This framework is a holistic one from which vulnerability situation of the households can be viewed; dimensions of resilience can be extracted; and household resilience index can be measured as an outcome and its determinants can be viewed well.

Overall, this framework helped to guide the study for both quantitative and qualitative methods of data collection and analysis in a mixed fashion. The mixed methods approach is employed (as provided in each article) in order to triangulate different methods from different paradigms that guide the study. The data are triangulated sequentially from both quantitative and qualitative techniques.

References

- Alemayehu Lerenso (2001). Food Security and Rural Vulnerability in Ethiopia: A Development Perspective. *Ethiopian e-Journal for Research and Innovation Foresight* 4(1), 49-62
- Alinovi L., D'Errico M., Mane E. and Romano D. (2010). Livelihoods Strategies and Household Resilience to Food Insecurity An Empirical Analysis to Kenya, Rome: Available online: http://erd.eui.eu/media/2010/Romano%20et%20al_Kenya%20paper%20r15.pdf
- Alinovi, L., Mane, E., and Romano, D. (2008), "Towards the Measurement of Household Resilience to Food Insecurity: Applying a Model to Palestinian Household Data". In Sibrian, R., (ed.). *Deriving Food Security Information from National Household Budget Surveys; Experiences, Achievement, Challenges*, FAO, Rome, 137- 152, Available at <ftp://ftp.fao.org/docrep/fao/011/i0430e/i0430e.pdf>
- Alinovi, L., Mane, E., and Romano, D. (2009). *Measuring Household Resilience to Food Insecurity: Application to Palestinian Household (Working Paper)*.
- Amdissa Teshome (2006). *Agriculture, Growth and Poverty Reduction in Ethiopia: Policy Processes around the New PRSP (PASDEP)*, A Paper for Future Agricultures Consortium Workshop, No. 004. Institute of Development Studies (IDS).

- Arege Bazezew, Woldeamlak Bewket and Melanie N. (2013). Rural households' livelihood assets, strategies and outcomes in drought-prone areas of the Amhara Region, Ethiopia: Case Study in Lay Gaint District. *Afr. J. Agric. Res. Vol. 8(46), pp.5716 - 5726*
- Babatunde, R., Omotesho O., Olorunsanya, and Owotoki, G. (2008), Determinants of Vulnerability to Food Insecurity: A Gender-based Analysis of Farming Households in Nigeria; *Indian Journal of Agricultural Economics*, Vol. 63, No. 1. PP. 116 – 125.
- Ballard, T., Coates, J., Swindale A. & Deitchler M. (2011)..Household Hunger Scale: Indicator Definition and Measurement Guide; FANTA Food and Nutritional Assistance Guide; Tufts University,
- Bazeley, P. (2004), Issues in Mixing Qualitative and Quantitative Approaches to Research. In: R. Buber, J. Gardner, & L. Richards (eds), *Applying qualitative methods to marketing management research*. UK: Palgrave Macmillan, pp141-156.
- Boserup, E (1965).The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure: *Earthscan Publication Ltd, London*
- Bowbrick, P. (1999).How Sen's Theory Can Cause Famines; Quality Economics, UK,
- Broom, A. and Wills, E. (2007). Competing Paradigms and Health Research; Saks-3519-ch 02.qxd 1/12/2007 7:52 PM Page 16.
- Burnett K. and Murphy S. (2013).Food Sovereignty: A Critical Dialogue. What Place for International Trade in Food Sovereignty? International Conference, Yale University, Conference Paper #2
- Canali and Slaviero (2010).Food Insecurity and Risk Management of Smallholder Farming Systems in Ethiopia; European IFSA Symposium, Veinna, Austria
- Ciani, F. (2012).A resilience-based Approach to Food Insecurity: The Impact of Mitch Hurricane on Rural Households in Nicaragua. JEL Classification, Q12, Q18, I32, I38
- Coates J., Swindale A. and Bilinsky P. (2006). Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide. Food and Nutritional Technical Assistance Project (FANTA), Academy for Educational Development, Washington DC.
- Coates, J., Swindale, A. and Bilinsky, P. (2007). Household food insecurity access scale (HFIAS) for measurement of food access: indicator guide. Washington, DC, United States Agency for International Development (USAID) Food and Nutrition Technical Assistance Project (FANTA), Version 3.

- Creswell J. (2003). *Research Design: Qualitative, Quantitative and Mixed Method approaches*, Second Edition; SAGE Publications; London, UK
- De Waal, A. (1989). *Famine that kills, Darfur, Sudan, 1984 - 85*, Oxford: Clarendon Press.
- Degefa Tolossa (2005). *Rural livelihoods, poverty and food insecurity in Ethiopia, A case study at Erenssa and Garbi communities in Oromiya Zone, Amhara National Regional State*, PhD Dissertation, Norwegian University of Science and Technology, NTNU, Trondheim.
- Devereux, S. (2000a) *Food Insecurity in Ethiopia: A Discussion Paper for DFID, IDS, Sussex*.
- Devereux, S. (2000b). *Famine in the twentieth century*, IDS Working Paper 105, Brighton: Institute of Development Studies,
- Devereux, S. (2001). Sen's Entitlement Approach: Critiques and Counter-critiques. *Oxford Development Studies, Vol. 29, No. 3, pp. 245 – 264*.
- DFID (1999). *Sustainable Livelihoods Guide sheets Framework*; Department for International Development (DFID).
- Ellis, F. (2003). *Human Vulnerability and Food Insecurity: Policy Implications*. Forum for Food Security in Southern Africa. Overseas Development Group.
- Ericksen, P. (2007). *Conceptualizing Food Systems for Global Environmental Change Research*. *Global Environmental Change*, doi:10.1016/j.gloenvcha.2007.09.002
- Eshetu Bekele (2007), *Study on Food Security Status of Rural Households in Metu Woreda, Illu Abba Bora Zone, Oromiya National Regional State*. Unpublished MA Thesis, A.A.U; Ethiopia.
- FAO (2006). *Food Security, Policy Brief, Issue 2*. Food and Agricultural Organization (FAO), Rome
- FAO (2011). *Resilient Livelihoods-Disaster Risk Reduction for Food and Nutrition Security Framework*, United Nations Food and Agricultural Organization (UNFAO), Rome
- FAO (2014). *The State of Food Insecurity in the World Strengthening the enabling environment for food security and nutrition*, Food and Agricultural Organization of the United Nations, Rome
- FAO-WFP (2008). *Food Consumption Score: Construction of the FCS*, World Food Programme- Food and Agricultural Organization, Rome, Italy.
- Faridi, R. and Wadood, N. (2010). *An Econometric Assessment of Household Food Security in Bangladesh*, *The Bangladesh Development Studies, Vol. XXXIII, No.3, pp.97 – 111*.

- Frankenberger T., Sutter P, Amdissa Teshome, Alemtsehay Abera, Mulugeta Tefera, Moges Tefera, Alemayehu Seyoum, Bernard T, Spangler T and Teshewamebrat Ejigsemahu (2007) Ethiopia: The Path to Self-resiliency. Volume I: Final Report. *CHF – Partners in Rural Development on behalf of the Canadian Network of NGOs in Ethiopia (CANGO)*.
- Gross R., Schoenebrger H., Pfeifer H. and Preuss H. (2000) The Four Dimensions of Food and Nutrition Security: Definitions and Concepts; FAO-Nutrition and Food Security.
- Guyu Ferede (2012). Voluntary Villagization Scheme (VVS) for Transforming Semi-pastoral Communities in Benishangul-Gumuz Region, Northwestern Ethiopia: Challenges and Local Development Indicators, *Journal of Sustainable Development in Africa*, Vol. 14, No.5, PP.162 – 196.
- Guyu Ferede (2014). Ethno-culture Disparity in Food Insecurity Status: The Case of Bullen District, Benishangul-gumuz Regional State, Ethiopia. *African Journal of Food Science* 8.2: 54 – 63
- Guyu Ferede (2015). Household Vulnerability to Green Famine: Component Based Analysis of Indicators in Belo-jiganfoy District (Case Study Area), Benishangul-Gumuz Region, Ethiopia. *Applied Science Reports*, 9(3), 139-156
- Guyu Ferede and Muluneh Wold-tsadik (2015a) Household Resilience to Seasonal Food Insecurity: Dimensions and Magnitudes in the “Green Famine” Belt of Ethiopia. *Applied Science Reports*, 11(3), 125-143
- Guyu Ferede and Muluneh Wold-tsadik (2015b). Wild Foods (Plants and Animals) in the Green Famine Belt of Ethiopia: Do They Contribute to Household Resilience to Seasonal Food Insecurity? *Forest Ecosystems*, 2:34.
- Hart, T. (2009) Exploring definitions of food insecurity and vulnerability: time to refocus assessments. *Agrekon*, Vol. 48, No.4, pp.362 – 383.
- Kelley, K., Clark, B., Brown, V. & Sitzia, J. (2003), Methodology Matters: Good Practice in the Conduct and Reporting of Survey Research; *International Journal for Quality in Health Care*, Vol. 15; No.3; PP. 261 -266
- Kim, S. (2003), Research Paradigms in Organizational Learning and Performance: Competing Modes of Inquiry, *Information Technology, Learning, and Performance Journal*, Vol. 21, No. 1, PP. 9 - 18
- Lautze, S., Yacob Akililu, Raven-Roberts, A., Young, H., Girma Kebede and Leaning J.(2003). Risks and Vulnerability in Ethiopia: Learning from the Past, Responding to the Present,

- Preparing for the Future. A Report for the UN Agency for International Development (UNAID).
- Lebeda, P., Chambers, Z., Destrée, A., Doležal, J., Lukáš, I., Marčík, F., Maritz, C., and Milerová-Prášková, D. (2012), Eds. Ethiopia's Food Insecurity: Europe's Role within the Broader Context of Food Flows, Climate Change and Land Grabs. A Study on Policy Coherence for Sustainable Development, Glropolis, Prague.
- Lima, M. (2008), Sustainable Food Security for Local Communities in the Globalized Era: a Comparative Examination of Brazilian and Canadian Case Studies, MSc Thesis, University of Waterloo, Ontario, Canada
- Luers A., Lobell, D., Sklar, L., Addams, C. and Matson, P. (2003), A method for quantifying vulnerability, applied to the agricultural system of the Yaqui Valley, Mexico. *Global Environmental Change*, 13(2035), 255 – 267.
- Luers, A. (2005).The surface of vulnerability:An analytical framework for examining environmental change. *Global Environmental Change*, 15(2005), pp.214 – 223.
- Marquette C. (1997).Turning but not Toppling Malthus: Boserupian Theory on Population and the Environment Relationships. Working Paper No. 1997:16, Bergen, Norway.
- Marsland N. (2004).Development of Food Security and Vulnerability Information Systems in Southern Africa: The Experience of Save the Children UK. Consultation Paper for save the Children.
- Maxwell D., Vaitla B., Gimay Tesfay and Nigussie Abadi (2013).Resilience, Food Security Dynamics, and Poverty Traps in Northern Ethiopia. Analysis of a Biannual Panel Dataset, 2011 – 2013; Feinstein International Center, Tufts University.
- Mesfin Wolde-Mariam (1984) Rural Vulnerability to Famine in Ethiopia, 1958- 1977, New Delhi: Vikas Publishing House LTD.
- Messay Mulugeta (2013) Resettlement and Food Security Nexus in Ethiopia: A Case Study from Nonno District. PhD Dissertation Published by LAMBERT Academic Publishers, Germany
- Methot J. (2013).Managing Food Security for Resilience: The Role of Ecosystem Services. ISID Policy Brief No. 12
- Miller, F., H. Osbahr, E. Boyd, F. Thomalla, S. Bharwani, G. Ziervogel, B. Walker, J. Birkmann, S. Van der Leeuw, J. Rockström, J. Hinkel, T. Downing, C. Folke, and D. Nelson (2010). Resilience and vulnerability: complementary or conflicting concepts?. *Ecology and Society* 15(3): 11. [online] URL: [http:// www.ecologyandsociety.org/vol15/iss3/art11/](http://www.ecologyandsociety.org/vol15/iss3/art11/)

- Mulugeta Lolamo (2014). Green Famine in Ethiopia: Understanding the Causes of Increasing Vulnerability to food Insecurity and Policy Responses in the Southern Ethiopian Highlands, PhD Dissertation, University of Sussex,
- Niemisto, N. (2011). The Resilience of Rural Ethiopian Livelihoods: A Case Study From t Hararge Zone, Eassten Ethiopia, Unpublished MA Thesis; Development and International Cooperation Social & Public Policy, University of Jyvaskyla;
- Nyéléni (2007). Declaration of Nyéleni. <http://www.nyeleni.org/spip.php?article290>.
- Omotesho OA, Adewumi M.O. Muhammad-Lawal A. and Ayinde OE. (2006) Determinants of Food Security among the Rural Farming Households I Kwara State, Nigeria. *African Journal of General Agriculture*, 2(1), 7-15
- Pankhurst R. (1985).The History of Famine and Epidemics in Ethiopia: Prior to the Twentieth Century. Addis Ababa: Relief and Rehabilitation Commission.
- Patel, R. (2009), Ed. Food sovereignty. *J. Peas. Studies*, 36:3, 663-706.
- Rangassani, A (1985).Future of Exchange Entitlement's Theory of Famine: A Response; Economics and Political Weekly, Vol. XX, No. 41
- Ravallion M (1997), Famines and economics, *Journal of Economic Literature*, Vol. XXXV, pp. 1205 - 1242.
- Ridenour, C. and Newman, I. (2008). Mixed Methods Research: Exploring the Interactive Continuum, *Southern Illinois University Press*, Carbondale, USA
- Sarracino F. (2010).Explaining Famines: A critical Review of Main Approaches and Future Causal Factors. NAF working paper series, No. 10/12.
- Scaramozzino, P. (2006), Measuring Vulnerability to Food Insecurity, *ESA Working Paper*, No. 06 – 12, US-FAO
- Scoones, I. (1998).Sustainable Rural Livelihoods: A Framework for Analysis, IDS Working Paper 72
- Sen A. (1981) Ingredients of Famine Analysis: Availability and Entitlements. *The Quarterly Journal of Economics* 96.3:433 – 464.
- Seyoum Mengist (2012).Maize Technology and Household Food Security in Benishangulmumuz Region, Ethiopia: The case of Assosa Woreda, Unpublished MA Thesis, Addis Ababa University,
- Spratt, C., Walker, R. & Robinson, B. (2004). Mmixed research methods, Allsop, T., Freema, R., & Robinson, B. (Critical reviewers), *Commonwealth of Learning (C.O.L)*

- Suppan, S. (2008). Challenges for Food Sovereignty, *The fletcher forum of world affairs*, Vol. 32:1, PP. 111 - 123
- Temesgen Tadesse (2010). Assessment of the Vulnerability of the Ethiopian Agriculture to Climate Change and Farmer's Adaptation Strategies. PhD Dissertation, University of Pretoria.
- Turunen, J., Snäkin, J., Panula-Ontto, J., Lindfors, H., Kaisti, H., Luukkanen, J., Magistretti, S. and Mang, C. (2011). Livelihood Resilience and Food Security in Cambodia-Results from a Household Survey. Knowledge for Development: Creating Rural Resources Database for Sustainable Livelihoods in Cambodia ("SURVEY"), Cambodia
- UNECA (2012). Status of Food Security in Africa, Eighth Session of the Committee on Food Security and Sustainable Development and Regional Implementation Meeting for the Wisner, B., Blakie, P., Cannon, T. and Devis, I. (2003). At Risk: Natural Hazards, People's Vulnerability and Hazards. Second Edition.
- Yaro, J. (2004). Theorizing food insecurity: building a livelihood vulnerability framework for researching food insecurity. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*. 58:1, 23-37.
- Young H., Jaspars S., Brown R., Frize J. and Khogali H. (2001) Food-security assessments in emergencies: a livelihoods approach. Humanitarian Practice Network (HPN) Paper, No. 36

2. Household Vulnerability to ‘Green Famine’: Component Based Analysis of Indicators in Belo-jiganfoy District (Case Study Area), Benishangul-gumuz Region, Ethiopia.

¹Guyu Ferede (2015)

Published in: App. Sci. Report, Vol. 9(3), 2015: 139 – 156 © PSCI Publications

Cite in text as: Guyu (2015).

Cite under Reference section fully as:

Guyu Ferede (2015). Household Vulnerability to ‘Green Famine’: Component Based Analysis of Indicators in Belo-jiganfoy District (Case Study Area), Benishangul-gumuz Region, Ethiopia. App. Sci. Report, Vol. 9(3), 2015: 139 – 156

¹Correspondence

E-mail: guyu_f@yahoo.com

Cell phone: +251-9-12-19-42-72

Addis Ababa University, Ethiopia

Abstract

A *green famine* has ever existed in Western part of Ethiopia although underestimated by policymakers and researchers, and should be examined and disclosed. A cross-sectional survey was conducted using a structured questionnaire based on randomly selected 220 households. All available tools/indicators were used to measure households' vulnerability status. The study indicates fascinating results as all indicators proved the prevalence of *green famine conditions*. The net available food was 3709.09 quintals for the total household size of 922.21 adult equivalent/year. The head count ratio indicates 40.5% of households produced less than threshold 2.25 quintals/person/year. Such a ratio as measured in terms of kilocalorie shows 71.8% of households produced below recommended threshold (2100 kilocalorie/ADE/day). Analysis of food shortfall/surplus index shows all households had kilocalorie of 22% (25% indigenous and 5% non-indigenous) far down from threshold. The analysis of household food insecurity prevalence also indicates 76.4% of households fell below the threshold, of which 47.7% were severely food insecure. The dietary diversity score shows 68.6% of households accessed food items of 5 and less in addition to having limited access to nutritious foods such as meat and milk. Coping strategies index shows 50% of surveyed households scored more than average. The household hunger scale shows that 60% of households were exposed to severe famine situation. Therefore, it is possible to conclude that households, mainly in the indigenous ethno-culture group, *are severely* food insecure even more than those in drought prone parts of Ethiopia. This implies that food insecurity has already been changed into *famine* situations. A comprehensive research and policies interventions must therefore be directed towards Western Ethiopia. The difference between the two ethno-culture groups in *green famine* experience should be taken as a reminder for policymakers and stakeholders when designing interventions that more target at the cultural variables than the physical ones.

Keywords: Household vulnerability, Belo-jiganfoy district, Ethiopia

Background

Green famine is an innovative phrase used to define the food insecurity condition of areas that are characterized by favorable natural conditions for food production such as climate (sufficient rainfall, absence of drought, and vast fertile agricultural lands), low population pressure, and less resource degradation. Despite favorable conditions (mainly natural), the majority of the people in such areas face the challenges of critical food shortages. This situation is what is termed, in this

article, as *green famine* while the areas where it occurs are termed as *green famine belt*. While such areas could be found elsewhere in the World, Western part of Ethiopia (including Benishangul-gumuz region, remotest areas of Oromiya region such as Wollega and Illubabur, and Gambella region), are regarded as *green famine belt* of Ethiopia.

In fact, food insecurity is a universal event affecting people all over the World. Around 2005, the proportion of World's undernourished was 14.3% (Degefa, 2005:1). It became 12.5% in 2010 (FAO, 2010:10), and then the recent document (i.e. in 2011) estimated the globally hungry people at 15% assuming the global population size to be 8 billion (Sasson, 2012:2). The regional distribution shows that about 2.05% of hungry people live in developed countries, 4% in Near East and North Africa, 5.7% in Latin America and the Caribbean, 25.8% in the sub Sahara Africa, and 62.5% in Asia and the Pacific (FAO, 2010:10). This implies that almost all hungry people of the World (i.e. about 98%) lives in developing countries of which Asia and the Pacific followed by the Sub Sahara Africa hosted 88% of such people. This difference is what is stated by Degefa as a paradox of living in the World of "plenty and hunger" (Degefa, 2005:1). Such a difference in the proportion of food insecure people exists not only between regions, nations, and districts but also between communities, households and individuals. These differences should not be surprised as there is uneven distribution of resource, difference in opportunities and constraints, and imbalance in power around the World (Degefa, 2005:1). Rather, the occurrence of *green famine* situations (like those in Ethiopia) may be miraculous.

Whereas Ethiopia has been structurally food deficit since at least 1980s (Devereux, 2000:1), the history of famine in the country is thought of as old as the history of man ever lived in it. However, available literatures on recorded history of famine in Ethiopia refer the 19th and the 20th centuries. For example, the *great famine* that occurred towards the end of the 19th c (Degefa, 2005:2) and the famine that occurred in the 20th century between 1973 and 1974 (Degefa, 2005:2) can be mentioned. Since then, the country has remained as one of the most food insecure countries in the World. All forms of food insecurity (chronic, transitory and cyclical/seasonal) are evident in the country. Data show that the population of Ethiopia living below food poverty line (head count ratio) has shown a declining trend. It was approximately 52% in 1980s that had declined to 43% in 1995/96 (Devereux, 2000:2), which had declined to 44% in 2003 (USAID, 2004:5), to 38.7% in 2004/05, 35.6% in 2005/06 and 33.3% in 2006/07, and expected to come

down to 28 % in 2009/10 (MoFED, 2008:6). Despite this trend, the actual number of people exposed to food shortages has remained significantly high. But most researchers do not have dared to define any condition of food insecurity as famine event since two decades ago in favor of the present government and assuming that famine history is already over perhaps due to good governance.

However, an interesting primary argument of this paper is centered on the idea that another face of famine termed as *green famine* has always existed but not recognized. The cause of the known famines of Ethiopia that have so far occurred are almost entirely attributed to natural calamities such as drought, high variability of rains, and crop pests (Degefa, 2005:2). Historical famines and the present day chronic poverty and food insecurity, therefore, geographically determined to be features of either the drought-prone Eastern and Northern parts, or high population pressure areas of Central and some Southern parts of the country. This customary view of famine, poverty and food insecurity that generally perceives drought and population pressure as sole causes is rejected in this paper. In contrast, the causes of the *green famine* of Ethiopia are largely unexplored. The area is masked by relatively favorable conditions such as green vegetation, sufficient precipitation, vast and fertile farmlands, and low population pressure. As a result, research and policy interventions are very minimal blindly thinking that the area is generally food secure. But, the concept of food insecurity is dynamic per se reflecting the existence of different factors that cause it. In this respect, Degefa seems to have made rational conclusion that the occurrence of famine and starvation and the resulting deaths today are mainly due to human failures, and even blamed the present day government of Ethiopia for inefficient strategy known as Agricultural-development-led industrialization (ADLI), which cannot boost food production (Degefa, 2005:153).

In fact, an attempt was made to examine the ethno-cultural disparity in food insecurity status based on household survey and to propose an ethno-culture approach to food insecurity in a district located in Benishangul-gumuz Region (BGR). This can be regarded as an early precursor to the application of ethno-culture based analysis of food insecurity in *green famine* belt of Ethiopia. In this study, ethno-culture disparity is indicated by determining the food insecurity status of the three ethno-culture areas. Accordingly, respectively 62.5%, 79%, and 48.9% of households in the Gumuz, Non-gumuz, and Mixed ethno-culture areas were food insecure (Guyu,

2014: 62). But, the present article did not apply the ethno-culture approach to food security rather used some cultural factors to understand and determine households' vulnerability to *green famine situation in terms of* food insecurity status of the two ethno-culture groups (the indigenous and the non-indigenous).

Moreover, although few, research findings in some parts of Western Ethiopia (i.e. *green famine belt*) show the vulnerability of households to food insecurity shocks. For example, Save the Children estimated an approximately 37% of the population of Benishangul-gumuz region that faces food shortage for several months each year (Save the Children, 2010 – 2015:1). This seems to be an underestimation as empirical studies in the region indicate figures that are much more than this. For example, in 2004, 58.1% of the population of the region was living in poverty trap (BGR, 2004:9). This is a little more than the national figure of about 50% in the mid-2000s (CIDA, 2013:10). The empirical household based district level studies also show more severe conditions of food insecurity in the region. For example, the proportion of food insecure households in Bullen district was 58% (Guyu, 2014:54). Similarly, the proportion of households that did not have sufficient food to last until the next harvest was 85% in Assosa district (Dagnachew, 2004:42). Moreover, a qualitative study entitled: *villagization for transforming semi-pastoral communities in BGR*, indicates the severe nature of poverty and food insecurity in the region in general and in Dibate district in particular (Guyu, 2012:188). The study indicates that the people (mainly the indigenous ethnic group such as the Gumuz) resort to depend on wild foods as coping mechanism. These figures are far more than the national figure of approximately 44% of food insecure population in 2004 (USAID, 2004:5) and one in three (33.3%) chronically food insecure households in 2013 (CIDA, 2013: 10). Moreover, the figures are much higher than the situation in Central Ethiopia, for example, in Nonno district, Shewa where about 21.09% of such food insecure households were found (Messay, 2013:209). Likewise, they are higher than the situation in the Northern Ethiopia, for example, in Tigray region where about 42.3% of food insecure households were found (Tsegay, 2009:50). This shows that the food insecurity situation in the *green famine* belt in general and BGR in particular is more severe than those in *non-green famine* areas of Ethiopia. BGR is characterized by both Transitory and chronic food insecurity (BGRFSS, 2004: 9), both reflecting the features of famine.

Therefore, the central argument of this article is twofold: one is concerning spatial dimension of famine in Ethiopia and the other is methodological. Firstly, food insecurity in the *green famine*

belt of Ethiopia has become worsened and overtaking the situation in areas characterized by occurrence of natural calamities (mainly drought) and high population pressure. But, the event is concealed by relatively conducive and greener environment of the belt. Accordingly, there should be nationwide policy that avoids bias and aims at addressing the challenges of food insecurity, which requires comprehensive nationwide evidence on food security. Thus, food security situation of Western part of the country must be investigated and the findings must contribute to this end. This article was therefore aimed at disclosing the situation of the event from *green famine belt* of Ethiopia by taking Belo-jiganfoy district as a case study area. Secondly, the existing few studies in the area couldn't not have shown the appropriate image of food insecurity as they are general assessments and lack depth rather merely distinguish food secure from food insecure. They are also based on static analytical models that are not fully capable of measuring the dynamic aspects of risks (Scaramozzino, 2006:4) rather indicate only the current status (Capaldo et al., 2010:10) based on, for example, either income or kilocalories. An example of such static model that lack depth of analysis is the household food balance model employed to determine the proportion of food secure and food insecure in Bullen district (Guyu, 2011:59). This model can be regarded as static firstly because it only allows the uses of availability component of food security (kilocalorie information) but doesn't allow other components and associated variables. Secondly, this model cannot predict the future probability of the event as it depends on simple arithmetic sum. As a result, it requires a dynamic model that accommodates any flexibility in terms of variables and ability of prediction of the event. As a result, a comprehensive vulnerability model is needed for the present study, which considers all components of food security and statistical model that can predict future condition of food insecurity. This is due to the fact that food security at any point in time is best thought of in a dynamic sense, and better addressed through dynamic vulnerability approach than through the static ones (Capaldo et al., 2010:7).

The aim of this study was therefore to measure the prevailing households' vulnerability to *green famine* expressed in terms of seasonal food insecurity and show ethno-cultural differences by taking Belo-jiganfoy district as a case study area. In order to achieve this objective, by measuring and in-depth analysis of the five components of food security was performed using different indicators and/or tools including: the net available food (NAF) obtained through different sources and measured in quintals, dietary energy supply (DES) measured in terms of kilocalories, dietary

diversity scores (DDS), household food insecurity access scale (HFIAS), household hunger scale (HHS) and, household coping strategies index (CSI). Moreover, it was aimed at identifying main determinants of households' vulnerability to the *green famine situation*. In this regard, the study closes geographical gaps in food security literature as it is located in the *green famine belt* (Western part) of Ethiopia. Moreover, it closes the methodological gaps as it used rigorous and comprehensive approach of vulnerability analysis that considers different tools as indicator and all components of food insecurity. The findings are therefore expected to awaken the government policymakers, researchers and other stakeholders to consider this part of the country if the overall national food insecurity challenges are to be effectively addressed.

Vulnerability to *Green Famine*: A Conceptual Framework

The concept of food security is a dynamic concept originated in 1940s during the historic Hot Spring Conference of Food and Agriculture held in 1943 (Gross et al., 2000:3). It was during this conference that the defining concepts of food security (i.e. secure, adequate, and suitable supply of food for everyone) were first accepted internationally (Gross et al., 2000:3). Since then, the concept has evolved incorporating new concepts and analytical models. Food insecurity that was initially defined as lack of adequate availability has begun to incorporate lack of physical and economic access to food in the definition following Sen's *entitlement* theory (Sen, 1981:434). The progress in the development of models of food security, later on, involved concepts such as consumption, stability and sovereignty in order to comprehensively understand the situation. These all are models related to components of food security. Of the five defining components, stability is a characteristic of food system, which is related to and defines the system's sustainability/vulnerability. An interesting model that combines the first four components is well presented by (Gross et al., 2000:5) which is also flexible so that the fifth component can be added. This model puts availability at the base of the flow chart followed by accessibility and then utilization. Perhaps the sovereignty might be put between accessibility and utilization. The other dimension (stability) is put to indicate the remaining dimensions and the chart put nutritional status at the top as final outcome. The idea that stability of each component leads to sustainable food security, otherwise vulnerability, is well shown in the model. This model is part and parcel of the analytical model proposed in this paper.

Sustainability/vulnerability of a food system depends on the livelihood bases of a household. The simple definition of a livelihood is given by (Chambers and Conway, 1991:5) as: "a means of

gaining a living”. This includes household’s capabilities, access to resources (both material and social), and activities pursued in order to secure means of living (Scoones, 1998:5). The livelihoods pursued by a household may lead to sustainable (desirable) or unsustainable (undesirable) livelihood outcomes, poverty and food insecurity being among such outcomes (Degefa, 2005:10). Therefore, a household whose life is founded on a sustainable livelihoods base is often food secure, otherwise food insecure. The definition of food insecurity is immense and evolving. The definition adopted in this paper conforms to Degefa (2005:10) that “food insecurity refers to a situation when a household is not capable to sufficiently feed its members from either its own production or purchase on market ...” (Degefa, 2005:10). Whereas households that face food shortages on a permanent basis are termed as chronically food insecure (Degefa, 2005:10), those who face it when hit by disasters or shocks are termed as transitorily food insecure and when transitory food shortages become cyclical, it is termed as cyclical or seasonal food insecurity. In Ethiopia, chronically poor people are found throughout the country (Brown and Amdissa, 2007) although more attention is given to drought-prone areas. The severe condition of food shortages that lead to diseases and death is referred to as famine. The famine conditions that prevail in environmentally and agriculturally conducive areas are termed as *green famine*.

The concept of *green famine* may look new while its essence is familiar. The essence of *green famine* is rooted in the influential work of Amartya Sen (1981) entitled: *Ingredients of famine analysis: Availability and Entitlements*. His argument that famines take place in situations of moderate to good availability (Sen, 1981:433) can be regarded as a precursor to the concept of *green famine*. Factors of food availability are generally related to environmental conditions that may enable or disable food production. In other words, favorable conditions mean good yield and hence good food supply whereas unfavorable conditions imply the reverse. Although Sen, when proposed a shift from availability to accessibility, observed the inability of people to command food through legal means available in the society such as the use of production possibilities, trade opportunities, entitlements through the state. His observation that people starve not only as a result of insufficient food but also having no access to enough food to eat (Sen, 1981:434) was made based on national level availability of food while famine occurred in some part of the country. For example, he used the 1973 famine of Wollo in Ethiopia as one of the famines selected for applying his entitlement approach. The argument of this paper is that the so-called

food sufficient part (mainly the Western extremes) of the country itself is also hit by food shortages.

Another core concept used in the paper is ethno-culture and its categories; indigenous and non-indigenous. Obviously, ethno-culture is a term that should be defined for an *ethnic group*. Ethnic group itself implies a unique list of groups for a country or an area (Fearon, 2003:200). The present definition added the term *culture* to produce an *ethno-culture* concept for future application. In fact, an attempt was made to implicitly define the concept of *ethno-culture* as the ethnic group in which a household or its members belongs to and the associated cultural backgrounds and experiences, which may potentially influence the ways of living (Guyu, 2014:55). According to this definition, the ethno-cultural backgrounds and experiences have their own outcomes that have impact on the way of living (in this study, food insecurity status) of that particular ethnic group. This definition may seem a little bit complex as no ethnic group that may fulfill these defining criteria. Ethnographers have even got problem in defining the term *ethnic* itself because defining for example groups who have same descent but speak different language as different or same ethnic group is difficult, an example being the case of Jews who lack a common language, shared customs and even common religious practice, but described as an ethnic (Fearon, 2003:200). This is also the case in the present study area where the indigenous ethnic group is to have almost lost many of ethnic identity including language and region. Ethiopia's central statistical agency (CSA) relates ethnicity or ethnic group to nation/nationality or tribal origin of a person (CSA, 2008:42). This way of defining ethnic group considers primarily the descent or tribal origin (i.e. the ancestral background) of a person. Other ethno-culture features such as same language, religion, etc are therefore regarded as secondary defining criteria. Accordingly, a study of food security status in Bullen district, divides the dwellers into the Gumuz (indigenous), the non-gumuz (both indigenous-i.e. Shinasha and non-indigenous), and the mixed (both Gumuz and non-Gumuz) (Guyu, 2014:56) ethno-cultures. The present study, therefore, tries to understand the difference in vulnerability status between the indigenous and non-indigenous ethno-culture groups. In this paper, the ethnic groups who have given legal rights of ownership of the region (BGR) as a native dwellers (including Berta, Gumuz, Shinasha, Mao and Komo) are regarded as indigenous while the others as the non-indigenous ethno-culture group.

Sustainable livelihood approach (SLA) (DFID, 1999:1) and vulnerability approach (VA) (Scaramozzino, 2007: 5 – 12) have most frequently been applied when conducting food security research while resilience approach has emerged very recently (Alinovi et al, 2008:140). The choice among these lies on the methodology for field investigation, intervention approaches, and planning approaches (Scoones, 1998:13). Methodologically, the SLA aims at providing a holistic and integrated view of the process by which a household achieve or fail to achieve sustainable livelihoods. With regard to intervention options, this holistic approach allows multiple entry points for development intervention ranging from conventional options such as supporting access to particular livelihood resources and activities to more complex ones such as social analysis of complicated institutional arrangements. Moreover, the framework provides dynamic and iterative approach for planning for intervention because the definition of sustainable livelihood for different areas is negotiable among stakeholders (Scoones, 1998:14). In contrast, VA has two advantages (Scaramozzino, 2006:1). First, it is dynamic and forward-looking approach in the sense that it is not simply concerned with current outcomes but looks at their future incidences. Hence, it examines food insecurity as an *ex ant* outcome rather than examining it as *ex post* outcome. Second, vulnerability analysis lies in a stochastic framework that can fully considers the uncertainties associated in future food security conditions. Such uncertain conditions may include external shocks and the strategies a household, community, or institution can adopt to avert the likelihood of negative outcomes. However, critiques against VA has begun from proponents of resilience approach (RA) as this model may not predict future event as some of the factors may not be captured easily (Alinovi et al, 2008:137). In spite of those critiques, VA is employed in this paper for its advantages mentioned above and other advantages it has over RA. In planning resilience studies in any system, understanding the extent of exposure (vulnerability) is often a precondition. In other words, VA provides an understanding of the extent of a shock (in this case, food insecurity) and provides certain information (with some uncertainty) about the future probability of the shock, RA tries to assess the current state of health of a food system and ability of humans to withstand shocks if they occur (Alinovi et al, 2008:138). In using the VA in this paper, different tools and/or indicators are employed to estimate the current status of food insecurity. The basic notion behind VA is, therefore, that vulnerability is a forward-looking concept that involves the stochastic process that results from a number of risk factors at different levels and can be modified by endogenous strategies implemented by households, communities and public institutions (Scaramozzino, 2006:10).

As far as the approaches to vulnerability analysis are concerned, there is no universally accepted single approach and different organizations use different approaches. What is common in literature is that most vulnerability studies focus on poverty rather than food security, and emphasize the role of assets in reducing it (Scaramozzino, 2006:2). In fact, the preference of approaches depends on the objective of the analysis. For example, the influential *entitlement* approach relates vulnerability to mainly lack of access to economic resources (Sen, 1981:459). Thus, a household that has limited access to resources is more vulnerable to food shortages than those who have better access. But, access to resources alone may not be guaranteed to reduce vulnerability as non-economic factors may cause vulnerability or assets may not be effectively used (Scaramozzino, 2006:2). Another approach to vulnerability analysis, which is used most often by different researchers and institutions, is the SLA (e.g. Degefa, 2005:2). This is a holistic approach that analyzes all components of the framework of the SLA and determines the livelihood outcomes of a household. As a result, this approach is a little bit complex and combines all other outcomes than a targeted variable (i.e. food security). The other approach is what is known as Risk-based approach to vulnerability, which is employed by World Bank in 2003 to analyze social-risks, which considers the sources of risks and the ability of a household or community to manage the associated risks (Scaramozzino, 2006:2). As critical analysis of all available approaches is not the objective of this paper, no need for further exploring all approaches rather the approach that is employed in the paper is proposed as the *ethno-culture approach (ECA)* to vulnerability analysis as at least the analysis considers ethno-culture differences.

ECA is chosen for studying the household vulnerability situation in the present study. It is a simple approach that assumes that the cultural backgrounds of different ethnic groups as a base of all factors of food security/insecurity. It has never been used as an approach but a study conducted in the *green famine* belt of Ethiopia proposed this approach for future use (Guyu 2014:55). The rationale behind for proposing the *ECA* lies on the fact that different ethnic group have different social, cultural, economic, demographic, and even political backgrounds and/or experiences that may affect the situation of a given system (in this case households). As a matter of fact, an attempt to examine the food insecurity status of the three ethno-culture areas showed significant difference among them (Guyu, 2014:57). This served as an encouraging finding for suggesting the *ECA* although a clear model for application was not established. In this approach,

a comprehensive understanding of households' vulnerability should consider analysis of all components of food security: availability, accessibility, consumption, stability, and sovereignty, and the differences among ethno-culture in these respects. Thus, household is unit of analysis and seasonal food insecurity as a proxy for *green famine* is the shock to which they were exposed to. The socioeconomic and cultural indicators of vulnerability are therefore used to determine the extent to which households were vulnerable to seasonal food insecurity considering all components of food security.

The Empirical Context

Benishangul-gumuz Region (BGR) is located in the Western part of Ethiopia between 09⁰17'-12⁰06' Northing and 34⁰10'-37⁰04' Easting. According to (BGRFS, 2004:4), it has an area of 50380 km² with altitude ranging from 580meter to 2731meter above mean sea level. Agroecologically, it is divided into three: 75% of *kola* (lowlands below 1500meter), 24% of *weina dega* (midlands between 1500 and 2500meter) and 1% of *Dega* (highlands above 2500meter). Average annual rainfall varies between 800 – 2000mm. Depending on the place and season, the minimum daily temperature ranges from 12 to 20⁰c while the maximum ranges from 20 to 25⁰c in rainy season and rises to 35 – 40⁰c in the dry season (BGRFSS, 2004:4). It had a population of 670, 847, of which nearly 86 % lives in rural areas (CSA, 2008:11).

Belo-jiganfoy is one of the 20 districts located in the Southern part of BGR. The district was purposively selected as a case study area because it contextually represents the *green famine* belt of Ethiopia. Observation shows that it sufficiently represents the region in terms of physical, cultural, socioeconomic, and demographic characteristics as well as ethnic composition. The absolute location of the district center (Soge town) is at 11⁰ 18'43"North and 36⁰ 12'57"East (FDRE-ERA, 2008:34). It is bounded by Oromiya region in Northeast through East, Southeast, South, and West, and by Kemashi and Yaso districts in the North. It has a total area of 1628km², which is divided into 10 *kebeles* (the smaller administrative unit than a district but larger than a village) in Ethiopia's administrative structure (FDRE-ERA, 2008:37). The relative location of the district with Oromiya region has been the cause of inter-ethnic conflict between the so-called "blacks" and the Oromo of Wollega. Although they have lived together since the time immemorial, the "blacks" of the present BGR and the Oromos of Wollega have been engaged in occasional conflict, the cause being the topic of future research.

Belo-jiganfof district lies between 1100 – 1450masl, which experiences nearly the characteristics of lowland (Kola agro-climate). Its rains are mono-modal type that begins in April/May and ends in October/November. The daily average temperature during rainy season ranges between 20⁰c – 25⁰c while the minimum temperature ranges between 12 – 20⁰ c depending on the season and altitude. Staying for at least eight months every year, rains of the region is sufficient for food production in terms of amount and distribution. In this regard, the case study area resembles the whole *green belt* of Ethiopia (FDRE-ERA, 2008:30). As it is very close to Western Ethiopia, Belo-jiganfof experiences longer duration of rainy season. The district, like most parts of the region has extensive fertile arable land, natural forest, surface and ground water, and mineral resources. Accordingly, the livelihood of households in the district depends largely on land resources through mixed farming, fishing and collection and hunting of wild foods. Despite availability of large rivers such as Didessa and Anger, small scale irrigation is little practiced.

Population pressure is not a major problem in Belo-jiganfof district as it has a very low population density (18.5persons//km²). It consisted of total population of 27,381. Of this 53% were males and 47% were females while 90.84% and 9.16% were rural and urban populations respectively. The average family size was 5.1. The rural population of the district (90.84 %) is much higher than the national average (85%) implying that the lives of most people in the district depend on agriculture. Moreover, about 42% of the population was under 15 years old, 56% between 15 and 64 and only 2% was above 64 (CSA, 2008:38). The major Ethnic groups of the district include Gumuz, Berta, Mao, Amahara and Oromo while few others also live in it. The cultural interaction of these different ethnic groups and the resulting experiences is what is defined as *ethno-culture* (Guyu, 2014:55), the concept also used in the article. The religious composition of an area has its own impact on local and national development efforts. In rural areas, it may affect agricultural productivity via the number of days devoted to working in farms and religious festivals. Almost all types of religious practices are found in Belo-jiganfof district. Data show that the district consists of 33.3% followers of Orthodox Christianity, 13.5% protestant Christianity, 0.6% Catholic, 45.0% Muslim, 7.1% traditional healers and 0.5% followers of undefined beliefs (CSA, 2008).

The livelihood of almost the entire population of Belo-jiganfof is founded on agriculture in the mixed fashion (arable and livestock farming). Most indigenous people of the district have been mainly shifting cultivators. Major cereal crops such as maize and sorghum, legumes such as

haricot beans and soya beans, oil seeds such as sesame and, fruits such as mangoes are produced. However, agricultural productivity (quintal/hectare) has remained very low, for example, 29 for maize, 26 for sorghum, 5.6 for haricot beans, 11 for soya beans and 200 for mangoes although it is relatively better than other districts (SID, 2010:15). Livestock production is also practiced in the district although the potential remains unexhausted. Cattle, goats, sheep, poultry and bees are better reared. Mules, horses and donkeys are bought from other areas for transportation purposes. Agriculture in the district is however constrained by backward technology such as use of hoe mainly by indigenous ethno-culture group. Livestock production is constrained by animal diseases.

With regard to socioeconomic infrastructure, Belo-jiganfoy district has only one main market center at Soge which serves twice a week. Following the regional pattern, it has weak road network that covers only 18kms (FDRE-ERA. 2008:4). Mobile telephone service is functional in most areas of the district although postal service is totally absent. Electricity line that is not functional for much of the time is available presently only in Soge town. The rural areas of the district depend on biomass as a source of energy. Protected water for domestic use is very limited in the district. According to district office information, the health coverage of the district had reached 58 % but characterized by poor quality while there were 11 primary and 1 secondary school showing 73 % coverage of primary education in the district. One credit service institution is available at the district center, Soge town.

Methods and Materials

Quantitative techniques of data collection and analysis were employed to achieve the objective of the study. The fact that data with different scales were collected and analyzed suggests positivist philosophy as an underlying approach. However, construction of respondents' opinion about their perceptions on the vulnerability situations through different tools such as HFIAS and CSI (although ultimately quantified) was performed. This suggests that constructivist philosophical approaches were as important as the positivist approaches in the present study. This implies that mixed methods approaches that combine the two paradigms were used to serve as a basis for the present study. The mixed methods approaches that simultaneously combine the qualitative and quantitative techniques is applied at both data collection and analyses phases in order to best capture the food security situation in the study area. In this technique, a qualitative data obtained (for example through CSI) is quantified and analyzed and interpreted quantitatively. The mixed

methods approach was chosen because it provides more comprehensive information about household vulnerability to food insecurity so that effective intervention is possible. In light of this, a cross-sectional survey was designed and conducted in August 2013 immediately after the lean season in order to obtain the necessary data.

A sample of 220 households was determined from total household size of 7347 living in 10 *kebeles* of Belo-jiganfoy based on a three stage sampling procedure. In the first stage, 3 *kebeles* namely Senne, Say Dalecha and Soge were selected purposively. Only Senne *kebele* is accessed through asphalt road while the remaining two *kebeles* were accessed through dry-weather roads. Moreover, three of them have dwellers from both indigenous and non-indigenous ethno-culture groups, a representation of which is considered in the analyses. The distance of each *kebele* from all-weather road (asphalt-road) and the district center (Soge) were also considered. In the second stage, a representative size of sample households from all '*kebeles*' was determined using a formula and a table provided by Krejcie & Morgan (1970) that is cited in (Agea et al, 2011:136). Considering the homogeneity within each ethno-culture group, the sample size is reduced to 220 households although Krejcie & Morgan (1970) suggest that on average 319 sample households represent 7347 households. Then, 220 households were proportionally allocated among the three sample *kebeles* based on total number of households in each *kebele*. In the third stage, households for interview were selected using simple random technique (lottery method) from the list obtained from respective *kebeles*.

Data were collected through a structured questionnaire that was prepared in official language of the area (Amharic). The questionnaire was administered through trained local enumerators who are familiar with the study area. Key informant interviews (KII) and focus group discussions (FGDs) were also conducted by the researcher himself. Ethical issues were also maintained in order to increase reliable and validity of the information. The department (ethics) committee at Addis Ababa University approved data collection with informed consent obtained by explaining the purpose of the research, dispersion of the results, and participant rights prior to their participation in the interview to each respondent before the actual interviews were started. This enhanced the confidentiality in respondents so that they offered valid and reliable data.

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 19. Indices or scores of each indicator were calculated and analyzed to examine the current and future

vulnerability status of households to *green famine* shock. NAF from available sources, households' DES measured in kilocalorie, DD score, HFIAS, HHS, and CSI were tools used to analyze the vulnerability status. Food insecurity head count ratio (HCR), defined as the ratio of the number of food insecure households (n) to total number of households in the sample (N) was calculated based on DES information. Mathematically, it is given as $HCR = n/N$. Moreover, as the HCR doesn't indicate the depth of food insecurity, a food shortfall/surplus index (FSSI), defined as the sum of the differences between the daily per capita calorie intake (Y_i) and the recommended daily minimum calorie (2100kilocalorie = R) divided by the product of "n" and "R". Mathematically, it is given as $SSI = [(Y_i - n) / Rn]$. The SSI was used to show the depth of food security of each household from average nationally recommended calorie.

Results and Discussion

Food Availability and Household Vulnerability to Food Insecurity

Net Available Food (NAF): NAF was used as both indicator of availability, and indicator of food security situation. Rain-fed arable farming is the main source of food availability for almost all rural households in Belo-jiganfoy district. For example, out of the total land cultivated (990.75hectares) by sample households, only 11.64hectare (i.e. 1.2%) was cultivated through small-scale irrigation implying that about 98.8% of cultivated land depended on rain-fed. Only 102.5quintals (1.5% of total yield) with mean 0.47quintals was produced through small-scale irrigation by sample households during the survey year. Vegetables, fruits and to some extent maize were the major crops produced through small-scale irrigation. This is nearly same as the national figure in which rain-fed agriculture accounts for 98% of annual production and small-scale irrigation accounted for about 1.2% in Ethiopia (CIDA, 2013:9). This clearly shows that the potential of small-scale irrigation has not been fully exploited in the district.

Average and per capita yield produced from potential sources were used to analyze the situation of food availability as a determinant of food insecurity. The NAF for each household is determined using household food balance model (HFBM). The NAF was therefore compared against 2.25quintals, which is roughly cereal equivalent of the recommended average daily kilocalorie of 2100 for a healthy adult person. The model considered food from own produce, purchasing and borrowing grains on one hand and grain sold, seed reserves and grain lost due to several reasons on the other hand.

Table 1.Total Food available from all Sources for Sample Households, 2013

Food Source	Amount produced (Quintal)					
	Total	%	Mean	Std	Min	Max
Cereals	5850.00	80.49	25.86	18.57	0.00	106.00
Legumes	274.50	3.78	1.68	6.48	0.00	48.00
Oil seeds	448.05	6.17	3.45	7.15	0.00	90.50
Vegetables &Fruits	98.25	1.35	0.45	1.65	0.00	10.00
Meat (domestic)	157.96	2.18	0.37	0.29	0.00	1.28
Total Own Produced	6828.76	93.97	30.01	22.44	0.06	131.15
Grain Purchased	81.51	1.12	0.29	0.97	0.00	5.00
Grain Borrowed	12.5	0.17	0.05	0.27	0.00	2.00
WEFs (all)	344.53	4.74	13.19	2.3	0.00	20.50
Grand Total	7267.30	100.00	-	-	-	-
Grain Sold (GS)	2798.1	38.50	8.20	9.45	0.00	74.00
Seed-Reserved (SR)	384.76	5.29	1.75	1.73	0.00	12.50
Post-harvest-lost (PHL) (5% of tot yield)	307.19	4.23	0.71	0.51	0.01	3.26
Total Deduced	3490.05	48.02	3.82	4.10	0.00	84.10
NAF	3777.25	51.98	14.21	10.17	0.15	65.25
Household Size(ADE)	922.81	-	4.20	1.65	1.68	13.65
NFA/ADE/year	4.09	-	3.62	2.93	0.04	19.59
HCR	40.5%	Indigenous = 65.2%; Non-indigenous = 34.8%				

*meat of 1 antelope = on average 25kilogram; **1bird = on average 0.5kilogram; ***1kg fish = 10fish; ****1 medeb cattle meat= on average 10kg

Source: Computed Based on Own Survey Data

The result (Table 1) indicates that all surveyed households had a total household size of 922.81 as measured in adult equivalent (ADE) with average household size of 4.09. Gross produce from all sources was 7267.3quintals, of which 93.97% was obtained from own produce, 1.12% and 0.17% through purchasing and borrowing, and 4.74% from wild edible foods (WEFs) obtained from gathering and hunting.

Hunting and gathering wild foods were found essential sources of food availability but underreported as it constituted 4.74% of gross food availability. At present, mainly of the indigenous people of the district in particular and BGR in general practice these activities although the source of WEFs has extremely been diminished. Consequently, crop production was

the main source of food for households in the district. Within crops, cereals constituted the largest percent (80.49%) of the total produce.

The NAF was calculated using the HFBM, which deduces any disposal (including the SR, GS, and PHL) from gross produce. The model produced 3777.25 quintals of NAF for all surveyed households (922.81 ADE). This means that on average there was 4.09 quintals/ADE/year of NAF during the survey year. In other words, the mean and standard deviation of NAF per household per year was 3.62 quintals and 2.93 quintals respectively. Observing the mean, one can generalize that the average NAF (3.62 quintal) was less than the average household size (4.09), which roughly indicates food shortfalls. But mean is not a good indicator of household vulnerability to seasonal food insecurity.

A better method of understanding the vulnerability condition is measuring household HCR that indicates the proportion of food insecure households. For this purpose, cereal equivalent of 2.25 quintals/ADE/year often suggested as a minimum amount for a healthy adult was used as a threshold. The result indicates that the HCR for the surveyed households as a whole was 40.5%. As expected, 65.2% of this was indigenous while 34.8% was the non-indigenous ethno-culture group. But, the HCR method calculated using NAF per ADE/year is not a good indicator of vulnerability for two reasons. First, it was not a calorie indicator so that converting the NAF into kilocalorie was essential as well as calculated for a year. Second, the HCR doesn't indicate the depth of household vulnerability as it only shows the percent of food insecure. As a result, the NAF for each household was converted into kilocalorie equivalent (DES) based on conversion factors of each food item and compared with the nationally recommended minimum amount (2100 kilocalorie/ADE/day). The DES is used as an indicator of consumption component of food insecurity and analyzed under it.

Food Consumption and Household Vulnerability to Food Insecurity

Food insecurity may occur due to problems related to consumption even under sufficient availability and accessibility. The type of food shortage related to consumption is more appropriately termed as nutritional insecurity. This component of food insecurity occurs due to mainly physiological and cultural constraints such as health and local taboos. However, in this study, food insecurity prevalence is examined based on kilocalorie (or DES) supply and DD score as proxy indicators for household food consumption. As indicated in Table 1, four major

food items were consumed most frequently in the study area: cereals, legume, vegetables and meat from different sources while oilseeds are used for sale. These are prepared in different forms and mix, for example, as ‘injera’ (fermented shallow bread), porridge, bread, whole-boiled and whole-roasted, and as sauces. The kilocalorie obtained from these food items were used as a consumption indicator of *green famine*.

Household Dietary Energy Supply (DES): DES is a continuous measure that indicates the households’ position of vulnerability status. As a result, rough classification of households into food secure and food insecure and determination of HCR requires a threshold value (in this paper, 2100kilocalori). The results in Table 2 indicate that a total of 388643.1kilocalorie with average kilocalorie of 1766.56 and standard deviation of 1440.1kilocalorie was available for all surveyed households from all sources. The average kilocalorie available for the food secure households was 3550.2kilocalorie/ADE/day with standard deviation of 1546.5kilocalorie/ADE/day. In contrast, for food insecure households, the average was 1066.7kcal/person/day with standard deviation of 462.77kilocalorie/ADE/day.

Table 2 Household kilocalorie supply per ADE/year, 2013

Information Type		Total	Mean	Std	Min	Max	
Household Size (number)		1210.0	5.50	2.41	2.00	20.00	
Household size (ADE)		922.82	4.15	1.62	1.68	13.65	
Kcal./ADE/day (FS + FIS)		388643.1	1766.6	1440.1	0.01	8899.5	
FS (28.2%)	Ave. hh size (ADE)	220.19	3.55	1.35	1.68	8.04	
	Kilocalorie/ADE/day	220112.5	3550.2	1546.5	2107.9	8899.5	
FIS (71.8%)	Ave. hh size (ADE)	693.18	4.38	1.66	1.94	13.65	
	Kilocalorie/ADE/day	168530.6	1066.7	462.8	0.01	2069.1	
Household Food Security Status & its Indicator		Ethno-culture Category				Total	
		Indigenous		Non-indigenous			
		No.	%	No.	%	No.	%
DES (kilocalorie)	FIS (HCR)	92	56.2	66	41.8	158	71.8
	FS	29	46.8	33	53.2	62	28.2
	Both	121	55.00	99	45.00	220	100.0
FSSI	FIS	-0.51		-0.46		-0.48	
	FS	+0.14		+0.77		+0.69	
	Both	-0.25		-0.05		-0.22	

Source: Computed Based on Household Survey Data

By observing the mean alone, one may generalize that the area is food insecure as it is much far from the minimum recommended value per ADE/day. However, the observation of the range (min= 0.01 and max= 8899.5) informs that there was a great variation among households so that looking into the conditions of each households was essential.

Setting the threshold at 2100kilocalorie, the HCR (Table 2) for the whole surveyed households was 71.8% indicating that the majority of people in the study area were unable to meet their annual food requirements and were vulnerable to food insecurity. The HCR for indigenous ethno-culture group was reasonably higher (56.2%) than the non-indigenous one (41.8%). This measure too doesn't as such indicate the depth/severity of the food insecurity situation. A better measure of the depth of food poverty is applying the food surplus/shortfall index (FSSI) that indicates how far each household's kilocalorie is from the threshold. Accordingly, the FSSI index for the surveyed households was 22% indicating that on average each household were far from the threshold by 22%. The distance of the indigenous ethno-culture group (25%) was further than that of the non-indigenous one (5%). Therefore, as expected from the beginning, the severity of food shortage is critical among the indigenous than the non-indigenous ethno-culture group implying that special policy attention to the indigenous group is required.

Although this measure of vulnerability is static in nature, it showed interesting finding based on currently available and accessed food sources. The fact that the food shortfall distance of food insecure households of the indigenous ethno-culture group was too much deep (51%) clearly reveals that food shortage has turned into the *famine* conditions and hence *green famine*. The FSSI of the non-indigenous group (46%) and even the overall FSSI (48%) were also significantly deep proving that the *green famine* condition is evident in the area.

Household Dietary Diversity Score (DDS): DDS is a consumption indicator of food insecurity. This directly captures the score of diets consumed over the past 24 hours as reported by the households. The result in Table 3 indicates that cereals are the most frequently consumed diets per day (20.1%) followed by condiments (19.1%), coffee (12.6%), wild mushrooms (11.7%), pulses (11.2%) and *kema* (9.8%).

Table 3. Distribution of Households by Access to Type of Dietary Group, 2013

Info. Type	Type of Food Item										Total
	Cere al	Puls e	Veget able	Me at	Mil k	Coff ee	Ke ma	Condi ment	Wild root	Wild M/room	
Freq.	219	122	66	50	10	136	106	208	43	127	1087
%	20.1	11.2	6.2	4.5	0.9	12.6	9.8	19.1	3.9	11.7	100.
Descriptive Statistics & % of Households Ate Food Items ≤ 3 and ≤ 5											
	Descriptive Statistics					DD \leq or >3		DD \leq or >5			
	Min	Max	Mean	Std		DD \leq	DD $>$	DD ≤ 5	DD $>$		
DD	1	8	4.89	1.34		3	3			5	
% of Indigenous Ethno-culture Group						8.3	91.7	55.4	44.6		
% of Non-indigenous Ethno-culture Group						20.2	79.8	84.8	15.2		
% of Both						13.6	86.4	68.6	31.4		

Source: Computed Based on Household Survey Data

In addition, the contribution of vegetables, meat and wild edible roots is considerable as they constituted 6.2%, 4.5% and 3.9% of the daily meals respectively. As the nutritional weights of these food items are better, their contribution should not be undermined despite lower percents. Only the frequency of daily milk consumption was observed to be too infrequent (0.9%) in the total daily meal. On average households consumed 4.89 food items with standard deviations of 1.34 and the minimum and maximum number of food groups of 1 and 8. From this, the mean score of DD seems fair but the range indicates that there is a great disparity among households. Setting daily consumption of 3 food groups as a cut-point below which it is poor dietary access, only 13.6% of the surveyed households consumed 3 and less food items while the remaining majority (86.4%) of households consumed food items above 3. There was great difference between the two ethno-culture groups in this regard. Whereas 8.3% and 91.7% from the indigenous ethno-culture group respectively consumed food items of ≤ 3 and >3 daily, 20.2% and 79.8% of the non-indigenous group did the same. Had food items of 5 and less been taken as a threshold, 68.6% of households would have, accessed *poor quality diets* while only 31.4% of them, accessed *better quality diet* daily. Such proportions for indigenous were 55.4% and 44.6% respectively whereas it was 84.8% and 15.2% respectively for the non-indigenous ones.

Although the current DDS pattern seems sufficient as most households used to consume food groups of 3 and more, the findings of DDS can be viewed from three angles: the nutrient composition, their contribution to regular dietary consumption, and the purpose of consumption.

Nutritionally, meat and milk, each consisting of a weight of 4 are obviously the most nutritious diet groups (FAO-WPF, 2008:4) but consumed least frequently. In contrast, condiments with 0 nutritional weights were most frequently consumed item. Coffee, which may be grouped as condiments, was one of the most frequently consumed items. Vegetables with a weight of 1 were also consumed in a reasonable frequency. *Kema*, unidentified vegetable too had contributed large percent. Cereals and pulses with moderate nutrient weights of 2 and 3 respectively made up relatively larger part of household daily diet supply. Although underreported, wild roots and mushrooms were found in the daily meals of mainly indigenous people although seasonal. Lastly, some of the items were consumed as a coping strategy as a response to food shortages. For example, immature crops such as maize were consumed to cope with seasonal food shortages but counted as part of one food group, which is rather an indicator of food insecurity. Thus, it is safe to generalize that the nutritional status of the surveyed households was characterized by poor mix as most of items were monotonous.

Food Accessibility and Household Vulnerability to Food Insecurity

HFIAS and CSI were the two access-related indicators of households' vulnerability to food insecurity in this paper. Both of them measure food insecurity occurrence based on the behavioral responses of households about their access to food. HFIAS is a continuous measure of access-related behavior of households and was used to indicate the level and depth of severity of vulnerability to food insecurity as 'rarely', 'sometimes' and 'often'. CSI is also a continuous measure that was used to show the relative position of households' food insecurity.

House Food Insecurity Access Scale (HFIAS): The results of analysis based on HFIAS were examined using four indicators, namely: Access-related conditions, domains, scale and prevalence. The analysis of the access-related conditions based on the 9 generic questions (Table 4) indicated that 63.13% of surveyed households faced problems of both economic and physical access to food while only 36.87% of them had never faced it. This finding is nearly similar with, and confirms, the findings from availability indicators which show that about 71.8% of households were food insecure. With regard to the average severity level, 16.21% of households encountered access problems "rarely", 30.91% "sometimes" and 16.01% "often" during the year.

Table 4 Distribution of Households by HFIAC and Severity Level, 2013

S/ n	HFIAC	Number & Percent of Households by Frequency					Hh experienced a condition	
		Never	Rarely	Sometimes	Often	Total		
1	Worry Enough Food	No.	18	43	74	85	220	202
		%	8.20	19.60	33.60	38.60	100.00	16.16
2	Unable to eat preferred meal	No.	52	20	88	60	220	168
		%	23.60	9.10	40.00	27.30	100.00	13.44
3	Ate just a few variety of food	No.	52	40	80	48	220	168
		%	23.60	18.20	36.40	21.80	100.00	13.44
4	Ate foods really didn't want	No.	55	42	88	35	220	165
		%	25.00	19.10	40.00	15.90	100.00	13.20
5	Ate a smaller meal than felt	No.	77	16	79	48	220	143
		%	35.00	7.30	35.90	21.80	100.00	11.44
6	Ate fewer meals per day	No.	91	24	77	28	220	129
		%	41.40	10.90	35.00	12.70	100.00	10.32
7	Absolutely no food to eat	No.	122	36	57	5	220	98
		%	55.50	16.30	25.90	2.30	100.00	7.84
8	Slept hungry at night	No.	121	43	49	7	220	99
		%	55.00	19.50	22.30	3.20	100.00	7.92
9	Went hungry a whole day	No.	142	57	20	1	220	78
		%	64.50	25.90	9.10	0.50	100.00	6.24
	Total Score (Out of 1980 scores)	No.	730	321	612	317	1980	1250 (100%)
		%	36.87	16.21	30.91	16.01	100.00	63.13

Source: Computed based on Household Survey Data

Cross examination of all the 9 condition reveals that the proportion of households faced the most serious conditions (the last 3 that show hunger event) was considerable (22%) showing how critical the problem was. Only considering the most harsh condition of food insecurity behavior (going hungry the whole day), 6.24% of households reported it, of which it was rarely (25.9%), sometimes (9.1%) and often (0.5%). Table 4 shows households' experience under each of the 9 conditions.

The 9 generic questions of household food insecurity (access) were also designed to represent varying levels of food insecurity that reflect three domains perceived to be central to the

experience of food insecurity. These domains are *Anxiety and Uncertainty*, *Insufficient Quality*, and *Insufficient Quantity and Its consequences* (Coates et al, 2006:17).

The first domain (Anxiety and Uncertainty) represents the proportion of households answered “yes” to the first condition only (Question 1). The result indicated that almost all (91.8%) of surveyed households were uncertain and anxious about their access to *enough food at any severity* level while only 8.2% of them were sure and certain of adequate access to food. Out of this, 19.6%, 33.6% and 38.6% of the surveyed households were anxious and uncertain about access to food rarely, sometimes and often respectively (Table 4). Even considering the most severity levels of the condition (sometimes and rarely), significant proportion (72.2%) was anxious and uncertain about their access to enough food. This is nearly the same as the finding from the analysis of kilocalorie supply, where 71.8% of the surveyed household who were food insecure.

The second domain that shows *food quality* in terms of variety, preference and social acceptability (Ballard et al., 2011:3) was measured based on the next three conditions (Question 2, 3 and 4). The percent of households that affirmatively responded to each one of these conditions gives the perception about the quality of food accessed by a household. The result reveals that 76.4% of households reported that they *couldn't eat the food they prefer*, 76.4% ate just limited variety of meal and 75% of them depended on the *food type they really didn't want* to eat, because of lack of access to food or resources to command over food (Table 4). This confirms that food insecurity in the district was not only a mere shortage of the dietary calorie supply but also shortage of access to quality food.

The third domain representing the access to sufficient *quantity and its consequence* was also examined based on the last five conditions (Questions 5, 6, 7, 8 and 9) that indicate the most severe behaviors as reflected by households. As indicated in Table 4, about 65% of surveyed households *ate less than what they felt* of which significant proportion, i.e. 35.9% and 21.8% did it sometimes and often. The next severe condition under this domain is whether a household *ate smaller meals per day*, which is reported by 58.6%. The third and fourth severe conditions that households reported were *having absolutely no food* and *sleeping hungry at night*, which were reported by 44.5% and 45% of households respectively. Lastly, 35.5% of households reported that they *went hungry the whole day without eating* any food indicating there was no food at all for that particular day. This domain confirmed the findings from availability consumption

indicators, which indicated that there was severe shortage of food in terms of amount produced and accessed through purchasing and borrowing. The consequence of food shortage is also clear as it results in both hunger and health problems, as a result the *green famine*.

The scale score of HFIAS is another indicator of vulnerability to food insecurity. It is a continuous and relative measure of the degree of food insecurity (access) problems that shows the relative position of household's status of food insecurity as felt in the past four weeks (Coates et al, 2007:17). It should be noted that the higher the score, the more severe food insecurity, and the more a household becomes vulnerable to *green famine and vice versa*, the maximum score being 27. The study reveals that the mean score of HFIAS for the whole surveyed households was 11.31 with a standard deviation of 7.44 while the minimum and the maximum were 1 and 24 respectively. The large range in the score shows that there was a great disparity among households in their status of vulnerability to food insecurity ranging between 1 and 24 out of 27. As stated above, HFIAS is a relative measure, which doesn't indicate the absolute status of food insecurity. But, considering the average score (i.e. 11.31) as a threshold, about 55% of the households scored more than the average showing how critical food insecurity was in the study area. In addition to its further use in construction of HVI, the HFIAS is better interpreted when used to assess HFIAP.

The HFIAP is a categorical indicator of households' vulnerability to food insecurity that shows its depth. It customarily categorizes households into four severity levels as: food secure, mildly food insecure, moderately food insecure and severely food insecure (Coates et al, 2007:19), which is also used in this paper (Table 5). Households are categorized as increasingly food insecure as they respond affirmatively to more severe conditions and/or experience those conditions more frequently⁸³. Among the severity levels indicated in Table 4, only the whole column of "never" and affirmative answer to the first condition for column of "rarely" indicate that households are food secure. In other words, households are food secure if their affirmative response is "never" for all of the 9 conditions and 'rarely' to the first condition, all the remaining indicating food insecurity condition of any severity level. Categorizing HFIAP goes on by cumulating relevant conditions and severity levels accordingly (Table 6).

In the routine classification of household vulnerability status based on kilocalorie supply, 71.8% of the surveyed households was food insecure while 28.2% were food secure. The analysis of the HFIAP (Table 5), in contrast, shows that 60.92% of households were food insecure. Of this,

20.57% were mildly, 22.59% moderately, and 17.76 % severely, food insecure. This shows that access related factors are also as important determinants of food insecurity as those of availability-related ones. Moreover, there was difference between the two ethno-culture groups under each contrast food insecurity prevalence category (Table 5). Technical way of visualizing the HFIAP is possible through tabular-graphical method (Table 6).

Table 5. Distribution of Households by HFIAP category, 2013

Information Required	Distribution of Households by HFIAC				Total
	Food-secure	Mildly-Food-insec	Moderately-Food-insecure	Severely-Food-insecu	
Response Freq	773	407	447	351	1978
Household (no.)	86	45	50	39	220
%	39.08%	20.57%	22.59%	17.76%	100%
Cumulative %	39.08%	59.65%	82.24%	100.0%	-
Indig. Ethno-cult	17.4%	6.6%	24.0%	52.1%	100%
Non-Indig. Ethn	31.3%	14.1%	12.1%	42.4%	100%
Total	23.6%	10.1%	18.6%	47.7%	100%

Source: Computed Based on Household Survey Data

Table 6 has two uses in studying the HFIAP and household vulnerability status. Firstly, it is used to visualize which conditions and severity levels constitute each category (level) of household vulnerability to the prevailing *green famine* easily. Secondly, it can be used to calculate, from the table, the percent of households falling under each vulnerability category. One best contribution in this paper is the addition of the “Never” column in order to indicate those food-secure group who never experienced a condition in the HFIAP table. The logic behind this column is that the researcher recognized that 100% frequency of occurrence of all conditions as “rarely” and above is rare per se; as a result, the column for ‘never’ is necessary. For example, Messay (2013: 218) did it as if all respondents responded affirmatively (“yes”) and rated it as “rarely” and above even in the last most severe conditions (Questions 7, 8 and 9), for which, according to (Coates et al, 2007:20), even “rarely” represents a severe food insecurity category. But the reality is that a level of “never” or “no-answer” to at least a question may exist. In this case, the fourth column is essential for clear analysis of food insecurity (access) behaviors as done in Table 6.

Table 6 Tabular-Graphical Depiction of HFIAP Status in Belo-jiganfoy District, 2013

S/n	HFIAS conditions	Frequency Distribution of Hhs by HFIAP			
		Never	Rarely	Sometimes	Often
1	Worry Enough Food	18.0	43.0	74.0	85.0
2	Unable to eat preferred meal	52.0	20.0	88.0	60.0
3	Ate just a few variety of food	52.0	40.0	80.0	48.0
4	Ate foods really didn't want	55.0	42.0	88.0	35.0
5	Ate a smaller meal than felt	77.0	16.0	79.0	48.0
6	Ate fewer meals per day	91.0	24.0	77.0	28.0
7	Absolutely no food to eat	122.0	36.0	57.0	5.00
8	Slept hungry at night	121.0	43.0	49.0	7.00
9	Went hungry a whole day	142.0	57.0	20.0	1.00

NB: Green = Food-secure; Blue = Mildly food-insecure; Rose = Moderately food-insecure; Red = Severely food-insecure

Source: Prepared based on Household Survey Data

An attempt was also made to examine whether the food insecurity situation in the study area is a mere food shortage or reached to a level of hunger. For this purpose, HHS was calculated based on the last 3 occurrence conditions (questions 7, 8 and 9) of the HFIAS (Ballard et al., 2011:13). This HHS is recommended to be most importantly used in areas of substantial food insecurity as a small module within a larger and more comprehensive food security questionnaire administered to a representative sample household (Ballard et al., 2011:5).

Household Hunger Scale (HHS): As indicated by the findings from HFIAP analysis, it is recognized that the *green famine* belt of Ethiopia had a substantial food insecurity condition. As a result, it is essential to analyze the hunger status of households using HHS tool. The result (Table 7) shows that about 56% of surveyed households didn't experience any condition of hunger. Significant proportion (44%) of them experience food insecurity in the form of hunger ranging from little (20%) through moderate (23%) to severe (2%) levels. As can be seen from Table 7, there was also difference between the two culture groups in hunger experience. For example, considering the severe hunger, 4.2% of the indigenous group experienced the condition while it was almost none (0.2%) for the non-indigenous implying more policy attention to the former group. At this point, it can be concluded that the food insecurity of households in the *green*

famine belt is not only a mere shortage in the quantity of food eaten but also is transforming into hunger, which causes a physiological effect on people.

Table 7 Distribution of Households by Hunger Category

Information Required	Distribution of Households by Hunger Category				Total
	No-hunger	Little-hunger	Moderate-hunger	Severe-hunger	
Response Freq	385	136	157	13	691
Household (no.)	88	37	90	5	220
%	55.72%	19.68%	22.72%	1.88%	100%
Cumulative %	55.72%	75.40%	98.12%	100.0%	-
Indigenous. Ethno-culture	38.0%	14.9%	43.0%	4.1%	100%
Non-Indig. Ethnoculture	42.2%	19.2%	38.4%	0.2%	100%
Total	40.0%	16.8%	40.9%	2.3%	100%

Source: Computed from Table 6

Coping Strategies Index (CSI): The CSI is one of the tools used to understand households vulnerability to food insecurity based on their behavioral responses. The index is good indicator of future vulnerability to food insecurity (Babatunde et al, 2008:119). This index was calculated based on the multiple answers (0-7) to a single question, “What do you do when you don not have enough food, and do not have enough money to buy food?” Table 8 Coping Strategies Ranked and Grouped as Reported by FGDs, 2013

s/n	Strategy	Focus Group Ranking for Each Coping Behavior							Ave	Consensus Rank
		FGD 1	FG D2	FG D3	FG D4	FG D5	FG D6			
1	Less expensive food	1	1	2	1	1	2	1.3	1	
2	Borrow Grain	2	3	3	4	2	4	3.0	3	
3	Depend on WEFs	1	1	1	2	2	1	1.3	1	
4	Depend on Immature Crops	5	4	3	4	5	5	4.3	4	
5	Send hh members elsewhere	5	5	4	3	5	4	4.3	4	
6	Reduce number of meals	4	2	4	3	3	3	3.2	3	
7	Reduce Adult consumption	3	3	2	2	2	2	2.3	2	
8	Feed working members	2	2	3	2	2	2	2.2	2	
9	Reduce portion size	1	1	1	1	1	2	1.2	1	
10	Skip the whole day	5	5	4	4	4	4	4.3	4	

NB:-Consensus Rank is a rounded average weight calculated from reports of FGDs,

Source: Computed based on Focus group discussions

The basic idea of CSI is to combine the frequency and severity of coping strategies. As indicated in Table 8, four severity weights were identified based on six focus group discussions (FGDs) conducted in the study area. The average weights were calculated from the weights assigned by the six focus group discussions (Table 8). The discussants were asked to freely group 10 of the coping strategies into similar coping behaviors and assign weights to them, the least severity weight being marked as 1, and the next as 2, and so on. Some grouped from 1- 4 while others from 1-5. The researcher then took the average weights resulting into 4 levels of weights. It should be noted that 1 = Least severe; 2 = Moderately severe; 3 = Severe, and 4 = Very severe.

The CSI was therefore calculated as the product of the frequency of occurrence (0-7) and respective weight of each coping strategy indicated in Table 8. The sum of weighted frequency of the ten coping strategies gives the overall CSI of each household.

Table 9. Household CSI by Indigenous & Non-indigenous Ethno-culture Group, 2013

Statistics	Both	Indigenous	Non-indigenous
Min	4	4	4
Max	102	98	77
Range	98	98	73
Ave	41.96	47.79	34.85
Std	20.32	19.94	18.51
HHs scored CSI < Ave	50.5%	20.9%	29.5%
HHs scored CSI ≥ Ave	49.5%	34.1%	15.5%
Both	100%	55.0%	45.0%

Source: Computed Based on Data from Household Data

The result (Table 9) indicated that the average CSI was 41.96 for the whole surveyed households with minimum and maximum score of 4 and 102 respectively. In principle, the higher the score, the more a household becomes food insecure in the future (Babatunde et al, 2008:122). Comparison between the two ethno-culture group shows that the *green famine* condition was more severe among the indigenous ethno-culture group with the average CSI of 47.79 than the Non-indigenous ones with the average score of 34.85 as expected at the beginning. However, the range shows great differences between the two ethno-culture groups implying that there was great variation among the households.

The CSI score by itself tells nothing about the food security status of the households. But simply one can say that the household with index of 102 is more food insecure than that of 4. The result (Table 9) also indicates that about 50.5% of surveyed households scored CSI less than the mean score (showing 20.9% for indigenous and 29.5% for non-indigenous households) while about 49.5% of them scored greater than the average (34.1% for indigenous and 15.5% for non-indigenous households). This finding goes in line with the initial expectation that the indigenous ethno-cultures are more vulnerable to food insecurity than the Non-indigenous ones.

Food Stability and Vulnerability to Seasonal Food Insecurity

This component refers to the sustainability of the other components of food security indicating whether the nutritional status is improving or deteriorating. In this study, only the trend in crop production over about a decade was used because of data constraint.

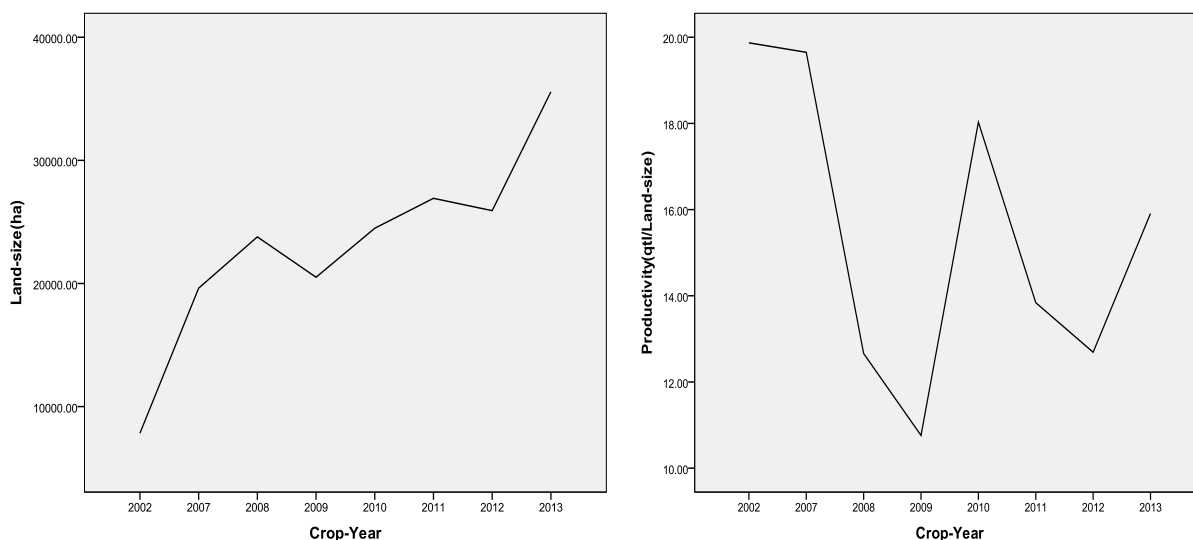


Figure 1 Trend in Land cultivated and Crop-productivity Over Eight Years Period (2002-2013)

Source: Prepared Based on Data Obtained from District Agricultural Office.

The trend in crop productivity (yield per unit hectare) was used as a proxy for stability of food supply as food from own produce was the main source of food in the area. Crop productivity was compared against per capita land cultivated and its trend was explained using the graph (Figure 1).

The result indicates that there had been a general increase in the amount of land cultivated. But crop-productivity had shown a general decline over about a decade (Figure 1). Close examination of the graph shows that there had been a sharp decline in the productivity between 2002 and 2009 followed by sharp raise between 2009 and 2010. Between 2010 and 2012, it shows a decline and then a raise from 2012 up to 2013. Although it depends only on availability dimension of food

security, the graph shows high instability of food supply in the district despite a general increase in land size.

Foods Sovereignty and Household Vulnerability to Food Insecurity

Food sovereignty is in fact an emerging concept, as a result of which no standard indicators and methodology has been developed. Advocators of food sovereignty however argue that food must be produced and available locally so as to ensure the rights to food while caring for natural environment in order to ensure sustainable food security. On this basis, while large room remains for future study of food sovereignty, the households in the district could be regarded as sovereign at least for depending on their own produce rather than on market and aid. They depend on hunting and gathering even during the times of food shortages rather than developing a dependency syndrome on food aid or assistance.

Conclusion

Unexplored famine has ever existed in the Western part of Ethiopia. Severe food shortages occur here but have not been recognized as famine. The author prefers to call this sort of food shortages as *green famine* and the areas where it occurs as *green famine belt*. It is termed as *green famine* because it occurs in environmentally and agriculturally conducive areas for food production. The central argument of this paper is that there is critical food shortage that causes adverse physiological and then health effect (both indicators of famine) on people in the belt. The purpose of this study was therefore to measure and show that the food insecurity situation has already led to the famine level in the *green famine* belt of Ethiopia. One of the districts located in this belt known as Belo-jiganfoy was taken as a case study area to empirically analyze the situation.

All the tools and/or indicators used to measure all the components of food security indicated the prevalence of *green famine* in the area. The head count ratio (HCR) measured based on, both food availability in terms of NAF and, food consumption in terms of calorie shows that 40.5% and 71.8% of household were living under food poverty line. The HFIAP indicates 76.4% of households were under food poverty level of which 47.7% were severely food insecure. The prevalence of *green famine* is well observed from the hunger indicator (HHS) which shows that 60% of households were exposed to hunger situation despite differences in hunger levels. In fact, there was great differences between the two ethno-culture groups, the indigenous being the most

hit. For example, kilocalorie measure of HCR show that 56.2% of indigenous as opposed to 41.8% non-indigenous ethno-culture group lived below food poverty line. The NAF measure also shows 65.2% indigenous and 34.8% non-indigenous ethno-culture group who were below food poverty line. Moreover, 57.8% non-indigenous as opposed to 62% indigenous households were exposed to hunger conditions. Another good indicator of households' vulnerability to *green famine* was the CSI which shows that about 50% of surveyed households scored more than average score. This shows that food shortage was as deep as the famine conditions.

Therefore, all food security indicators that measure the four components of food security (availability, accessibility, consumption, and stability) revealed that food insecurity has already been changed into famine situations. But indicators of food sovereignty show that people in the area have depended on local sources of food whatever hunger occur avoiding dependency syndrome on food aid. Accordingly, food security research must be directed towards western Ethiopia and, policies and strategies must target on five of the components of food security. The findings that reveal the ethno-culture disparity in level of household vulnerability to food insecurity should be taken as a reminder for stakeholders for designing intervention strategies that more target at the cultural variables than the physical determinants affecting those components of food security.

NAF (Net Available Food); DES (Dietary Energy Supply); DD (Dietary Diversity); HFIAS (Household Food Insecurity Access Scale); HHS (Household Hunger Scale); CAI (Coping Strategies Index); HCR (Head Count Ratio); FSF/S (Food Shortfall/surplus).

References

- Agea G. J., Kimondo M.J., Okia A. C., Abohassan R.A, Obua J. Hall J.& Zewgw, T. 2011. Contribution of Wild and Semi-wild Food Plants to Overall Household Diet in Bunyoro Kitara Kingdom, Uganda, *Agricultural Journal* 6.4: 134-144
- Alinovi, L., Mane, E., and Romano, D. 2008. "Towards the Measurement of Household Resilience to Food Insecurity: Applying a Model to Palestinian Household Data". In Sibrian, R., (ed.). *Deriving Food Security Information from National Household Budget Surveys; Experiences, Achievement, Challenges*, FAO, Rome, 137- 152, Available at <ftp://ftp.fao.org/docrep/fao/011/i0430e/i0430e.pdf>

- Babatunde, R.O., Omotesho O.A., Olorunsanya, Owotoki, G.M. 2008. Determinants of Vulnerability to Food Insecurity: A Gender-based Analysis of Farming Households in Nigeria; *Indian Journal of Agricultural Economics* 63.1: 116 – 125.
- Ballard, T., Coates, J., Swindale A. & Deitchler M. 2011. Household Hunger Scale: Indicator Definition and Measurement Guide; FANTA Food and Nutritional Assistance Guide; Tufts University,
- Benishangul-gumuz Region Food Security Strategy [BGRFSS]. 2004. Benishangul-gumuz Region Food Security Strategy, Assosa, Ethiopia
- Benishangul-gumuz Regional State Bureau of Finance and Economic Development (BGRSFED). 2012. Physical and Socioeconomic Profile of Benishangul-gumuz Regional State, Assosa
- Brown T. Amdissa Teshome, CPRC and ODI. 2007. Implementing Policy for Chronic Poverty in Ethiopia. Background Paper for Chronic Poverty Report 2008-09, Chronic Poverty Research Center
- Canadian International Development Agency (CIDA). 2013. Assessment of CIDA's Food Security Strategy and Funding in Ethiopia. Canadian Food Security Policy Group.
- Capaldo, J., Karfakis, P., Knowles, M. & Smulders, M. 2010. A Model of Vulnerability to Food Insecurity. FAO ESA Working Paper No. 10-03; Rome, Italy; *JEL Classification: I32, O2, Q18*
- Central Statistical Agency [CSA]. 2008. Summary and Statistical Report of the 2007 Population and Housing Census; Population Size by Age and Sex; Federal Democratic Republic of Ethiopia, Population Census Commission
- Chambers R. and Conway G. 1991. Sustainable Rural Livelihoods: Practical Concepts for the 20st Century. IDS Discussion Paper 296.
- Coates, J., Swindale, A. & Bilinsky, P. 2007. Household food insecurity access scale (HFIAS) for measurement of food access: indicator guide. Washington, DC, United States Agency for International Development (USAID) Food and Nutrition Technical Assistance Project (FANTA), Version 3.
- Coates, J., Swindale, A. & Bilinsky, P. 2006. Household food insecurity access scale (HFIAS) for measurement of food access: indicator guide. Washington, DC, United States Agency for International Development (USAID) Food and Nutrition Technical Assistance Project (FANTA)

- Dagnachew Anberbir (2004). Generic Agri-service Delivery and Farmers' Differences: The Case of the Natives and Resettled Farmers of Assosa Woreda. MA Thesis, Addis Ababa University.
- Degefa Tolossa. 2005. Rural livelihoods, poverty and food insecurity in Ethiopia, A case study at Erenssa and Garbi communities in Oromiya Zone, Amhara National Regional State, PhD Dissertation, *Norwegian University of Science and Technology*, NTNU, Trondheim
- Department for International Development [DFID].1999. Sustainable Livelihoods Guide sheets Framework, DFID
- Devereux S. 2000. Food Insecurity in Ethiopia: A Discussion Paper for DFID, IDS, Sussex.
- Fearon J.D. 2003. Ethnic and Cultural Diversity by Country. *Journal of Economic Growth* 8:195-222
- Federal Democratic Republic of Ethiopia-Ethiopian Road Authority [FDRE-ERA]. 2008. Consultancy Paper for District Integrated Development Study (Group-8); Belo-jiganfoy Integrated District Development Program Study (Final Report). Unpublished Document Translated from Amharic" Version, Addis Ababa, Ethiopia,
- Food and Agricultural Organization [FAO]. 2010. The State of World Food Insecurity: Towards ensuring food security in protracted crises: recommended actions; 45 - 49
- Gross R, Schoenebrger H, Pfeifer H and Preuss HA (2000).The Four Dimensions of Food and Nutrition Security: Definitions and Concepts; FAO-Nutrition and Food Security.
- Guyu Ferede. 2011. Food Security Status of Rural Households Northwestern Ethiopia: The Case of Households in Bullen District of Benishangul-gumuz Regional State, VDM Verlag, Germany
- Guyu Ferede. 2012. Voluntary Villagization Scheme (VVS) for Transforming Semi-pastoral Communities in Benishangul-Gumuz Region, Northwestern Ethiopia: Challenges and Local Development Indicators; *Journal of Sustainable Development in Africa* 14.5: 162 – 196
- Guyu Ferede. 2014. Ethno-culture Disparity in Food Insecurity Status: The Case of Bullen District, Benishangul-gumuz Regional State, Ethiopia. *African Journal of Food Science* 8.2: 54 – 63
- Messay Mulugeta 2013. Resettlement and Food Security Nexus in Ethiopia: A Case Study from Nonno District. PhD Dissertation, Addis Ababa University; LAMBERT Academic Publishers, ISBN: 978-3-8484-3106-9

- Ministry of Finance and Economic Development [MoFED]. 2008. Dynamics of Poverty and Growth in Ethiopia (1995/96 – 2004/05), Addis Ababa, Ethiopia
- Sasson, A.2012.Food security for Africa: an urgent global challenge. *Agriculture & Food Security 1.2*: 1 – 16
- Save the Children. 2010 – 2015. Benishangul-gumuz Food security and Economic Growth Project of 2010 -2015, Ethiopia
- Scaramozzino, P. 2006, Measuring Vulnerability to Food Insecurity, *ESA Working Paper*. 06 – 12, US-FAO
- Scoones I.1998.Sustainable Rural Livelihoods: A Framework for Analysis, IDS Working Paper 72;
- Sen A. 1981. Ingredients of Famine Analysis: Availability and Entitlements; *The Quarterly Journal of Economics 96.3*:433 – 464.
- Support International Development [SID] (2010), Market Assessment and Value Chain Analysis in Benishangul Gumuz Regional State, Ethiopia, Final Report; SID-Consult-Support Integrated Development, Addis Ababa, Ethiopia
- Tsegay Gebrehiwot, 2009. Determinants of s Food Security in Rural Household of the Tigray Region, unpublished MA Thesis, Addis Ababa University, Ethiopia
- United States Agency for International Development (USAID). 2004.Breaking the Cycle of Food Crisis: Famine Prevention in Ethiopia. The Mitchel Group, Inc. (TMC).
- World Food Programme (WFP). 2008. Food Consumption Score: Construction of the FCS

3. Determinants of Seasonal Food Insecurity in the ‘Green Famine’ Belt of Ethiopia: The Case of Households in Belo-jiganfoy District, Benishangul-gumuz Region.

¹Guyu Ferede and ²Muluneh Woldetsadik

Ready to be submitted to journals

¹Correspondence

E-mail: guyu_f@yahoo.com

Cell phone: +251-9-12-19-42-72

Department of Geography and Environmental Studies

Addis Ababa University, Ethiopia

²Supervisor

Department of Geography and Environmental Studies

Addis Ababa University, Ethiopia

Abstract

Despite enormous body of literature on household food insecurity and its determinants in the *non-green belt* of Ethiopia, similar research is rare in the ‘green famine’ belt (GFB). This is because the GFB is customarily viewed as food secure area only due to relative adequacy of rainfall and green vegetation in the area. The objective of this study was to examine factors determining household food insecurity in the GFB of Ethiopia. For this purpose, logistic model was employed to analyze the empirical data collected through cross-sectional survey of 220 sample farm households selected from Belo-jiganfoy district (i.e. a case study area). Overall, the study revealed that food insecurity is significantly dependent on some demographic, socioeconomic and technological factors. Out of these, the effects of household size, participation in local labor unions and farming systems were positive while that of the use of extravagant consumption, small-scale irrigation, aggregate production, and education of household head were negative. This implies that most members of each household were not productive; generally participation in labor unions were aimed at earning money mostly by food insecure households to cope with food shortages, and hoe-based farming had dominated the farming system. Moreover, food insecure households were less extravagant consumers because they have no extra food; they had less access to small scale irrigation, produced less aggregate food and, they were almost illiterate. Therefore, we recommend that interventions should target at promoting rural extension services that boost labor productivity, increase aggregate production, focusing on these most significant variables when attempting to build household resilience to food insecurity without underestimating the effects of variables that have moderate influences on food insecurity.

Keywords: Food insecurity, determinant, logistic model, ‘green famine’ belt, Ethiopia

Background

Ethiopia’s economy has been growing on average by a double digit rate since 2004 (IMF, 2014). Perhaps following this fast economic growth, food security status at national level has shown improvements over the last two and half decades. Food insecurity at national level had declined from approximately 52% in 1980s to 43% in 1995/96 (Devereux, 2000a), but stayed almost the same at about 44% in 2003 (USAID, 2004). From this status, it had declined to about 39% in 2004/05 and further to about 36% in 2005/06. Then, it came down to about 33% in 2006/07 and 28% in 2009/10 (MoFED, 2008). The most recent information show that the proportion of

undernourished population has remained at about 35% (FAO-WFP, 2014). Despite these reports of fast economic growth and declining trend in food insecurity status at national level, empirical research shows that food insecurity at household level has remained considerably high in many parts of the country. A surprising feature of food insecurity in Ethiopia is its situation in the GFB, the area that generally represents the western half of Ethiopia characterized by adequate rainfall, green cover, non-drought occurrence, low population pressure, and better land resource endowments (Guyu, 2015). Benishangul-gumuz region (BGR) is entirely located in the belt and the case study district (i.e. Belo-jiganfoy) for this paper is selected from this region.

In BGR as a whole, about 58% of the population was food insecure in 2004 (BGRFSS, 2004). Empirical studies at community and household levels in different districts of the region showed that food insecurity (proxy indicator of ‘green famine’) is deep-rooted in the region. A qualitative study of *semi-pastoral communities* indicated that poverty and food insecurity in the region in general and in Dibate district in particular were severe (Guyu, 2012). According to this study, mainly people among the indigenous ethnic group (particularly the Gumuz) resorted to depend on wild foods as coping mechanism even during the main season of crop harvesting. The proportions of food insecure households were 85% in Assosa district (Dagnachew, 2004) and 58% in Bullen district (Guyu, 2014), both of them being located in BGR. A parallel study in Belo-jiganfoy district showed that the majority of households (i.e. about 72%) were food insecure (Guyu, 2015). Moreover, the analysis of resilience-vulnerability continuum in the same district revealed that about 65% of households were vulnerable while only about 35% of them were resilient to food insecurity at different levels (Guyu and Muluneh, 2015a). This shows that food insecurity has remained as one of the most considerable challenges of the region despite the relative suitability of conditions for agricultural production.

The definition of food security/insecurity originally emerged as availability in the 1970s (Degefa, 2005) and later it has evolved to embrace the access, utilization and stability components (Gross et al., 2000) and more recently sovereignty. According to FAO (2010), food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. On the other hand, food insecurity exists when people do not have adequate physical, social or economic access to food. Undernourishment exists when caloric intake is below the minimum

dietary energy requirement. Household food insecurity is the application of the above concept to the household level, with individuals within households as the focus of concern (FAO, 2010; Canali and Slaviero, 2010). In Ethiopian context, Degefa (2005) defines it for application at household level as food insecurity exists when a household is not capable of sufficiently feeding its members from either its own production or purchase on the market, in return to own cash that might be earned from the exchange of self endowment (Degefa, 2005).

‘Green famine’ on the other hand exists when people face the challenges of acute food shortage leading to hunger or starvation but when this occurs in areas characterized by environmentally and demographically favorable conditions for agricultural production (Guyu and Mulneh, 2015a). The concept was initially taken up by Mulugeta (2014) as an official academic research topic conducted in southern Ethiopia although the idea of green famine in Ethiopia was mentioned by individual authors (Alemayehu, 2001; Goyder and Goyder, 1988; Dessalegn, 2007 cited in Mulugeta, 2014) and foreign media such as Agence France-Press [AFP] (2008). The concept of ‘green famine’ taken up by Mulugeta (2014) is entirely dependent on the suggestion by Alemayehu (2001), both located in ‘enset’ producing southern highlands of Ethiopia that are characterized by high population pressure, fragmented and degraded lands, and occasional occurrences of droughts but considered as everything there is ‘green’. The concept is then redefined by adapting it to the situations in the western Ethiopia in Guyu (2015) and become more mature in Guyu and Mulneh (2015a), both sources using seasonal food insecurity as a proxy indicator of ‘green famine’, in which the area itself is termed as GFB of Ethiopia. In the later sources, greenness of everything, as opposed to Alemayehu (2001) and Mulugeta (2014), is defined for not only rainfall and vegetation but also adequate availability of farmland as a result of low population density and existence of little or no drought. Therefore, the phrase food insecurity and ‘green famine’ in this paper are used synonymously implying one another. The causes of household food insecurity or ‘green famine’ situations depend primarily and heavily on agricultural production, ethno-culture background forming its foundation. Household’s ability to access to food through purchasing, aids and cultural reciprocity as well as through off-farm activities is essential mainly in traditional rural societies. In general, the remaining pillars of food security including access, utilization and sovereignty depend on availability and the stability of each of them. By definition and based on the empirical review made above, the GFB in general and the study area in particular is vulnerable to ‘green famine’ or seasonal food insecurity. The

question in this paper is what determines households' food insecurity status (i.e. a proxy indicator of 'green famine') in the GFB of Ethiopia?

Different theories that explain the causation of food insecurity can be used to understand the factors that determine 'green famine'. The first is the demographic theory explanation of food security, which in turn is divided into two different perceptions held by different thinkers, primarily Thomas Malthus and Easter Boserup. Thomas Malthus (1766-1834) argues that population tends to increase faster than the food supply because rapid population growth results in tremendous land degradation leading to the down spiral of agricultural productivity and the decline in per capita food supply for consumption (Degefa, 2005). In short, according to the neo-Malthusian theory, increasing and high population, if remains unchecked, leads to famine and food shortages. Contrary to this, the theory of Boserup argues that increasing and large population stimulates agricultural development and ensures increased level of food supply (Boserup, 1965). Both theories are however criticized for they are merely availability-oriented models but have been used as theoretical foundations for understanding causes of failures in food availability. However, food insecurity is not caused by factors that determine availability component alone. Rather, models used to capture and comprehensively understand the determinants of food insecurity should include all components of food security: availability, accessibility and utilization as well as stability (Gross et al., 2000) and even sovereignty. Another theory that can be used to explain causes of famine and food insecurity is supply-demand theory explanation of food security (Shiferaw et al., 2003). According to this theory, determinants of food insecurity can be divided into two: supply-side determinants and demand-side determinants. Supply-side factors can be technology adoption, farming system, farm size, land quality, etc (Shiferaw et al., 2003) while demand-side factors can include household size, market access, per capita aggregate production, wealth (i.e. livestock possession), and access to off-farm work (Shiferaw et al., 2003). In this study, however, we used a model that uses a combination of factors from different theories and indicators of food security/insecurity in order to achieve a comprehensive understanding of the determinants.

In literature, different authors have identified different factors that determine food security/insecurity in developing countries including Ethiopia (Degefa, 2005; Khan and Gill, 2009; Bashir et al., 2012; Aidoo et al., 2013; Shiferaw et al., 2003; Haile et al., 2005; Bogale and

Shimelis, 2009; Messay, 2009a; Canali and Slaveiro, 2010). In Ethiopia, although mainly qualitative study, Degefa (2005) provides five detailed accounts of the causes of food insecurity by classifying them into biophysical shocks or stresses, lack of access to livelihood assets, constraints to livestock, access-related constraints such as lack of opportunities, start-up capital, knowledge and skills, and inappropriate land right arrangements (Degefa, 2005). Moreover, different determinants of household food insecurity have been identified in southern (Shiferaw et al., 2003), eastern central (Haile et al., 2005), eastern (Bogale and Shimelis, 2009), and central (Messay, 2009a), parts of Ethiopia. With regard to causes of 'green famine', little or no studies have been conducted in general and in GFB and our study area in particular. Although purely qualitative, Mulugeta (2014) examines some underlying causes and trigger factors of green famine. However, as far as our reading is concerned, there is no study that examined the determinants of 'green famine' statistically in the GFB and it is totally absent in the case study area. This is perhaps because the national research and policy actions tend to focus on the drought-prone parts of the country. We believe that such a tendency to overlook the relatively greener western part of Ethiopia cannot bring the overall national development goals in general and food security objectives in particular. The reminder of this paper is that the challenges of food insecurity in the GFB of Ethiopia is at least equivalent to, otherwise more than, the drought-prone eastern half of the country and needs at least equal focus in taking actions through research and policy if the overall national objective of ensuring sustainable food security is to be achieved. In light of this, the paper aims at statistically examining and documenting the main socioeconomic and demographic determinants of food insecurity in the GFB of Ethiopia based on selected case study district. Doing so, the study provides an insight into the nature of food insecurity ('green famine') and their determinants so that researchers and policymakers that are interested in further research and implementation of policy measures respectively may use the model for addressing food insecurity challenges especially at household level.

Methodology

Data Sources, Sampling and Method of Collection

The study was conducted in the GFB of Ethiopia by taking Belo-jigafoyo district as a case study area. The GFB is generally located in Western half of Ethiopia where BGR is a part. BGR is one of the 9 federal states of Ethiopia located in western and relatively greener part of the country. It is located between 09°17' - 12°06' Northing and 34°10' - 37°04' Easting. According to BGR (2010),

it has an area of 50380 km² with altitude ranging from 580meter to 2731meter above mean sea level. Agro-ecologically, it is divided into three: 75% of *kola* (lowlands below 1500meter), 24% of *weina dega* (midlands between 1500 and 2500meter) and 1% of *Dega* (highlands above 2500meter). Average annual rainfall varies between 800 – 2000mm. Depending on the place and season, the minimum daily temperature ranges from 12 to 20⁰c while the maximum ranges from 20 to 25⁰c in rainy season and rises to 35 – 40⁰c in the dry season (BGRFSS, 2004). It had total population of 670, 847, of which nearly 86 % lives in rural areas (CSA, 2008). Thus, Belo-jiganfoy district was selected as a case study area because it can generally represent the GFB of the region in terms of environmental, ecological, demographic and cultural contexts (see Figure 2, Chapter 5, page 113 and Figure 1, Chapter 7, page 166). According to the 2012 information obtained from FDRE-ERA (2008), Belo-jigafoy consisted of total population of 37471 forming 7347 households with average family size of 5.1. The district has population density of 23persons/km². Berta, Gumuz, Shinasha, Mao and Komo make up the indigenous ethno-culture group of BGR. The Oromo and Amahara ethnic groups are the dominant non-indigenous ethnic groups of the region.

A cross-sectional survey was conducted in Belo-jiganfoy district, western Ethiopia in 2013. Four-stage sampling procedure was employed to select 220 sample households. In the first stage, the district was purposively selected as it can generally represent the GFB in terms of physical, socioeconomic and cultural backgrounds. Then, it was divided in to three strata based on the distance from district center (Soge town) and proximity to asphalt road. In the second stage, 3 *kebeles* (i.e., an administrative unit lower than a zone but higher than a village) were selected from each stratum. In the third stage, proportional allocation method was applied to determine sample size in each *kebele*. Finally, households for interview were identified using simple random (lottery) method. Data for measuring the status and determinants of household food insecurity were collected through a structured questionnaire. The questionnaire includes information on sources of food, as well as demographic and socioeconomic determinants of food insecurity.

Analytical Framework and the Models

In light of the above discussion, the dependent variable in the study is food insecurity (Y), which is one of the negative outcomes of household livelihoods, the positive outcome being food

security. We assumed that food security/insecurity is a function of socioeconomic, cultural and demographic factors.

$$Y_{ij} = f \{X_{1j}, X_{2j}, X_{3j}, \dots, X_{ij} \} \dots\dots\dots \text{equ.1}$$

Where; X_{ij} represents the i^{th} determinant for the j^{th} household.

Y_{ij} represents the food insecurity status of the j^{th} household for i^{th} determinant.

The overall food security status is a binary outcome variable that takes a value of 1 if a household is food insecure, 0 otherwise. Thus, the food insecurity of the j^{th} household for i^{th} determinant (Y_{ij}) is therefore given as follows:

$$Y_{ij} = 1, \text{ if } K_i < Z; \text{ and } Y_i = 0, \text{ if } K_i \geq Z.$$

Where; K_i is the per capita kcal/ADE/day for j^{th} household, and

Z is the food security line (i.e. the minimum required kcal/ADE/day)

The determination of food insecurity status involves certain procedure. It was determined based on three steps following the foot-steps of Haile et al. (2005). First, household food balance model (HFBM) was used to determine the net available food (NAF) for each household based on equ.1. The model was used to calculate the NAF as the difference between the gross available food (GAF) and food disposed due to various reasons (FDSP). The HFBM was originally adapted by Degefa (1996) from FAO regional food balance model (Messay, 2013) in the Ethiopian context and then used by many other authors (Haile et al., 2005; Messay 2009b; Guyu 2014, 2015). Second, the NAF was converted to total kilocalories for each household and then to ADE based on conversion factors provided by the 1998 Ethiopian Health and Nutrition Research Institute (EHNRI). Third, the kilocalories per kilogram calculated in step two were compared with the minimum per day per ADE subsistence calories required by an adult to live a healthy and moderately active life in Ethiopia which is set at 2100 kcal. This threshold was used as a cut-point between food insecure and food secure households in this paper.

$$NAF = (GAF - FDSPL) = (OPF + FP + FB) - (FS + SR + PHL) \dots\dots\dots \text{equ.2}$$

Where; NAF = Net Available Food/Dietary Energy Supply

GAF = Gross Available Food FS = Food Sold

FDSPL = Food Disposal

SR = Seed Reserved

OPF = Own Food Produced

PHL = Post Harvest Loss

FP = Food Purchased

FB = Food Borrowed

Relevant Model for Analyzing the Impacts of Explanatory variables

Food security/insecurity is a binary categorical response variable in this paper. Different options of models are available for analyzing a categorical dependent variable. Linear regression model is a commonly used method in many studies. It is, however, applied when the dependent variable is measured on a continuous scale. For a binary response variable, discriminant analysis and logistic regression method are widely used but have their own limitations. Discriminant analysis is used if all predictors are continuous and nicely distributed. Loglinear analysis is often used if all predictors are categorical although the dependent variable is always categorical. Finally, logistic regression is often chosen if predictors are mixed and/or if they are not nicely distributed. In other words, logistic regression makes no assumption about the distribution of explanatory variables for best prediction of binary outcomes (Karl, 2011). The probit model is an alternative to logistic model because either of them can be used for a categorical dependent variable. While probit is based on standard normal distribution, the logit is based on standard logistic distribution. According to Greene (2008) cited in Sodjinou et al. (2015), these two models often lead to the same conclusion and it is difficult to make a choice between the probit and the logit on theoretical bases. In this paper, we used the binary logistic regression method for its advantages over others. It assumes that the dependent variable is linearly related with the predictors. The dependent variable (Y_{ij}) is defined as 1 if j^{th} household for i^{th} variable is food insecure, otherwise 0 (j ranging from 1 - 220) and given as follows:

$$Y_{ji} = \beta_0 + \beta_1 X_{1j}, \beta_2 X_{2j}, \beta_3 X_{3j}, \dots, \beta_i X_{ij} + e \dots \dots \dots \text{euq.3}$$

Where; Y_j is the dependent variable; β_0 is a constant value that represents the Y intercept; $\beta_1, \beta_2, \beta_3, \dots, \beta_i$ are coefficients or slopes of $X_1, X_2, X_3, \dots, X_i$ respectively, and $X_1, X_2, X_3, \dots, X_i$ are explanatory variables, i is the number of coefficients and j is the number of observations, and e is error term. Statistical Package for Social Sciences (SPSS) version 19 was statistical tool or software used for analyzing the data.

Hypothesized Variables Influencing Household Food Insecurity

The following 16 potential explanatory variables were selected and hypothesized based on literature and the authors' observation of the study area. Then, the dependent variable, food insecurity status (Y_{ij}), is regressed on these variables to look at their importance in influencing it.

Household Size in ADE (continuous) (HHSZADE): This is a count variable expressed in adult equivalent (ADE) that is expected to influence household food insecurity. There is no clear relationship between household size and agricultural productivity and hence food security in literature. Some argue that large household size increases crop productivity and improve food supply while others disagree with this idea. The acceptance of either idea depends on the nature of the activity and the degree of involvement of labor force into the work. The Boserupian theory of agricultural change argues that households with larger family size (labor supply) tend to produce higher crop yield per unit of area (Boserup, 1965). Following this theory, some authors hypothesized and proved it to have positive relationship with agricultural yield, for example, in organic cotton production in Benin which needs labor intensive production system although it has insignificant influence (Sodjinou et al., 2015). On the other hand, most authors showed that household size has positive influence on food insecurity (Shiferaw et al., 2003; Haile et al., 2005; Bogale and Shimelis, 2009; Bashir et al., 2012; Aidoo et al., 2013). One obvious reason for this is that as household size increases, the number of mouths to feed from the available food increases (Bogale and Shimelis, 2009). Observation in most areas of Ethiopia shows that farm households are small-scale subsistence or semi-subsistence producers with limited participation in the non-agricultural sector. In this case, as resources are very limited, the increasing household size may put more pressure on consumption than it contributes to production. Under such a situation, food requirements increase with the number of persons in a household (Shiferaw et al., 2003; Haile et al., 2005). As a result, we expect a positive relationship between household size and food insecurity in our study area.

Cultivated Land Size per Household (continuous) (LCULTD): Generally, literature shows that land size and agricultural yield have positive relationship (Sodjinou et al., 2015). Other things being constant, cultivated farmland size measured in ha has also negative relationship with the probability of being food insecure (Bogale & Shimelis, 2009; Aidoo et al., 2013). Access to, and cultivation of, land decreases the likelihood that the household will be food insecure. In this

paper too, cultivated land size is hypothesized to have negative influence on household food insecurity.

Irrigation Use (dummy) (IRRUSE): There is a general consensus among literature that use of irrigation has a negative influence of the probability of being food insecure (Bogale and Shimelis, 2009). In this paper, we also hypothesized that farm households' use of small scale irrigation has a negative influence on food insecurity. The idea is that households who practice small scale irrigation can produce more output than those who do not and the likelihood of these households to become food insecure is less. Especially, its benefits are bold when rain-fed agriculture failures occur for various reasons.

Education of Household Head (continuous) (HEDUY): This variable is measured in terms of years households stayed in schools. Literature shows that the likelihood of being food insecure decreases as the number of years a household head stayed in schools increases (Haile et al., 2005). The assumption is that education equips individuals with the necessary knowledge of how to make a living. That is, literate individuals are keen to get information and use it (Bogale and Shimelis, 2009). In other words, educated producers are able to read manuals and other extension materials, accessible to information through media and can communicate with extension services (Sodjinou et al., 2015). In this paper too, we expect a negative influence of education of household head on the probability of being food insecure.

Off-farm Income (continuous) (Off-farm): This is a continuous variable measured in Eth birr. Literature shows that the likelihood of being food insecure decreases as access to and earning of money through off-farm income increases (Omotesho et al., 2006; Bogale and Shimelis, 2009). Following this assumption of general literature, we also proposed that off-farm income has negative relationship with food insecurity. The idea is that as households have more and more access to and practice of these activities, their likelihood of being food insecure will decrease.

Dependence on Wild Foods (dummy) (WEFs): This refers to gathering and hunting wild foods by households. Although no literature was found that analyzed WEFs as a determinant of food insecurity, literature shows their contribution to household food security (Debela et al., 2011; Agea et al., 2011; Guyu, 2015) and to household resilience to food insecurity (Guyu and Muluneh, 2015b). Accordingly, WEFs is hypothesized to influence food insecurity negatively in

the study area. The assumption is that households can compensate food shortages by gathering and hunting wild foods. In other words, households that are more involved in gathering and hunting WEFs improve their food security than those who depend less on them.

Livestock Possession (continuous) (TLU): Literature shows that livestock possession has negative influence on household food insecurity (Messay, 2009b). The idea is that livestock can be sold in order to purchase food during food shortages (Bogale and Shimelis, 2009). Following this, it is expected to have a negative influence on household food insecurity in our study area.

Participation in Labor Unions (dummy) (LBRUPTC): This refers to whether household members participated in labor union, locally known as *wenfel* or *debo*. It is expected to influence household food insecurity negatively. The assumption is that households that work together through such local labor unions are less likely to be food insecure than those who do not.

Ethno-culture Background (dummy) (ETHCBGD): This refers to whether households belong to indigenous or non-indigenous ethnic group (Guyu, 2015). It is expected that the probability of being food insecure increases for indigenous than the non-indigenous ethno-culture group. Accordingly, being indigenous ethno-culture group is hypothesized to have positive influence on household food insecurity in our study area.

Age of Household Head (continuous) (AGEHH): Age of household head is expected to influence household food security. Nevertheless, there is no general consensus as to the direction of the influence of age on food security in literature. For example, Sodjinou et al. (2015) argue that the relationship between farmers' age and the decision to adopt an innovation or technology is not clear in the literature. Some argue that a one year increase in age of household head increases the probability of being food secure (Bogal and Shimelis, 2009). Proponents of this argument assert that age of household head is negatively related with food insecurity for various reasons. Rural households mostly devote their lifetime or base their livelihoods on agriculture. The older the household head has more experience in farming and weather forecasting. Moreover, older persons are more risk averters, and mostly they tend to diversify their production activities. As a result, the chance for such a household to be food insecure is less. In addition, in a household where productive age groups are higher than the non-productive age groups, the probability of a household to face food shortage would be less, provided that the area provides

good working atmosphere and production potential (Bogal and Shimelis, 2009). In contrast, others argue that it is positively related with household food security. That means, a one year increase in the age of household head decreases the chances of being food insecure (Bashir et al., 2012; Aidoo et al., 2013). The proponents of this argument assert that the direct relationship between age of household head and food security is due to the fact that the younger people are stronger than the elderly and can perform tougher jobs in the field. Moreover, households with older heads are the multigenerational households having more retired and/or older persons to feed (Bashir et al., 2012). Based on the general observation of the study area, we expect a negative influence of age of household head on food insecurity as at least older age is associated with adequate experiences than younger one.

Health Condition of Household Members (continuous) (HEALTH): This variable refers to the frequency of illness or sickness of members of a household during the year. This variable is expected to influence food insecurity positively in the study area. It is assumed that the more frequently the household members get sick, the more they will become food insecure and vice versa.

Aggregate Agricultural Production (continuous) (AGRPD): This refers to the total amount of crop production (measured in kg) obtained by a household without considering the deductions through selling, seed reserves, losses due to attacks by rodents, insects, etc. In principle, it should consist of both crop and livestock production. However, in this study the outputs of various crops alone are considered as livestock in TLU were taken as another variable in the model. Literature shows a disagreement as to the direction of the influence of this variable on food insecurity. Some show that aggregate production has a positive influence on household food insecurity through the price effect (e.g., Shiferaw et al., 2003). The assumption is that an increase in aggregate production causes price to fall and hence those households whose income is dependent on food crops face a fall in farm income. The higher the market supply, the lower the price and the higher the loss of producer revenue in the case of inelastic demand (Foster, 1992 cited in Shiferaw et al., 2003). Others show it has a negative influence on household food insecurity perhaps without considering the price effect in the model (Haile et al., 2005). We also expect a negative influence of this variable on food insecurity as we do not consider the price effects because farm households in the study area are not entirely dependent on sell of crop yield as a source of income.

Oxen Possession (continuous) (Ox): Literature shows that oxen possession has a negative influence on agricultural production in general as they are important means of tillage and allow producers to sow large area (Sodjinou et al., 2015) and food insecurity in particular (Messay, 2009b). The assumption is that households who possess more oxen are less likely to be food insecure than those who possess either less or no ox. In this paper too, we expect that possession of oxen has negative influence on the probability of being food insecure.

Farming System (dummy) (FARMSTM): Farming system may mean different systems for different authors. For example, for Shiiferaw et al. (2003) it refers to classifying the system based on a combination of crops produced so that they grouped farming system as cereal-based and cereal-enset-based system (Shiiferaw et al., 2003). For others, it refers to the division of farming into shifting cultivation and permanent field farming systems (Beyene et al., 2011). FAO (2001) defines *farming system* as a population of individual farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate (FAO, 2001). It should be noted that a *farm system* refers to a household, its resources, and the resource flows and interactions at this individual farm level so that depending on the scale of the analysis, a farming system can encompass a few dozen or many millions of households. Accordingly, farming systems can be divided into irrigated farming systems, wetland rice based farming systems, rain-fed farming systems in humid areas of high resource potentials, rain-fed farming systems in steep and highland areas and rain-fed farming systems in dry and cold low potential areas, dualistic (mixed large commercial and small holder) farming systems, coastal artisanal fishing, often mixed farming systems, and urban based farming systems (FAO, 2001). In this paper, the definition of farming system refers to whether farming is hoe-based or oxen-based system. It is hypothesized that households which were based on hoe-farming system were likely to become more food insecure than households who were based on oxen-farming system.

Extravagant Consumption (dummy) (EXTRVGC): This refers to the post harvest overconsumption of agricultural outputs through different pretexts, the notable ones being traditional festivals, guest hosting, and labor unions mainly by the indigenous people of the study area. We expect extravagant consumption to have a negative influence on household food

insecurity in the study area. The assumption is that the more households consume in post harvest period through different pretexts, the more likely they will be food insecure.

Aspiration for Change & Wealth (ASPR): Aspirations (or the capacity to aspire) refers to the manner in which people visualize the future and engage in forward-looking behavior (Appadurai, 2001; Rao and Walton, 2002 cited in Frankenberger et al., 2007). This is the capacity of households that conditions the preferences, choices and calculations of individuals/groups as well as the relationships they form with one another (Frankenberger et al., 2007). We hypothesize that aspiration has negative influence on household food insecurity. The assumption is that households who aspire to change their living conditions into better ones will work day and night and become wealthy and food secure and are less likely to become food insecure.

Results and Discussion

Dietary Supply (kcal) of Surveyed Households

The descriptive statistics of food intake of surveyed households in terms of kcal are presented in Table 1. The study revealed that household had average food intake of 1766.56kcal/ADE/day with standard deviation (STD) of 1440.06kcal/ADE/day. Previous studies conducted in central Ethiopia (Shewa), where population density is high and land fragmentation is much more than the GFB the average kcal intake was about 4726kcal/ADE/day (Messay, 2009a). Previous study conducted in Bullen district (located in BGR and hence in the GFB in Northwestern Ethiopia, showed an average food intake of about 2319.02kcal/ADE/day (Guyu, 2014). While the former clearly shows that the average food intake is much lower than the non-green areas, the later implies that food insecurity has been worsened in the GFB as the study was conducted in the same region. There were also differences between the food secure and food insecure groups in their average kcal intakes. As expected, the average food intake was larger for food secure households (3550.2kcal/ADE/day) than the food secure ones (1066.7kcal/ADE/day). As with our prior expectation, the average food intake was also larger for non-indigenous group (1994.64kcal/ADE/day) than the indigenous ones (1579.95kcal/ADE/day). The study also showed higher diversity in food intake among household in the food secure group (STD = 1546.5) than in food insecure group (STD = 462.8) and among the non-indigenous group (STD = 1590.82) than the indigenous group (STD = 1280.56). This contrasts to the previous study in Bullen district where the mean kcal intake of households in the indigenous ethno-culture areas

(i.e. the Gumuz) was higher (1674.16kcal/ADE/day) than in the non-Gumuz ethno-culture areas (1399.28kcal/ADE/day) (Guyu, 2014). This shows that severe food shortage is not necessarily the feature of indigenous households.

Table 1 Descriptive statistics of kcal supply by Food Security Status and Ethno-culture Group

Kcal/ ADE/day	Food Security Status			Ethno-culture Group		
	Food-insecure	Food-secure	Both	Non-indig.	Indig.	Both
Total	168530.6	220112.5	388643.02	197469.29	191173.73	388643.02
Minimum	0.01	2107.9	0.01	65.01	0.01	0.01
Maximum	2069.1	8899.48	8899.48	8028.20	8899.48	8899.48
Average	1066.7	3550.2	1766.56	1994.64	1579.95	1766.56
STD	462.8	1546.5	1440.06	1590.82	1280.56	1440.06

Food Security Status of Surveyed Households

The food security status of households by ethno-culture groups is presented in Table 2. Overall, about 71.8% of surveyed households were food insecure. This result is very high by standards of some countries in Africa including Ethiopia. For example, in Kwara state, Nigeria 75% of surveyed households was food insecure (Omotesho et al., 2006). Similarly, it is alarmingly larger than the national level incidence of undernourishment indicated in FAO's previous study in Ethiopia that shows 41% in 2005-2007 and 28 % in 2009/10 (FAO, 2010). It is almost similar with the finding in previous study conducted in Oromiya zone (Wollo) where drought is frequent. Here, about 81% and 74% of households felt food insecure and were food non-sufficient (Degefa, 2005). Likewise, this finding is almost similar with previous study conducted in Arsi zone (Dodota district) in central eastern Ethiopia that showed about 79% of food insecure households (Haile et al., 2005), an area characterized by low rainfall distribution (Haile et al., 2005). Moreover, the finding is much more than a previous study conducted in the central part of Ethiopia (i.e. Nonno district in Oromya region), an area characterized by high population density and land fragmentation, which showed about 21% of food insecure households (Messay, 2013). Within the 'green famine' belt of Ethiopia (specifically in BGR), previous studies showed larger proportions of food insecure households than this one. For example, previous study conducted at household level in Bullen district showed about 58% of food insecure households (Guyu 2014). A parallel study that assessed resilience-vulnerability continuum in Belo-jiganfoy district

revealed about 65% of food insecure households (Guyu and Muluneh, 2015a). The same study revealed that if the moderately food secure households on the continuum were considered as food insecure, the percent of food insecure households would have reached at 80 % (Guyu and Muluneh, 2015a). Out of the total food insecure households, 46.8% and 53.2% were indigenous and non-indigenous ethno-culture groups respectively as compared to 58.2% and 41.8% of food insecure households respectively. Moreover, 24% and 76% of indigenous households were food secure and food insecure respectively as opposed to 33.3% and 66.7% of non-indigenous households respectively. In general, this study shows that food insecurity in our study area (i.e. GFB) was at least similar with, otherwise more severe than, that of the drought-prone and high population density areas of Ethiopia. The overall implication of these results is that the depth and severity of food insecurity in the GFB of Ethiopia was severe as in the drought-prone and high population pressure areas. It is more severe for the indigenous households than the non-indigenous ones. But, it should be understood that the nature of food insecurity is seasonal in the ‘green famine’ belt while it is chronic in the non-green famine areas of the country.

Table 2 Distribution of Household Food Security Status by Ethno-culture Group

Food Security Status	Type of Information	Ethno-culture Group		Total
		Indigenous	Non-indigenous	
Food-secure	Count	29	33	62
	% within FSS-of -hh	46.8%	53.2%	100.0%
	% within Ethno-culture Group	24.0%	33.3%	28.2%
	% of Total	13.2%	15.0%	28.2%
Food-insecure	Count	92	66	158
	% within FSS-of -hh	58.2%	41.8%	100.0%
	% within Ethno-culture Group	76.0%	66.7%	71.8%
	% of Total	41.8%	30.0%	71.8%
Both	Count	121	99	220
	% within FSS-of -hh	55.0%	45.0%	100.0%
	% within Ethno-culture Group	100.0%	100.0%	100.0%
	% of Total	55.0%	45.0%	100.0%

Determinants of Household Food Insecurity

Descriptive Results of Hypothesized Variables

Descriptive statistics of hypothesized variables are summarized in Table 3. The mean household size of food insecure households (4.45ADE) was larger than that of food secure households (4.20ADE). The mean difference in the household size between the two groups was statistically significant ($p < 0.01$). The negative sign of the t-value shows the inverse relationship between household size and the probability of being food secure. In contrast, the average cultivated land size of food insecure households (4.11ha) was smaller than that of food secure households (5.52ha) showing statistically significant mean difference between them ($p < 0.01$) and positive relationship between land size and household's probability of being food secure. The mean year of household head education of the food insecure households (2.59 year) was much lower than that of the food secure households (4.26 years) and the mean difference between the two groups was significant with $p < 0.01$ and positive relationship. Average livestock possession was smaller for food insecure households (1.08TLU) than for food secure households (2.04TLU) showing statistically significant difference ($p < 0.01$). In contrast, the average off-farm income was larger for food insecure households (2835.3 birr) than for food secure households (1766.8 birr) showing statistically significant difference at $p < 0.05$. This is indeed because off-farm earning was fundamentally the feature of food insecure household. Similarly, the mean age of food insecure households (39.55 years) was relatively higher than that of food secure households (35.18 years) showing statistically significant differences at $p < 0.05$. The average number of days a household had slept due to sickness (the indicator of the health condition) for food insecure households (10.01days) was relatively higher than for food secure households (9.00 days) but the mean difference was not statistically significant at $p < 0.1$. The mean aggregate production for food insecure households (2309.5kg) was much smaller than for food secure households (4630.2kg) with statistically significant difference at $p < 0.01$. Likewise, the mean number of oxen possessed by food insecure households (0.49) was smaller than the food secure households (0.73) but not significant at $p < 0.1$.

About 13% of respondents had access to and used small scale irrigation, with about 7% for food secure and 6% for food secure households. Their mean difference was statistically significant at $p < 0.05$. Almost 59% of households reported their dependence on one or more types of wild

foods. Out of this, about 45% were food insecure while 14% were food secure households with statistically significant mean difference at $p < 0.1$. Out of 64.5% of households who engaged in labor unions, 50% belongs to food insecure while 14.5% belongs to food secure households. Their mean difference was significant at $p < 0.05$. Out of 55% of households in the indigenous ethno-culture group contacted during survey, about 42% was food insecure while 13% was food secure, but their mean difference was statistically insignificant at $p < 0.1$. As a whole, 70% of the respondents employed hoe-based farming system, with about 56% food insecure and 14% food secure. Indeed, their mean difference was highly significant ($p < 0.01$). Almost 63% of respondents reported extravagant consumption as a cause of food insecurity. Of this, about 43% belongs to food insecure and 20% belongs to food secure and their mean difference was not statistically significant at $p < 0.1$. Finally, about 46% of respondents reported that they had been aspiring for change and become wealthy. Out of this, almost 43% belongs to food insecure households and 20% belongs to food secure households.

Table 3 Descriptive Statistics of the Variables Included in the Model

Variable	Food Insecure		Food Secure		Both		t-value
	Mean	STD	Mean	STD	Mean	STD	
HHSZ(ADE)	4.45	1.69	3.55	1.35	4.20	1.65	3.726***
LCULTD(ha)	4.11	2.64	5.52	5.13	4.50	3.57	-2.675***
HEDUY(year)	2.59	3.47	4.26	3.95	3.06	3.68	-3.083***
Off-farm inc.(Eth.Br.)	2835	3117	1767	1999	2534	2883	2.503***
Livestock (TLU)	1.08	1.99	2.04	3.01	1.35	2.36	-2.779**
AGEHH (year)	39.55	12.61	35.18	11.97	38.32	12.56	2.347***
HEALTH(number)	10.01	9.73	9.00	8.57	9.72	9.41	0.713
AGRPRD (kg/hh)	2309.5	1620.1	4630.2	2681.5	2963.5	2231.5	-7.839***
OX (number)	0.49	1.24	0.73	1.16	0.55	1.217	-1.310
% of Responded to given choices for the dummy variables in parentheses							Chi-sq.
IRRUSE (yes)	6.8		5.5		12.3		4.022**
WEFs ((yes)	45.0		14.1		59.1		2.951*
LBRU (yes)	50.0		14.5		64.5		6.309**
ETHNCB (indig.)	41.8		13.2		55.0		2.360
FARNSTM (Hoe)	55.9		14.1		70.0		16.444***
EXTRVGC (yes)	43.2		20.0		63.2		2.250
ASPR (yes)	31.8		14.1		45.9		0.582

***, ** and * refers to statistically significant at <1%, 5% and 10% respectively

Statistical tests used: t-test for continuous and Pearson chi-square for dummy variables.

Regression Results of Determinants Influencing Household Food Insecurity

The result of the binary logistic regression revealed that out of 16 hypothesized variables, 7 were statistically most significant at <10% level (Table 4). These include household size, use of small scale irrigation, household head education, participation in labor union, aggregate production, farming system, and extravagant consumption. It does not mean that all the remaining 8 determinants had no influence on food insecurity. Health condition, ethno-culture background and age of household head were the most insignificant factors. Others had moderate effect on household food insecurity. Especially, oxen ownership had moderate influence at almost 10% level ($p = 0.116$) while aspiration for change & wealth ($p = 0.174$), and dependence on wild foods ($p = 0.162$) were the next moderate influencers at <20% level. Size of cultivated land ($p = 0.334$) and livestock possession ($p = 0.297$) can be regarded to have influenced food insecurity moderately at <35% level.

Model Characteristics

The model produced by the binary logistic regression was checked for goodness of fit by using different methods and statistics. In all standards, the model was found appropriate and well fitted the data employed (Table 4). For selection of significant factors, first the regression analysis was run using forward stepwise likelihood ratio (Forward-LR) method. This showed seven significant variables at $p < 0.10$ level. Both the change in -2 Likelihood ratio and Wald statistics were in agreement in showing that each predictor was useful to the model. Moreover, the Omnibus chi-square statistic test was significant. The Hosmer and Lemeshow (H-L) chi-square statistic test for the model was 8.379 ($p = 397$). Then, as we were interested in those factors which were significant at $p < 0.10$, we re-run the binary logistic regression using enter method. We found no difference in the type of significant variables and proceeded with further analysis. The H-L chi-square test statistic as indicated by the enter method was 12.341 ($p = 0.137$). Both methods were in agreement with each other and showed that the model adequately fitted the data because the p-value of both methods was greater than 0.05 which, as suggested by SPSS, shows a significant model fit. The pseudo R^2 statistic was 0.668 showing that almost 67% of the likelihood of a household being food insecure was strongly explained by the predictors in the model. Moreover, the logistic regression model predicted about 88% of the total variation in the food security status of surveyed households while such predictive capacities were almost 94% and 76% for food

insecure and food secure households. The chi-square statistic shows that the parameters included in the model were significantly different from zero at $p < 0.10$ level. This shows that the probability of households' being food insecure was generally related to the predictors in the model so that we can proceed to present and interpret the results.

Table 4 Results of Binary Regression showing Parameters Estimating the Effects of Determinants

Variable	B	S.E.	Wald	Sig.	Exp(B)
Household Size (ADE)	1.528	.296	26.744***	.000	4.611
Land Cultivated (ha)	-.120	.124	.935	.334	.887
Irrigation Use (yes/no)	-1.795	.782	5.268**	.022	.166
Household Education (year)	-.226	.076	8.862***	.003	.797
Dependence on WEFs (yes/no)	.915	.655	1.952	.162	2.498
Livestock possession (TLU)	-.157	.150	1.089	.131	1.169
Participation in Labor Union (yes/no)	1.205	.520	5.362**	.021	3.335
Off-farm income (^a Eth. birr)	.005	.012	.178	.678	1.005
Ethno-culture (indigenous/non-indigen.)	.094	.765	.015	.803	1.098
Age of Household Head (year)	.008	.020	.154	.695	1.008
Health Condition (number of days/year)	.002	.028	.006	.938	1.002
Aggregate Production (kg/household)	-.112	.022	25.592***	.000	.894
Oxen Possession (number)	-.402	.256	2.473	.116	.669
Farming Systems (Hoe/oxen-based)	1.410	.655	4.637**	.031	4.096
Extravagant Consumption (yes/no)	-1.226	.574	4.571**	.033	.293
Aspiration for Change & wealth (yes/no)	.793	.584	1.845	.174	2.210
Constant	-1.977	1.222	2.616	.106	.138
Model Prediction success (%)	Overall case predicted				88.6
	Food Insecure				93.7
	Food Secure				75.8
-2 Log-likelihood ratio for the model					124.049
H-L model test (df = 8)					Chi-square = 12.341 (p = 0.137)
Nagelkerke Pseudo R ²					0.668

***, ** and * represents statistically significant at <1%, <5% and <10% respectively.

^a represents US \$1 = 19.45 Eth. birr.

Effects of Demographic Factors on Household Food insecurity

Household size: In line with our prior expectation, the effect of household size on food insecurity was positive ($B = 1.528$) and statistically most significant ($p < 0.01$). *Ceteris paribus*, the odds ratio in favor of being food insecure increased by a factor of 4.611 with an increase in the household size by one member. This result conforms to the theory of Malthus (1798) that argues that large population lowers agricultural productivity and food security, but disproves the theory of Boserup (1965) that argues that large family size would increase agricultural productivity through intensification. This is also similar with several previous research findings conducted in developing countries including Ethiopia that showed statistically significant and positive relationship between household size and food insecurity (Shiferaw et al., 2003; Haile et al., 2005; Omotesho et al., 2006; Bogale and Shimelis, 2009; Bashir et al., 2012; Aidoo et al., 2013). The possible explanations to this sort of findings is that in an area where households depend on less productive agricultural land (Bogale and Shimelis, 2009) and/or areas where there is shortage of land or limited access to land and high rate of rural unemployment (Degefa, 2005), increasing household size results in increased demand for food which cannot match with the existing food supply so ultimately ending up with food insecurity. In contrast, the explanation of the finding in our study area (i.e. the GFB) is quite different from the above ones because the situation here is characterized by relatively productive and adequate moisture and is different from the drought-prone and high population pressure areas of Ethiopia. The likely explanation is that many household members would be in their non-productive age and were incapable of contributing their labor. In this regard, the study showed that there were about 97 dependent people per 100 economically active people for the surveyed households. The other possible explanation is that most households reported their dependence on hoe-culture rather than on oxen-plough or other cultivation systems. The survey showed that about 70% of the households depended on hoe-culture which used traditional tool locally known as *sapeta* as main tool for tilling land manually and only 30% of them depended on oxen-culture as main tool for the same purpose. One more justification is that as observation shows many people in the study area were not hard workers rather prefer to pass much of their working days or hours of days in villages drinking alcohols. In such a condition, an increase in household size, obviously affects food insecurity positively.

Age of Household Head: Contrary to our expectation, the influence of the age of household head on food insecurity was positive but not significant at $p < 0.1$ level (Table 4). This means that the

odds ratio in favor of being food insecure increased by a factor of 1.008 with a one year increase in the age of household head. Although its effect was insignificant, the negative sign goes in line with some studies in developing countries (Bashir et al., 2012; Aidoo et al., 2013). The insignificant effect implies that the mean ages of the food insecure and food secure household heads were almost the same.

Effects of Economic, Social and Cultural Factors on Household Food Insecurity

Cultivated land size: Degefa (2005) argues that there should be a positive relationship between access to, and cultivation of land and food security. This argument is proved by many studies in Ethiopia that showed cultivated land size influences household food insecurity negatively and statistically significantly (Shiferaw, 2003; Messay, 2009; Bogale and Shimelis, 2009). This is also true for Nigeria (Omotesho et al., 2006) and for Ghana (Aidoo et al., 2013). Our study also revealed a negative effect of cultivated land size on household food insecurity, which is in line with the general literature, but it was statistically insignificant ($P > 0.10$). This relationship is probably due to the fact that the mean size of cultivated land size possessed by food insecure and food secure households was large in size. As indicated in Table 3, it was 4.11ha and 5.52ha respectively.

Livestock possession: Size of livestock possessed by households was insignificant at $P < 0.10$ level in influencing food insecurity. In fact, its effect should not be underestimated as it had 70% probability of influencing food insecurity ($p < 0.297$). The odds ratio in favor of being food insecure increased by a factor of 1.169 with a decrease in livestock size by 1 TLU. However, contrary to our expectation and the general literature (Bogale and Shimelis, 2009; Messay, 2009b), this factor was positively related with food insecurity ($B = 0.157$). The possible explanation for this is that livestock possession was reported by food insecure households and the type of livestock possessed was mostly chicken and small ruminants, which were generally owned by the poor and food insecure households. The better-offs and food secure households, on the other hand, rather possessed oxen. That is probably why the likelihood of being food insecure for households who had more TLU was more than those who had less or no TLU.

Aggregate production: This variable is oriented towards the availability component of food security and is the main determinant of household food security/insecurity in rural areas of

developing countries (Khan and Gill, 2009). In line with theory and as we expected earlier, the probability of being food insecure was negatively related with ($B = -0.112$), and significantly affected ($p < 0.01$) by, aggregate production. The odds ratio in favor of being food insecure was increased by a factor of 0.894 with an increase in aggregate production by 1kg. This is similar with many previous study in developing countries including Ethiopia which showed that per capita aggregate production had negative and statistically significant influence on household's probability of being food security (Shiferaw et al., 2003; Haile et al., 2005). The possible explanation is that households who produced more aggregate production were less likely to be food insecure than those who produced less.

Oxen possession: While the general theory shows that oxen possession is directly related with wealth and food security of households, some argue that it is only one indicator of wealth (Degefa, 2005). The influence of oxen possession of food insecurity was negative ($B = -0.402$) but statistically insignificant ($P > 0.10$). However, close observation of the probability value (i.e. $p = 0.116$) shows that this variable had almost significant effect on food insecurity at almost 10% level. The odds ratio in favor of the probability of being food insecure decreased by a factor of 0.669 with an increase in one additional ox. This is similar with some studies that showed positive but significant relationship (Haile et al., 2005; Messay, 2009b) although our finding shows insignificant result between oxen possession and food insecurity at $p < 0.1$. The likely explanation of this result is clear that households that has one or more oxen can cultivate more food crops and are less likely to be food insecure that households having less or no an ox.

Education: In theory, education and household food security have direct linkages because, mainly in subsistence farming, literate farm household heads are better than their illiterate counterparts in several ways although the role of indigenous knowledge in realizing food security should not be underestimated (Degefa, 2005). Our finding is in line with this theory because it showed that education of household head influenced household food insecurity negatively ($B = -0.226$) and significantly ($p < 0.01$). The odds ratio in favor of the probability of being food insecure decreased by a factor of 0.797 with one year increase in the level of education. This indicates that households headed by relatively better educated were less likely to be food insecure than those headed by less educated or illiterate ones. This goes in line with some previous studies in Ethiopia and Pakistan which showed statistically significant and positive relationship between level of household head education and the probability of being food secure (Haile et al., 2005;

Bashir et al., 2012). The possible justification is that better educated household heads had better knowledge and skills that enabled them diversify their livelihoods, improve crop productivity, access means of generating income, and easily forecast possible occurrence of food shortages so that they could plan to tackle it.

Off-farm income: The effect of off-farm income on food insecurity was statistically insignificant at $p < .10$. Moreover, contrary to our prior expectation and the general literature that shows negative relationship (Omotesho et al., 2006; Bogale and Shimelis, 2009), it was positively related with household food insecurity ($B = 0.005$). The odds ratio in favor of being food insecure was increased by a factor of 1.005 with an increase in such income by 1 Eth. birr. The likely justification of the positive relationship is that it was the food insecure households that mostly reported their engagement in such activities while the statistically insignificant effect implies that food insecure and food secure households had almost the same level of access to these activities.

Participation in labor union: The effect of this variable on household food insecurity was statistically significant ($p < 0.05$). However, in contrast to our prior expectation, it was positively related with the probability of being food insecure ($B = 1.205$). The odds ratio in favor of the probability of being food insecure increased by a factor of 3.335 with increased participation in labor union. The likely justification for the violation of the expected relationship between participation in labor union and food insecurity is that households were perhaps engaged in such work to cope with food shortages by earning money and buying grains. This is why the mean off-farm income earned by the food insecure households was much more than that of the food secure households (Table 3). Thus, the frequency of participation in labor union increases as the probability of being food insecure increases as opposed its customary assumption.

Health condition: Health condition of households had insignificant and, as our prior expectation, positive effect on household food insecurity. Despite its insignificant influence on food insecurity, observation of the study area shows that household members were frequently sick of mainly malaria.

Aspiration: Research shows that households that more aspire to become wealthy and desire to change their means of livelihoods are more likely to be self resilient and food secure than those

who do not (Frankenberger et al., 2007). Although aspiration had insignificant effect on food insecurity at $p < 0.10$, contrary to our expectation, it had positive influence on the probability of being food insecure ($B = 0.793$). It should be noted that its effect on the household's probability of being food insecure was about 80% ($p = 0.174$). The odds ratio in favor of the probability of being food insecure increased by a factor of 2.210 with increased level of aspiration by one unit. The possible justification for the positive relationship between aspiration and food insecurity is that households were likely to aspire more and more as they become more and more food insecure.

Dependence on Wild foods: Literature generally shows that wild foods contribute enormously to household food security if they depend on it (Agea et al., 2011; Bharucha and Pretty, 2010; Tilahun and Miruts, 2010). Although insignificant at $p < 0.10$ level, the effect of wild foods on household food insecurity was positive, which contrasts our prior expectation and the general literature. Its effect on household probability of being food insecure should not be underestimated as it was almost 85% ($p = 0.162$). The odds ratio in favor of the probability of being food insecure increased by a factor of 2.498 with increased dependence on wild foods. The likely explanation for positive linkage between food insecurity and wild foods is that perhaps households were engaged more and more in wild food gathering and hunting when they become more and more food insecure.

Ethno-culture background: The effect of ethno-culture background on household food insecurity was insignificant at $P < 0.10$. Nevertheless, as expected earlier the probability of being food insecure was directly associated with indigenous ethno-culture group as shown by the positive coefficient ($B = 0.094$), which is almost similar with Guyu (2014). The insignificant level of influence shows that the probability of being food insecure was almost similar for indigenous and non-indigenous ethno-culture groups. This had happened over longer time period probably as a result of continued interactions between the two ethno-cultures.

Extravagant consumption: As expected earlier, extravagant consumption had negative ($B = -1.226$) and significant influence on household food insecurity. Also, extravagant consumption influenced the probability of being food insecure significantly ($p < 0.05$) in the study area. The odds ratio in favor of the probability of being food insecure decreased by a factor of 0.293 with increased extravagant consumption. The possible explanation is that households that consume

more grains with pretext to traditional festivals, labor unions and gusts were the well-off ones who had more grain stock.

Effects of Technological Factors on Household Food Insecurity

Irrigation use: The effect of use of small-scale irrigation on household food insecurity was statistically significant ($p < 0.05$) and negative ($B = -1.795$). The odds ratio in favor of the probability of being food insecure decreased by a factor of 0.166 with an increased access to and use of small-scale irrigation by a household. This goes in line with the findings of many previous studies conducted in Ethiopia and showed statistically significant and negative relationships between irrigation use and household food insecurity (Degefa 2005; Bogale and Shimelis, 2009). The possible explanation is that although there is adequate rainfall in western Ethiopia (i.e. the GFB), access to and use of small-scale irrigation enabled households to produce twice a year. This increased access to both income and food from crop production through irrigation especially during times of crop failures.

Farming system: In line with our prior expectation, the effect of farming system on household food insecurity was positive ($B = 1.410$) and statistically significant ($p < 0.5$). The odds ratio in favor of the probability of being food insecure increased by a factor of 4.096 with increased use of hoe-based farming system. In other words, the probability being food insecure for households who were based on hoe-culture as a farming system was 4.096 times more than those who were based on oxen-culture. The likely justification is that as hoe-based farming system is most traditional system of production, households who depended on it might not produced sufficient crop that could support their members throughout the year. In this regard, many households (mainly indigenous ones) in the study area heavily depended on hoe-based farming system.

Conclusion

The objective of this study was to examine the factors determining household food insecurity in the GFB of Ethiopia. Literature in the field of food insecurity has focused almost entirely on the *non-green famine* areas. Our study, however, focused on the determinants of food insecurity in the GFB in order to contribute to the scholarly efforts towards a full-fledged knowledge about food security. In Ethiopia, economic growth has been accelerated especially over the first Growth and Transformation Plan period lasted between 2010/11 and 2014/15 showing two digit

persistent growth. Despite this fact, food insecurity, termed as ‘green famine’, has persisted over the same period in the GFB. Indeed, this is partly proved by our study that showed almost 72% of the surveyed households were vulnerable to the ‘green famine’. In addition, a number of previous studies in different districts of Benishangul-gumuz region, which is in turn located in the GFB, confirmed the persistence of food insecurity (Dagnachew, 2004; Guyu, 2012, 2014, 2015; Guyu and Muluneh, 2015a). Thus, future policy and research interventions that aims at, tackling the challenges of ‘green famine’ and building resilience capacity of households in GFB in particular and, achieving the overall national objectives of food security requires understanding of the main determinants of food insecurity. Our study revealed that households that, had larger household size, did not have access to irrigation, were illiterate, participated in labor union, had less aggregate production, depended on hoe-based farming system, and characterized by low extravagant consumption were more likely to be food insecure than their counterparts. Moreover, the influence of cultivated land size, wild foods, livestock in general and oxen possession in particular, and aspiration for change and wealth should be considered because they had moderate effect on food insecurity (Table 4). Thus, we conclude that not only demographic, but also socioeconomic and technological, factors were affecting household food insecurity in the study area. Therefore, we recommend that while policy interventions may focus on these most significant determinants, they may also deal with those having moderate effects. Empirical research interventions that further explores the natural resource bases of the GFB and the trend in the level of rainfall so that whether there are drought in the region should be conducted.

Reference

- Agea J., KImondo J. and Okia C. (2011). Contribution of Wild Edible Food Plants to Overall Household Diet in Bunyoro-Kitara Kingdom, Uganda, *Agricultural Journal*, 6 (4), 134-144.
- Agence France-Press [AFP] (2008). Ethiopia’s ‘Green Famine’ Takes Its Toll, ASP. <http://www.google.com/hostednews/afp/article/ALeqM5gSfDVZBXkurtaxUxzyd1NhaGKA>
- Aidoo A. Mensah J. and Tuffour T. (2013). Determinants of Household Food Security in the Sekyere-Afram Plains District of Ghana, 1st Annual International Interdisciplinary Conference Proceedings, pp. 514-521, *AiIC 2013*, 24-26 April, 2013, Azores, Portugal.
- Alemayehu Lerenso (2001). Food Security and Rural Vulnerability in Ethiopia: A Development Perspective. *Ethiopian e-Journal for Research and Innovation Foresight* 4(1), 49-62

- Bashir M., Schilizzi S. and Pandit R. (2012). The Determinants of Rural Household Food security: The Case of Landless Households of the Punjab, Pakistan, Working Paper 1208, School of Agricultural and Resource Economics, University of Western Australia, Crawley, Australia.
- Beyene Teklu, Tegene Negesse and Ayana Angassa (2011). Effect of farming systems on livestock feed resources and feeding systems in Benishangul-Gumuz region, western Ethiopia. *International Research Journal of Agricultural Science and Soil Science* 1(1), 20-28
- BGR (2010). Benishangul-gumuz Region (BGR) Government's Villagization Programme Implementation Guideline; September, 2010, Assosa; Translated from the Amharic Version
- BGRFSS (2004). Food Security Strategy of Benishangul-gumuz region, Benishangul-gumuz Region Food Security Strategy (BGRFSS), Assosa, Ethiopia
- Bharucha Z. and Pretty J. (2010). The Role and Values of Wild Foods in agricultural systems; *Philosophical Transaction, Royal Society, Biological Sciences*, 365: 2913 – 2926
- Bogale A and Shimelis A (2009). Household level determinants of food insecurity in rural areas of Dire Dawa, Eastern Ethiopia. *African Journal of Food and Agriculture, Nutrition and Development* 9(9), 1914-1926
- Boserup E. (1965).The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure: *Earthscan Publication Ltd, London*
- Canali and Slaviero (2010).Food Insecurity and Risk Management of Smallholder Farming Systems in Ethiopia; European IFSA Symposium, Veinna, Austria
- Dagnachew Anberbir (2004) Generic Agri-service Delivery and Farmers' Differences: The Case of the Natives and Resettled Farmers of Assosa Woreda. Unpublished MA Thesis, Addis Ababa University, Ethiopia
- Debela Hunde, Njoka J., Zemedede Asfaw and Nyangito M. (2011). Seasonal availability and consumption of wild edible plants in semiarid Ethiopia: Implications to food security and climate change adaptation. *Journal of Horticulture and Forestry* 3(5), 138-149
- Degefa Tolossa (1996). Belg Crop Production as a Strategy of Households' Food Security: A Comparative Study of Belg Grower and Non-Belg Farmers in Munessa Wereda, Arsi Zone. Unpublished MA Thesis, Addis Ababa University
- Degefa Tolossa (2005).Rural livelihoods, poverty and food insecurity in Ethiopia, A case study at Erenssa and Garbi communities in Oromiya Zone, Amhara National Regional State, PhD Dissertation, Norwegian University of Science and Technology, NTNU, Trondheim.

- Dessalegn Rahmato (1988). Settlement and Resettlement in Metekel, Western Ethiopia; Reviewed work, In: e l'Oriente, Anno 43, No. 1, (MARZO 1988), pp 14 -34, IsIAO. Stable at URL: <http://www.jstor.org/stable/40760225>
- Devereux S. (2000a) Food Insecurity in Ethiopia: A Discussion Paper for DFID, IDS, Sussex.
- Devereux S. (2001). Sen's Entitlement Approach: Critiques and Counter-critiques. *Oxford Development Studies, Vol. 29, No. 3, pp. 245 - 264*
- FAO (2001). Farming Systems and Poverty: Improving Farmers' Livelihoods in a Changing world. Food and Agricultural Organization (FAO) and World Bank, Washington DC
- FAO (2010). The Status of Food Insecurity in the World: Addressing Food Insecurity in a Protracted Crises. Food and Agricultural Organization (FAO) of the United Nations, Rome.
- FAO-WFP (2014). The State of World Food Insecurity in the World. FAO and Agricultural Organization of the United Nations (FAO). FAO-WFP, Rome.
- Frankenberger T., Sutter P, Amdissa Teshome, Alemtsehay Abera, Mulugeta Tefera, Moges Tefera, Alemayehu Seyoum, Bernard T, Spangler T and Teshewamebrat Ejigsemahu (2007) Ethiopia: The Path to Self-resiliency. Volume I: Final Report. *CHF – Partners in Rural Development on behalf of the Canadian Network of NGOs in Ethiopia (CANGO)*.
- Gross R., Schoeneberger H., Pfeifer H. and Preuss H. (2000) The Four Dimensions of Food and Nutrition Security: Definitions and Concepts; FAO-Nutrition and Food Security.
- Guyu Ferede (2012). Voluntary Villagization Scheme (VVS) for Transforming Semi-pastoral Communities in Benishangul-Gumuz Region, Northwestern Ethiopia: Challenges and Local Development Indicators, *Journal of Sustainable Development in Africa, Vol. 14, No.5, PP.162 – 196*.
- Guyu Ferede (2014). Ethno-culture Disparity in Food Insecurity Status: The Case of Bullen District, Benishangul-gumuz Regional State, Ethiopia. *African Journal of Food Science 8.2: 54 – 63*
- Guyu Ferede (2015). Household Vulnerability to Green Famine: Component Based Analysis of Indicators in Belo-jiganfoy District (Case Study Area), Benishangul-Gumuz Region, Ethiopia. *Applied Science Reports, 9(3), 139-156*
- Guyu Ferede and Muluneh Wold-tsadik (2015a) Household Resilience to Seasonal Food Insecurity: Dimensions and Magnitudes in the “Green Famine” Belt of Ethiopia. *Applied Science Reports, 11(3), 125-143*

- Haile, H., Alemu, Z.. and Kudhlande, G. (2005) Caused of Household Food Insecurity in Koredegaga Peasant Association, Oromiya, Ethiopia. Working Paper. Faculty of Natural and Agricultural Sciences, Department of Agricultural Economics, University of the Free State, South Africa.
- IMF (2014) The Federal Democratic republic of Ethiopia. Selected issues. International Monetary Fund, Washington DC.
- Karl L. (2011) Binary Logistic Regression with PASW/SPSS. Logistic SPSS Document.
- Khan R. and Gill R. (2009) Determinants of Food Security in Rural Areas of Pakistan. The paper was presented in National Conference on Socio-Economic Stability in Pakistan. February 16-17, 2009 at Sarhad University of Science and Technology, Peshawar, Pakistan.
- Malthus T. (1798). An essay on the principle of population. Wrigley and David Souden (eds.). *The Works of Thomas Robert Malthus*. Volume 1. London: William Pickering.
- Messay Mulugeta (2009a) Challenges and Opportunities of Voluntary Resettlement Schemes in Ethiopia: A Case from Jiru Gamachu Resettlement Village, Nonno District, Central Ethiopia. *Journal of Sustainable Development in Africa*, 11(3), 83 – 102.
- Messay Mulugeta (2009b) Causes of Rural Household Food Insecurity: A Case from Kuyu District, Central Ethiopia. *Journal of Sustainable Development in Africa*, 11(4), 286 – 304.
- Messay Mulugeta (2013) Resettlement and Food Security Nexus in Ethiopia: A Case Study from Nonno District. PhD Dissertation Published by LAMBERT Academic Publishers, Germany
- MoFED (2008) Dynamics of Poverty and Growth in Ethiopia (1995/96 – 2004/05), Ministry of Finance and Economic Development, Addis Ababa, Ethiopia
- Mulugeta Lolamo (2014). Green Famine in Ethiopia: Understanding the Causes of Increasing Vulnerability to food Insecurity and Policy Responses in the Southern Ethiopian Highlands, PhD Dissertation, University of Sussex,
- Omotesho O., Adewumi M. Muhammad-Lawal A. and Ayinde O. (2006) Determinants of Food Security among the Rural Farming Households I Kwara State, Nigeria. *African Journal of General Agriculture*, 2(1), 7-15
- Shiferaw Bekele, Kimer R. and Gladwin C. (2003). Determinants of Food security in Southern Ethiopia. A Paper Presented at the 2003 American Agricultural Economics Association Meetings in Montreal, Canada
- Sodjinou E., Glin L., Nicolay G., Tovignan S. and Hinvi J. (2015) Socioeconomic Determinants of Organic Cotton Adoption in Benin, West Africa. *Agricultural and Food Economics*, 3(12)

Tilahun Teklehaymanot and Mirutse Gidey (2010).Ethnobotanical study of Wild Edible Plants of Kara and Kwego Semi-pastoralist People in Lower Omo river Valley, Debub Omo Zone, SNNP, Ethiopia, Journal of *Ethnobiology and ethnomedicine*, 6(13).

USAID (2004) Breaking the Cycle of Food Crisis: Famine Prevention in Ethiopia, United States Agency for International Development. The Mitchel Group, Inc. (TMC)

4. *'Green Famine': Underlying Shocks and Stresses Triggering Household Vulnerability in the 'Green Famine' Belt of Ethiopia*

¹Guyu Ferede and ²Muluneh Woldetsadik

Ready to be submitted to journals

¹Correspondence

E-mail: guyu_f@yahoo.com

Cell phone: +251-9-12-19-42-72

Department of Geography and Environmental Studies

Addis Ababa University, Ethiopia

²Supervisor

Department of Geography and Environmental Studies

Addis Ababa University, Ethiopia

Abstract

Although several attempts have been made to study food insecurity, less research that explores the shocks and stresses that trigger food insecurity (a proxy indicator of green famine) in the ‘green famine’ belt (GFB) of Ethiopia. This article was aimed at exploring the main shocks and stresses that triggered green famine in the GFB of Ethiopia taking Belo-jiganfoy district as case study area. It also identified the most significant factors of the underlying shocks/stresses. For this purpose, descriptive and logistic models were employed to analyze the data collected through cross-sectional survey of 220 sample farm households. While the former model is used to explore and categorize the shocks/stresses, the latter is used to examine the most statistically significant variables. The result revealed that climate-induced, biophysical, economic, social, demographic, and culture, induced shocks and stresses triggered household food insecurity in the study area. Nonetheless, factors such as heavy wind, wild animal attack, rat plague, literacy of household head, poverty, and child dependency were most statistically significant variable of the underlying shocks/stresses in triggering ‘green famine’. This shows that drought never caused ‘green famine’ shock although other climate/weather related factors contributed to the shock. Therefore, a policy measure should focus on these most important variables while considering all others when attempting to address the impacts of these shocks.

Keywords: Food insecurity/green famine, shock/stress, green famine belt, Ethiopia

Background

History shows that Ethiopia is a typical nation in the Sub Sahara Africa (SSA) that has suffered a lot from famine and food insecurity shocks perhaps since 250 BC (Pankhurst, 1985). Since then, famine has perhaps caused deaths of millions of Ethiopians and destruction of livelihoods of many more people in the country. Although Pankhurst (1985) can be regarded as a pioneering author who documented the detailed account of the history of famines prior to the 20th c in the country (Degefa, 2005), many other writers have also documented the major famine events and their causes and consequences (Sen, 1981; Mesfin, 1984; Devereux, 2000b; Degefa, 2005; Mulugeta, 2014). Literature also shows major famine events that recur after every 7 – 10 years over last 20thc and this seems to have continued in 21st c. For example, Degefa (2005) and Mulugeta, (2014) reviewed and documented 3 and 10 such famines respectively that had occurred since 1950s.

The causes of historical famines in Ethiopia are generally attributed to droughts due to sustained moisture stresses. Nevertheless, drought-induced famines can be exacerbated by conflicts and war in certain occasions. This implies that famines in the country are seen as the features of drought-prone regions of the country including the highland areas in the north-central, central and southern parts as well as the lowland areas in the north-eastern, eastern, southern and south-eastern parts (Degefa, 2005; Mulugeta, 2014). This implicitly ignores the food insecurity and famine conditions in the western parts of the country. However, although few in number, emerging empirical studies show the occurrence of acute food insecurity (famine) in terms of both extent and depth (USAID, 2004; Dagnachew, 2004; Eshetu, 2007; Guyu, 2012, 2014, 2015; CIDA 2013; Guyu and Muluneh, 2015a). This is termed as ‘green famine’ and the area where it occurs is also termed as ‘green famine’ belt (GFB) (Guyu, 2015; Guyu and Muluneh, 2015a). Hoddinott et al. (2011) offered a relatively comprehensive list of shocks/stresses that trigger famines in Ethiopia that probably considers the GFB. According to this source, despite regional variations, the most important shocks/stresses that trigger acute food insecurity (famine) in Ethiopia include drought, flood, erosion, frost, crop pests, livestock pests, input access problems, rise in the price of input, death and illness of both humans and animals. In light of this, there can be no doubt that ‘green famine’ has ever occurred in the GFB of the country. This requires identification of the shocks and stresses that trigger famines and measure and understand the resilience capacity of households in the GFB although the latter is not the objective of this paper. In fact, the term ‘green famine’ is new and rarely appears in famine literature. The use of the term ‘green famine’ itself in some literature (Alemayehu, 2001; Mulugeta, 2014) are even misleading. First, they used the concept to define the food insecurity and famine events in the Southern Nations Nationalities and People’s (SNNP) region, specifically with emphasis on ‘enset’ growing areas. This implicitly implies the rejection of the likelihood of occurrence of ‘green famine’ in the western half of Ethiopia, which is probably a typical example of the GFB of Ethiopia. Second, they defined the ‘green famine’ concept relating to drought as a primary cause. This definition is confused with the definition of conventional famines that occur in the drought-prone areas of the country. The central argument of this paper is, therefore, that acute food insecurity, termed as ‘green famine’ (Guyu, 2015; Guyu and Muluneh, 2015a), has always occurred in the GFB of Ethiopia and the main causes of ‘green famine’ are not related to drought or sustained moisture stresses although occasional delays in onset and offset of summer (wet seasons in Ethiopia) rains are unavoidable processes. It further contends that the national

development objectives in general and the objectives of ensuring sustainable food security cannot be attained to the level of expectation unless the challenges of ‘green famine’ are resolved. Based on this argument, the paper was aimed to identify and understand the underlying shocks/stresses triggering ‘green famine’ events in the GFB of Ethiopia, and to draw conclusion and highlight implications for both research and policy that may apply at both national and international arenas. The purpose was to indicate that policymakers should consider the shocks when planning and implementing intervention (e.g. through resilience building programme) in an attempt to improve food security in the GFB of Ethiopia. Moreover, the results of the study can provide researchers, focusing on disaster, with baseline information that enables them to further investigate food insecurity related shocks/stresses.

Theoretical Framework

Shock, also known as hazard, refers to sudden onset of disasters unexpectedly that has high impacts or effects (Scoones, 1998). They can be dangerous natural phenomena, human activities or conditions that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption or environmental damage (DFID, 1999). Wisner et al. (2003) contends that disasters that are principally caused by natural hazards such as earthquakes and volcano are not the greatest threat to humanity (Wisner et al., 2003). These researchers place more emphasis on social systems as the main causes of shocks and stresses such as violent conflict, disease/illness, which are the focus of this paper. Shocks can be either exogenous (for example, drought or price increase), which are not influenced by the characteristics of individuals, households/communities or endogenous which are influenced by the characteristics of the above units; for example, sudden sickness or epidemics is influenced by investment in health care (Maxwell et al., 2013). However, they may remain a major treat to humanity in situations where there are no adequate prevention mechanisms such as health institutions.

Stresses, on the other hand, are characterized by smaller, regular, predictable disturbance with low cumulative effect (Scoones, 1998). Such effects of stress include seasonal factors such as unemployment, price fluctuations, ill health, local conflicts or gradual change in climate conditions that undermine livelihoods (Frankenberger et al., 2012). The term disturbance is given to both shock and stress altogether by Scoones (1998) but a ‘stress’ is more related to a small, regular, and predictable disturbance with a cumulative effect while a ‘shock’ is infrequent and unpredictable disturbance with immediate impact (Scoones, 1998).

Disasters are commonly defined as a serious disruption in the functioning of a community or society involving widespread human, material, economic or environmental losses and impacts that exceed the ability of the affected community or society to cope with its own resources. It is noted that not all shocks and stresses lead to disasters (Frankenberger et al., 2012). In other words, by itself, a shock is not a disaster; it can, however, trigger a disaster because of underlying physical, social, economic or environmental vulnerabilities (Frankenberger et al., 2012).

Shocks/stresses may occur at varying speeds disturbing different aspects of physical and socioeconomic environments. Disturbance may occur in the form of rapid or slow onset of shocks (i.e., natural or man-made hazards) such as earthquakes, floods, drought, human disease epidemics, plant pest outbreaks, and conflict, or longer-term stresses (for example, environmental degradation, political instability, conflict, price inflation) (Frankenberger et al., 2012). It is also important to distinguish between idiosyncratic and covariate disturbances when planning to assess resilience/vulnerability. Some disturbances naturally affect only certain individuals or households and are known as idiosyncratic disturbances whereas others affect an entire population or geographic area and called covariate disturbances (Frankenberger et al., 2012). Most disturbances in the GFB of Ethiopia are mainly covariate in character as they affect most households and communities once they occur. Here, the probability for disasters to occur is less than in the conventional drought-prone famine areas. However, natural hazards such as earthquakes, volcanic eruptions, floods, frost, hailstorm; biophysical hazards such as epidemic diseases, pest infestation, rat plague, etc as well as human-induced hazards such as wild fire may lead to hazardous events in the GFB. In general, both types of disturbances (shocks and stresses) have existed in the GFB.

In theory, the initial phase in planning to measure and understand the resilience/vulnerability of households and/or communities begins with the understanding that resilience measurement is context-specific, shock-dependent, and outcome-oriented (Frankenberger et al., 2013). Context here refers to the environmental, political, social, economic, historical, demographic and policy conditions that affect households, communities, and sections of governments (Scoones, 1998), and determine to some degree the extent to which they are able to cope with risks (Frankenberger et al., 2012). Context is dynamic, rather than static, and changes according to the adaptive capacity of a unit (i.e. individuals, household, or communities) in response to risks and disasters or shocks/stresses (Alinovi et al., 2010; Maxwell et al., 2013). Resilience is therefore context-

specific, i.e., it is defined by the type of change or shock experienced, as well as by the social, economic, environmental, and political context in which the shock occurred and household or community response decisions are made (Frankenberger et al., 2013) . It is also outcome-oriented, if not just about measuring the ‘outcomes’ rather about measuring the changes in the outcome over time as it is a dynamic concept (Maxwell et al., 2013). Understanding the context and the shocks/stresses is very important to manage those shocks/stresses and help people to become more resilient by supporting especially the poor people to build up their assets through increasing access to appropriate means of livelihood strategies (DFID, 1999). Resilience measures must therefore be closely tied to the local context and the nature of the particular shock (e.g., drought, price volatility, conflict, etc). It is essential to note that vulnerability context in general and shocks/stresses in particular destroy assets of household and wider communities in a given nation directly (DFID, 1999). An analysis of resilience therefore involves an analysis of shocks/stresses in a given context, and an understanding of the nature of their vulnerabilities (Frankenberger et al., 2012; Maxwell et al., 2013). Accordingly, the context of the GFB is partly different from the conventional famine-prone areas. This paper aims at exploring the underlying shocks/stresses that trigger acute food insecurity (a proxy indicator of ‘green famine’) in the GFB of Ethiopia.

Study Area and Methodology

Where is ‘green famine belt’ located?

Green famine, the writer believes, could be found in different parts of the world and the areas where it occurs are termed as the GFB (Guyu, 2015). The GFB can also be identified for each nation and region. Accordingly, the GFB of Ethiopia roughly covers areas in the western half stretching from northwestern border areas in the Amhara region through the whole, Benishangul-gumuz region (BGR), Gambella region, and western parts of Oromiya region to areas in the western part of SNNP region (Guyu, 2015; Guyu and Muluneh, 2015a). However, it is impossible to exactly delineate GFB both at global and national levels as it is dynamic over time and space. Likewise, the GFB of Ethiopia cannot be exactly mapped as its areal extent might change over time. In other words, the area which is presently free from ‘green famine’ may be affected by the event as time goes. This is why the writer tries to indicate rough coverage of the areas that probably fall under GFB in Ethiopia. The general unifying features of all of these areas should include at least a relative abundance of green vegetation cover and adequate rainfall and

surface water resources (e.g. rivers) for agricultural and food production. Most parts of the GFB of the country are also characterized by lower population density, better fertility of land (at least cultivated for short period of time and at most virgin land), lesser degradation of farmlands and, larger per capita landholdings than the conventional famine-prone areas of Ethiopia. Belo-jiganfoyo district, located in BGR (Figure 2, Chapter 5, page 113 and Figure 1, Chapter 7, page 166), which in turn is located in the GFB, was selected as a case study area in order to understand the detailed account of green famine and the underlying shocks/stresses that triggered it.

According to the 2012 information obtained from FDRE-ERA (2008), Belo-jigafoyo consisted of estimated total population of 37471 forming 7347 households with average family size of 5.1. The district has population density of 23persons/km². Berta, Gumuz, Shinasha, Mao and Komo make up the indigenous ethno-culture group of BGR. The Oromo and Amahara ethnic groups are the dominant non-indigenous ethnic groups of the region. The district can generally represent the GFB of Ethiopia in terms of environmental, ecological, demographic and cultural contexts. Thus, the findings from the case study area can be generalized to the whole GFB of the country.

Methods and Materials

A cross-sectional survey was conducted in Belo-jiganfoyo district, western Ethiopia in the last week of August 2013. Four stage sampling procedure was employed to select 220 households for the study. The sample size was determined using the formula and table provided by Krejcie & Morgan (1970) as used in Agea et al. (2011) with some adjustments based on the homogeneity criterion. In the first stage, the district was purposively selected as it can generally represent the GFB in terms of environmental, biophysical, socioeconomic and cultural backgrounds. Then, it was divided into three strata based on the distance from district center (Soge town) and proximity to asphalt road. In the second stage, 3 kebeles, one from each stratum, were selected. In the third stage, proportional allocation method was applied to determine the sample size in each kebele. Finally, households for interview were identified using simple random (lottery) method. Data for exploring the main shocks/stresses triggering green famine were collected through a structured questionnaire, focus group discussion (FGD), key informant interview (KII) and field observation. Six FGDs, two from each kebele and each group consisting of 6 members, were selected and studied. Individuals for KIIs were selected among concerned officials from the district agricultural and revenue department as well as villages. Observation of the study area was

also conducted. Questions that focus on climate, biophysical, economic, social, demographic, culture-related shocks and stresses were carefully designed and included in the questionnaire as well as in FGDs and KIIs. Field observations were accompanied by photographs. Data were analyzed primarily descriptively but regression analysis was also employed to identify the most statistically significant causes of food insecurity.

Results and Discussion

Underlying Shocks/stresses Triggering Green Famine

As indicated in the background section, acute food insecurity is used as a proxy indicator of the ‘green famine’ used in this paper. In addition to literature reviewed, about 94% of the surveyed households reported their exposure to food shortages during the survey year. The study identified and categorized the underlying shocks and stresses that caused ‘green famine’ into climate, biophysical, economic, social, demographic, and culture related shocks and stresses (Table 1).

The results of regression analysis showed the relative importance of the effects of individual shocks/stresses in causing ‘green famine’. At least a shocks/stress under almost all categories caused food insecurity: i.e. climate-related shock (heavy wind), biophysical (wild animal attack and rat plague), social (literacy of household head), economic (poverty), and demographic (child dependency) were the most significant factors ($p > 0.100$) in influencing household food insecurity (Table 1).

Climate-Related Shocks: Previous studies showed that drought is the most common climatic and weather-related hazard faced in the northeastern Ethiopia (Degefa, 2005; Frankenberger et al., 2007:13; Maxwell et al., 2013). The current study located in the western Ethiopia however revealed the opposite. Only 3.2%, 35.5%, 5.0%, 8.2%, and 25% of the surveyed households reported that they had experienced problems related to water lodging, delayed onset and early offset in rains (i.e. rainfall variability), hailstorms, heavy winds, frosts respectively in the past five years. Thus, it can be generalized that the occurrence of shocks related to climate abnormalities were either little or none in the GFB. This goes in line with the prior expectation that environmental or climate-related factors are not the main causes of the present conditions of the green famine in the GFB of Ethiopia.

Biophysical-Related shocks: The role of biophysical factors that triggered food insecurity was considerably higher than that of climate-induced factors (Table 1). A previous study conducted in northeastern Ethiopia (i.e. in conventional famine area) indicated the impacts of biophysical shocks, for example, attacks by wild animals primarily on crops (Degefa, 2005). The current study shows that 77.5% of the surveyed households experienced a devastating weed infestation in the last 5 years. The writer observed that a destructive type of weed locally known as “minda” or “akenchra/kitign” in Amharic (i.e., the national and regional official language) was spreading fast killing crops during their early stage of growth. Plant pests, rat plagues, wild animal attacks, erosion, deforestation, bird attacks and soil infertility shocks and stresses were perceived factors reported by 99.1%, 66.4%, 46%, 25%, 65%, 45.5% and 33.6% respectively. The writer also confirmed the prevalence of all of these shocks/stresses when conducting field observation. This finding is in line with a previous regional level assessment that reported almost all of the above factors (BGRFSS, 2004). In general, unlike the climate-induced shocks, the biophysical related shocks/stresses triggering food insecurity were critical in the GFB of Ethiopia.

Economic shocks/stress: Animal diseases and deaths, poverty, backward technology and price fluctuation were economic-related shocks and stresses reported by about 72%, 94%, 69.1%, 48% and 48% of the surveyed households respectively (Table 1). Although the percent of households reported their experience of each shock varies, economic related shocks and stresses are generally as adverse as the biophysical ones.

Table 1. Percent of Households affected, Type of Shocks/stress and Regression Results (N=220)

Shock/stress Category	% of hh	Regression Results					
		B	S.E.	Wald	df	Sig.	Exp(B)
1. Climate-induced Shocks/Stresses							
Water-Lodging (dummy)	3.2	.604	1.082	.312	1	.577	1.830
Rainfall-variability (dummy)	35.5	.025	.407	.004	1	.951	1.025
Hailstorm (dummy)	5.0	-.612	.971	.398	1	.528	.542
Heavy wind (dummy)	8.2	-.988	.757	1.703	1	.101	.372***
Frost (dummy)	25.0	.150	.427	.124	1	.725	1.162
2. Biophysical shocks/stresses							
Pest Infestation (dummy)	99.1	-19.18	27038.5	.000	1	.999	.000
Weed infestation (dummy)	77.5	-.247	.421	.343	1	.558	.781
Bird attack (dummy)	45.5	.286	.431	.440	1	.507	1.331
Wild animal attack (dummy)	45.9	.621	.411	2.283	1	.097	1.86***
Soil erosion (dummy)	25.0	.460	.450	1.044	1	.307	1.584
Infertility of soil (dummy)	33.6	-.949	.410	5.348	1	.021	.387**
Rat plague (dummy)	66.4	-.749	.466	2.584	1	.091	.473***
Deforestation (dummy)	65.0	-.062	.420	.022	1	.883	.940
3. Social-dimension of Shocks/stresses							
Ethnic conflict (dummy)	76.4	-.519	.526	.973	1	.324	.595
Conflict breakout (dummy)	84.5	-.332	.501	.440	1	.507	.717
Human diseases (dummy)	72.7	.278	.484	.330	1	.565	1.321
Children in school (number)	63.9	.097	.133	.533	1	.465	1.102
Literacy of H/head (dummy)	50.0	-1.076	.380	8.016	1	.005	.341*
4. Economic-related Shocks/stresses							
Price Instability (dummy)	48.2	.106	.456	.054	1	.816	1.112
Animal diseases (dummy)	72.2	-.407	.462	.775	1	.379	.666
Poverty stress (dummy)	94.0	1.399	.719	3.783	1	.052	4.052**
Backward techno.(dummy)	69.1	-.048	1.099	.002	1	.965	.953
5. Demographic stresses							
In-migration (dummy)	70.5	-.216	.410	.278	1	.598	.805
Child-dependency (number)	87.7	.273	.136	4.015	1	.045	1.313**
6. Culture-induced shocks							
Extravagant-consum(dummy)	86.4	.474	.494	.920	1	.338	1.607
Saving culture (dummy)	28.6	-.328	.404	.659	1	.417	.720
Constant		19.881	27038.5	.100	1	.899	4.309E8

As most parts of BGR is located in the river valleys of bigger rivers such as the Nile, Didesa, Dabus and Beles, vectors that carry disease causing microorganisms such as tsetse flies and ticks are widespread and adversely affecting livestock production. As a result, especially production of cattle was extremely hindered by livestock diseases. This goes in line with previous studies in both northern and western parts of Ethiopia. A study in northern Ethiopia by Maxwell et al. (2013) found livestock diseases as number 5 shock in the rank order while another study in BGR by Beyene et al. (2011) indicated that animal diseases and parasites had hampered cattle production in the region. The analysis of the type and detailed statistical measure of livestock diseases and deaths are beyond the scope of this paper. Nevertheless, the present analysis of field observation revealed that livestock diseases and deaths were one of the most important economic-related shocks that triggered household food insecurity (see Figure 2).



a) Dead goat (Assosa-sefer village)

b) Infected oxen being taken to
Veterinary post (Senne village)

Figure 2. The Left photo shows suddenly died goat (Assosa-sefer village) due to unknown cause and the right photo showing oxen infected by a disease (Senne village) being taken to veterinary post

Source: Photo taken by the writer during Field observation in Senne kebele.

Livestock production is a crucial complementary to arable farming in mixed farming systems and perhaps a sole source of livelihood in pastoral areas of Ethiopia. Despite this fact, livestock diseases have constrained the production and productivity of this sector. Figure 2 depicts two

examples of the effects of livestock diseases in the study area. The event in the left photo surprisingly happened suddenly when the writer was conducting key informant interviews with a veterinary post worker and villagers in Senne kebele. The goat, which was healthy and fat in appearance, fell down and died in front of us for unknown cause while it was feeding on herbs. The author tried to understand the cause asking the key informants. But, neither the veterinary worker nor the villagers know the cause of such sudden death of goats. They informed the writer that this was not new but common event in the area. Similarly, the event in the right photo was taken when the man was taking the oxen to veterinary post. The oxen were likely fat and healthy but their stomachs were pumped (as seen from the photo bulged) for unknown disease. The man however informed the writer that there is a type of grass that pumps the stomach of cattle. The veterinary worker repeated the same but could not tell the actual cause professionally.

Poverty was reported by almost all (94%) of the surveyed households. In fact, the concept of poverty is similar with the concept of food insecurity as perceived by the local people. The main defining criterion of poverty in the study area was whether a given household produces adequate crop that can feed the household until the next harvest period. This was probably the reason why the percent of households reporting their experiences of being poor and food insecure were equal. In general, field observations confirmed that most households were hit by severe level of poverty.

Backward technology stress was reported by considerable proportion (69%) of the surveyed households. In this regard, the figure was reported by households solely depended on hoe-based farming practice alone. Considering non-tractor technology users alone, about 95% of the surveyed households depended on backward technology for cultivation (Table 2). Hoe-based farming method and slash-and-burn activities had been practiced mainly by the indigenous communities of the area. Given the current situation of households (i.e. poverty, food insecurity, farming systems, poor housing conditions, etc), the use of backward technology is likely to continue in the future. Moreover, the traditional ways of raising livestock rearing was another technological stresses that trigger food insecurity in the GFB. None of the surveyed households practiced modern ways of animal fattening in the last 5 years in the study area. This implies that households in the study area had been practicing open-field grazing on communal fields. This further implies that agricultural extension workers did not train households about modern ways of livestock production. However, key informants (veterinary post workers) working in Say

Dalecha and Senne villages contested that the farm households in the villages were not willing to take whatever training was given by extension workers.

Table 2 Percent of Households by Type of Farm Technologies in the Last 5 Years (N=220)

Type of Technology	% of Households	Valid Percent	Cumulative Percent
Hoe-based	69.1	69.1	69.1
Oxen/Donkey	4.1	4.1	73.2
Hoe-&-Oxen	21.4	21.4	94.6
Hoe-oxen-tractor	3.2	3.2	97.8
Tractor	2.2	2.2	100.0
Total	100.0	100.0	

The writer tried to substantiate this information by triangulating with the one obtained from village key informants. Almost all key informants selected from each kebele blamed the quality of veterinary services so far offered. They argue that the workers had no the quality to give the service; as a result they preferred purchasing drugs from shops and injecting their livestock themselves to going to veterinary posts to seek the services.

Price fluctuation as an economic-related stress was also reported by about 48% of the surveyed households. In contrast to lower percent of households reported price problem, field observation showed that there were two main constraints related to price actually observed in the area. The first was that the price of crops in post harvest period fell down. Despite the low prices, households were forced to sell their produce for various reasons including covering child education, health expenses, and government tax. Moreover, most demand on non-crop items by households would be covered by the income earned from the sale of their agricultural produce. For this purpose, selling crops was unavoidable. This depleted their grain stock and households in the study area are inevitably hit by seasonal food insecurity shocks each year (see Dagnachew 2004; Guyu 2011, 2012, 2014, 2015; Guyu and Muluneh 2015a). Consequently the households were compelled to buy food at high prices. Such a change that compelled households to sell their produce at low prices and to buy food at high prices was observed to be a critical economic stress although the majority of the surveyed households (52%) did not take it as a challenge.

Social Dimensions of Shocks/Stresses: Maxwell et al. (2013) found that human health and local conflict breakout to stand as 6th and 9th in the rank order of hazards in the drought-prone northern part of Ethiopia. In the current study, human health related problems, conflict between ethnic groups and fear of future probability of conflict breakout as reported by 72.7%, 76.4% and 63.9% of the surveyed households respectively were the main social-related shocks while the number of children in schools and literacy level of household heads as reported by 63.9% and 50% of the surveyed households were selected indicators of social-related stresses in this study. With regard to human health problems, malaria was the leading cause of sickness that knocks the doors of almost all households in the study area. In fact, the households were also exposed to water borne diseases as rivers and streams were the main sources of drinking water.

The past conflict, especially in 2008, mainly between the Gumuz and Oromo ethnic groups has put in the minds of both a bad feeling towards each other. There was a tension between the Gumuz of Kamashi zone (Benishangul-gumuz regional state) and the Oromos of the Wollega (Oromiya regional state) for reasons that have not yet proved through research. Although studying the conflict and its causes is beyond the scope of this paper, the author wanted to understand its impacts on household food security. For these purpose, three village key informants were selected from three kebeles (i.e. Senne, Say Dalecha and Soge) and interviewed.

According to the informant from Senne, the cause was likely political in the sense that the Gumuz and the Oromo communities engaged in conflict are living at the border of each region- Benishangul-gumuz and Oromiya. Accordingly, a rural town known as Arjo Gudatu and its surrounding rural areas that were formerly parts of Benishangul-gumuz regional state were the sources of their conflict. Consequently, Arjo Gudatu has been taken by the Oromos of Wollega and become part of Oromiya regional state. According to this informant, the Gumuz of Kemashi and the Oromos of Wellega were engaged in front to front firing of guns. He continued his speech by mentioning the example of Assosa Sefer village located immediately at the other side of Didesa valley found along the way from Addis Ababa through Nekemte to Assosa. According to him, although the Gumuz community was armed itself informally with guns, the Oromos were assisted by Oromiya regional special force (army) equipped with modern tanks and launchers fired at their villages without discriminating the women, children and old from capable fighters.

The key informant from Say Dalecha kebele was intentionally selected as he was the victim of the conflict. He was an elderly man at his 60s who was forced to leave the village known as Afrem (currently in Oromya) located in Didesa Valley immediately before the village of Assosa Sefer (Senne kebele) and presently living in Say Dalecha. He was then about to become abnormal because of the damages experienced when he was in Afrem at his old village. According to him, Oromos slaughtered his wife and three children during the conflict when he was in his house. He was the only member of the family who escaped the slaughtering by running away from the house and hiding himself in the backyard as the event happened in the night. He informed that he was not clear with the causes of the conflict but, as he was later heard from others, it was a struggle for expanding the territory.

The third informant selected from Soge was a little bit different in explaining the cause of the conflict. He was aware of the areas covered by the conflict that it stretched from Anger Waja and Anger Meti (the two kebeles of Belo-jiganfoy district, Kemashi zone) bordering Anger Gutin of Oromiya in North through Leku-Gumbi/Lije kebele, areas known as Belo-Central, Belo-Bereda, Say Dalecha, and Arjo Gudatu to Senne kebele in the South. The author asked the informant to understand the causes of the conflict. According to him, the conflict was historical and political. It was historical because many Gumuz individuals were oromonized in the past through a number of ways by mainly taking them as slaves as the Gumuz are “blacks”. He mentioned the examples of individuals living in Sasiga district (Oromiya) just having completely changed their culture especially their language. But, these individuals have visible features that show they were the Gumuz, for example, the scares on their faces, and their hard hairs. Therefore, according to these informant, Oromos were interested to repeat the same at present, this being the source of the conflict. However, the immediate breakout of the conflict was the attempt that the Oromos made to kidnap the young Gumuz boys at Anger town in the evening when they were drinking alcohols. The town of Anger is located in Sasiga district (Wollega) near Leku-Gumbi/Lije villag. This town is the common meeting place of the Oromos and the Gumuzes frequently.

The overall implication of this finding is that the households in the area were in that bad situation which does not allow them to produce sufficient food to their families or they cannot access income generating activities leaving them poor. As reported by 84.5% of the households, the area had still been fragile and there was a fear for the likelihood of breakout of ethnic conflict. This

was another source of tension that might hinder them from concentrating on the improvement of their livelihoods because they lack sense of stability. In general, conflict was the main underlying shock that had triggered the food insecurity shock among the households in the district. Similarly, conflicts between ethnic groups in areas in the GFB of Ethiopia which are located at ethnic boundaries of different regional states are unavoidable unless the government gives special attention to these sorts of areas.

The number of children currently at school and literacy level of household heads as reported by about 64% and 50% of the surveyed households were the selected social-related stresses triggering household food insecurity. The number of children in school varied among households but the percent reported was referring to those who had at least a child at school. The idea is that as the number of children in school increases, it created a huge burden for the household head to produce and feed his/her family. Thus, education can have a temporary adverse effect on food supply of the households. Studies show that household head education is often positively associated with household food security (Bashir et al., 2012; Aidoo et al., 2013). In this regard, more than half of the households reported that the head has at least attended grade 1 although it differs among households.

Demographic stresses: Demographic stresses that had triggered food security were in-migration and child dependency as reported by 70.5% and 87.5% of the households respectively. This goes in line with a previous finding that found population pressure ranked as 3rd hazard (Maxwell et al., 2013). The in-migrants had increased the number of people in the destination and imposed more and more burden on the farmland. This might led to deforestation and constrained the practice of hunting and gathering as well as shifting cultivation and hence adversely affected households' access to food. Children less than 1 year old are often less active economically and the proportion of households reported to have at least 1 child in the family was significant (i.e. 87.5%). In general, the role of demographic stresses in triggering food insecurity was considerable as children and some young persons in most households, especially that of the indigenous people, as field observation showed, were idle and did not actively engage in farming activities in the study area.

Culture-induced Shocks and Stresses: Two factors that represent culture-related underlying shocks triggering household food insecurity shock were extravagant consumption and saving

culture of the households. About 86% of the surveyed households know that the cause of their food insecurity shock was extravagant consumption through different pretexts. Guest feeding, traditional festivals such as death and marriage related food and drink invitations as well as the recent increased trend of drinking alcohol the sources of extravagant consumption especially among the indigenous households. A related practice was lack of saving culture as reported by about 71% of the surveyed households. Generally, tomorrow did not make sense for the households in the studied district. They used to eat and drink what they had then. Thus, these were important triggering causes of food insecurity shocks in the study area.

Conclusion

This article explored the main shocks and stresses that triggered 'green famine' in the study area. The result revealed that climate-induced shocks, biophysical-induced shocks, economic-related shocks/stress, social-related shocks/stress, demographic stresses, political, and culture-induced shocks and stresses triggered household food insecurity in the study area. Nonetheless, factors such as heavy wind, wild animal attack, rat-plagues, literacy of household head, poverty, and child dependency were most statistically significant variable of the underlying shocks/stresses in triggering 'green famine'. Climate-induced shocks were not currently significant causes triggering food insecurity in the study area. This confirms the theory that climate-related factors such as drought cannot be defining criteria for 'green famine' (Guyu, 2015; Guyu and Muluneh, 2015a). In general biophysical, economic, social, demographic, and culture, induced factors were the most important shocks and stresses that characterize the 'green famine' condition. In other words, if drought occurs in the GFB, then the resulting famine would become the conventional type of famines that occurs in the non-green famine belt. Therefore, any intervention aiming at addressing the shocks/stresses should focus on the most important ones while without ignoring climate related ones.

Reference

- Agea J., KImondo J. and Okia C. (2011). Contribution of Wild Edible Food Plants to Overall Household Diet in Bunyoro-Kitara Kingdom, Uganda, *Agricultural Journal*, 6 (4), 134-144.
- Aidoo A., Mensah J. and Tuffour T. (2013). Determinants of Household Food Security in the Sekyere-Afram Plains District of Ghana, 1st Annual International Interdisciplinary Conference Proceedings, pp. 514-521, *AIIC 2013*, 24-26 April, 2013, Azores, Portugal.

- Alemayehu Lerenso (2001). Food Security and Rural Vulnerability in Ethiopia: A Development Perspective. *Ethiopian e-Journal for Research and Innovation Foresight* 4(1), 49-62
- Alinovi L., D'Errico M., Mane E. and Romano D. (2010). Livelihoods Strategies and Household Resilience to Food Insecurity An Empirical Analysis to Kenya, Rome. Available online: http://erd.eui.eu/media/2010/Romano%20et%20al_Kenya%20paper%20r15.pdf
- Bashir M, Schilizzi S. and Pandit R. (2012). The Determinants of Rural Household Food security: The Case of Landless Households of the Punjab, Pakistan, Working Paper 1208, School of Agricultural and Resource Economics, University of Western Australia, Crawley, Australia.
- Beyene Teklu, Tegene Negesse and Ayana Angassa (2011). Effect of farming systems on livestock feed resources and feeding systems in Benishangul-Gumuz region, western Ethiopia. *International Research Journal of Agricultural Science and Soil Science* 1(1), 20-28
- BGRFSS (2004). Food Security Strategy of Benishangul-gumuz region, Benishangul-gumuz Region Food Security Strategy (BGRFSS), Assosa, Ethiopia
- CIDA (2013). Assessment of CIDA's Food Security Strategy and Funding in Ethiopia; Canadian Food Security Policy Group, Ethiopia; Canadian International Development Agency (CIDA).
- Dagnachew Anberbir (2004). Generic Agri-service Delivery and Farmers' Differences: The Case of the Natives and Resettled Farmers of Assosa Woreda. Unpublished MA Thesis, Addis Ababa University, Ethiopia
- Degefa Tolossa (2005). Rural livelihoods, poverty and food insecurity in Ethiopia, A case study at Erenssa and Garbi communities in Oromiya Zone, Amhara National Regional State, PhD Dissertation, Norwegian University of Science and Technology, NTNU, Trondheim.
- Devereux S.. (2000b). Famine in the twentieth century, IDS Working Paper 105, Brighton: Institute of Development Studies,
- DFID (1999). Sustainable Livelihoods Guide sheets Framework; Department for International Development (DFID).
- Eshetu Bekele (2007). Study on Food Security Status of Rural Households in Metu Woreda, Illu Abba Bora Zone, Oromiya National Regional State. Unpublished MA Thesis, A.A.U; Ethiopia.
- FDRE-ERA ((2008). Study on Belo-jiganfoy Integrated District Development Programme (Final Report), Federal Democratic Republic of Ethiopia-Ethiopian Roads Authority (FDRE-ERA),

- Consultancy Service Offered to District Integrated Development Study (Group-8). By Afroconsult and Pan-African in Collaboration
- Frankenberger D., Vaitla B., Gimay Tesfay and Nigussie Abadi (2013). Resilience, Food Security Dynamics, and Poverty Traps in Northern Ethiopia. Analysis of a Biannual Panel Dataset, 2011 – 2013. Feinstein International Center, Tufts University.
- Frankenberger T., Langworthy M., Spangler T. and Nelson S. (2012). Enhancing Resilience to Food Security Shocks, (White paper), Draft.
- Frankenberger T., Sutter P, Amdissa Teshome, Alemtsehay Abera, Mulugeta Tefera, Moges Tefera, Alemayehu Seyoum, Bernard T, Spangler T and Teshewamebrat Ejigsemahu (2007). Ethiopia: The Path to Self-resiliency. Volume I: Final Report. *CHF – Partners in Rural Development on behalf of the Canadian Network of NGOs in Ethiopia (CANGO)*.
- Guyu Ferede (2011). Food Security Status of Rural Households Northwestern Ethiopia: The Case of Households in Bullen District of Benishangul-gumuz Regional State, VDM Verlag publishing house, Germany
- Guyu Ferede (2012). Voluntary Villagization Scheme (VVS) for Transforming Semi-pastoral Communities in Benishangul-Gumuz Region, Northwestern Ethiopia: Challenges and Local Development Indicators, *Journal of Sustainable Development in Africa*, Vol. 14, No.5, PP.162 – 196.
- Guyu Ferede (2014). Ethno-culture Disparity in Food Insecurity Status: The Case of Bullen District, Benishangul-gumuz Regional State, Ethiopia. *African Journal of Food Science* 8.2: 54 – 63
- Guyu Ferede (2015). Household Vulnerability to Green Famine: Component Based Analysis of Indicators in Belo-jiganfoy District (Case Study Area), Benishangul-Gumuz Region, Ethiopia. *Applied Science Reports*, 9(3), 139-156
- Guyu Ferede and Muluneh Wold-tsadik (2015a). Household Resilience to Seasonal Food Insecurity: Dimensions and Magnitudes in the “Green Famine” Belt of Ethiopia. *Applied Science Reports*, 11(3), 125-143
- Guyu Ferede and Muluneh Wold-tsadik (2015b). Wild Foods (Plants and Animals) in the Green Famine Belt of Ethiopia: Do They Contribute to Household Resilience to Seasonal Food Insecurity? *Forest Ecosystems*, 2:34.
- Hoddinott J, Guush B, Neha K, Alemayehu S, Michael T, Yisehac Y, Sabates-Wheeler R, Mulugeta H., Lind J., Mulugeta T. and Feyera S. (2011). Evaluation of Ethiopia’s Food

- Security Program: Documenting Progress in the Implementation of the Productive Safety Nets Programme and the Household Asset Building Programme.
- Krejcie R. and Morgan D. (1970). Determining Sample Size for Research activities. *Edu. Psychol. Measur.* 30:607-610
- Maxwell D., Vaitla B., Gimay Tesfay and Nigussie Abadi (2013). Resilience, Food Security Dynamics, and Poverty Traps in Northern Ethiopia. Analysis of a Biannual Panel Dataset, 2011 – 2013; Feinstein International Center, Tufts University.
- Mesfin Wolde-Mariam (1984). Rural Vulnerability to Famine in Ethiopia, 1958- 1977, New Delhi: Vikas Publishing House LTD.
- Mulugeta Lolamo (2014). Green Famine in Ethiopia: Understanding the Causes of Increasing Vulnerability to food Insecurity and Policy Responses in the Southern Ethiopian Highlands, PhD Dissertation, University of Sussex,
- Pankhurst R. (1985). The History of Famine and Epidemics in Ethiopia: Prior to the Twentieth Century. Addis Ababa: Relief and Rehabilitation Commission.
- Scoones I. (1998). Sustainable Rural Livelihoods: A Framework for Analysis, IDS Working Paper 72
- Sen A. (1981) Ingredients of Famine Analysis: Availability and Entitlements. *The Quarterly Journal of Economics* 96.3:433 – 464.
- USAID (2004) Breaking the Cycle of Food Crisis: Famine Prevention in Ethiopia, United States Agency for International Development. The Mitchel Group, Inc. (TMC)
- Wisner B., Blakie P., Cannon T. and Devis I. (2003). At Risk: Natural Hazards, People's Vulnerability and Hazards. Second Edition.

5. Household Resilience to Seasonal Food Insecurity: Dimensions and Magnitudes in the “Green Famine” Belt of Ethiopia

¹Guyu Ferede and ²Muluneh Woldetsdik (2015)

Published in: App. Sci. Report, Vol. 11(3), 2015: 125 – 143 © PSCI Publications

Cite in text as: Guyu and Muluneh (2015).

Cite under Reference section fully as:

Guyu Ferede and Muluneh WOldetsadik (2015). Household Resilience to Seasonal Food Insecurity: Dimensions and Magnitudes in the “Green Famine” Belt of Ethiopia. *App. Sci. Report, Vol. 11(3), 2015: 125 – 143*

¹Correspondence

Department of Geography and Environmental Studies

Addis Ababa University, Ethiopia

E-mail: guyu_f@yahoo.com

Cell phone: +251-9-12-19-42-72

²Supervisor

Department of Geography and Environmental Studies

Addis Ababa University, Ethiopia

Abstract

In this paper, resilience to green famine in the green famine belt of Ethiopia was examined based on a case study area (i.e. Belo-jiganfoy district) using a resilience approach that analyzes the present characteristics of household's ability to recover from shock and transform into another regime of behavior by absorbing the food insecurity shock. The main objective of the study was to analyze household's resilience to seasonal food insecurity and identify resilience building blocks in the study area. Cross-sectional survey was conducted immediately after seasonal food insecurity shock based on 220 sample households. Factor analysis and regression models were employed to analyze the data using SPSS version 19. The results indicate that 34.75% of households were resilient at different levels. More non-indigenous (19.72%) than Indigenous (15.03%) ethno-culture groups were resilient to green famine condition. As indicated by the factor loadings and Beta coefficients, aspiration to change, social safety net and cultural bond were the most important dimensions of household resilience to food insecurity. These are followed by income and food access, asset possession and stability, which played an intermediate role, and then by adaptive capacity and access to basic services, which also played considerable role and would play important role in long-term in enhancing household's resilience capacity. Therefore, interventions must target at strategies that address the different levels of resilience between the two ethno-culture groups by building each factors of resilience in accordance with their relative importance.

Keywords: Ethno-culture difference; Factor loading; Resilience-vulnerability-continuum;

Introduction

The *green famine* is an innovative term used to denote areas that are characterized by naturally conducive for food production but most community members are facing the challenges of acute food shortages. According to Guyu (2015:139), such areas are termed as *green famine* belt. While such areas could be found elsewhere in the world, it roughly covers western part of Ethiopia including Benishangul-gumuz region (BGR), remote areas of Oromiya region such as Wollega and Illubabur, and Gambella region. This belt is generally characterized by favorable climatic, resource and demographic conditions. Climatically, it is characterized by adequate rainfall, and little or no occurrence of drought. The potential of the natural resources of this belt is relatively better than other parts of Ethiopia. The green vegetation cover, fertility of agricultural lands and per capita arable farmland possession is better than other parts of Ethiopia.

Moreover, low population density, and the resulting less resource degradation characterizes the belt (Guyu, 2015:139). Despite these favorable conditions, research shows that the majority of people in this belt are seasonally vulnerable to food insecurity each year. In this article, Belo-jiganfoy district, which is located in BGR, is selected as a case study area recognizing that the findings from it can generally reflect the situation in Western part of the *green famine belt* of Ethiopia.

Empirical research on the status of food insecurity is very minimal in western Ethiopia. The available studies however show that households are seasonally vulnerable to acute food insecurity shocks. Save the Children estimated an approximately 37% of the population of BGR that faces food shortage for several months each year (Save the Children, 2010 – 2015, pp.1). This seems underestimation as some governmental and non-governmental organizations (NGOs) reports in the region indicate observations that are much more than this. For example, in 2004, 58.1% of the population of the region was under poverty trap and have no any asset and couldn't feed themselves from their own produce (BGR, 2004: 9). This is 8% more than the national figure of about 50% in the mid-2000s (CIDA, 2013: 10). The empirical household based studies at district levels also show more severe conditions of food insecurity in the region. For example, the proportion of food insecure households was 86.6% in Menge district (BGR, 2004:10), 85% in Assosa district (Dagnachew (2004: 42), 58% in Bullen district (Guyu, 2014: 59), and 71.8% in Belo-jiganfoy district (Guyu, 2015:147). Similarly, in a qualitative study entitled *villagization for transforming semi-pastoral communities in BGR* indicates the critical nature of poverty and food insecurity in the region in general and in Dibate district in particular (Guyu, 2012: 188). This study indicates that mainly the indigenous people such as the Gumuz resort to depend on wild food as a coping mechanism. In general, the extent of food insecurity is far more than the national figure of about 44% food insecure population in 2004 (USAID, 2004: 5) 33.3% chronically food insecure households in 2013 (CIDA, 2013: 10) indicating that food insecurity is one of the most critical challenges faced by the region.

Despite its favorable environmental conditions, no doubt that BGR as a whole and Belo-jiganfoy district in particular is vulnerable to acute cyclical food shortage, which is referred to as *green famine* (Guyu, 2015:139). Even, some government reports state that both transitory and chronic food insecurity exist in the region (BGR, 2004: 23). Overall, the people in BGR go hungry for 4 – 6 months annually (i.e. example of seasonal/transitory food insecurity) while in some districts

(e.g. Kurmuk and Sherkole) people face food shortages for about 8 – 10 months even during normal years showing occurrence of chronic food insecurity (BGR, 2004: 23). This calls for urgent measures to tackle the challenges posed by food insecurity, which in turn requires an appropriate approach, resilience being hotly emerging and timely one. But, empirical research on food insecurity in Western Ethiopia in general and in the case study area in particular is scarce. Specifically I couldn't come across with single study on household resilience to food insecurity.

Thus, the objective of this study was to identify and analyze the main dimensions of household resilience to seasonal food insecurity and comparing the results between indigenous and non-indigenous ethno-culture groups. The study has important contributions. Resilience dimensions identified have immense importance to policy formulation and interventions that aim at building household resilience to food insecurity. In this regard, some new dimensions are included in the model which might perhaps be the characteristics of *green famine belt* of Ethiopia. Secondly, the research gaps in terms of geographical coverage and conceptual issues are addressed in the food security literature.

The Concept of Resilience

The concept of resilience is familiar in ecology but new in social sciences (Ciani, 2012: 3). It officially began in 1970s mainly by the influential work of Holling in ecology. Resilience in ecology is regarded as the persistence of relationships within a system and the measure of the ability of these systems to absorb changes of state variables, driving variables, and parameters (Holling, 1973: 17). Since then, it has been applied in a variety of disciplines including social sciences (Martin-Breen and Anderies, 2011: 5). Well established formulation of the concept for studying food systems and then food security has however begun since the novel contribution by the work of three individuals (Alinovi, Mane and Romano) at Food and agricultural Organization (FAO) in 2008. They should be acknowledged for their contribution of strictly statistical model for analyzing resilience to food insecurity. However, the work by Frankenberger and others in 2007 can be regarded as a precursor to the application of resilience approach to poverty and food insecurity a year earlier in their study of *The Path to Self resiliency* in Northern Ethiopia. They employed sustainable livelihood approach to examining the resiliency and vulnerability of beneficiary communities and households of NGO intervention (Frankenberger et al, 2007: vi). Therefore, when choosing resilience as appropriate approach, it is essential to clarify conceptual and theoretical relations of resilience with other concepts and/or approaches:

vulnerability/sensitivity, stability, sustainability, adaptive capacity, robustness, and transformability.

Resilience is the property of a system that denotes the persistence or probability of extinction whereas stability is the ability of the system to return to an equilibrium state after a temporary disturbance, which measures the degree of fluctuations around a specific state or result (Holling, 1973: 17).

Resilience and vulnerability, as applied in this paper, can be viewed as determinants of each other (Alinovi et al, 2009: 24) because they are inversely related measures of properties of a system (Martin-Breen and Anderies, 2011: 26). This is why, in literature, resilience is regarded as a flip-side of vulnerability (e.g. Alinovi et al., 2008: 139). Characteristically, vulnerability approach places agents (for example, households) who are exposed to shocks and their role as a quite passive, while resilience approach puts agents and their ability to react in a creative ways at the center of debate (Ciani, 2012: 5). Stating in different way, they are opposite sides (negative and positive poles) on a continuum (Burton, 2012: 10). On the vulnerability-resilience continuum as we move from the pole of vulnerability to the pole of resilience the incidence of vulnerability decreases while resilience increases and vice versa.

Sustainability as an approach to food security is a broader concept than resilience. It can be seen as an overarching term that implies the preservation of some desirable functions (of food security) for a sustained period of time (Martin-Breen and Anderies, 2011: 14). However, sustainability may be promoted in ways that do not involve resilience such as risk aversion, crisis recovery, and increased efficiency (Martin-Breen and Anderies, 2011:14). Despite these distinguishing features, resilience as a defining component of sustainability is, however, required if one accepts the thesis that disruptive events of a certain magnitude cannot be avoided. In this case, sustainability over time requires resilience at each time, and the relationship between them is more of theoretical but not semantic (Martin-Breen and Anderies, 2011:14).

Sensitivity is much more related to vulnerability. Accordingly, vulnerability is a function of exposure, sensitivity, and coping or adaptive capacity (Ericksen, 2008: 5). According to this source, exposure refers to one part of vulnerability that a unit must be exposed to a shock/stress to be vulnerable to it and sensitivity follows exposure. Sensitivity depends on the inherent

characteristics of both the system and the shock (Ericksen, 2008: 5). Finally, if a system is less vulnerable and more resilient, then it will become more sustainable. Sustainability is therefore the persistence of the function of the system over a considerable period of time.

Robustness, like resilience, refers to: “the capacity of a system to continue to function given external shocks” (Martin-Breen and Anderies, 2011: 14). It measures how much damage can be sustained to an individual’s relationships and abilities in the face of crisis (Martin-Breen and Anderies, 2011: 26). It differs from resilience in certain aspects. This difference can be viewed in terms of the nature of the system and temporal scale considered. Robustness is applied to a fixed system and a fixed set of external shocks studied over a short period (small time scale). Resilience, on the other hand emphasizes on learning and transformation that occur over long period of time (on a large scale of time), i.e. a broader concept that incorporates a broader range of temporal scales of analysis. In this sense, on shorter time scales, robustness and resilience are roughly equivalent concepts (Martin-Breen and Anderies, 2011: 14).

Adaptive Capacity (adaptability) is an aspect of resilience that refers to a disposition to establish new relationships between parts and maintain function in the face of crisis (Martin-Breen and Anderies, 2011: 26). It reflects learning, flexibility to experiments and adopts novel solutions and development of generalized responses to broad classes of challenges (Walker et al., 2002: 6). Given that the term is applied to a particular system, it is implicitly focused on smaller time scales (Martin-Breen and Anderies, 2011: 14).

Transformability refers to the capability of a system to reorganize into a new system by transforming parts of the system when it can no longer be in its existing form (Martin-Breen and Anderies, 2011: 14). Transformability is, therefore, the ability of a system to change its identity, implicitly such changes occurring over a longer scale of time as a domain of the system flips in another domain (Martin-Breen and Anderies, 2011: 15). Therefore, on a small scale time basis, resilience, adaptive capacity, and transformability can sometimes be used interchangeably (Walker et al, 2002: 5).

Understanding of the concept of resilience becomes complete when the worldviews associated with it are understood. Accordingly, two broad facets of resilience that can be considered as alternative worldviews are identified as engineering resilience and ecological resilience (Sakurai

et al, 2012: 2). Both deal with aspects of stability of equilibria providing alternative measures of a system's ability to maintain its functions following disturbance (Alinovi et al, 2009: 3). Their definitions reflect which of the two aspects of stability of a system should be emphasized (Holling, 1996: 32). The third facet, termed as *resilience as adaptive system* (i.e. closely related to ecological resilience) is also proposed (King, 2008: 115). Such identification is useful for a researcher to choose among the respective underlying philosophical and methodological foundation of study. In order to understand the essence of the first two views, we can relate them to the engineers' desires when designing, for example a building, as *fail-safe* or *safe-fail* design, the former being equated with engineering resilience while the later with ecological resilience (Holling, 1996: 33).

Engineering resilience can be defined as the speed of return to the steady state following a perturbation perceiving a system as existing close to a stable state (Sakurai et al, 2012: 2). In this definition, resilience focuses on efficiency and assumes constancy and predictability of a system's properties (King, 2008: 113). All of these attributes are at the core of engineers' desires for *fail-safe* design (Holling, 1996: 33). It perceives a system to exist close to a known stable equilibrium steady state and its functions should be maintained to this state after a perturbation (Holling, 1996: 34). Thus, an increased resilience implies the system's ability to bounce back faster after stress, enduring greater stress, and being disturbed less by a given amount of a stress (Martin-Breen and Anderies, 2011: 5).

Engineering resilience is therefore grounded more within the theory of positivist tradition, both epistemologically and ontologically (King, 2008: 113). The epistemology and ontology of a positivist scientist aims at developing an objective understanding about a reality (a system) assuming that a system can be known and a truth exists suggesting there is one best management option for this system (King, 2008: 114). In this tradition, people are also assumed to be separated from nature. A researcher adopting engineering resilience approach therefore searches for variables that contribute to the existence of a single stable state. A system's resilience is measured as a resistance to disturbance and the speed of return to this steady state or recovery from a shock following a perturbation. In applying this approach in food system, household consumption resilience is defined as the speed of recovery of consumption from a shock assuming consumption as a single stable state (Sakurai et al, 2012: 9). In reality, however, a

system has multiple states of equilibrium for which ecological resilience approach that assumes dynamism in the properties of a system is appropriate for analyzing and understanding a system.

Ecological resilience refers to the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables, driving variables, and parameters, and still persist (Holling, 1973: 17). It is simply the potential of the system to remain in a particular configuration and to maintain its feedbacks and functions, and involves the ability of the system to reorganize following disturbance-driven changes (Walker et al, 2002: 6). In other words, ecological resilience model focuses on persistence despite changes in, and unpredictability of, a system's properties (King, 2008: 114). It assumes multiple stability domains and is measured by the magnitude of disturbance that can be absorbed before instabilities shift/flip into another regime of behavior (Alinovi et al, 2009: 3; Sakurai et al, 2012: 3). Ecological resilience is dynamic model, rather than static, that captures properties of complex dynamic systems. This is closely related to what is termed as resilience as adaptive system, as third facet of resilience by (King, 2008: 115). It conceives conditions far from any single stable steady state, where instabilities can flip a system into another regime of behavior and domain of stability (Holling, 1996: 33). In general, three defining characteristics of ecological resilience are listed as: "the amount of change a system can undergo (and the amount stress it can sustain) and still retain the same controls on function and structure (still be in the same configuration-within the same domain of attraction); the degree to which a system is capable of self-organization...; and the degree to which a system expresses capacity for learning and adaptation" (Walker et al, 2002: 5-6).

The ecological resilience model is grounded in constructivist tradition epistemologically and ontologically (King, 2008: 114). In this philosophical stance, knowledge or understanding of the property of a system is obtained through a social construction while reality/truth is ultimately subjective. Moreover, unlike positivism in which man is assumed to be separated from nature, constructivism assumes that people cannot be separated from nature, but are part of nature (King, 2008: 115). Accordingly, researchers search for alternative stable states, the properties of the boundaries between states, and the conditions that cause a system move from one stability domain to another (King, 2008: 114). Resilience, according to this approach is therefore

measured in terms of the magnitude of disturbance absorbed before the system is restructured with different controlling variables maintaining the existence of functions (King, 2008: 114).

In sum, the choice between the two approaches for practical application in a field of research depends on the objective and methodological underpinnings of the study as well as the characteristics of the system under investigation. In this regard, social systems are so dynamic and have multi-state stability for which social and cultural capitals, networks, values and relationships and systems of knowledge determine resilience (Alinovi et al, 2009: 3). This is the main concern of the present article where these capitals are used to measure the different stability states among households. Ecological resilience approach is therefore applied in this article assuming that different equilibria exist, at least, among different households (i.e. a household is defined in this article as a system, or sub-system of food system). Thus, household resilience to seasonal food insecurity is analyzed considering the existence of different levels of resilience among households.

The Concept of Resilience to Food Insecurity

Food security, as quoted from Food and Agricultural Organization, FAO (1996), is defined as “all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs food preferences for an active and a healthy life” (Ericksen, 2007: 1). Failure to achieve this as a result of food deficit is what is termed as food insecurity (Nangulu, 2001: 6). Defining resilience to food insecurity requires deciding the unit of analysis and the type of shock, which answers the questions of resilience of what and resilience to what (Alinovi et al, 2009: 6). Unit of analysis can be the globe as a whole, a continent, a country or a region of a country. Or, it can be a community, a household or an individual. As this article aims at examining the resilience of households to seasonal food insecurity, obviously household is the unit of analysis and food insecurity is the shock to which households are exposed. Therefore, recalling the definition of resilience, households’ resilience to seasonal food insecurity can be defined as the ability of households to absorb the negative effects of unpredictable shocks, maintain self-organization, and restructure their behavior in the face of stress.

Resilience thinking is a systemic thinking. Food systems are complex systems that involves household as a component (Alinovi et al, 2009: 4). Food systems encompass a set of activities and outcomes ranging from production to consumption which involve both human and

environmental dimensions, and whose primary policy objective is achieving food security (Ericksen, 2008: 4). Such activities include production, distribution, processing, preparation and consumption of food, whereas their outcomes include food availability, affordability, preference, food use, value, and safety (Ciani, 2012: 6). They are made up of the interacting social and ecological components that affect the food security of a given group of people (Alinovi et al, 2009: 4). Households are therefore not only subsystem of a food system but also are adaptive complex systems that can make a choice among available alternatives (Alinovi et al, 2009: 4) because they are decision making units that play a leading role in reorganizing the function of the food system when they face food crisis. The source of resilience therefore lies in the diversity and flexibility of the system's functional groups (Ciani, 2012: 6). The sources of such diversity and flexibility for a household to reorganize better in the face of food insecurity shock depends on economic factors (diversification of income sources and accumulation of income, asset, access to market, credit), social (education, health), infrastructural (road, energy, electronic communication), cultural (values of food, taboos and preferences) (Alinovi et al, 2009: 3).

In general, resilience systems (including household) have plenty of buffering capacity and can absorb disturbances, where diversity is a key factor for such buffering capacity; they can also take action (including restructuring and reorganizing) to respond to feedbacks, which depends on how well managers understand these feedbacks; and they can learn (i.e. the past mistakes are incorporated into new responses and better management) (Ericksen, 2008: 6). A household's resilience can be enhanced if it shows the characteristics that decrease its sensitivity/vulnerability to shocks and increase stability (Ciani, 2012: 7). A household that shows these characteristics also show increasingly robustness, adaptive capacity, and transform from one regime of behavior to another.

Why Resilience Approach? A Question of Methodological Issues

Resilience thinking in food insecurity can be seen as the outcome of the trend in developing or refining models of food security (Ciani, 2012: 4). It emerged admitting the conceptual differences between resilience and vulnerability and the weaknesses associated with vulnerability approach. Most research in the field of food security has been centered on developing methods of analysis to predict the likelihood of a crisis more accurately (Alinovi et al., 2008: 137). In fact, most research in the field of food security has focused on the development of methods that aim at predicting the likelihood of occurrence of food crisis, i.e. vulnerability analysis (Ciani, 2012: 2).

Following this trend, vulnerability of households to seasonal food insecurity in the green famine belt of Ethiopia is measured and the results proved that households in the study area are much more vulnerable than even those in the drought-prone and high population density areas (Guyu, 2015:139).

However, it is argued that both analytical and policy approaches that aim at reducing vulnerability through large-scale humanitarian intervention have not been as effective as expected and have not substantially improved people's capacity to withstand future shocks and stresses (Frankenberger and Nelson, 2013: 2). Although forward-looking models, all statistical methods of vulnerability analysis have been static and are unable to predict future events for it has both conceptual and empirical problems (Alinovi et al, 2009: ii). The conceptual problems arise from two perspectives: the complexity (multidimensionality) of the concept of food insecurity, and the unpredictability of the many shocks that cause food insecurity. The empirical problems on the other hand arise due to lack of longitudinal data from which prediction would be possible (Alinovi et al, 2009: ii). Moreover, models used to predict seem incomplete and give partial information. For example, the composite index method that uses household coping strategies (Babatunde et al, 2008: 119) gives partial information about vulnerability as it considers only coping strategies. As a result, there is a need for an alternative and better approach that can address these gaps in food system analysis.

An alternative approach to vulnerability analysis is resilience that maintains the capacity of a system to cope with the shock whatever the future brings (i.e. at a given cost) when undergoing changes (Walker et al, 2002: 2). Resilience is such an approach that has emerged as a plausible framework for substantially improving the capacity of people to withstand future shock and stresses (Frankenberger and Nelson, 2013: 2). Unlike vulnerability approach that attempts to forecast future probability of food insecurity, resilience-based approach to food insecurity aims at analyzing the factors that may improve the household's ability to react to unforeseeable events (Ciani, 2012: 7) and seeks to assess the current strength of food system. It tries to identify the factors that have increased the capacity of a system (i.e. a household) to absorb external shocks and to respond effectively to those shocks rather than attempting to predict them. It does not focus on what is missing in a crisis (needs and vulnerabilities) but on what is already in place (resources and adaptive capacity) in order to maintain the functioning of the system (Andharia and Lakhani, 2013: 3). Resilience building has therefore become better policy option than

reducing vulnerability condition at present in areas where shocks are persistent. In other words, policy making and practical interventions to minimize the impacts of food insecurity should focus on working on variables that enhance household resilience than operating against factors of vulnerability. In order to benefit these and other advantages, a resilience approach to seasonal food insecurity is applied by substantiating the previous models with some new variables. What is fascinating in this article is the focus on the modification of the model by new dimensions of resilience such as aspiration and cultural-bond. The essence of household resilience is therefore while each household as a component of food system is confronted with similar external shocks, the more resilient one is able to absorb the shock better, respond effectively to, and recover faster than others from, shocks.

An encouraging framework of household's resilience to food insecurity is provided by individuals at FAO (Alinovi et al, 2008: 140). The analytical framework used in this paper is a modified form of FAO. Household resilience to seasonal food insecurity is a latent variable, which in turn is determined as a function of eight latent variables, which in turn are also estimated from a number of observed variables. Figure1 shows the analytical framework that represents the rationale for measuring household resilience to seasonal food insecurity.

In a given context (climate, policy, cultural, social, political, etc), the model assumes that the resilience of a household at initial time (T_0) depends on the options available for a household to make living. These options may include access to assets, income generating activities, basic services, safety nets, cultural bonds, etc (Alinovi et al, 2009: 9). Between T_0 and T_1 certain shock (i.e. food insecurity in this article) may occur and this may be due to either exogenous (beyond households' control) or endogenous (within the households' control) or both. Households react to this shock through available response mechanisms, and their absorption and adaptive capacities. Therefore, households who respond higher are more resilient than those who respond lower at time T_1 . Accordingly, the indices of resilience are relative measures that show the resilience status of households from least through medium to highest on the resilience-vulnerability spectrum. The continuum is interpreted as when resilience status decreases, vulnerability status increases and vice-versa because they the flip-sides of each other.

Each component at T_0 is estimated separately to generate a composite index of household resilience. The components at T_1 reflect how all observed and latent factors cause changes in household's resilience.

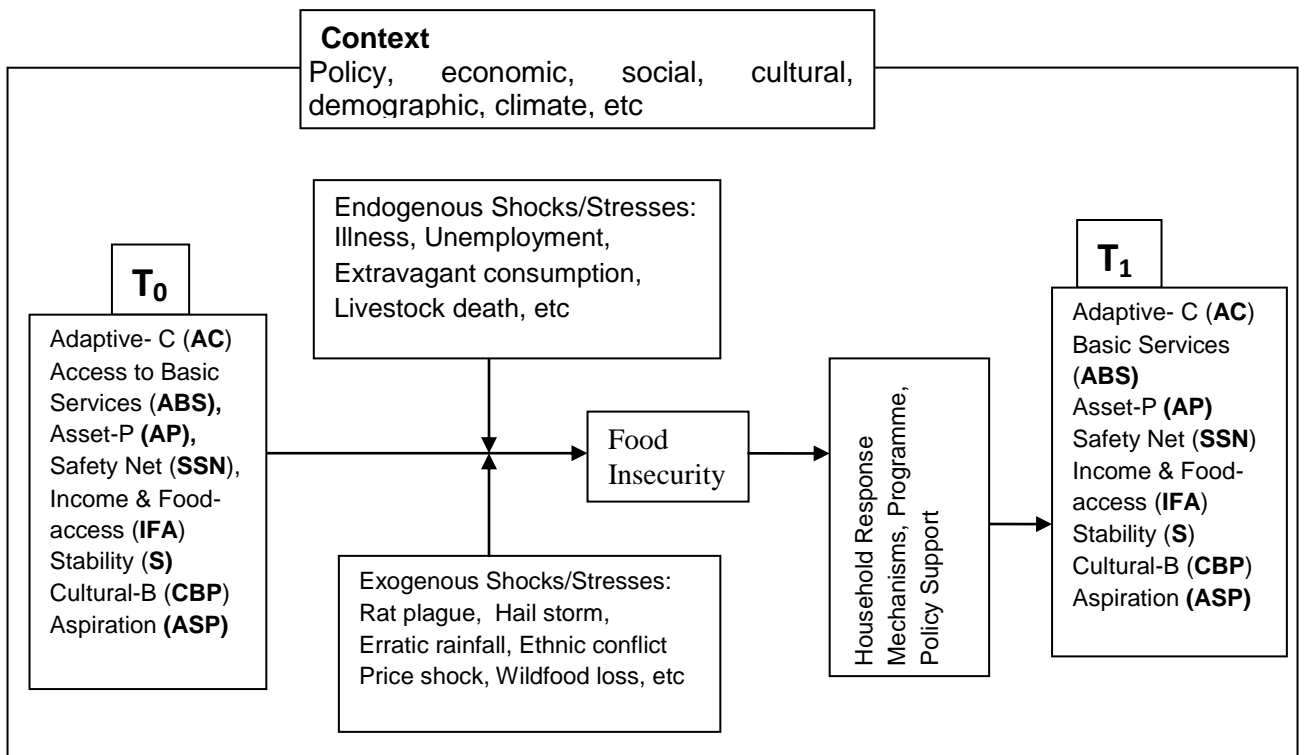


Figure1. Analytical Framework for the Study; Modified from Alinovi et al (2009: 10)

This model of household resilience index can mathematically be expressed as:

$$RI = f(AC, APS, AP, S, SSN, IFA, CBP, ASP) \dots\dots\dots \text{equ.1}$$

Where, RI = resilience Index; AC = Adaptive- Capacity; ABS = Access to Basic Services; AP = asset-possession; S = Stability; SSN= Social Safety Net; IFA = Income and Food Access; ASP = Aspiration to change.

Burton argues that two tasks are very important in furthering resilience scholarship. The first is development of measurement tools to better understand the factors that contribute to resilience while the second being the selection of relevant factors of resilience to a particular shock (Burton, 2012: 33). The aim of this paper is not developing measurement tools or methodology rather selection and analysis of parsimonious variables that constitute resilience index. Statistical methods employed for selecting variables and estimating resilience index have been performed

through multivariate techniques (Alinovi et al, 2008: 142). Five general steps for constructing index (including resilience index) are identified as: developing theoretical framework; identifying and developing relevant variables; standardizing to allow for comparison; weighting and aggregation of variables; and conducting uncertainty measures to gauge the robustness of variables (Burton, 2012: 34). In this study too, these steps were carefully addressed so as to generate a reliable measure of household resilience. With regard to type of data employed, a cross-sectional household-based survey data were used in this study. In fact, some authors advise to use a panel data for measuring resilience. However, as data from panel studies in developing countries are rarely available, the use of cross-sectional data is inevitable.

However, when using a multivariate technique, careful use of relevant approaches and method should be employed. Thompson's regression, Bartlett's and Anderson-Rubin's approaches of generating factor scores have their own specific uses (DiStefano et al, 2009: 4). Thompson's regression method is useful in predicting the location of each individual on the factor or component. It also maximizes validity as it produces the highest correlation between a factor score and corresponding factor (DiStefano et al, 2009). Whereas, Bartlett's scoring approach is used to show the impact of shared (common) factors on factor scores so that the resulting factor scores are highly correlated with their corresponding factors and not with other factors. Its advantage over Thompson's Regression and Anderson-Rubin's approaches is that this procedure produces unbiased estimates of the true factor scores. This is due to the fact that this approach used the Maximum Likelihood estimates-a statistical procedure which produces estimates that are the most likely to represent the "true" factor scores (DiStefano et al, 2009: 4-5). Anderson-Rubin's approach is an adjusted variant of Bartlett's method which uses least square formula to produce not only factor scores that are uncorrelated with other factors, but also uncorrelated with each other scores (DiStefano et al, 2009: 5). In this paper, Bartlett's method is used for selecting variables and generating latent factors.

Materials and Methods

Green famine belt of Ethiopia is generally located in Western half where BGR is a part. As mentioned in the introductory section, Belo-jingafoy district (a district in BGR) is selected as a case study area in order to understand the resilience of households to seasonal food insecurity in the belt.

Astronomically, BGR is located between $09^{\circ}17'$ - $12^{\circ}06'$ Northing and $34^{\circ}10'$ - $37^{\circ}04'$ Easting. According to (BGR, 2004), it has an area of 50380 km² with altitude ranging from 580meter to 2731meter above mean sea level. Agroecologically, it is divided into three: 75% of *kola* (lowlands below 1500meter), 24% of *weina dega* (midlands between 1500 and 2500meter) and 1% of *Dega* (highlands above 2500meter). Average annual rainfall varies between 800 – 2000mm. Depending on the place and season, the minimum daily temperature ranges from 12 to 20⁰c while the maximum ranges from 20 to 25⁰c in rainy season and rises to 35 – 40⁰c in the dry season (BGR, 2004: 4). It had a population of 670, 847, of which nearly 86 % lives in rural areas (CSA, 2008: 11).

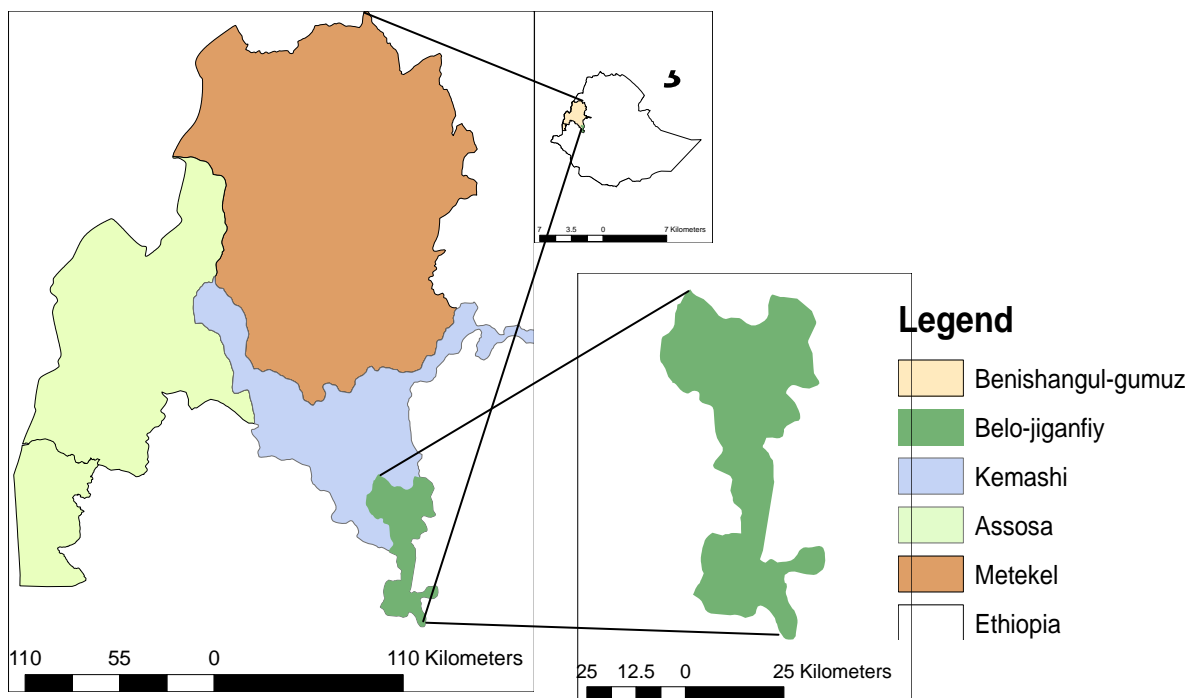


Figure 2 Location of Belo-jiganfof District at National, Regional and Zonal Settings

Observation shows that Belo-jiganfof district generally represents the region in terms of physical, cultural, socioeconomic, and demographic characteristics as well as ethnic composition. The absolute location of the district center (Soge town) is at $11^{\circ} 18'43''$ North and $36^{\circ} 12'57''$ East (FDRE-ERA, 2008: 34).

Belo-jiganfof district lies between 1100 – 1450masl, which experiences nearly the characteristics of lowland. Its rains are mono-modal type that begins in April/May and ends in October/November. The daily average temperature during rainy season ranges between 20⁰c –

25⁰c while the minimum temperature ranges between 12 – 20⁰ c depending on the season and altitude. Staying for at least eight months every year, rains of the region is adequate for food production in terms of amount and distribution. In this regard, the case study area resembles the whole *green belt* of Ethiopia (FDRE-ERA, 2008: 30). As it is very close to Western Ethiopia, Belo-jiganfoy experiences longer duration of rainy season. The district, like most parts of the region has extensive fertile arable land, natural forest, surface and ground water, and mineral resources. Accordingly, the livelihood of households in the district depends largely on land resources through mixed farming, fishing and collection and hunting of wild foods. Despite availability of large rivers such as Didessa and Anger, small scale irrigation is little practiced.

Population pressure is not a major problem (18.5persons//km²). It consisted of total population of 27,381. Of this 53% were males and 47% were females while 90.84% and 9.16% were rural and urban populations respectively. The average family size was 5.1. The rural population of the district (90.84 %) is much higher than the national average (85%) implying that the lives of most people in the district depend on agriculture. Moreover, about 42% of the population was under 15 years old, 56% between 15 and 64 and only 2% was above 64 (CSA, 2008: 38). The major Ethnic groups of the district include Gumuz, Berta, Mao, Amahara and Oromo while few others also live in it. The cultural interaction of these different ethnic groups and the resulting experiences is what is defined as *ethno-culture* (Guyu, 2014: 55), the concept also used in the article. The religious composition of an area has its own impact on local and national development efforts. In rural areas, it may affect agricultural productivity via the number of days devoted to working in farms and religious festivals. Almost all types of religious practices are found in Belo-jiganfoy district. Data show that the district consists of 46.4% followers of Orthodox Christianity, 44.6% protestant Christianity, 16% Catholic, 46% Muslim, 2.2% traditional healers and 0.8% followers of undefined beliefs (CSA, 2008: 44 - 45).

The livelihood of almost the entire population of Belo-jiganfoy is founded on agriculture in the mixed fashion (arable and livestock farming). However, the role of wildfood in the district (following the regional trend) is considerable mainly among the indigenous ethno-culture group. Most indigenous people of the district have been mainly shifting cultivators. Major cereal crops such as maize and sorghum, legumes such as haricot beans and soya beans, oil seeds such as sesame and, fruits such as mangoes are produced. Livestock production is also practiced in the

district although the potential remains unexhausted. Cattle, goats, sheep, poultry and bees are better. Belo-jiganfoy district has only one main market center at Soge which serves twice a week. Following the regional pattern, it has weak road network that covers only 18kms (FDRE-ERA, 2008: 4). Mobile telephone service is functional in most areas of the district although postal service is totally absent. Electricity line that is not functional for much of the time is available presently only in Soge town. The rural areas of the district depend on biomass as a source of energy. Protected water for domestic use is very limited in the district. According to district office information, the health coverage of the district had reached 58 % but characterized by poor quality while there were 11 primary and 1 secondary school showing 73 % coverage of primary education in the district. One credit service institution is available at the district center, Soge town.

In this study, a cross-sectional survey was conducted using a structured questionnaire in summer (i.e. rainy season in Ethiopia) season of 2013 immediately after the lean period (i.e. the last week of August). The informed consent of each household was obtained prior to interviews. Confidentiality was also built in households by explaining the purpose of the paper that is only meant for academic and policy consumptions. This increases the reliability of the results of measurement of households' resilience to the prevailing *green famine* in the belt.

The study was conducted based on a sample of 220 out of 7347 total households in the district. The sample households were selected based on both purposive and probability sampling procedure. Before, selection of sample households, statistically representative size of sample households was determined based on recommendations given by Krejcie and Morgan (1970). But, considering the homogeneity of intra ethno-culture group, it was reduced to 220. Then, three kebeles were purposively chosen out of the ten kebeles of the district based on the distance from the district center. Based on the data on the number and ethno-culture information of households in each kebele, households were stratified into indigenous and non-indigenous ethno-culture groups because understanding their differences in resilience status was one of the objectives. Accordingly, 121 indigenous and 99 non-indigenous households were determined to be sample subjects of the study. Then the total sample size was proportionally distributed first to the two ethno-culture group (121 from indigenous and 99 from the non-indigenou) and to each kebele. Finally, households for interview were selected using random technique applied to each ethno-culture group and each kebele. The questionnaires were administered by oriented local

enumerators who know the culture and language of the people through face to face technique because most households cannot do it themselves.

In fact, consensus on how to measure resilience has not been achieved among researchers (Maxwell et al, 2013: 6). While some researchers employ qualitative techniques (e.g. Niemisto, 2011: 4), others use methods of constructing resilience index and statistically measure the relative status of household resilience (e.g. Alinovi et al, 2008: 146). In this article, quantitative techniques are employed in order to measure the status of households' resilience to seasonal food insecurity. SPSS version 19 was the main tool used to perform the analysis.

A series of multivariate techniques (principal components analysis, factor analysis, and optimal scaling) using Bartlett's scoring methods were used to analyze the data. Principal components analysis was used to select parsimonious variables that are used to estimate the first latent variables if the observed variables are measured on a continuous scale, otherwise optimal scaling method was used. In fact, the initial phase of variable selection was based on literature and the researcher's experience of the study area. In addition to its use in variable selection, optimal scaling was used to estimate the factor scores of latent dimensions from dummy variables while factor analysis using principal axis factoring was used to estimate such score from continuous variables. The variance accounted for in each factor in solution as computed from eigenvalues is used to estimate the weighted scores of each latent variable and the overall RI for each household, which per se, is also a latent indicator. That is, finally the indices of each household were generated weighting the scores using the following simple formula:

$$RI_n = \partial_1 \text{Factor}_1 + \partial_2 \text{Factor}_2 + \partial_3 \text{Factor}_3 + \dots + \partial_n \text{Factor}_n \quad \dots\dots\dots \text{equ.2}$$

Where; RI_n = is the resilience index of n household; ∂ = the variance explained by each factor, $\text{Factors}_{1, 2, 3, \dots, n}$ = the respective factors generated by the factor analysis representing each latent dimension.

RI is a continuous measure that indicates the relative position of household's on resilience-vulnerability continuum. In this study, four levels of household resilience were identified as: Less-resilient/Vulnerable ($RI < 0.100$), Moderately-resilient ($0.100 \leq RI < 0.250$), Resilient ($0.250 \leq RI < 0.500$), and Highly-resilient ($RI \geq 0.500$). Lastly, linear regression using the ordinary least squares (OLS) method was employed in order to estimate the relative importance

of each dimension in determining household resilience. The results are presented in tables, interpreted accordingly and discussed against some findings from empirical literature.

Results and Discussion

Estimation of Latent Indicators of Household Resilience

As mentioned in the conceptual framework, identification of relevant variables is basic requirement for effective policy designing and intervention purposes. Intervention must target at these variables if resilience building is to be effective and efficient and if resource and time wastages are to be radically reduced. For this purpose, two steps of analysis were undertaken. Firstly, relevant multivariate analysis were run (i.e. principal components/factor analysis for continuous variables and optimal scaling for non-continuous ones) using available indicators of each latent dimension separately as done in Alinovi et al (2009:11). Then, relevant variables were selected based on the factor loadings and other statistical criteria such as Kaiser-Meyer-Olkin (KMO)-statistics of sampling adequacy, Bartlett's test of sphericity, communalities, and variance explained by the factor generated. Secondly, these variables were used to estimate the respective final latent dimensions that are later used to estimate the overall resilience index. In light of these, the following observed variables were identified, defined and used to estimate their respective latent dimensions.

Income and Food Access (IFA)

IFA is an important latent dimension of household resilience. It is directly related to the capacity of a household to access to food through different ways. In rural areas of Ethiopia (including the present study area), economic access to food is a critical problem. Identifying main indicators that constitute IFA was essential as each indicator should be focused when designing programmes that aim at building resilience. The traditional indicator of IFA that measures food access capacity is the per-capita income (Alinovi et al, 2009: 14). In addition to this, household food insecurity access scale (HFIAS), calorie intake (CI), coping strategies index (CSI), wild foods, dietary diversity (DDS) and per capita money saving (MSAV) were found to be important indicators used to estimate IFA after running a series of exploratory multivariate analysis.

Household Food Insecurity Access Scale (HFIAS): This is an indicator computed based on the 9 generic questions developed by Food and Nutrition Technical Assistance (FANTA) project

(Coates et al, 2006: 5) based on the answers to ‘what happened over the past 30 days’. This indicator is inversely related to household resilience.

Calorie Intake (CI): The per capita kilocalorie intake of a household is calculated based on food available for the year from all sources. This indicator is directly related to household resilience.

Per Capita Income (INCM): This is average income (birr) generated from all sources of IGAs (including off-farm) that might be expended for purchasing food by a household.

Coping Strategies Index (CSI): Coping refers to what people have to do when they do not have enough to eat, thus the more people have to cope, the less they are food secure (Maxwell & Caldwell, 2008: 2). This implies that CSI is inversely related to resilience.

Wild edible foods (WEFs): This is the sum of wildfood gathered and/or hunted measured in kg. The amount of WEFs is assumed to positively contribute to IFA. As a result, the larger amount of WEFs accessed, the more a household becomes resilient.

Dietary diversity (DD): This refers to the total number of meals eaten per day by a household. Accordingly, the larger the number of meals eaten per day, the more a household becomes resilient.

Per Capita Money Saving (MSAV): This is the amount of cash-money (birr) saved by a household. This money would be expended for purchasing food during times of food shortage. It is directly related to resilience.

As all of these variables have continuous scales, factor analysis was run to estimate IFA (a latent indicator) using the principal axis factoring method and the scoring method suggested by Bartlett (1937) using SPSS version 19. The first factor generated is quite meaningful and can be considered as the underlying latent variable (IFA) as it meets all statistical requirements. Although it satisfies the requirements, the remaining 2 factors were also used in estimating IFA as they accounted for significant variance, the three factors accounting for more than 67% of the variance. The KMO measure of sampling adequacy is 0.631 indicating that the sample size was adequate for running factor analysis and indicating a reliable first principal component representing IFA. This well fits the suggestion of Field (2005: 6) that KMO statistics should be >0.5 if sample size and the proportion of variance in variables that might be caused by underlying factors are adequate for running factor analysis. This result goes in line with the finding of Keil et al (2006: 6) where the KMO measure of sampling adequacy was 0.760

indicating relatively compact pattern of correlations so that factor analysis yielded distinct and reliable factors. Moreover, Bartlett's test of sphericity is also evaluated for testing the null hypothesis that the original correlation matrix is an identity matrix in which all correlation coefficients (R-matrix) would be zero (Field, 2005: 6). This shows that the variables are unrelated and therefore unsuitable for which structure detection is run. Accordingly, smaller values (<0.05) of significance level indicate that it is insignificant and generally suggest nearly an identity matrix. The result of this study shows that the test was significant ($p = 0.000$) and Chi-square = 325.902) suggesting that the factor analysis was appropriate with the data available for the study. All except the DDS score have larger extraction communalities. The factor loadings of each observed variable is greater than ± 0.3 (Table1) meeting the suggestion of Peterson (2000: 264) that factor loadings of ± 0.3 are considered as the minimum level accepted especially in social and behavioral sciences although different researchers set different thresholds.

Table 1. Communalities, Factor Loadings, and Correlation of Variables with IFA

Indicators of IFA	Communalities		Factors & their Loads			Corr. (IFA)
	Initial	Extraction	1	2	3	
HFIAS scores	.535	.952	-.880	.343	.245	-.457
Kilocalorie/ADE/day	.486	.573	.741	-.035	.150	.743
Income/ADE/year	.324	.424	.405	-.339	.381	.402
CSI Score	.363	.733	-.181	.836	-.047	.287
WEFs (qtl/hh/year/)	.170	.226	-.055	.467	-.070	.174
DDS(#of meal/hh/day)	.049	.027	-.040	-.002	.158	.051
Save (birr/ADE/year)	.229	.498	.324	-.151	.609	.581
Eigenvalue	Total		2.55	1.33	1.03	
	Variance		0.364	0.162	0.153	
	Cumulative		0.364	0.526	0.679	
KMO Test of Sampling Adequacy = 0.631						
Bartlett's Test of Sphericity = significant at $p=0.000$; Chi-square= 325.902						
Extraction Method: Principal Axis Factoring						

Source: Factor Analysis Result, 2013

These indicators play important role in estimating the IFA dimension although they differ in their correlation coefficients. Only, the role of DDS seems less in all measures. As expected, the factor loadings and correlation coefficients of all variables except HFIAS are negative. But CSI, as captured by Factor2 has positive factor load and correlation with IFA. This seems against the theory that the more a household copes, the less it becomes food secure. However, the reason

behind this result is that the coping strategies used for analysis were more of asset disposal (rather than behavioral adaptation) strategies that increase the households' access to food and hence IFA. The relative size of factor loading of each variable has therefore important policy implication (i.e. the higher the loading, the more important it is, and the more policy attention should be placed on it). In general, as suggested by the statistical criteria mentioned above, the factor scores can be used to estimate the IFA variable. As a result, three of the factors were used to estimate IFA as their contribution is adequate. It is estimated as follows:

$$\text{IFA} = [0.364*\text{Factor1} + 0.162*\text{Factor2} + 0.153*\text{Factor3}]/3 \dots\dots\dots\text{equ.3}$$

The result obtained through this equation was further used as one of the latent indicators in constructing an overall RI for each household.

Adaptive Capacity (AC)

AC is a crucial dimension of resilience that measures the household's ability to adapt and react to shocks (Alinovie et al, 2010: 22). It represents the household's capacity to absorb shocks (Alinovi et al, 2009: 16). Having more coping strategies implies more probability of mitigating food insecurity shock (Alinovi et al, 2008: 145). The following observed variables were selected as determinants of AC of households to food insecurity shock in the study area.

Labor Disposal Diversity (LDD): This is a count variable that refers to the number of household members engaged in labor as a means of making a livelihood during food shortages. This variable is directly related to the adaptive capacity of a household.

Income Diversity (INCDV): This is a count variable that represents the number (diversity) of income sources of a household. The assumption behind this variable is that the more diversified the sources of income, the higher ability of a household to adapt to a given shock (in this case food insecurity).

Diversity of Behavioral Coping Strategies (BCSD): This is a count variable that refers to the number of coping strategies that involve behavioral changes during a shock.

Diversity of Asset-disposal as Coping Strategies (ACSD): This is a count variable that refers to the number of coping strategies that involve asset disposal during a shock.

Diversity of Wild-Edible-Foods (WEFs): this is a count variable that refers to the total number of wild foods gathered and/or hunted during the year. The idea is that the more the number of wild foods a household gathered/hunted, the more he/she adapts to the food insecurity shock.

All of the variables are based on a count measurement scale and factor analysis was run using principal axis factoring method in order to estimate the AC latent variable. The result obtained through this equation was further used as one of the latent indicators in constructing an overall RI for each household.

$$AC = [0.4457*Factor1 + 0.2011*Factor2 + 0.1616*Factor3] / 3 \dots\dots\dots equ.4$$

Table 2 Communalities, Factor Loadings, and Correlation of Variables with AC

Indicators of AC	Communalities		Factors & their Loads			Corr. (AC)
	Initial	Extract	1	2	3	
Labor Diversity (LCSDIV)	.394	.727	.198	.728	.399	.524
Income Diversity (INCDIV)	.348	.678	.202	.312	.735	.575
B/hral Coping Div. (BHRLC)	.341	.758	.794	.356	-.036	.890
Asset-disposal-coping (ACSD)	.103	.133	.337	.063	.122	.417
Wild Foods Div. (WEFFRQ)	.249	.372	.575	.029	.200	.687
Eigenvalue	Total		2.228	1.006	.808	
	Variance		.4457	.2011	.1616	
	Cumulative		.4457	.6468	.8084	
KMO Test of Sampling Adequacy = 0.622						
Bartlett's Test of Sphericity is significant at p=0.000; Chi-square= 204.723						
Extraction Method: Principal Axis Factoring						

Source: Factor Analysis Result, 2013

The first factor generated using Bartlett's scoring method was satisfactory to represent the AC latent dimension. The KMO test is 0.605; the Bartlett's test of Sphericity was significant (p-value = 0.000, Chi-square = 114.578); the factor has eigenvalue of 2.084 that accounted for about 46% of the variation, and all observed variables have factor loadings of >0.3 and can be used for further analysis. All variables are also positively correlated to the AC as expected with the exception of the coping strategies diversity which is negatively correlated with AC but the correlation was insignificant (-0.130). This was in contrast to the original assumption that this variable has positive relationship with AC, thus the alternative assumption is accepted. The negative correlation indicates that increased asset disposal in long run it gradually leads to a

decreased AC of households as the asset might be exhausted. But, the overall factor load as captured by Factor2 (0.432) shows its positive contribution to AC in a short run.

Access to Basic Service (ABS):

It is a key factor for enhancing households’ resilience by improving their access to assets although it is beyond their control (Alinovi et al, 2009: 14). It is true that better access to public services affects the capacity of households to manage risks and respond to crisis. The average distance to reach the nearest available services is taken as a proxy for representing APS. Despite their poor quality, other services such as school are available in every village while electricity is totally absent in all villages of Belo-jiganfoy district except occasional appearance in Soge town. As a result, the ABS latent variable was constructed as a composite of the following observable indicators.

Distance to Fitch Water for Domestic Use (WATERD): This is a continuous variable measured in hours. This is inversely related to APS latent variable, and the lesser resilient a household is.

Distance to the nearest Farmland (FARMLD): This is a continuous variable measured in hours. This is inversely related to APS latent variable. It was assumed that households whose farmlands were nearer to homes are more resilient than those farther from home.

Distance to Market the nearest Place (MKTD): This is a continuous variable measured in hours required to reach the nearest market place. This is inversely related to APS latent variable.

Distance to Health station (HSTD): This is a continuous variable measured in hours. This variable is inversely related to APS latent variable.

All of these variables are continuous and factor analysis using principal factor axis method is appropriate to estimate the ABS. The result shows that the first factor was satisfactory to represent the ABS as examination of statistical outputs shows. The KMO statistics was sufficient (0.492) while Bartlett’s measure was significant (p = 0.000). The two factors generated together accounted for more than 62% of the variance. As a result, they were used to estimate APS as follows:

$$APS = [0.3532*Factor1 + 0.2715*Factor2]/2 \dots\dots\dots equ.5$$

Table 3 Communalities, Factor Loadings, and Correlation of Variables with ABS

Indicators of ABS	Communalities		Factors & their Loads		Corr. (ABS)
	Initial	Extraction	1	2	
Dist-to-waster (WATERD)	.104	.423	-.644	.086	-.800
Dist-to-farmland (FARMLD)	.058	.284	-.473	.413	-.634
Dist-to-market (MKTD)	.131	.394	-.260	.037	-.034
Dist-to-health-station(HSTD)	.037	.069	.025	-.532	-.241
Eigenvalue	Total		1.413	.1.086	
	Variance		.3532	.2715	
	Cumulative		.3532	.6246	
KMO Test of Sampling Adequacy = 0.492					
Bartlett's Test of Sphericity is significant at p=0.000; Chi-square= 37.522					
Extraction Method: Principal Axis Factoring					

Source: Computed from Survey Data, 2013

As expected the factor loadings and correlation between the variables and ABS are negative. It should be noted that the negative relationship in the factor loadings of WETERD, FARMLD and MKTD are captured in Factor1 while that of HSTD was in Factor3 (see Table3).

Social Safety net (SSN)

SSN are important components of household resilience in almost all communities. In some studies (Ciani, 2012: 16), SSNs are regarded as dependence for assistance on national and international agencies, charities, and NGOs. In the present study, these are totally absent. As a result, traditionally existing SSNs that are inherent to this particular community are employed. Whatever the source, SSNs can be considered as a system's capacity to mitigate shocks (in this case, food insecurity). The idea is that the more households practice these indicators, the stronger they are socially integrated, and the more resilient they become. Accordingly, the following indicators of SSN are identified in the present study area.

Debo (D): This is a dummy (yes/no) variable that refers to whether a household had been participating in *Debo*. *Debo* is a labor union under which people of a village or more are engaged in for facilitating farmland and other work such as construction of housing.

Wenfel (W): it is a dummy variable (yes/no) similar to *debo* but often involves smaller number of persons and held continuously each day for each person turn by turn.

Borde-ceremony (BC): this is a dummy (yes/no) variable that refers to the engagement of a household in this ceremony. This ceremony is conducted intentionally for drinking *borde* (locally brewed alcohol), which is most often practiced by the indigenous people (the Gumuz and Berta) of the area although the non-indigenous have also accustomed to this culture.

Drink-coffee Ceremony (DCFC): This is a dummy (yes/no) variable that refers to whether a household had been engaged in such a social co-existence. It is similar to *borde* ceremony that involves drinking coffee every morning together, which is expected to enhance the cooperation of villagers. This is directly related to the social bond and an overall resilience to food insecurity.

Borrowing Grain/Cash (BRWGC): This is a dummy variable (yes/no) about whether households borrowed grain or cash during food shortages. This is directly related with SSN and increases households' resilience.

Engaged-in One-to-five (OTF): This is also a dummy variable (yes/no) showing whether households were engaged in one-to-five organization at the time of survey. Although some argue that this is more of political, its contribution to social cohesion outweighs. Accordingly, it is directly related with SSN.

Eating together During Difficult Times (EDFT): This is a dummy variable (yes/no) which shows whether households used to share and eat what they had during times of food shortages. It is directly related to SSN and then household resilience.

All of these variables are not continuous so that optimal scaling is appropriate for estimating the SSN latent variable by transforming the dummy variables. The first factor generated through this procedure was quite satisfactory and can be used to represent the SSN. This factor alone explained about 32% of the variation. In this regard, consideration of Factor2 in estimating SSN is evident as both explained about 51% of the total variance. With the exception of OTF, all variables have factor loadings of about and greater than 0.3 and all are captured by Factor1 while that of EDFT is captured by Factor2. Even the loading of OTF is considerably enough.

Table 4 Factor Loadings and Correlation of Transformed Variables with SSN

Indicators of SSN		Factors & their Loads			Corr. (SSN)
		1	2	3	
<i>Debo</i> (D)		.751	-.446	-.030	.760
Wenfel (W)		.749	-.509	.148	.802
Borde cermoney (BC)		.732	.415	-.182	.640
Drink-coffee Ceremony (DCFC):		.553	.516	-.319	.431
Borrowing Grain/Cash (BRWGC)		.388	-.203	-.132	.336
Engaged-in One-to-five (OTF)		.227	.145	.889	.416
Eating together During Difficulties (EDFT)		.288	.603	.243	.417
Eigenvalue	Total	2.253	1.323	1.025	Total Cronbach's alpha = 0.913
	Variance	.3218	.1889	.1464	
	Cumulative	.3218	.5108	.6575	
	Cronbach's Alpha	.649	.285	.028	

Source: Factor Analysis Result, 2013

As expected the loadings and correlation of all variables with SSN were positive. The SSN score for further estimation of overall household resilience was estimated as follows:

$$SSN = [0.3218*Factor1 + 0.1889*Factor2 + 0.1464*Factor3] / 3 \dots\dots equ.6$$

Asset Possession (AP)

This component is a crucial aspect of household resilience because the more a household possess asset, the more he/she copes with a shock and becomes more resilient. Four observed variables were used to estimate the AP component as they were very essential for a farm household.

Farmland Owned (FLAND): This is a continuous variable that refers to total amount of farmland a household owns. This is also directly related to AP and resilience.

Farm implements (FIM): This is a continuous variable that refers to the total monetary value of all farm implements a household owns.

Non-agricultural-assets (NAA): This is a continuous variable that represents the total monetary value of all non-agricultural durable goods a household possessed.

Livestock owned (TLU): This is a continuous variable that refers to the number of livestock (TLU) owned by a household. This variable is directly related to AP and resilience.

All indicators of the Asset component are continuous and were estimated by factor analysis using principal factor axis method. The KMO test was 0.599, Bartlett’s test was significant (p=0.000).The first factor generated is satisfactory and can be used to represent AP latent indicator. This factor alone accounted for about 46% of the variance while both of the factors constituted about 67%.

Table 5 Communalities, Factor Loadings, and Correlation of Variables with AP

Indicators of AP	Communalities		Factors & their Loads		Corr. (AP)
	Initial	Extraction	1	2	
Farmland Owned (FLAND)	.038	.049	.124	.183	.152
Farm implements (FIM)	.163	.281	.610	.602	.150
Non-agricultural-Assets (NAA)	.377	.735	.160	.506	.797
Livestock owned (TLU)	.282	.466	.644	.228	.909
Eigenvalue	Total		1.852	.932	
	Variance		.463	.239	
	Cumulative		.463	.696	
KMO Test of Sampling Adequacy = 0.599					
Bartlett’s Test of Sphericity is significant at p=0.000; Chi-square= 118.089					
Extraction Method: Principal Axis Factoring					

Source: Computed from Survey Data, 2013

Consequently, both factors were used to estimate the AP variable that is in turn a latent indicator of the overall household resilience. The following simple formula is used to estimate the AP.

$$AP = [0.463*Factor1 + 0.239*Factor2]/2 \dots\dots\dots equ.7$$

As expected, the factor loadings and the correlation of each variable with AP was positive.

Stability (S)

In most food security literature, stability is used to describe the stability of food supply. Since the novel contribution of Alinovi et al (2009: 17), it has become a cross-sectional dimension of resilience. In the present study area, stability is seen in relation to conflict. Belo-jiganfoy district located at the boundary of Oromya Region where two exclusively different groups of people (the

so-called *blacks* and the *non-black*) are frequently interacting. The two groups had occasionally been engaged in gun-accompanied conflicts for historical reasons. As a result, this area is vulnerable to inter-regional and inter-ethnic conflicts between the *blacks* (mainly the Gumuz) and the Oromos of Wollega. A good example of the conflict in this area is the one held in the autumn season of 2008, which left enormous scar on the minds of many *blacks*. This has an impact on household food security and resilience. The following variables are taken as proxy for stability.

Peace-Perception (PP): It is a dummy variable (yes/no) that refers to the perception of a household on the current condition of peaceful co-existence of the ethnic groups (the *blacks* and the *non-blacks*).

Inter-Ethnic Marriage (IEMRG): It is a dummy variable (yes/no) that refers to whether there is presently inter-ethnic marriage between the two types of ethnic groups.

Bad Attitude towards each other (ATTUD): This is a dummy variable (yes/no) representing if there is bad attitude towards each other by the two types of ethnic groups.

Future Probability of Conflict Breakout (CONFCTP): This is a dummy variable (yes/no) that refers to household's perception of future probability of conflict breakout.

Evicted due to conflict (EVICT): This is a dummy variable (yes/no) representing whether a household had been evicted due to conflict between the ethnic groups.

Legal Protection of Crime and Supremacy of Law (LPLSPL): this is a dummy variable (yes/no) that refers to the perception of households about whether there is strong legal protection of crime and respecting supremacy of law.

Income Stability (INCSP): This is a dummy variable (yes/no) that refers to the perception of households about whether they have stable sources of income or not.

Livestock Stability (LIVSKS): This is a dummy variable that refers to whether a household had reported a death of a livestock.

Human Health Stability (HUHS): It is a count variable that refers to the number of sick household members during the survey year.

Almost all of these variables are not continuous. Only number of sick persons is measured on a continuous scale. As a result, optimal scaling method is employed to estimate the stability (S) latent variable which transforms the dummy variables. The result shows that the first factor generated was satisfactory explaining about 35% of the total variance. But, the contributions of

the second and the third factors were also significant as they altogether accounted for about 67% of the total variance. Therefore, finally all of them were used to estimate S as follows:

$$S = [0.3499*Factor1 + 0.1857*Factor2 + 0.1377*Factor3] / 3 \dots\dots\dots\text{equ.8}$$

Table 6 Factor Loadings and Correlation of Transformed Variables with S

Indicators of S		Factors & their Loads			Corr. (S)
		1	2	3	
Peace-Perception (PP)		.895	.176	-.162	.761
Inter-Ethnic Marriage (IEMRG)		.896	.100	-.195	.718
Bad Attitude towards each other (ATTUD)		-.851	-.111	.174	-.595
Probability of Conflict Breakout (CONFCT)		.090	.807	.254	.509
Evicted due to conflict (EVICT)		-.090	.727	.424	.389
Legal protection of crime (LPCRM)		.597	.135	.109	.585
Income Stability (INCP)		.213	-.325	.629	.237
Livestock Disease (LIVSTKD)		-.348	.308	-.484	-.308
Human-Health Stability (HUHS)		.232	-.307	.474	.221
Eigenvalue	Total	2.799	1.485	1.101	Total
	Variance	.3499	.1857	.1377	Cronbach's alpha = 0.931
	Comulative	.3499	.5356	.6733	
	Cronbach's Alpha	.735	.373	.105	

Source: Factor Analysis Result, 2013

Cultural-bond-Reciprocity and Practices (CLRBP)

This is one of the most important dimensions of household resilience, which the previous literature on resilience missed. Households which make strong bond with each other are more resilient than those weakly bonded. The reciprocity of assets and food by households is very important in responding very well in the face of shock/stress. The following observed variables are selected as indicators of CLRBP.

Reciprocity of Money (MONREC): This is a dummy variable (yes/no) that refers to whether a household had been involved into giving and taking money as per the culture.

Reciprocity of Grain (GRNREC): This is a dummy (yes/no) variable that indicates whether a household gives and takes grain as per the culture

Reciprocity of Hosting-Gust (GUSTREC): This is a dummy variable (yes/no) that refers to whether a household had been involved in hosting gust and/or being hosted as a gust and fed.

Reciprocity of Food (FOODREC): This is a dummy variable (yes/no) that indicates whether a household involved in giving and taking food (including coffee and *borde* ceremonies) as per the culture.

All of these variables are not measured on a continuous scale, as a result optimal scaling was used to estimate the CLRBP latent variable as it transforms dummy variables. The first factor explained about 51% of the variation. Although it is satisfactory and can be used to represent the CLRBP, the contribution of the second factor was significant as both accounted for about 74% of the total variation. Therefore, both factors were used to estimate the CLRBP that later used to estimate overall resilience of each household as follows.

$$\text{CLRBP} = [0.941 * \text{Factor1} + 0.235 * \text{Factor2}] / 2 \dots\dots\dots \text{equ.9}$$

Table 7. Factor Loadings and Correlation of Transformed Variables with CLRBP

Indicators of S		Factors & their Loads		Corr. (CLRBP)
		1	2	
Give-&-Take Money (GITKM)		.864	-.092	.746
Give-&-Take Grain (GITKG)		.845	-.180	.692
Host-&-Feed-Gust (HOFEDG)		.679	-.128	.563
Eat-together Food (EATTGF)		.336	.940	.702
Eigenvalue	Total	2.038	.941	Total
	Variance	.509	.235	Cronbach's
	Cumulative	.509	.744	alpha =
	Cronbach's Alpha	.679	-.084	0.886

Source: Computed from Survey Data, 2013

As expected, the result shows that all variables are positively correlated with CLRBP.

Aspiration (ASP):

Aspiration is a crucial component that profoundly affects household resilience to a shock. However existing few research works on quantitative analysis of resilience to food insecurity

have missed this component. Only Frankenberger et al (2007:22) used the concept to assess the forward-looking (vulnerability) perception about poverty and food insecurity situation in Northeast Ethiopia, mainly qualitatively. A household that aspires for a change, will better cope with a shock as aspiration is most often accompanied by hardworking to achieve what is aspired. The following observed factors are used as indicator of household aspiration.

Aspired or Not (ASPN): This is a dummy variable (yes/no) that represents whether a household has ever been aspired in his life time to become wealthy and fundamentally change his/her life.

Saving (SAVE): This is also a dummy variable (yes/no), which refers to if households had saved in Cash or kind in order to achieve his/her aspiration for change and become rich.

Borrow Money (BORMON): This is a dummy variable (yes/no) that indicates whether a household had borrowed money for starting up business in order to achieve aspiration for change and become rich.

Invest on Asset (INVSTAS): This is a dummy variable (yes/no) that shows whether a household had invested on asset on a long-run objective of achieving his/her aspiration for change and become rich.

Active Engagement in Work (AEW): This is a dummy variable (yes/no) which refers to whether a household had actively engaged in any work in order to achieve his/her aspiration for change and become rich.

Relation with Institutions (RIEI): This is also a dummy variable (yes/no) that shows whether a household had made a strong relation with internal & external institutions in order to achieve his/her aspiration for change and become rich.

Interest to Change (INTRSCNG): This is a dummy variable (yes/no) that indicates if a household had a strong interest for change and become rich.

Exposure to Information (EXPSRINF): This is also a dummy variable (yes/no) which refers to whether a household had an exposure to information in order to achieve his/her aspiration for change and become.

In this case, traditional multivariate techniques (factor analysis and principal components analysis) are not suitable as the variables are not continuous. Optimal scaling technique was rather run using PRINCALS algorithm to estimate the ASP latent variable. The generated factor is satisfactory accounting for about 67% of the total variance and can be considered as a latent variable (ASP). Moreover, all loading on the factor are >0.3 and is accepted for further analysis

as suggested by Peterson (2000), who proposes factor loadings of ± 0.3 for further analysis. But, the second factor was also used for estimating ASP as both factors together make up about 77% of the total variance.

Table 8. Factor Loadings and Correlation of Transformed Variables with ASP

Indicators of ASP		Factors & their Loads		Corr. (ASP)
		1	2	
Aspired or Not (ASPN)		.777	-.238	.731
Saving (SAVE)		.841	-.145	.809
Borrow Money (BORMON)		.512	.824	.633
Invest on Asset (INVSTAS)		.870	-.080	.847
Active Engagement in Work (AEW)		.895	-.101	.868
Relation with Institutions (RIEI)		.794	.216	.818
Interest to Change (INTRSCNG)		.861	-.047	.848
Exposure to Information (EXPSRINF)		.912	-.095	.886
Eigenvalue	Total	5.333	.831	Total
	Variance	.6667	.1039	Cronbach's
	Cumulative	.6667	.7706	alpha =
	Cronbach's Alpha	.929	-.233	0.957

Source: Computed from Survey Data, 2013

Based on the two factors, the ASP latent variable was determined using the following simple formula:

$$ASP = [0.6667 * \text{factor1} + 0.1039 * \text{Factor2}] / 2 \dots\dots\dots \text{equ.10}$$

The result indicates that all observed variables positively contributed to ASP implying that an increase in each of them increases level of aspiration. Moreover, almost all variables are very important in defining ASP.

Estimating an Overall Resilience Index (RI)

The overall resilience index (RI) for each household is estimated by applying factor analysis using principal axis factoring method and taking the latent variables estimated earlier, which are in fact normalized/standardized through factor analysis or optimal scaling (i.e. mean = 0 and variance = 1). The eight building blocks (latent factors) were analyzed using Bartlett's method

for factor scores saved in the SPSS active data set in order to calculate the overall index. Unfortunately, SPSS generates n-1 factors in the active data set (n being number of factors involved in the analysis, in this case 7 factors were generated in the solution). The household RI was, therefore, constructed by calculating the weighted sum of the 7 factors (the weights = proportion of variance explained by each factor) as suggested by DiStefano et al (2009:3)

$$RI = 0.2280 * FAC1_2 + 0.2016 * FAC2_2 + 0.1372 * FAC3_2 + 0.1237 * FAC4_2 + 0.1055 * FAC5_2 + 0.0804 * FAC6_2 + 0.0677 * FAC7_2 \dots \dots \dots \text{equ.11}$$

The result indicates that all factors with the exception of Factor 7 had heavy loadings at least from one variable. Five of them had loadings of ± 0.3 . The model shows that seven factors together accounted for about 94% of the total variance. The KMO statistics for the model was 0.579 and Bartlett's test of sphericity was significant (p-value = 0.000 with Chi-square = 187.05).

Table 9. Factor Loadings, Variance Explained, Correlation and Beta (B) coefficient of Latent Dimension with Household Resilience Index

Variable	Factors and Their Loadings							Corr.with (RI)
	1	2	3	4	5	6	7	
ASP	.709	.092	-.014	.104	.245	.170	-.095	.763*
AP	-.745	.080	.172	-.105	.070	.060	-.095	-.467*
AC	.331	-.578	.229	.132	-.075	-.022	.188	.033
IFA	-.086	-.053	.489	-.011	-.012	-.114	.004	.085
SSN	.073	.651	.011	.144	.069	-.049	.059	.592*
CLBRP	.155	.418	-.040	.241	.446	-.086	-.006	.625*
S	-.081	-.063	.008	-.411	-.055	-.105	-.006	-.325*
ABS	.029	-.038	-.107	.100	-.018	.439	-.003	.102
Eigenvalue	1.824	1.613	1.098	.990	.844	.643	.542	
Variance (%)	.2280	.2016	.1372	.1237	.1055	.0804	.0677	
Cumulative%	.2280	.4297	.5669	.6906	.7961	.8764	.9442	
KMO = 0.579	Bartlett's score (significant; p-value = 0.000; Chi-square = 187.05)							

Correlation is significant at 0.01; Source: Factor Analysis Result, 2013

As defined in the theoretical framework, resilience is a flip side of vulnerability on a resilience-vulnerability continuum. That is, the gradual decline in the resilience status of households is accompanied by an increasing level of vulnerability and vice-versa. The extreme negative value (-1) on the spectrum shows the most vulnerable households whereas that of +1 shows the most resilient ones. In this paper, the smallest index indicating the most vulnerable households is -

0.769 whereas the highest index indicating the most resilient ones is 0.765 (Table 10). In between these values are the intermediate ones and can be categorized into relatively different levels of resilience.

Like all composite indices, RI is a relative measure of the level of household resilience, otherwise vulnerability, to seasonal food insecurity. So far, unlike the static measures of food security status that divides households into food secure and food insecure, no universally accepted cut-off point has been established for delineating resilient from non-resilient households. The RI is a composite index that simply shows the relative decrease or increase in the level of resilience among the studied subjects. In addition to suggesting own cut-off points to categorize households into different resilience levels, this paper has two main purpose. The first is to identify important building blocks and determinants of household resilience, and examine resilience levels of households belonging to the two ethno-culture groups (indigenous and the non-indigenous) as these have profound policy implications. The paper uses the following ranges of RI scores, which are randomly proposed and used as grouping methods of four levels of resilience: Less-resilient/vulnerable ($RI < 0.100$), moderately Resilient ($0.100 \leq RI < 0.250$), Resilient ($0.250 \leq RI < 0.500$) and highly-resilient ($RI \geq 0.500$).

Table 10. Percent Distribution of Household Resilience Status by and Ethno-culture Group

Ethno-culture Category	Measurement	Households by Resilience Category				Total
		Vulnerable	Moderately resilient	Resilient	Highly resilient	
Indigenous	Count	68	25	24	4	121
	%	39.97%	5.50 %	6.72%	2.81%	55.0%
Non-indigenous	Count	72	10	12	5	99
	%	25.28%	9.33%	8.92%	1.47%	45.0%
Total	Count	140	35	36	9	220
	%	65.25%	14.83%	15.64%	4.28%	100.0%

NB: Vulnerable = ($RI < 0.100$); Moderately Resilient= ($0.100 \leq RI < 0.250$); Resilient = ($0.250 \leq RI < 0.500$); Highly-resilient = ($RI \geq 0.50$)

Source: Analysis of Household Survey Data, 2013

The result (Table 10) shows that 65.25% of surveyed households were vulnerable while only 34.75% were resilient at different levels (14.83% moderately, 15.64% resilient and 4.28% highly). Considering those households which were moderately resilient as vulnerable, about 80% of the total surveyed households were vulnerable to food insecurity shocks. The proportion of resilient households in the indigenous ethno-culture group (15.03%) was much less than that of the non-indigenous group (19.72%). This finding is relatively consistent with Guyu (2015:147) in which 72% of households were found vulnerable to food insecurity.

Relative Importance of Latent Dimensions of Household Resilience

It should be recognized that the latent dimension do not equally contribute to households' resilience. Some have more significant impact than others although the role of each is still crucial in estimating resilience. To identify the impacts of each latent variables on household resilience, simple regression analysis was run using ordinary least squares (OLS) algorithm. This gives the impacts in terms of standardized (B) coefficient. The household resilience score was used as dependent variable and 8 of the latent variables as explanatory variables. The following is the empirical model used to predict household resilience (RI).

$$RI = \partial + \beta_1 IFA + \beta_2 AC + \beta_3 APS + \beta_4 SSN + \beta_5 AP + \beta_6 S + \beta_7 CLBRP + \beta_8 APS \dots \text{equ12}$$

Where RI = household resilience; ∂ = constant; β_{1-8} = coefficient of each variable, e = an error term representing the negligible information of the variables used to estimate resilience but excluded from the model above.

SPSS recommends examination of the Beta-coefficient for the relative importance of each variable in determining a dependent variable (in this paper household resilience to food insecurity). Accordingly, Table 11 shows that irrespective of the negative signs, aspiration (ASP) was the most important dimension which actually contributed more (Beta = 0.520) to the regression model followed by social safety net (SSN) (Beta = 0.427), cultural bond and practices (CLRBP) (B = 0.327), income and food access (B = 0.191), asset possession (AP) (B = -0.158), and stability (S) (B = -0.141). The importance of adaptive capacity (AC) (B = 0.083) and access to basic services (ABS) (B = 0.075) seem less as compared to others. For example, a 0.520 unit increase in households' aspiration to change increases their resilience by 1 standard deviation. In contrast, a 0.158 unit decrease in households' asset possession increases their resilience by 1

standard deviation. The logic behind negative impacts of asset possession and stability is that households' resilience increases temporarily through disposal of assets which might negatively affect their stocks. Similarly, the negative sign in stability is that data were collected against the presence of instability, which decreases household resilience. This relative importance of the dimensions of households' resilience to seasonal food insecurity has clear policy implications because it minimizes intervention costs. Policy makers and implementers can emphasize the important dimensions of resilience when planning to improve the resilience capacity of households.

Table 11. Relative Importance of Each Latent Variable in Household Resilience

Latent variables	Unstandardized Coefficients		Std. Coef	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Constant	-.001	.000	-	-1508134.805	.000	-	-
AC	.128	.000	.083	52181439.436	.000	.760	1.316
AP	-.145	.000	-.158	-94340571.069	.000	.686	1.458
ABS	.064	.000	.075	53204575.071	.000	.967	1.034
ASP	.452	.000	.520	3.089E8	.000	.680	1.470
CLRBP	.343	.000	.327	2.100E8	.000	.792	1.262
IFA	.326	.000	.191	1.337E8	.000	.942	1.062
S	-.291	.000	-.141	-98821323.891	.000	.952	1.051
SSN	.941	.000	.427	2.742E8	.000	.792	1.262

Dependent Variable: Resilience Index; *Significant at 0.01

Source: Regression Analysis Result, 2013

Conclusion

In general, three main conclusions can be drawn from this empirical study. First, in contrast to the public opinion that the green famine belt (western) Ethiopia is food secure and most resilient, the study shows that only 34.75% of the surveyed households were resilient but at different level implying that the majority of them (65.25%) were less resilient (vulnerable) to the shock. Therefore, the research concludes that the resilience capacity of households in the study area is

very weak and they may remain vulnerable in the future unless sound intervention measures are taken. In this regard, a clear and sound policy that aims at building household resilience capacity should be included in the existing food security policy. Accordingly, in long term rather than merely focusing on strategies that improve agricultural productivity, it is essential to work to strengthening the traditional/cultural and social elements that help people cope with and recover from seasonal food insecurity shocks. In short term, however, the application of formal safety net programmes approach needs to be adopted. Second, households in the indigenous ethno-culture group were much less resilient than the non-indigenous ones. This calls for different intensity of focus for different ethno-culture groups. In this regard, appropriate policy intervention that should address this difference should be established based on research that aims to identify the causes of such a difference. Third, although eight of the latent indicators of household resilience were important, aspiration to change (ASP), social safety net (SSN) and cultural bond and practices (CLRBP) played the most important role. Thus, the study recommends that any intervention should prioritize on strengthening these dimensions of resilience in order for households to recover from (by absorbing) seasonal food insecurity shock without damaging their asset bases. In addition to these, interventions to improve households' income and food access (IFA) conditions, and minimizing causes of instability and improving stability should be made. Strategies such as creating opportunities for income generating activities, wildfood collection/hunting, and wage labor opportunities can be implemented to improve IFA. Awareness creation about the use of available human and livestock health services, adoption and implementation of traditional conflict management strategies for reducing the bad attitude that the so-called blacks and non-black (mainly the Oromo) should be made in order to improve stability. The role of asset disposal may not be a sustainable way of improving resilience while it is inevitable option where others are absent. In this case, households should be assisted to generate their own physical assets as these are sources of security during shocks. This can be done by providing them startup capital and serious follow up for its implementation. Although their importance in resilience is relatively low, the contribution of adaptive capacity (AC) and access to basic services (ABS) may play significant roles in long-term. Therefore, basic services should be improved for building resilience a sustainable basis. In general, households' ASP to changes, SSN, and CLRBP play the most significant role in household resilience to green famine and should be focused when planning for intervention. Moreover, the role of resilience dimensions that had an intermediate role (IFA, S and AP) and those which have long-term

importance (AC and ABS) should not be underestimated. The intervention efforts to improve household's resilience capacity should also target mainly at the indigenous ethno-culture group while assisting the non-indigenous to maintain at least their present status of resilience.

Reference

- Alinovi L., D'Errico M., Mane E. and Romano D. 2010. *Livelihoods Strategies and Household Resilience to Food Insecurity An Empirical Analysis to Kenya*, Rome: Available online: http://erd.eui.eu/media/2010/Romano%20et%20al_Kenya%20paper%20r15.pdf
- Alinovi L., Mane E. and Romano E 2008. *Towards the Measurement of Measuring Household Resilience to Food Insecurity: Applying A Model to Palestinian Household Data*. In R. Sibrian (ed.), *Deriving Food Security Information from National Household Budget Survey. Experiences, Achievements, Challenges*, Rome: FAO, pp. 137 – 152. Available online: <ftp://ftp.fao.org/docrep/fao/011/i0430e.pdf>
- Alinovi L., Mane E. and Romano E 2009. *Measuring Household Resilience to Food Insecurity: Application to Palestinian Household (Working Paper)*. Florw
- Angharia J. and Lakhani V. 2013. *Towards Measuring Resilience of Low Income Settlements in Cities: The Case of Mumbai*. Tata Institute of Social Sciences, and Gujarat State Disaster Management Authority, India
- Babatunde, R.O., Omotesho O.A., Olorunsanya, Owotoki, G.M. 2008. *Determinants of Vulnerability to Food Insecurity: A Gender-based Analysis of Farming Households in Nigeria*; *Indian Journal of Agricultural Economics*, Vol. 63, No, 1. PP. 116 – 125.
- Benishangul-gumuz Region [BGR].2004.BGR Food Security Strategy Document, Assosa.**
- Burton C.G 2012. *The Development of Metrics for Community Resilience to Natural Disasters*, Unpublished PhD Dissertation, University of South Carolina,
- Canadian International Development Agency [CIDA], 2013. *Assessment of CIDA's Food Security Strategy and Funding in Ethiopia*; Canadian Food Security Policy Group, Ethiopia
- Capaldo J., Karfakis P., Knowles M. and Smulders.2010. *A Model of Vulnerability to Food Insecurity*; ESA Working Paper; No. 10-03, FAO
- Central Statistical Agency [CSA].2008. *Summary and Statistical Report of the 2007 Population and Housing Census; Population Size by Age and Sex*; Federal Democratic Republic of Ethiopia, Population Census Commission

- Ciani, F. 2012. A resilience-based Approach to Food Insecurity: The Impact of Mitch Hurricane on Rural Households in Nicaragua. *JEL Classification*, Q12, Q18, I32, I38
- Coates J., Swindale A. and Bilinsky P. 2006. Household Food Insecurity Access Scale (HFAS) for Measurement of Food Access: Indicator Guide. Food and Nutritional Technical Assistance Project (FANTA), Academy for Educational Development, Washington DC.
- Dagnachew Anberbir. 2004. *Generic Agri-service Delivery and Farmers' Differences: The case of the Native and Resettled Farmers of Assosa Woreda; MA Thesis, Addis Ababa University*
- DiStefano C., Zhu M. and Mindrila D. 2009. Understanding and Using Factor Scores: Considerations for the Applied Researchers. *Practical Assessment, Research & Evaluation*, Vol.14, No. 20.
- Ericksen, P. J 2008. What is the Vulnerability of Food System to Global Environmental Change? *Ecology and Society*, 13 (2), 14. [online] URL: <http://www.ecologyandsociety.org/vol13/iss2/art14/>
- Ericksen, P. J. 2007. Conceptualizing Food Systems for Global Environmental Change Research. *Global Environmental Change*. doi:10.1016/j.gloenvcha.2007.09.002
- Ericksen, P.J. 2007. Conceptualizing Food Systems for Global Environmental Change Research. Environmental Change Institute, *Oxford University Center for Environment*, UK.
- Federal Democratic Republic of Ethiopia-Ethiopian Road Authority [FDRE-ERA]. 2008. Consultancy Paper for District Integrated Development Study (Group-8); Belo-jiganfoy Integrated District Development Program Study (Final Report). Unpublished Document Translated from Amharic Version; Afro-consult and Pan African in Collaboration, Addis Ababa, Ethiopia.
- Field A. 2005. Factor Analysis Using SPSS, C8057 (Research Method II)
- Frankenberger T. and Nelson S. 2013. Background Paper for the Expert Consultation on Resilience Measurement for Food Security. Organized by FAO & WEF together with the Food Security Information Network (FSIN)
- Frankenberger T.B., Sutter P., Amdissa T., Alemtsehay Aberra, Mulugeta Tefera, Moges Tefera, Alemayehu Seyoum, Tanguy B., Spang T, Yeshewamebrat Ejigsemahu. 2007. Ethiopia: The Path to Resiliency, Volume I: Final Report, Prepared for CHF – Partners in Rural Development On behalf of: Canadian Network of NGOs in Ethiopia (CANGO)

- Guyu Ferede D. 2015. Household Vulnerability to Green Famine: Component-based Analysis of Indicators in Belo-jiganfoy District (Case Study Area), Benishangul-gumuz Region, Ethiopia. *Applied Science Reports*, 9(3), 139-156. Retrieved from www.pscipub.com. (DOI:10.15192/PSCP.ASR2015.9.3.139156).
- Guyu Ferede. 2014. Ethno-culture Disparity in Food Insecurity Status: The Case of Bullen District, Benishangul-gumuz Regional State, Ethiopia. *African Journal of Food Science*, Vol. 8(2), pp.54 – 63.
- Guyu Ferede. 2012. Voluntary Villagization Scheme (VVS) for Transforming Semi-pastoral Communities in Benishangul-gumuz Region, Northwestern Ethiopia: Challenges and Local Development Indicators. *Journal of Sustainable Development in Africa*, Vol.14, No.5.
- Holling S.C. 1996. Engineering Resilience versus Ecological Resilience. *Engineering within Ecological Constraints*. The National Academy of Sciences
- Holling, C. A. 1973. Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics*, Vol.4, (1973), pp. 1- 23;
- Keil A., Zeller M., Wida A., Sanim B. and Birner B. 2006. Determinants of Farmers' resilience Towards ENSO-related drought: Evidences from Central Sulawesi, Indonesia. A Paper Presented at the International Association of Agricultural Economists Conference, Gold Coast, Australia, August 12-18; 2006.
- King C.A. 2008. Community Resilience and Contemporary Agri-Ecological Systems: Reconnecting People and Food, and People with People. *Systems Research and Behavioral Science*; Research Paper, *Syst.Res.*25, 111-124(2008).
- Krejcie R.V. and D.W. Morgan. 1970. Determining Sample Size for Research activities. *Edu. Psychol. Measur.* 30:607-610
- Martin-Breen, P. and Anderies, J.M. 2011. Resilience: A Literature Review. Arizona State University, New York
- Maxwell D., Vaitla B., Gimay Tesfay and Nigussie Abadi. 2013. Resilience, Food Security Dynamics, and Poverty Traps in Northern Ethiopia. Analysis of a Biannual Panel Dataset, 2011 – 2013. Feinstein International Center, Tufts University
- Maxwell, D., & Caldwell, R. 2008. The Coping Strategies Index (CSI), A Tool for Rapid Measurement of Household Food Security and The Impact of Food Aid Programmes in Humanitarian Agencies, Field Methods Manual, Second Edition, USAID-WFP

- Nangulu A.K. 2001. Food Security and Coping Mechanisms in Kenya's Marginal Areas: The Case of West Pokot.
- Niemisto, N. 2011. The Resilience of Rural Ethiopian Livelihoods: A Case Study From t Hararge Zone, Eassten Ethiopia, Unpublished MA Thesis; Development and International Cooperation Social & Public Policy, University of Jyvaskyla;
- Peterson R. A. 2000. A Meta-Analysis of Variance Accounted for and Factor Loadings in Exploratory Factor analysis. *Marketing Letters*, Vol. 11, No. 3, pp. 261-275.
- Sakurai T., Nasuda A., Kitsuki A., Miura K., Yamauch T. and Kanno H. 2012. Vulnerability and Resilience of Household Consumption and Their Determinants: The Case of the Southern Province of Zambia. National Agricultural Research Center for Tohoku region, Morioka, Iwate, Japan.
- Save the Children. 2010 – 2015. Benishangul-gumuz Food Security and Economic Growth Project, 2010 – 2015.
- United States Agency for International Development [USAID]. 2004. Breaking the Cycle of Food Crisis: Famine Prevention in Ethiopia. The Mitchell Group, Inc. (TMG) Publication for pursuant to the following USAID task order: AFR/SD RLA-M-00-04-00009-00
- Walker B., Carpenter S., Anderies J., Abel N., Cumming G., Janssen M., Lebel L., Norberg J., Peterson G. D., and Pritchard R. 2002. Resilience Management in Social-ecological Systems: A Working Hypothesis for A Participatory Approach. *Conservation Ecology*, 6(1): 14, [online] URL: <http://www.consecol.org/vol6/iss1/art14>

6. Effect of Access to Livelihood Resources on Household Resilience to ‘Green Famine’ in Belo-jiganfoy District, Benishangul-gumuz Region, Ethiopia

¹Guyu Ferede and ²Muluneh Woldetsadik

Ready to be submitted to journals

¹Correspondence

E-mail: guyu_f@yahoo.com

Cell phone: +251-9-12-19-42-72

Department of Geography and Environmental Studies

Addis Ababa University, Ethiopia

²Supervisor

Department of Geography and Environmental Studies

Addis Ababa University, Ethiopia

Abstract

Livelihood assets and strategies are the core building block of livelihood approach to food insecurity and famines. This paper was aimed at examining the effect of assets and livelihood strategies on household resilience to acute seasonal food insecurity (i.e. a proxy indicator of ‘green famine’) in Belo-jiganfoy district, Benishangul-gumuz region, which is located in the ‘green famine’ belt of Ethiopia. A cross-sectional survey of 220 households was conducted using a structured questionnaire and key informant interviews. Both quantitative and qualitative data were used to analyze descriptively. The result showed that generally access to natural capital was not a serious problem that had adverse impact on household resilience to green famine. Overall, elements of natural capital such as land, water (rivers and their resources such as fish), trees and forest, wildlife and wild food, etc are relatively abundant. In contrast, it is human, physical, social and financial capitals that were likely to have adverse effect on household resilience to green famine. This implies that a policy and strategies that aim at improving the livelihoods of the poor should focus on mainly the later resources at household level.

***Keywords:** Livelihood, Asset, Strategy, Resilience, ‘Green famine’, Belo-jiganfoy, Ethiopia*

Background

The analysis of household resilience to ‘green famine’ in the study area revealed that households were less resilient or more vulnerable to acute seasonal food insecurity (a proxy indicator of green famine). Thus, it is concluded that the green famine belt (GFB) of Ethiopia is facing hidden famine that has been generally ignored by researchers and policymakers although its impacts are as severe as the famines in the conventional famine-prone areas of the country (Guyu and Muluneh, 2015a). The present paper examines how households’ access to livelihood resources (assets and strategies) affects the resilience of households to green famine shocks.

As indicated in the analytical framework in chapter 1, there is a fertile common ground for mixing resilience and livelihood research (Alinovie et al., 2010). The way a household copes with and withstands economic shocks depends on the options available in terms of capabilities, assets and livelihood activities/strategies (Ellis, 2003). Households with different socio-economic background have different levels of access to assets and strategies that help them to make their own living which, in turn, may ensure different levels of resilience to food insecurity or famine. This paper aims at analyzing the livelihood assets and strategies in order to understand their

impacts on household resilience to green famine in Belo-jiganfoy district, a case study area. The basic assumption is that those households that have better access to assets and able to diversify activities as well as make use of intensive cultivation of farmlands are more resilient than their counter parts.

Theory and Analytical Framework

The sustainable livelihoods approach (SLA) is a holistic model used to analyze and understand the livelihoods of the people. It is based on two main concepts (sustainability and livelihoods) and gives an overall picture of food security and famine situation at a given level of analysis and explains the process leading to livelihood outcomes (Scoones, 1998; Yaro, 2004). Vulnerability or enhanced resilience can be the two possible outcomes of the SLA (Scoones, 1998). Basically, this approach requires a range of assets to achieve positive livelihood outcomes (DFID, 1999). The basic assumption of the SLA is that if livelihoods are exposed to shocks and stresses, they are vulnerable to those shocks, if not sustainable. This approach therefore seeks to investigate how a person or a community in a socio-politico-economic situation devises livelihood strategies for achieving a sustainable livelihoods using a range of resources with given institutions and social norms (Yaro, 2004). In this paper, this approach is employed to examine the household resilience to green famine as an outcome of their livelihood resources and strategies.

The sustainable livelihoods framework (SLF) (Figure 1) is a tool used to improve our understanding of livelihoods, particularly that of the poor (DFID, 1999). The SLF is an integrating concept which binds together different economic and ecological aspects of making a living (Turunen et al., 2003:14). It consists of vulnerability context, livelihood assets, transforming structures and processes, livelihood strategies, and livelihood outcomes (Scoones, 1998; DFID, 1999; Solesbury, 2003; Ellis, 2003; Alinovi et al., 2010). Such ability of the framework to consider a number of issues and other models such as food availability decline (FAD) and food entitlement decline (FED) makes it a holistic tool. In this regard, Young states that livelihoods are made up of a combination of exchange entitlements (Young et al., 2001). The FED model proposed by Sen (1981) in turn considers the FAD approach (Sarracino, 2010), both in turn being taken into account in the SLF. The transforming structures and processes of the SLF may mean the incorporation of the recently growing emphasis on the sovereignty model of

famine and food insecurity in the SLF. It is essential to briefly overview the elements of the sustainable livelihoods and their application in this paper.

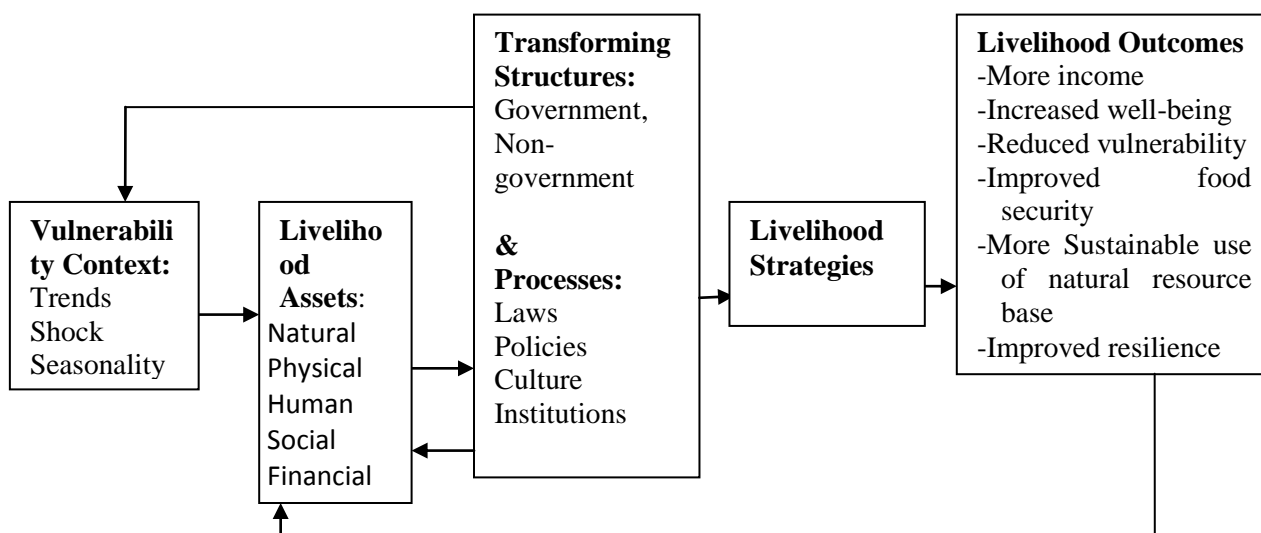


Figure 1 Sustainable Livelihood Frameworks (Scoones, 1998; DFID, 1999).

Analysis of resilience often begins with understanding the specific contexts that surround the people (Frankenberger et al., 2013). Context here refers to the environmental, political, social, economic, historical, demographic and policy conditions that affect households, communities, and governments (i.e. a unit) (Scoones, 1998), and determine to some degree the extent to which they are able to cope with risks (Frankenberger et al., 2012). Vulnerability context that involves trend, shock and seasonality (DFID, 1999) may be seen as an aspect of these contexts. Understanding the shocks/stresses is very important to manage them and help people to become more resilient by supporting especially the poor people to build up their assets through increasing access to appropriate means of livelihood strategies (DFID, 1999). Resilience measures must therefore be closely tied to the local context and the nature of the particular shock (e.g., drought, price volatility, conflict, etc). It is essential to note that vulnerability context destroys assets of household and wider communities in a given nation directly (DFID, 1999). An analysis of resilience therefore involves an analysis of vulnerabilities to shocks/stresses in a given context, and an understanding of the nature of their vulnerabilities (Frankenberger et al., 2012; Maxwell et al., 2013).

Livelihood assets, also known as livelihood resources (Scoones, 1998), are regarded as the core building block of a SLF (DFID, 1999). The ability to pursue different livelihood strategies depends on the basic material and social, tangible and intangible assets that people have in a possession (Scoones, 1998). Drawing on an economic metaphor, such livelihood resources may be seen as the ‘capital’ base from which different productive streams (i.e. goods and services) are derived from which livelihoods are constructed, hence the term ‘capitals’ (Degefa, 2005). Livelihood assets are grouped into five types of capital namely: natural, physical, human, financial, and social, all of which are essential in attaining livelihood outcomes in rural areas.

Natural capital represents the natural resources which benefit the community/group and includes fisheries resources, biodiversity, land, forests, and waters (Degefa, 2005). It includes the natural resource stocks (e.g. soil, water, air, forest, genetic resources) and environmental services (e.g. hydrological cycle, erosion protection, pollution sinks) from which resource flows and services useful for livelihoods are derived (Scoones, 1998; DFID, 1999). The resources that make up natural capital vary widely ranging from intangible public goods such as the atmosphere and biodiversity to divisible assets used directly for production such as land, water, trees, etc. Generally, DFID (1999) listed some examples of natural capitals and the services derived from them namely: land, forest, marine/wild resources, water, air quality, erosion protection, waste assimilation, storm protection, biodiversity degree and rate of change (DFID, 1999). Clearly, natural capital is very important to those who derive all or part of their livelihoods from resource-based activities such as farming, fishing, gathering in forests, mineral extraction, etc (DFID, 1999). Although all of these are very crucial to attain livelihood outcomes, land, forest and water are very important ones for the studied households).

According to DFID (1999), human capital represents the skills, knowledge, and ability to produce and reproduce, and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives (DFID, 1999).

Social capital, on the other hand, represents networks and relationships which exist in society that are made use of by people in pursuit of their livelihood (Degefa, 2005). According to DFID (1999) in the context of SLF, social capital refers to the social resources upon which people draw in pursuit of their livelihood objectives, which are developed through networks and connectedness, membership of more formalized groups, and relationships of trust, reciprocity and

exchanges that facilitate cooperation, reduce transaction costs and may provide the basis for informal safety nets amongst the poor. The networks and connectedness can exist either vertically (patron/client) or horizontally (between individuals with shared interests) and increase people's trust and ability to work together and expand their access to wider institutions, such as political or civic bodies. The membership of a formalized group entails adherence to mutually-agreed or commonly accepted rules, norms and sanctions. Social capital improves mutual trust and reciprocity, which lower the costs of working together.

Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods. These include affordable transport, secure shelter and buildings, adequate water supply and sanitation, clean and affordable energy, and access to information/communications (DFID, 1999; Degefa, 2005).

Financial capital denotes the financial resources that people use to achieve their livelihood objectives and include cash, savings, access to savings and credit, and people's ability to quickly convert other assets to cash (Degefa, 2005). According to DFID (1999), the financial assets include two main sources: available stocks and regular inflow of money. Available stocks include savings in the form of cash, bank deposits, or liquid assets such as livestock and jewellery. They can also be obtained through credit-providing institutions. Regular inflows of money include pensions or other transfers from the state, remittances and do not include earned income. Analysis of this capital helps to capture the availability of cash or equivalent that enables people to adopt different livelihood strategies (DFID, 1999).

In summary, the livelihoods approach therefore focuses on helping to provide access to people relevant and appropriate resources that enable especially the poor to achieve their livelihood objectives.

Structures in the DFID (1999) SLF are thought as hardware and refer to the organizations (both private and public) that set and implement policy and legislation, deliver services; purchase, trade and perform all manner of other functions that affect livelihoods. They draw their legitimacy from the basic governance framework. Structures exist at various levels. This is most obvious in the case of governmental organizations. Private commercial organizations also operate at different levels from the multi-national to the very local; it is not only the local level that is

relevant to livelihoods. Analysis should therefore be sensitive to the roles and responsibilities of the different levels of structures and seek to identify those that are of greatest importance to livelihoods. Processes are thought of as software, which determine the way in which structures and individuals operate and interact. And like software, they are both crucial and complex: not only there are many types of processes operating at a variety of different levels but there are also overlap and conflict between them. They include policies, legislation, institution, culture and power relations (DFID, 1999). In this regard, the nexus between policies and resilience was examined implicitly in Guyu and Muluneh (2015a) and explicitly in Guyu and Muluneh (2015b). Thus, analyzing structures and processes is not the objective of the present paper.

The livelihoods approach seeks to promote choice, opportunity and diversity for livelihood strategies. Livelihood strategies refer to the overarching term used to denote the range and combination of activities and choices that people make/undertake in order to achieve their livelihood goals including: productive activities, investment strategies, reproductive choices, etc (DFID, 1999). Adaptive strategies and coping strategies are frequently used to mean livelihood strategies. Livelihood strategies are analyzed mainly when measuring household vulnerability to green famine (Guyu, 2015) as well as when analyzing household resilience to green famine and wild food analysis respectively (Guyu and Muluneh, 2015a and b). Thus, the present chapter does not take up livelihood strategies in detail. Rather, it analyzes it in terms of diversification or intensification/extensification strategies for achieving their livelihood objectives.

Livelihood outcomes are the achievements or outputs of livelihood strategies. More income, increased well-being, reduced vulnerability, improved food security and more sustainable use of natural resource base, all of these being indicators of resilience system, are the livelihood outcomes that should be measured (DFID, 1999). These aspects of SLF were exhaustively examined in Chapter 2 (Guyu, 2015) and Chapter 5 (Guyu and Muluneh, 2015a) and it is not the concern of the present paper. Rather the present paper analyzes the resilience and food insecurity status of households as the outcome of the framework and looks at the effect of each asset and strategy on it.

Materials and Methods

The study was conducted in the GFB of Ethiopia taking Belo-jiganfof district as a case study area from BGR. The district is located in southern most part of BGR in western Ethiopia (Figure

2, Chapter 5, page 113 and Figure 1, Chapter 7, page 166). It generally represents the GFB in terms of environmental and economic characteristics.

According to the 2012 projection (FDRE-ERA, 2008), the district consisted of a total population of 37471 forming 7347 households with average family size of 5.1. The district has population density of 23persons/km². However, due to continuous in-and-out migration of the non-indigenous people, the population size of the district fluctuates from year to year. Berta, Gumuz, Shinasha, Mao and Komo make up the indigenous ethno-culture group of BGR. The Oromo and Amahara ethnic groups are the dominant non-indigenous ethnic groups. With the exception of Shinasha and Komo, all ethnic groups mentioned above live in Belo-jiganfoy district. Economically, the people in the region and hence in the district depend on agriculture. The forests in the area are better than other parts (especially northern, eastern and central) of Ethiopia although declining from time to time. As a result, they supply wild foods to household that depend on them in addition to cultivated and domesticated food sources. Agriculture is the main source of income for almost all communities in the region and the district. Malaria is the leading cause health problems in humans while livestock sector is threatened by several types of disease. Poor road infrastructure and socioeconomic services are the main challenges to BGR in general and Belo-jiganfoy district in particular (FDRE-ERA, 2008).

The district is characterized by plain topography although certain mountainous features and river gorges exist with altitudes ranging between 1100m and 1450m above mean sea level. Its climate shows a very hot temperatures ranging from 20 – 25⁰c during rainy season while the minimum temperature varies from 12 – 20⁰c according to the relief and seasons (FDRE-ERA, 2008).

Sampling Procedure and Sample Size

A cross-sectional survey of 220 households was conducted during the last week of August 2013. The sample size for the study was determined based on the formula suggested by Krejcie and Morgan (1970) used in Agea et al. (2011). According to this formula 366 households would be statistically representative of the total population in our study area. But, considering the relative homogeneity of households within each ethno-culture group, the sample size was reduced to 220. The selection of sample households followed both non-random and random techniques. Firstly, 3 *kebeles* (the lowest administrative unit of Ethiopia that is larger than a village but smaller than a zone, a zone in turn being such a unit lower than a region) out of 10 in the district were

purposively selected based on their distance from district center and road infrastructure. Accordingly, Senne, Say Dalecha and Soge *kebeles* were selected. Secondly, based on information on the total number of households and ethno-cultures in each *kebele*, households were stratified into two groups: the indigenous and the non-indigenous. Thirdly, the number of sample size in each *kebele* and ethno-culture group was determined through proportional allocation method. Finally, sample households for interview were selected using simple random technique (i.e. lottery method).

Data Collection

A questionnaire, key informant interviews (KIIs), and semi-participant observations were employed to collect data. A structured questionnaire was carefully designed and administered to respondents through oriented local enumerators and mainly face-to-face techniques as most of them were not able to read and write. Some households who are able to read and write were given the questionnaire to fill it themselves with some assistance from enumerators. The questionnaire was used to collect data regarding the livelihood assets and strategies pursued in order to achieve their livelihood outcomes. KIIs were used to collect data about the situation of assets and households' access to them as well as the different mechanisms households employed to diversify and intensify the livelihood strategies. For this purpose, informants were selected from villages and offices of the districts' department of agriculture and food security. Semi-participant observations had been conducted by the writer of the paper in 2013. The objective was to record and understand the overall situation of livelihood assets and the level of diversification and intensification of activities by the households

Data Analysis

Descriptive methods of data analysis were used in a mixed-methods fashion as this paradigm underpins the study. Accordingly, the objective data from questionnaire were first analyzed and interpreted, and then substantiated by data from qualitative sources (i.e. key informant interviews and semi-participant observations) in a sequential way.

Simple descriptive methods of data analysis such as frequency distribution, percent, means and cross-tabulations were used to analyze the statistical data and understand the effect of livelihood assets and strategies on household resilience to green famine. For this purpose, statistical package for social sciences (SPSS) version 19 was employed.

Results and Discussion

A) Livelihood Assets/capital

Rural livelihoods (assets and activities) in the green famine belt (GFB) and hence the case study area are diverse in nature. The five assets/capitals are the building block of SLF because people require a range of these assets to achieve a positive outcome of livelihoods (DFID, 1999).

Natural Capital: “Rural livelihood strategies are often reliant on the natural resource base” (Scoones, 1998:11). Access to natural capital determines household’s successful achievement of livelihood outcomes (i.e. resilience). Most of the natural capitals listed in DFID (1999) are found in the present study area and were found important sources of household resilience to green famine in a number of ways. First, these assets supplied food through crop and livestock production, and wild food gathering and hunting. Second, they contribute to earn on-farm and non-farm income from sale of forest products.

Land as a natural capital forms the most important source of rural livelihood in the study area. There is adequate access to vast amount of farmland by each and every household. The farmland size for the surveyed households was about 4.5ha/household. This is much more than the average landholding size of about 1ha in Oromiya zone of Amhara region (Degefa, 2005). Observation showed that generally the farmland in the study area was relatively new and fertile. This is similar to the finding by a previous study in central Ethiopia (Nonno district) which was observed to be rich in fertile soil (Messay, 2013). In this regard, most of food supply (about 95%) for households (Guyu, 2015) came from crop produced. Accordingly, the contribution of land as a natural capital to enhance household resilience to food insecurity was paramount. Access to common grazing land was not then a serious problem although declining following implementation of villagization scheme and an increasing trend in large-scale agricultural land transfers to investors. As indicated in Table 1, 94.5% of the surveyed households reported that they had access to communal land resources including grazing land and hunting fields.

Forests as a natural capital were important sources of making livelihoods and achieving positive livelihood outcomes, in this paper resilience to food insecurity. Firstly, forests were direct sources of gathering wild edible plants and hunting wild edible animals covering about 4% of total food supply (Guyu, 2015) and contributed to household resilience through income and food access (IFA) latent dimension of resilience (Guyu and Muluneh, 2015b). Secondly, forests were

indirect sources of food access through sale of their resources such as firewood and charcoal as well as building materials.

Access to water resources for many purposes (fishing, domestic use, livestock, and irrigation) was generally in a better situation. Access to water for fishing purpose was reported by about 69% of the surveyed households (Table 1). The distribution along the vulnerability-resilience continuum shows that about 44%, 10.5%, 12% and 3% of vulnerable, moderately-resilient, resilient, and highly-resilient households respectively reported their access to fishing rivers. It seems that the remaining 58% of households did not report because perhaps they were far from rivers especially after relocated due to villagization. About 64% of the surveyed households (i.e. about 39% of vulnerable, 11% of moderately-resilient, 11% of resilient, and 3% of highly-resilient) reported their access to clean water (i.e. developed springs, hand-dug wells, and hand-pump) for domestic purposes. The remaining 46% of the households depended on unprotected sources of water (rivers and streams) for domestic use. This shows that a significant proportion of households had still remained inaccessible to clean water and this might threatened their resilience in different ways. Access to water for livestock was not a problem in the study area. All households (100%) reported they had access to water bodies (mainly rivers as reported by 93.2% and springs as reported by 6.8%) for the livestock in the study area. The challenges to livestock production in the study area were rather related with livestock diseases, but not shortage of water. In contrast, despite the district's high potential for small-scale irrigation, only about 12% of the surveyed households had access to irrigable land. This was, as one key informant from district's department of irrigation development informed, associated with other factors such as households' lack of interest in practicing irrigation and heavy dependence on rain-fed. In contrast to general expectation, 10.5% out of 12% belonged to vulnerable group while the remaining 1.5% belonged to moderately-resilient and resilient households.

Human Capital: At a household level, human capital is a factor of the amount and quality of labor available which varies according to household size, skill levels, leadership potential, and health status (DFID, 1999). In other words, it is the labor available to households and other qualities embedded in it such as education, skills, and health (Degefa, 2005). Health and educational status are commonly used as indicators of the conditions of human capital. In the present study area, there are many problems related to the availability and quality of labor among

the surveyed households. The study indicated that on average the surveyed households had about 3.0 economically active persons per household that can supply labor as compared to overall average of 4.2 ADE/household. There was no significant difference between different resilience groups in their mean size of household (F-test > 0.001), this showing that the difference in the mean size of labor size did not cause the differences in their resilience. This might imply that the quality and participation of available labor force in production activities matters and can be captured in their health and educational situations.

Household Health Conditions and Resilience: The actual number of household members per household was likely to be high in the study area. For that matter, the surveyed households had average household size of 4.20. But, all available labor might not be efficiently deployed to production purposes for qualities embedded in the labor itself. In this regard, field observation showed that many economically active and capable elderly people were seen sitting idle, drinking alcohol wasting much of working hours of each day. This was exacerbated by poor health and frequent occurrence of diseases to household members.

Ill-health of household members was reported to be frequent health hazard in the studied district. According to health post workers' information, malaria was the leading human health problem attacking almost all members of households at least ones each year. Field survey results showed that 69.5% of the surveyed households reported the exposure of at least one household member to malaria infection at least once during the survey year (Table 1). The distribution by resilience category showed that 45.9%, 10.9%, 10%, and 2.7% of the vulnerable, moderately resilient, resilient, and highly resilient households were exposed to malaria infection least once in the year. In addition to malaria, dysentery, diarrhea, typhoid, and other diseases related to problems of sanitation were reported by the health post workers in the area.

A previous study in Ethiopia (although located in urban area) revealed that the physical distance between the community and the health station, overcrowded service provision, unavailability of prescribed medicines and unaffordable prices of the available medicines were the major health related problem (Degefa, 2010). In the present study area both health posts in different villages and one health station are found. However, both types of health institutions were blamed for their low quality service provisions. Key informants selected in the villages stressed the problem mainly with regard to the quality of health post workers. The health workers themselves

informed that the majority of patients prefer to go to hospitals located in Oromiya region, to services provided in either health posts or the health station. As a result, most economically capable households were forced to travel on average about 130km with standard deviation of 73km in seeking quality services provided by the hospitals. This implies that most incapable patients would be forced to seek the poor quality treatment or sleep sick and use traditional medicines. All these had cumulative impact on the households' ability to pursue, as stated by Degefa (2005), livelihood activities including crop production, livestock rearing and non-farm activities. This goes in line with the theory that ill-health is a core dimension of poverty and food insecurity, which in turn may weaken household's capacity of building resilience (DFID, 1999). Thus, overcoming these conditions may be one of the primary livelihood objectives of households (DFID, 1999), helping enhance their resilience to food insecurity being one of those livelihood outcomes.

Household Education: Universal education seems to have been implemented in the study area in terms of coverage. Each and every village in the studied district is supplied at least with primary education. This goes with the statement of Degefa (2010) that distance between home and school was not the problem although his study area is located in the urban area in Ethiopia. Moreover, Degefa (2010) found that dropouts and lack of persisting through secondary schools and other factors such as low educational background of parents, living environments and housing conditions, parents' low financial capacity to purchase stationery materials for their children, and the poor quality of public schools as the causes of poor performance of children in their education. Likewise, in the present study area illiteracy of households head was likely a considerable factor that might affect household resilience to food insecurity. Accordingly, about 47% of the surveyed household heads were illiterate. In this regard, the vulnerability-resilience continuum showed that 28.6%, 6.4%, 10.0% and 1.8% of them belonged to vulnerable, moderately resilient, resilient, and highly resilient groups respectively (Table 1). If the household heads that could read and write were considered as illiterate, more than half (51%) of the surveyed household heads were almost illiterate. This goes in line with the theory that lack of education is one of the core dimensions of poverty and food insecurity that ultimately weakens the capacity of household's to build their resilience (DFID, 1999). The remaining proportion of household heads generally belonged to literate although the majority of them (35%) belonged to the primary level and very few of them (about 14%) belonged to grades 9 -10 and only 0.5% of

them belonged to grades 11 – 12. Surprisingly, out of those in primary education a considerable proportion (about 25%) of them belonged to vulnerable group along the vulnerability-resilience continuum. This implies that the formal education helped them little or did not help them at all in build their resilience. The study also showed that about 91% of the surveyed households (i.e. 58.6% vulnerable, 13.6%, moderately-resilient, 14.6% resilient, and 4.1% highly-resilient) had at least on illiterate member while only 9% of them could at least read and write (Table 1). On average, the surveyed households had illiterate members of 2.6 per household with standard deviation of 1.76. In contrast to Degefa's (2010) finding that dropouts of children were causes of poor educational performance, it was not a significant problem in the present study area as only 10% of the surveyed households reported that one or more children dropped out from the school. Overall, household head level of education, as it also was reflected in children's education, was likely to be the most important cause that threatened their capacity to become resilient in the faces of food insecurity shock and its triggering shocks and stresses. The overall finding goes in line with Degefa's (2005) that the main problems of human capital in his study area (i.e. northeastern Ethiopia) relates to lack of skills and being illiterate.

Social Capital: In rural areas, the widely practiced social resources upon which people draw in pursuit of their livelihood objectives involve reciprocity that may be based on kinship or neighborhood among households (Degefa, 2005). Following this foot-step, the major types of reciprocities practiced by the surveyed households in the study area include reciprocities in terms of food and drinks, money and labor. In addition, as described by DFID (1999), political capital is an aspect of social capital, in this paper participation in one-to-five.

“Senbete” and “idir” are related to religious practices that were reported by 13.5% of the surveyed households. Although reported by small proportion, they have benefits beyond immediate eating and drinking as they arrange loans for the members. “Drink-borde” and “drink-coffee” are sources of social cohesions through which, beyond drinking, neighbors help each other as they make frequent contacts. “Drink-borde” and “drink-coffee” were reported by 84.5% and about 88% of the surveyed households respectively. More related to these is sharing and eating together during bad seasons. This was reported by about 31% of the surveyed households, the small proportion showing that this practice had been deteriorating from time to time. “Wenfel” and/or “debo” is a labor union arranged to facilitate farm work. In the study area, this

was also practiced as a means of earning income. This was reported by 64.5% of the surveyed households. Seemingly political capital is the one-to-five cell/grouping that had been arranged by the push from government, which is found in the grassroots level. In principle, farm households are grouped into one-to-five cell in order to cooperate in their farming practices. However, there have been some rumors that this cell has a political connotation that the party that governs the state uses to follow-up and control any movement (i.e. bad or good). About 66% of households reported their engaged and practiced in one-to-five cell in the study area.

Physical Capital: Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods. The basic infrastructure and producer goods that are needed to support livelihoods include access to affordable transport, secure shelter and buildings, adequate water supply and sanitation, clean and affordable energy, and access to information/communication facilities (DFID, 1999). More specifically, this involves community/household infrastructure such as transport, shelter, irrigation work and production equipments that enable people pursue their livelihood activities (Degefa, 2005). The livelihoods approach therefore focuses on helping to provide access to appropriate infrastructure that enables poor people to achieve their livelihood objectives. The analysis of access to all-whether road showed that only 33.2% of the surveyed households had access to all-whether road. The distribution by resilience category showed that the majority of them (27.6%) belonged to the vulnerable group and only 2.3% belonged to the moderately-resilient, 2.3% resilient and none of the highly resilient had access to all-whether road. This shows that access to better road facility had nothing to do with resilience to food insecurity. Another indicator of access to physical resources is shelter, for which thatched hut was used to show how poor shelter condition used by households. Accordingly, about 92% of the surveyed households lived in a very poor housing (thatched-hut). Out of this, about 55%, 15%, 11% and 3% were vulnerable, moderately-resilient, resilient and highly resilient respectively. Significant proportion (about 64%) of the surveyed households (39% vulnerable, 11% moderately-resilient, 11% resilient, and 3% highly-resilient) had access to pure water from developed springs and hand pumps for domestic consumption. Out of the total surveyed households, 12.3% (10.5% vulnerable, 0.9% moderately-resilient, 0.9% resilient and none of highly resilient) households accessed small-scale irrigation facility.

Financial Capital: This may include both stocks and regular inflow of money (DFID, 1999). Savings are preferred financial stock (i.e. both in cash and in kind), loans (formal and informal), remittance, and pension (Scoones, 1998; Degefa, 2005; DFID, 1999; Degefa, 2010). Savings can be made informally in home (cash, livestock, house in towns, jewellery) or formally in financial institutions such as banks and microfinance institutions. Access to most of the financial resources mentioned above was limited and only very few of them were reported.

Table 1 Percent Distribution of Households by Resilience Category and % of Responses to each Indicator of Assets (N = 220)

Indicator of Access to Assets		% of Households by Resilience category				Total	
		Vulnerable	Moderate y-resilient	Resilient	Highly- resilient		
Labor supply (mean size)		3.04	2.85	2.92	2.44	2.97	
Human Capital	Health	Malaria	45.9	10.9	10.0	2.7	69.5
		Av. # of sick	2.3	1.12	1.36	1.33	1.93
		Av.km. Hospita	107.85	164.30	170.31	183.33	129.63
	Education	Illiterate**	28.6	6.4	10.0	1.8	46.8
		Read & write**	2.3	0.5	0.5	0.9	4.1
		Grade 1-8**	24.5	5.0	4.1	1.4	35.0
		Grade 9-10**	9.1	3.2	1.4	0.0	13.6
		Grade 11-12**	0.0	0.0	0.5	0.0	0.5
		Illiterate*	58.6	13.6	14.6	4.1	90.9
		School Dropout*	6.8	0.9	2.3	0.0	10.0
Natural Capital	Land		55.5	10.5	12.3	3.2	81.4
	Grazing-land		59.1	15.0	16.4	4.1	94.5
	Forest	Access-Firewood	22.7	7.7	10.5	1.8	42.7
		Access-Charcoal	20.0	6.8	7.3	0.9	35.0
		Access-Wild-food	43.6	9.1	10.9	1.4	65.0
	Water for Fishing		43.6	10.5	11.8	2.7	68.6
Physi	Access to road		28.6	2.3	2.3	0.0	33.2
	Av. Dist (km)		72.23	155.15	158.61	176.11	103.70

	Shelter (thatched-hut)		54.9	15.4	18.5	3.1	91.8
	Clean water supply		39.1	10.9	11.0	2.7	63.7
	Irrigation	% Access	10.5	0.9	0.9	0.0	12.3
		Av. Size (ha)	0.045	0.007	0.139	0.000	0.053
	Hoe-culture (use)		42.8	10.7	12.1	2.8	68.4
Social Capital	Senbete & Idir		10.5	1.4	0.9	0.9	13.5
	Drink-borde		57.3	13.2	12.3	1.8	84.5
	Wenfel		54.1	7.3	3.2	0.0	64.5
	One-to-five		46.4	9.5	9.1	1.4	66.4
	Share-Eat-toge.		21.8	5.0	3.2	0.9	30.9
	Drink-coffee		57.7	14.1	13.6	2.3	87.7
Financial Capital	Saving	livestock	45.0	6.8	4.5	0.9	57.3
		TLU (Av.)	1.73	0.75	0.59	0.60	1.35
		Cash-sav (yes)	25.9	0.9	1.4	0.5	28.6
		Av. Cash (birr)	303.89	30.34	41.50	48.95	209.51
	Loan	Well-offs only	66.6	6.1	6.1	3.0	81.8
		Microfinance	6.1	0.0	3.0	0.0	9.1
		Both only	9.1	0.0	0.0	0.0	9.1
		Overall	12.3	0.9	1.3	0.5	15.0
	House in town		3.6	0.0	0.5	0.5	4.5

*all households reported 1 or more illiterate member; ** illiterate household head only

The surveyed households did not report the practice of saving cash in formal institution perhaps for two reasons: one, there is no banking service in the district; two, people had no trust on micro-finance institutions perhaps due to lack of awareness about it. Building houses in towns was reported only by 4.5% of the surveyed households and it is insignificant resource that belongs to only very few households. Despite small proportion of households having houses in the town, they had been earning cash money from renting the houses. As a result, the only way of saving, as done by few, was in-kind (i.e. livestock). About 57% of the surveyed households reported that they saved one or more type of livestock, of which the majority (45%) was vulnerable, about 7% moderately-resilient, 4.5% resilient and 0.9% highly resilient. The survey

result indicated that the surveyed households on average possessed 1.4 tropical livestock unit (TLU)/household with standard deviation of 2.4 TLU. Saving cash money was reported by about 29% of the households (about 26% vulnerable, 0.9% moderately-resilient, 1.4% resilient and 0.5% highly resilient). Informal loans from neighbors and relatives, although as stated by Degefa (2005) had been declining, were practiced among the households. During the survey year, only 15% of the surveyed households reported that they got loans (formal and informal) from their relatives and/or neighbors and microfinance institution (Table 1). The distribution by resilience group shows that about 12.3%, 1%, 1.3%, and 0.5% of those households belonged to vulnerable, moderately-resilient, resilient, and highly-resilient group respectively. The overall finding showed that insignificant proportion of households accesses such financial resources.

But, considering those households who got loan, about 82% of the loan came from informal institution (i.e. relatives and other neighbors) while only about 9% of the loan was obtained from formal institution (microfinance) and about 9% from both informal and formal institutions.

B) Livelihood Activities and strategies

Livelihood strategies is an overarching term used to denote the range and combination of activities and choices that people make/undertake in order to achieve their livelihood goals (DFID, 1999). Three basic clusters of livelihood strategies by which rural households can improve their living standards (i.e., intensification/extensification, diversification, and migration) are identified and discussed (Scoones, 1998; Degefa, 2005).

Intensification is a strategy used for the enhancement of agricultural production and increasing productivity (Degefa, 2005). This means that more output per unit area would be obtained through capital investment or increases in labor inputs while extensification refers to use of more land under cultivation (Scoones, 1998). *Diversification* refers to integrating different sources of livelihood, such as mixed crop and livestock farming, new crops, agricultural production with non-agricultural activities, and combining a variety of non-agricultural activities, and *migration* is seasonal mobility or permanent change of place of residence in search of better sources of livelihood (Scoones, 1998; Degefa, 2005). Like in most rural parts of Ethiopia, agriculture (arable and pastoral) form the livelihood of almost all households. Most livelihood options for the households are therefore between on-farm activities and few off-farm activities, which are based on labor disposal for wage payment.

Intensification/Extensification of Livelihood Activities: In the study area, in addition to its virginity/newness, the per capita landholding was relatively large enough, the average being about 4.5ha/household. As a result, intensification of crop cultivation and livestock rearing were not the major practices. Rather, households prefer to practice a short period fallowing to help some plots of land take a rest and regain its original fertility. This matches with the Boserupian model of forest fallow stage that needs a 15 – 25 years fallow period (Boserup, 1965). Under such a situation, rather extensification of farm land for more production might be practiced. However, very small percent (8.6%) of the surveyed households reported the application of fertilizers on their farm plots. Similarly very small percent (2.7%/3.2%) of the surveyed households reported their application of herbicides/pesticides on their farm plots. Even, information from village key informants showed that weeding had been practiced once or twice implying that labor intensification was not as such significant. Vast communal grazing land in each village was also providing fodder for livestock. The overall, this finding shows that agricultural intensification was not a major practice in the study area because of the present adequately large size of farmland possessed per household.

Level of Diversification of Livelihood Activities

The basic type of livelihood activity in the study area was agriculture (especially crop production) although livestock rearing was used as a supplementary activity.

Table 2 Distribution of Households by Resilience Category and Livelihood Strategies (N = 220)

Livelihood Activities & Strategies		% of Households by Resilience category				Total
		Vuln.	M/resi	Resilient	Highly-res.	
Intens	Fertilizer application	7.3	0.9	0.5	0.0	8.6
	Herbi/pesticide appl.	2.7/3.2	0.0/0.0	0.0/0.0	0.0/0.0	2.7/3.2
Livelihood Diversification	Crop-cultivation	64.5	15.0	16.4	4.1	100.0
	Livestock-raising	45.0	6.8	4.5	0.9	57.3
	Wage-labor	38.6	9.1	9.1	2.7	59.5
	Sale of local alcohol	5.5	0.5	0.5	0.0	6.4
	Sale of firewood	22.7	7.7	10.5	1.8	42.7
	Sale of Charcoal	20.0	6.8	7.3	0.9	35.0
	Pottery	4.1	0.5	0.5	0.0	5.0
	Petty trade	6.8	1.4	0.5	0.0	6.8
	Wild-food gather/hunt	43.6	9.1	10.9	1.4	65.0
	In-Migration	46.4	8.2	12.3	3.6	70.5

All households (100%) produced one or more types of crop. About 57% of the surveyed households reported their practice of livestock rearing along with crop production. However, most of the livestock produced were chicken and goats/sheep. Only about 26% of the households had reared cattle (including donkeys) while 20% of them reported that they reared goats and sheep and the majority (about 41%) of them reported their dependence on chicken in the study area. This shows that most households in the study area depend on chicken rather than cattle rearing. About 60% of the surveyed households engaged in daily wage labor; very few (6.4%) of them reported their dependence on sale of local alcohols; about 43% of them reported their dependence on sale of firewood; about 35% of them depended on sale of charcoal; 5% of them reported their dependence on pottery; 6.8% on petty trade, the majority (65%) of them involved in collecting and hunting of wild foods from forest and rivers for their livelihoods (See Table 2 for the distribution by resilience category).

Table 3 % Distribution of Households by Number of Livelihoods and by Resilience Category

No. of Activity	% of Number of Livelihood type and Mean				Total N=220)
	Vulnerable	Moderately-resilient	Resilient	Highly-resilient	
1	0.5	0.5	0.5	.5	2.0
2	5.0	0.9	0.9	1.4	8.2
3	4.1	3.2	4.5	1.4	13.2
4	15.0	2.5	4.5	0.0	22.0
5	12.7	3.2	4.5	0.5	20.9
6	11.4	3.2	0.5	0.0	15.1
7	11.8	0.9	0.9	0.0	13.6
8	4.1	0.0	0.0	0.4	4.5
9	0.0	0.5	0.0	0.0	0.5
Total	64.5	15.0	16.4	4.1	100.0
Mean	5.11	4.55	4.03	3.22	4.77

A more understanding of livelihood diversification might be made from analysis of the resulted presented in Table 3. On average, the surveyed household practiced about 5 types of livelihood activities. This shows that households were on average practiced diversified sources of activities although there was large disparity among the households as it can be seen from the standard deviation (i.e. STD = 1.71). The mean differences between resilience group were significant (p-value =0.000). Finally, migration as a livelihood strategy played a significant role in the study area. The type of migration involved both inter-regional (mainly from Amhara and Oromiya

regions) as well as intra-regional (that involved any residential change at zonal or district level). About 70.5% of the surveyed households reported that they involved at least inter-district change of address in seeking for better living condition. Out of these, about 46%, 8%, 12%, and 4% belonged to vulnerable, moderately-resilient, resilient, and highly-resilient group respectively (Table 2).

Conclusion

This paper examined the effect of livelihood assets and strategies on household resilience to green famine in the green famine belt of Ethiopia taking Belo-jiganfoy district as a case study area. Although the results were somewhat mixed (some elements in each asset category were better accessed than others), generally natural capital was better accessed than others. The natural assets such as land, water (rivers and their resources such as fish), trees and forest, wildlife and wild food, etc are relatively abundant. In contrast, it is human, physical, social and financial capitals that were likely to have adverse effect on household resilience to green famine. Majority of households were engaged more in livelihood diversification than intensification. On average households were engaged in about 5 activities. One important feature of most livelihood strategies is that they were means of coping with food shortages rather than regular activities. Therefore, during interventions, focus must be given to improving the human, physical, social and financial capital of households as well as improving the types of livelihood strategies to make them part of regular activities. Moreover, to work towards helping households to intensify their farming activities is essential as future landholding size is likely to decrease if the present trend in large scale land transfer will persist.

Reference

- Agea J., KImondo J and Okia C (2011).Contribution of Wild Edible Food Plants to Overall Household Diet in Bunyoro-Kitara Kingdom, Uganda, *Agricultural Journal*, 6 (4), 134-144.
- Alinovi L., D'Errico M., Mane E. and Romano D. (2010).Livelihoods Strategies and Household Resilience to Food Insecurity An Empirical Analysis to Kenya, Rome: Available online: http://erd.eui.eu/media/2010/Romano%20et%20al_Kenya%20paper%20r15.pdf
- Boserup, E (1965).The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure: *Earthscan Publication Ltd, London*

- Degefa Tolossa (2005). Rural livelihoods, poverty and food insecurity in Ethiopia, A case study at Erenssa and Garbi communities in Oromiya Zone, Amhara National Regional State, PhD Dissertation, Norwegian University of Science and Technology, NTNU, Trondheim.
- Degefa Tolossa (2010) Some realities of the urban poor and their food security situations: a case study of Berta Gibi and Gemechu Safar in the city of Addis Ababa, Ethiopia. *Environment and Development*: 22: 179. [online]:<http://eau.sagepub.com/content/22/1/179>
- DFID (1999). Sustainable Livelihoods Guide sheets Framework; Department for International Development (DFID).
- Ellis, F. (2003). Human Vulnerability and Food Insecurity: Policy Implications. Forum for Food Security in Southern Africa. Overseas Development Group.
- FDRE-ERA ((2008). Study on Belo-jiganfoy Integrated District Development Programme (Final Report), Federal Democratic Republic of Ethiopia-Ethiopian Roads Authority (FDRE-ERA), Consultancy Service Offered to District Integrated Development Study (Group-8). By Afroconsult and Pan-African in Collaboration
- Frankenberger D., Vaitla B., Gimay Tesfay and Nigussie Abadi (2013). Resilience, Food Security Dynamics, and Poverty Traps in Northern Ethiopia. Analysis of a Biannual Panel Dataset, 2011 – 2013. Feinstein International Center, Tufts University.
- Frankenberger T., Langworthy M., Spangler T. and Nelson S. (2012). Enhancing Resilience to Food Security Shocks, (White paper), Draft.
- Guyu Ferede (2015). Household Vulnerability to Green Famine: Component Based Analysis of Indicators in Belo-jiganfoy District (Case Study Area), Benishangul-Gumuz Region, Ethiopia. *Applied Science Reports*, 9(3), 139-156
- Guyu Ferede and Muluneh Wold-tsadik (2015a) Household Resilience to Seasonal Food Insecurity: Dimensions and Magnitudes in the “Green Famine” Belt of Ethiopia. *Applied Science Reports*, 11(3), 125-143
- Guyu Ferede and Muluneh Wold-tsadik (2015b). Wild Foods (Plants and Animals) in the Green Famine Belt of Ethiopia: Do They Contribute to Household Resilience to Seasonal Food Insecurity? *Forest Ecosystems*, 2:34.
- Maxwell D., Vaitla B., Gimay Tesfay and Nigussie Abadi (2013). Resilience, Food Security Dynamics, and Poverty Traps in Northern Ethiopia. Analysis of a Biannual Panel Dataset, 2011 – 2013; Feinstein International Center, Tufts University.

- Messay Mulugeta (2013) Resettlement and Food Security Nexus in Ethiopia: A Case Study from Nonno District. PhD Dissertation Published by LAMBERT Academic Publishers, Germany
- Sarracino F. (2010). Explaining Famines: A critical Review of Main Approaches and Future Causal Factors. NAF working paper series, No. 10/12.
- Scoones, I. (1998). Sustainable Rural Livelihoods: A Framework for Analysis, IDS Working Paper 72
- Sen A. (1981) Ingredients of Famine Analysis: Availability and Entitlements. *The Quarterly Journal of Economics* 96.3:433 – 464.
- Solesbury, W. (2003). Sustainable Livelihoods: A Case Study of the Evolution of DFID Policy, Working Paper 217. Overseas Development Institute, London
- Turunen, J., Snäkin, J., Panula-Ontto, J., Lindfors, H., Kaisti, H., Luukkanen, J., Magistretti, S. and Mang, C. (2011). Livelihood Resilience and Food Security in Cambodia-Results from a Household Survey. Knowledge for Development: Creating Rural Resources Database for Sustainable Livelihoods in Cambodia (“SURVEY”), Cambodia
- Yaro, J. (2004). Theorizing food insecurity: building a livelihood vulnerability framework for researching food insecurity. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*. 58:1, 23-37. Available at: <http://dx.doi.org/10.1080/00291950410004375>.
- Young H., Jaspars S., Brown R., Frize J. and Khogali H. (2001) Food-security assessments in emergencies: a livelihoods approach. Humanitarian Practice Network (HPN) Paper, No. 36

7. Wild foods (Plants and Animals) in the ‘Green Famine’ Belt of Ethiopia: Do they contribute to household resilience to seasonal food insecurity?

¹Guyu Ferede and ²Muluneh Woldetsdik (2015)

Published in: *Forest Ecosystem, Vol. 2 (34), 2015. SpringerOpen Journals*

Cite in text as: Guyu and Muluneh (2015).

Cite under Reference section fully as:

Guyu Ferede and Muluneh Woldetsdik (2015). Wild foods (Plants and Animals) in the ‘Green Famine’ Belt of Ethiopia: Do they contribute to household resilience to seasonal food insecurity? *Forest Ecosystem, Vol. 2 (34), 2015*

¹Correspondence

Department of Geography and Environmental Studies

Addis Ababa University, Ethiopia

E-mail: guyu_f@yahoo.com

Cell phone: +251-9-12-19-42-72

²Supervisor

Department of Geography and Environmental Studies

Addis Ababa University, Ethiopia

Abstract

Background: The role of wild foods in combating problems of food shortage is paramount. However, existing approaches to combat food insecurity shock have generally focused on reducing vulnerability via increasing productivity of domesticated foods. In contrast, approaches that enhance resilience mainly through wild food sources have been less focused. This study examined the contribution of wild foods to household resilience to food insecurity in the green famine belt of Ethiopia.

Methods: A cross-sectional survey of 220 households was conducted using a structured questionnaire, key informant interviews, and semi-participant observations. Factor analysis was run using SPSS to analyze data. Correlation analysis was used to examine the direction and strength of association between wild foods and the income and food access (IFA), a latent proxy indicator of resilience. Cross-tabulation was also run to determine the proportion of households in each ethno-culture group under each resilience category.

Results: The mean amount of wild foods obtained by households was 156.61kg per household per annum. This was about 5% and 9% of, gross and, net food available from all sources respectively. Wild foods contributed well to household resilience as the factor loading (Factor2 = 0.467) was large enough and were significantly correlated with IFA ($r = 0.174$). Wild vegetables were the most collected and consumed type of wild foods constituting 52.4% of total amount of wild foods. The total amount of wild foods was smaller than that of domesticated sources of food. The majority of households (38.6%) reported "reduced source of wild foods" as a reason for this. Smaller proportion of the indigenous (11.2%) than the non-indigenous (34.1%) ethno-culture group reported one or more reasons for their lower level of dependence on wild foods.

Conclusion: From the study we concluded that wild foods had important contribution to households' resilience to food shortages and are likely to continue to contribute in the future, this being more to indigenous than non-indigenous ethno-culture group. Therefore, a resilience building policy that incorporates wild foods should be adopted, and research that aims at exploring their current status and future prospect are urgently required.

Keywords: Wild food; Forest; Contribution to resilience; Food-Insecurity; Green famine belt; Ethiopia

Background

There has been a strong tie between forest and human survival since time immemorial, when homo-sapiens began to emerge on the planet earth. Forests provide both direct uses (e.g.

supplying fuel wood, timber, fibers, food, and medicine) and indirect uses (e.g. balancing CO₂ concentration, and protecting erosion) to human beings. More specifically, forests are sources of livelihoods for people. Gathering and hunting wild foods are one among the many livelihood activities provided by forests. In this regard, policy measures that aim at ensuring, sustainable supply of wild foods and, sustainability of forest resources often overlap. In other words, a policy that targets at development of wild foods has direct contribution to sustainability of forest ecosystem.

The economic and medicinal uses of wild foods to human beings have been discussed in the literature. Wild foods constitute an important part of global and household food baskets (Bharucha and Pretty 2010). Nevertheless, their types and extent of use vary from place to place and time to time. Wild foods are perceived by the Lebanese to have practical medicinal values that cure a number of diseases including diabetes, pains in the digestive and urinary tract, anemia, and cancer (Batal et al. 2007). *Spirulina* (i.e. Blue-green algae) has been collected and consumed as supplementary to food obtained from cultivated and domesticated sources in some countries such as Chad and China in addition to using as a source of income by many households (FAO 2008). In South Africa, wild vegetables play important role in combating the challenges of food insecurity (Mavengahama et al.2013). Rural people of Ethiopia have deep knowledge about wild foods and their consumption both as a regular meal during normal times and as a famine food (Dechassa and Guinand 2000; Debela et al. 2011). They provide irreplaceable nutritional contents and economic values to people who depend on them (Illgner and Nel 2000; Kajembe et al. 2000; Agea et al. 2011). Especially, the role of wild edible plants (WEPs) as supplementary to nutritional requirements, coping food shortages and, emergency (famine) food is clearly shown in Assegid and Tesfaye (2011). In the western part of Ethiopia, specifically in Benishangul-gumuz region (BGR), households (mainly the indigenous ones) were found to resort to depend on wild foods as a coping mechanism to overcome extremely severe poverty and food insecurity conditions (Guyu 2012). Coping mechanisms are one of the defining components of household resilience because having more coping strategies means having more probability of mitigating food insecurity (Alinovi et al. 2008). In this regard, coping via the use of wild foods can be seen as one of the defining components of behavioral shifts into which households flip when exposed to the food insecurity shock. In this study, therefore, household resilience to seasonal food insecurity is measured as the amount of this shock absorbed before flipping into the behavior

regime measured in terms of eight latent variables. One of these latent dimensions used for determining the contribution of wild foods to household resilience is the income and food access (IFA) variable measured as a factor solution of seven observable variables (Figure 2).

The phrase “wild foods” refers to all plant and animal resources that are not domesticated but gathered and hunted from forests and bush-lands for the purpose of human consumption (Bell 1995). This paper extended this definition to include wild edible fish from the rivers. Wilderness can however be seen as a continuum ranging from an entirely ‘wild’ to ‘semi-domesticated’ food (Bharucha and Pretty 2010). In this paper, we included only purely wild plants and animals but excluded semi-wild foods from the study. Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (Canali and Slaviero 2010). In this paper, the sources of food from which food security are ensured include own production, purchase, social and cultural networks, wild foods, and food aids (Guyu 2015). Famine is the concept intimately related with food insecurity. It is often defined as a discrete event that is triggered by food shortages or starvation and results in a sudden flare-up of mass deaths (Devereux 2000). But, this definition of famine has been criticized because deaths during famines are more related to epidemic diseases than starvation. As a result, famines can be divided into three: minor famines causing hunger, severe famines causing destitution, and catastrophic famines resulting in mass deaths (De Waal 1989 cited in Devereux 2000). The famine condition in our study area, also known as green famine belt (Guyu 2015), could be categorized under the minor and severe categories that are caused by starvation, breakout of human and livestock diseases and deaths, destruction of livelihood bases, household destitution and dissolution of family. The authors also believe that “famine that kills” (although not resulting in mass death) even occurs in the green famine belt although it requires further empirical investigation. Therefore, green famine is defined as food insecurity conditions that occur under the shadow of favorable natural conditions such as climate (sufficient rainfall, almost absence of drought, and vast fertile agricultural lands), low population pressure, and less resource degradation (Guyu 2015; Guyu and Muluneh 2015). Thus, in this paper seasonal food insecurity is regarded as a proxy indicator of green famine.

Vulnerability approach is the conventional method of understanding the nature of household food insecurity and famine. However, it has been overtaken by resilience approach (RA) since the seminal work of Alinovi et al. (2008). Following the footsteps of these authors we also applied

RA for analyzing the contribution of wild foods to household resilience to food insecurity. This approach is founded on two broader worldviews: ecological and engineering. Both approaches deal with aspects of stability of equilibria but provide alternative measures of a system's ability to maintain its functions following disturbance (Holling 1996; Alinovi et al. 2009; Sakurai et al. 2012). In both varieties of resilience, vulnerability is regarded as the flip side of resilience (Alinovi et al. 2008) because when a system gradually loses its resilience it becomes more and more vulnerable to changes. The difference between them lies on the paradox between efficiency and persistency, constancy and change, or predictability and unpredictability (Holling 1996).

The engineering definition of resilience that resembles the engineer's desire for "fail-safe" design focuses on the efficiency and assumes constancy and predictability of a system's properties (King 2008). It can therefore be defined as the speed of return to the steady state following a perturbation perceiving a system as existing close to a stable and a near equilibrium steady state (Sakurai et al. 2012). As a result, resilience is measured as the system's resistance to disturbance and speed of return to the equilibrium. Thus, an increased resilience implies the system's ability to bounce back faster after stress, enduring greater stress, and being disturbed less by a given amount of a stress (Martin-Breen and Anderies 2011). Engineering resilience is therefore grounded more of within the theory of positivist tradition, both epistemologically and ontologically (King 2008).

The ecological resilience focuses on the persistency, change and unpredictability, the core idea celebrated by biologists with an evolutionary perspective and by those who search for "safe-fail" designs (Holling 1996). It is a dynamic model that focuses on persistence despite changes in, and unpredictability of, a system's properties (King 2008). It assumes multiple stability domains and is measured by the magnitude of disturbance that can be absorbed before instabilities flip into another regime of behavior (Sakurai et al. 2012). In other words, ecological resilience is the measure of the ability of the system to absorb changes of state variables, driving variables, and parameters (Holling 1973). The ecological resilience model is therefore grounded in constructivist tradition, both epistemologically and ontologically (King 2008). This definition and model is appropriate for analyzing food system that considers households as its sub-system. Due to the fact that food system is a cultural/social-ecological system, it is not a fixed system for which there is equilibrium steady state and for which resilience can assume efficiency,

predictability and constancy. Such a system is characterized by persistency, change and unpredictability (Anilovi et al. 2008). Following this theory, some researchers have applied the ecological definition of resilience to analyze household resilience to food insecurity (Alinovi et al. 2010; Ciani 2012; Guyu and Muluneh 2015). In this paper too, we applied the ecological definition of resilience.

In Ethiopia interventions by researchers, policymakers and humanitarian actors have generally focused on cultivated and domesticated sources of food. Particularly, these actors have never considered wild foods' contribution to household resilience. Researchers have largely explored and documented rich indigenous knowledge of ethnobotanical and medicinal values of forest resources in general and wild foods in particular (Dechassa and Guinand 2000; Tilahun and Mirutse 2010; Ermias et al. 2011). Research concerning socio-economic, cultural, traditional and nutritional/food aspects of wild foods (especially WEPs), still lacks adequate attention (Dechassa and Guinand 2000). Policymakers have almost entirely aimed at boosting the productivity of cultivated foods. Humanitarian actors have attempted to improve household access to cultivated food sources through different mechanisms including relief aids. However, such a dependence on food from domesticated sources alone may not address the challenges of food insecurity shocks and enhance the resilience of rural households. This paper examined the contribution of wild foods to household resilience to food insecurity with the following purposes. First, the findings can be used by policymakers to consider wild foods when planning and implementing resilience building programmes as wild foods' development policy involves, per se, strategies that aim at protecting environmental degradation due to deforestation. Second, the study can contribute to the ongoing academic and policy discourses held regarding household resilience to food insecurity and the role of forests in mitigating food shortages.

Methods

Study area

The study was conducted in the green famine belt of Ethiopia taking Belo-jiganfoy District as a case study area. The district is located in southern most part of BGR in western Ethiopia (Figure1). It generally represents the green famine belt in terms of environmental and economic characteristics.

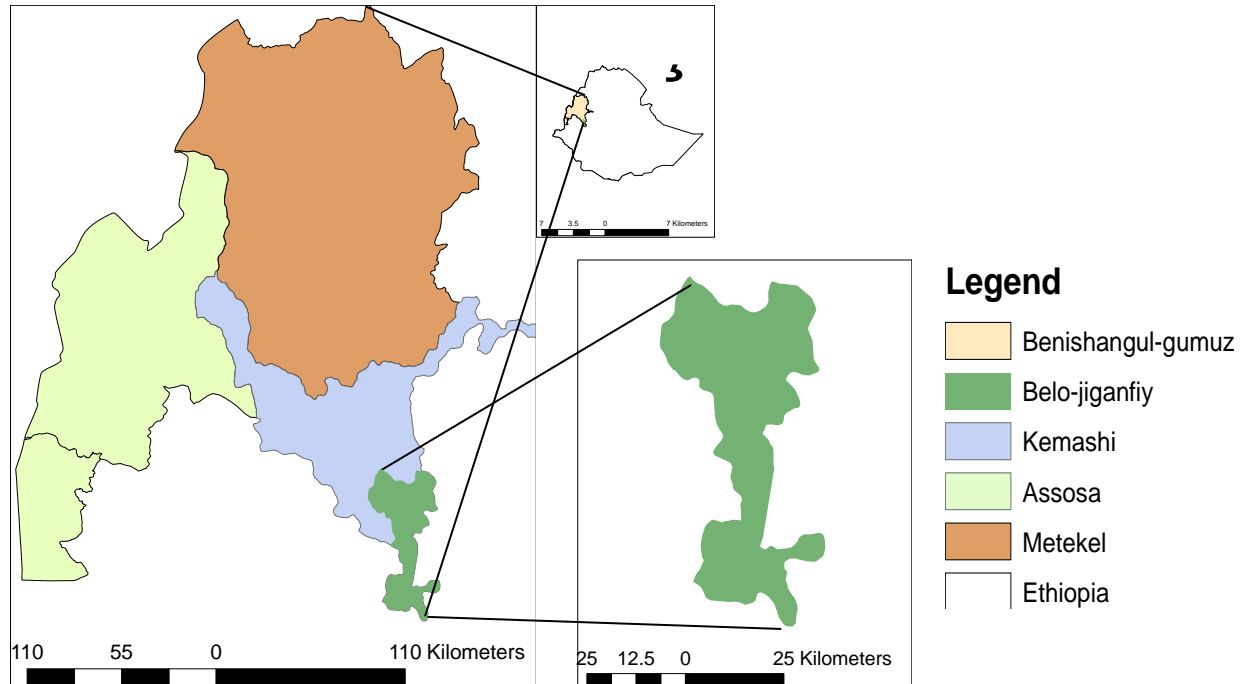


Figure 1. Location of Belo-jiganfoy District at National, Regional and Zonal Settings

According to the 2012 projection (FDRE-ERA 2008), the district consisted of a total population of 37471 forming 7347 households with average family size of 5.1. The district has population density of 23 persons/km². However, due to continuous in-and-out migration of the non-indigenous people, the population size of the district fluctuates from year to year. Berta, Gumuz, Shinasha, Mao and Komo make up the indigenous ethno-culture group of BGR. The Oromo and Amahara ethnic groups are the dominant non-indigenous ethnic groups. With the exception of Shinasha and Komo, all ethnic groups mentioned above live in Belo-jiganfoy District. Economically, the people in the region and hence in the district depend on agriculture. Forests are available better here than other parts (especially northern, eastern and central parts of Ethiopia) although declining from time to time. As a result, they supply wild foods to household that depend on them in addition to cultivated and domesticated food sources. Malaria is the leading cause of human health problem while livestock sector is threatened by several types of diseases. Poor road infrastructure and socioeconomic services are the main challenges to BGR in general and Belo-jiganfoy District in particular (FDRE-ERA 2008).

The district is characterized by plain topography although certain mountainous features and river gorges exist with altitudes ranging between 1100 and 1450m above mean sea level. Its climate shows a very hot temperatures ranging from 20°C–25°C during rainy season while the minimum

temperature varies from 12°C– 20°C according to the relief and seasons (FDRE-ERA 2008). It has vast forest area although declining due to indiscriminate deforestation especially through the recent introduction of land deals in the pretext of large scale agricultural investments. Different types of fauna and flora are found in the forest, which provide different types of wild food for people living in and around it (Table 1).

Table 1 Partial list of WEPs, their family and local names and, edible parts in BGR

Scientific name	Family name	Local name	Edible part
<i>Acaci negrii</i> Pic.Serm.	<i>Fabaceae</i>	Tedecha (Oromo)	Bark
<i>Aframomum alboviolaceum</i> (Ridl.)K.Schum	<i>Zingiberaceae</i>	Oula (Gumuz)	Fruit
<i>Ampelocissus bombycina</i> -(Bak.) Planch.	<i>Vitaceae</i>	Astigena(Gumuz)	Fruit
<i>Bedens Prestinaria</i> (Sch.Bip.) Culfod	<i>Asteraceae</i>	Assegetsiya(Berta)	Leaf
<i>Bridelia Scleroneura</i> Muell. Arg.	<i>Euphorbiaceae</i>	Haragjello (Berta)	Fruit
<i>Crassocephalum rubens</i> (juss.ex Jacq.)	<i>Asteraceae</i>	Shekaadona (Berta)	Leaf
<i>Cymbopogon caesiu</i> (Hook. & Arn.) Stapf	<i>Poaceae</i>	GnieeraWoni(Berta)	Infloure
<i>Justicia ladanoides</i> Lam.	<i>Acanthaceae</i>	Aelangiya (Gumuz)	Leaf
<i>Leonotis nepetifolia</i> (L.) R. Br.	<i>Lamiaceae</i>	Angesho (Berta)	Nectar
<i>Ochna leucophloeos</i> Hochst. ex A. Rich.	<i>Ochnaceae</i>	Anddha (Gumuz)	Fruit
<i>Oleacapensis</i> subsp. macrocarpa(C.A.Wright.) Ve.	<i>Oleaceae</i>	Bulumtsee (Berta)	Fruit
<i>Oxytenanthera abyssinica</i> (A. Rich.) Munro.	<i>Poaceae</i>	Enta (Gumuz)	Shoots

Source: Adapted from Ermias et al. 2011 (90-122), Wild Edible Plants in Ethiopia: A Review on their Potential to Combat Food Insecurity.

Sampling procedure and sample size

A cross-sectional survey of 220 households was conducted during the last week of August 2013. The sample size for the study was determined based on the formula suggested by Krejcie & Morgan (1970) cited in Agea et al. (2011). According to this formula 366 households would be statistically representative of the total population in our study area. But, considering the relative homogeneity of households within each ethno-culture group, the sample size was reduced to 220. The selection of sample households followed both non-random and random techniques. First, 3 *kebeles* (the lowest administrative unit of Ethiopia that is larger than a village but smaller than a zone, a zone in turn being such a unit lower than a region) out of 10 in the district were

purposively selected based on their distance from district center and road infrastructure. Accordingly, Senne, Say Dalecha and Soge *kebeles* were selected. Second, based on information on the total number of households and ethno-cultures in each *kebele*, households were stratified into two groups: the indigenous and the non-indigenous. Third, the number of sample size in each *kebele* and ethno-culture group was determined through proportional allocation method. Finally, sample households for interview were selected using simple random technique (i.e. lottery method).

Data collection

A questionnaire, key informant interviews, and semi-participant observations were employed to collect data. A structured questionnaire was carefully designed and administered to respondents through oriented local enumerators and face-to-face techniques as most of them were not able to read and write. Some households who are able to read and write were given the questionnaire to fill it themselves with some assistance from enumerators. The questionnaire was used to collect data regarding the amount of food obtained from both agricultural produce, wild foods, perceived factors affecting dependence on wild foods, and different variables used to estimate household resilience. Key informant interviews were held to secure information about the types of wild foods, the local peoples' dependence on them, and their economic and medicinal values. For this purpose, informants were selected from villages and offices of the districts' department of agriculture and food security. Semi-participant observations had been conducted by the corresponding author of the paper in 2013 until the households had begun to harvest and consume the immature crops such as maize. The objective was to record and understand the types of wild foods and frequency of hunting and gathering them and to understand which ethno-culture group was much engaged in these activities.

Data analysis

Both quantitative and qualitative methods were used to analyze data in a mixed-methods fashion as this paradigm underpins the study. Accordingly, the objective data from questionnaire were first analyzed and interpreted, and then substantiated by data from qualitative sources (i.e. key informant interviews and semi-participant observations) in a sequential way.

Multivariate techniques (i.e. factor analysis and optimal scaling), correlation, and descriptive analysis including cross-tabulations were used to examine the contribution of wild foods to

household resilience. For this purpose, statistical package for social sciences (SPSS) version 19 was employed. RI was estimated using the above multivariate techniques based on a number of observed variables iteratively as suggested by Alinovi et al. (2008). These techniques generated eight latent dimensions, IFA indicator being one of them. In fact, some of the observed variables, for example, Household Food Insecurity Access Scale (HFIAS), Coping Strategies Index (CSI), kcal, and dietary diversity scores (DDS) were determined through a complex procedure before running relevant multivariate techniques. The models of multivariate analysis were tested for their appropriateness before deciding to interpret the results. They were tested for sampling Adequacy, sphericity and problems of multicollinearity and singularity using Kaiser-Meyer-Olkin (KMO hereafter), Bartlett's test of sphericity, and the value of determinant (R^2) respectively. Based on the criteria suggested by Field (2005), all tests showed that the models were appropriate. That is, the sample from which data were collected was adequate (KMO = 0.631), the Bartlett's test of sphericity was significant ($p < 0.001$), and there were no problems of both singularity in the R-matrix and multicollinearity ($R^2 = 0.221$). As a rule of thumb, the KMO statistics should be > 0.50 for adequate sample, Bartlett's test of sphericity that shows $p < 0.001$ shows significant level that in turn shows that there is no problem of identity matrix, R-matrix ($R \geq 0.9$) shows problem of singularity, and for multicollinearity to exist, the determinant (R^2) of the correlation matrix should be > 0.00001 (Field 2005). Overall, the multivariate models were appropriate with the data available for the study. As a result, the first factor produced was quite meaningful and used as a latent variable as it fulfils most requirements mentioned above. All latent dimensions were estimated and determined if and only if they fulfilled these requirements. IFA indicator was one of them through which we examined the contribution of wild foods to household resilience to food insecurity.

All sources of wild foods were used to calculate for each household. This value of wild foods and six other observed variables were analyzed using principal axis factoring method to estimate the IFA index. The variables include HFIAS, kcal, income, CSI, saving, and DDS. The factor analysis generated three factors with eigen values greater than 1. The tests of KMO and Bartlett's statistics suggested that the first factor could be used as a representative indicator of IFA. But, the examination of Scree plot suggested that the third factor should be dropped from further analysis because the slope between it and the second factor was gentle and allowed the use of the first and second factors only. However, as the variance explained by both the second and third factors was

relatively large enough, three of them were maintained in further estimation process. The three factors together explained about 68% of the total variance in IFA (Table 2). Correlation analysis was also run in order to examine the magnitude and direction of relationship between each variable and the IFA indicator. Data obtained from key informants and field observations were carefully organized and analyzed to supplement the quantitative results.

Analytical Framework

Most variables and latent indicators of resilience are adopted from Alinovi et al. (2008).

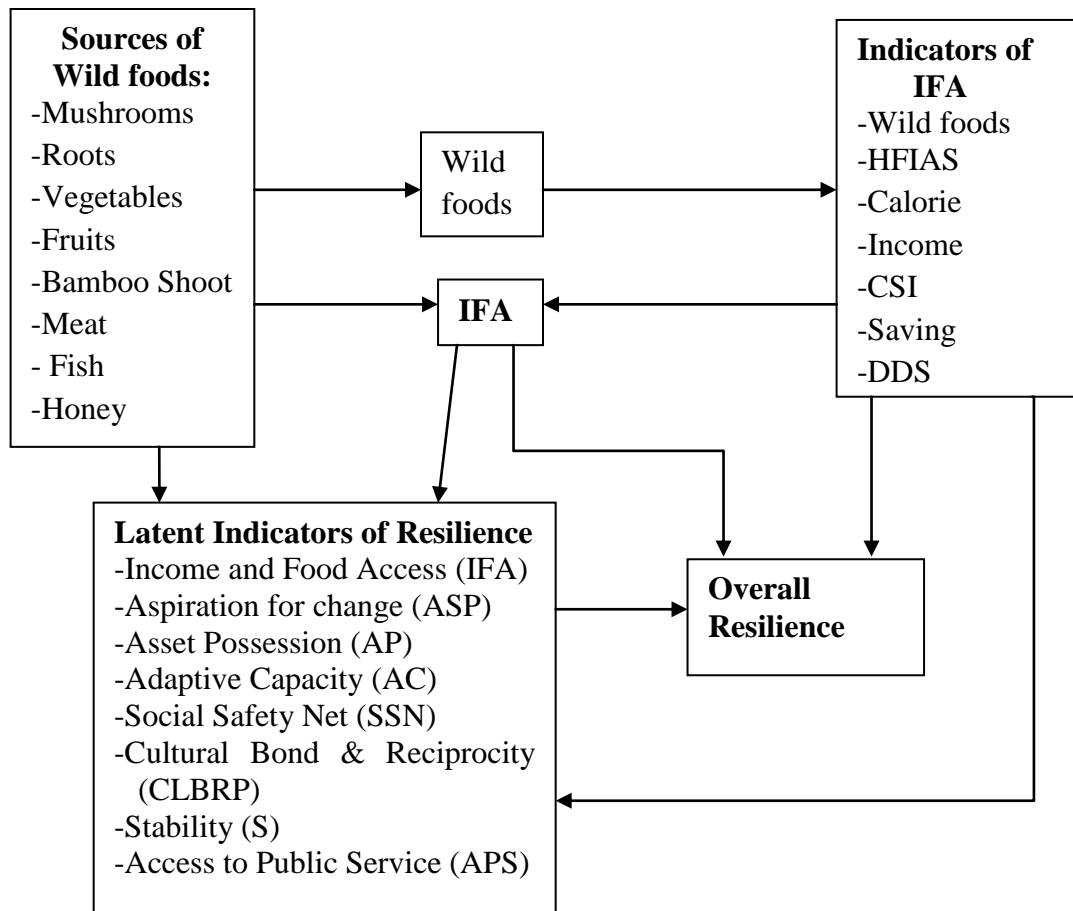


Figure 2. Analytical Framework (Adapted and modified from Alinovi et al. 2008)

Few variables such as wild foods, aspiration, and cultural bond were included based on the local context. Amount of wild foods obtained by households from different sources forms the base of the study. Wild foods' contribution to resilience is measured through IFA indicator. IFA is a variable constructed as a composite index of seven variables including wild foods. It is assumed

that wild foods are used as, both observed variable constituting the IFA and, latent variable measured from different sources. The overall analytical framework is given below (Figure 2).

In order to secure a reliable and valid data, ethical issues were well addressed. The informed consent of each respondent was obtained and their confidentiality was built before the actual interviews were conducted. This was done prior to their participation by explaining the purpose of the study, dispersion of the results, participant rights and risks.

Results and discussion

Amount of wild foods gathered and hunted by the households

The study showed that surveyed households had household size of 922.81 in adult equivalent (ADE) with mean size of 4.20. As shown in Table 2, on average surveyed households gathered and hunted 156.61kg of wild foods per annum/household. This was very small when compared to the average amount of food obtained from agricultural produce (i.e. 3146.7kg). This constituted about 5% of the total food obtained from all sources and about 9% of the net available food for surveyed households during the year. This result is similar with the findings of a study in Tanzania, the sub-Saharan Africa country, where wild fruits constituted about 11% of food consumed by studied households (Kajembe et al. 2000). Although small in amount, wild foods also contributed well to household resilience to food insecurity (Table 5) as some wild foods have better nutritional contents than cultivated foods. In this regard, semi-participant field observations and key informant interviews showed that most households (mainly the indigenous) did not miss either wild or semi-wild food in their daily meals mainly during summer (rainy season) of Ethiopia. This finding is similar with a previous study in southern Ethiopia where the daily meals of most people comprised an element of wild food (both WEPs and WEAs) during certain periods of the survey year (Dechasa and Guinand 2000). Another previous study indicates that wild foods often have higher contents of important minerals and vitamins than cultivated plant foods (Milton 1999). In similar interpretation, wild foods in our study area had considerable importance in household resilience to food insecurity.

Table 2 Amount of food available from wild and domesticated/cultivated sources*

Food Source	Amount produced (kg)					
	Total	% of Total	Mean	Std.	Min.	Max.
Cultivated food*	692277	95.26	3147	2368	0.06	13115
Wild foods	34453	4.74	157	169	0.00	685
Total	726730	100.00	3303	2280	0.06	14610
Net available food	377725	51.98	409	293	0.06	1959

Meat of 1 antelope on average = 25kg; 1bird on average = 0.5kg; 1kg fish = 10fish; 1 'medeb' cattle meat on average = 10kg.*includes own produce, grain purchased and grain borrowed.

At least three reasons can be mentioned for collection and hunting of small amount of wild foods. First, data were collected on purely wild sources of food (i.e. the semi-wild foods were not considered). Had semi-wild foods been considered, the contribution of wild foods would have been much higher than what was found from purely wild sources. Second, perhaps most households did not report hunting wild animals due to fear of legal prohibitions. This idea goes in line with a previous study which states that most often in a given survey the amount of wild foods are under-reported perhaps due to hunting forest or bush meat is illegal (Bharucha and Pretty 2010). Third, presently hunting and gathering are perceived as traditionalism and inferiority so that many households might have reserved themselves from fully reporting the amount of wild foods they obtained. By implication if these reasons were removed, the actual amount of wild foods reported by the households would have been considerably higher than what they reported during the survey and their contribution to alleviating nutritional inadequacies and enhancing resilience too.

Household Food Insecurity and Resilience Statuses

As shown in Table 3, large proportion of households (about 35%) was less resilient to seasonal food insecurity at different levels. On the resilience-vulnerability continuum, about 65%, 15%, 16.2% and 4% of households were vulnerable, moderately resilient, resilient and highly resilient respectively (Guyu and Muluneh, 2015a:141). The same source showed that the ethno-culture distribution by resilience category showed that more households in the indigenous (about 40%) than those in the non-indigenous (about 25%) were vulnerable or less resilient to food insecurity. In contrast, the majority of households in the non-indigenous (about 20%) were resilient to food

insecurity than those in the indigenous group (about 16%). This implies that perhaps the number of resilience-enhancing variables (other than wild foods) was much higher for the non-indigenous than for indigenous households.

The analysis of the resilience-vulnerability continuum shows that 60% of households in both ethno-culture groups were vulnerable to food insecurity. This finding is higher than the level of food insecurity in Ethiopia where on average about 44% of households were food insecure (Haan et al. 2006) and the most recent data show that “35% of the population of Ethiopia was undernourished between 2012 and 2014” (FAO, 2014:40). It is almost the same as the results in BGR. Food insecurity status in BGR as a whole where the study area is located and in Bullen District located in BGR was 58.1% (BGR 2004) and 58% (Guyu 2014) respectively. One parallel data used to analyze food insecurity in Belo-jiganfoy District based on measure of kcal revealed that 71.8% of households were food insecure (Guyu 2015; Guyu and Muluneh 2015). This study also indicated that food insecurity was more severe in the *green famine belt* than in the drought-prone and high population density areas of the country. For example, while 60%–71% of households were food insecure in Belo-jiganfoy District, about 21.09% (Messay 2013) and 42.3% (Tsegay 2009) of households were food insecure in the central Ethiopia (Nonno District, Shewa) and in northern Ethiopia (Tigray region), the former being high population density area and the later being drought-prone area. In this regard, the traditional focus on drought-prone and high-density areas of Ethiopia by overlooking famines masked by green environmental conditions in the western half of the country may not bring long-lasting solutions for household food insecurity. This implies that researchers and policy makers must equally focus on the green famine belt if all-encompassing and sustainable solutions to food insecurity problems are to be brought.

Contribution of wild foods to household resilience to food insecurity via IFA

The IFA index was estimated as average score of the three factors generated through factor analysis (Table 4).

Table 4 Results of factor analysis: Factors in the factor solution and the statistics

Statistics	Factors in the Factor Solution			
	Results	Factor1	Factor2	Factor3
Initial Eigenvalues	Total	2.55	1.13	1.07
	Variance (%)	36.44	16.17	15.34
	Cum. (%)	36.44	52.60	67.94
Extraction Sums of squared Loadings	Total	2.20	0.68	0.56
	Variance (%)	31.41	9.71	7.94
	Cum. (%)	31.41	41.11	49.05
Rotation Sums of squared Loadings	Total	1.63	1.17	0.63
	Variance (%)	23.29	16.76	9.01
	Cum. (%)	23.29	40.04	49.05

Extraction Method: Principal Axis Factoring

The three factors together explained about 68% of the total variance in IFA. The following simple empirical model was used to estimate IFA:

$$\text{IFA} = 0.3644 \times \text{Factor1} + 0.1617 \times \text{Factor2} + 0.1534 \times \text{Factor3}$$

The results of factor analysis indicated that the contribution of wild foods to IFA was large enough (Table 5). The proportion of variance accounted for in wild foods by the rest of the variables (as indicated by initial communality = 0.170) and by the factors in the factor solution (communality after extraction = 0.226) were acceptable. Accordingly, 17% of the variance in wild foods was shared by the rest of the variables.

Table 5 Communalities, factor loadings and correlation coefficients (*r*) with IFA

Indicators of IFA	Communalities		Factors & Loads			Correlation (<i>r</i>)
	Initial	Extraction	1	2	3	
WEFs (quintal/hh/year/)	0.170	0.226	-0.055	0.467	-0.070	0.174*
HFIAS scores	0.535	0.952	-0.880	0.343	0.245	-0.457*
Kilocalorie/ADE/day	0.486	0.573	0.741	-0.035	0.150	0.743*
Income/ADE/year	0.324	0.424	0.405	-0.339	0.381	0.402*
CSI Score	0.363	0.733	-0.181	0.836	-0.047	0.287*
Saving (birr/ADE/year)	0.229	0.498	0.324	-0.151	0.609	0.581*
DDS (No. meal/hh/day)	0.049	0.027	-0.040	-0.002	0.158	0.051

Extraction Method: Principal Axis Factoring. *Significantly correlated.

This shows that wild foods were associated with the rest of the variables in the process of detecting the structure towards estimating the IFA index. Similarly, 22.6% of the variance in wild

foods was shared by the factors generated in the factor solution indicating their moderate contribution to IFA. The factor loading of 0.467 as captured by Factor2 showed that wild foods had significantly contributed to IFA. This goes in line with a previous finding by Dechasa and Guinand (2000) in southern Ethiopia where wild food constituted daily meals for the majority of households.

The result of correlation analysis showed that there was direct and significant association between wild foods and IFA ($r = 0.174$) (Table 5). This shows that a unit increase in wild foods increased the IFA score by 0.174. In fact all variables except DDS were significantly correlated with IFA. The relatively lower coefficient (r) was perhaps due to the fact that data collected for this paper was based on purely wild foods intentionally ignoring the semi-wild ones.

Type of wild foods and their contribution to household resilience

The study identified eight major types of wild foods consumed in the study area (Table 6). This may help to emphasize, when formulating policy and strategies for intervention, on relevant ones that were frequently consumed. In the sub-Saharan Africa, for example, in South Africa, wild vegetables have important contributions to household food security mainly among the poor in rural areas (Mavengahama et al. 2013). This seems true in our study area where 52.4% of the total amount of wild foods came from wild vegetables. The amount of wild vegetables was about 5 times higher than the second and third large contributors: wild fruits and roots, each constituting 11.6% and 10.6% respectively. This goes in line with a previous study conducted in semi-arid part of Ethiopia where WEPs were found to play significant role in household food security (Debela et al. 2011). The fact that wild vegetables were easily obtainable and palatable as well as they have good taste and are also important sources of vitamins (Kajembe et al. 2000) implies that they had contributed to households' nutritional security. Wild fruits and roots were reported by 55.9% and 49.9% of households. They were followed by the amount obtained from wild meat (7.7%), mushrooms (5.9%), fish (5.6%), bamboo shoots (3.6%), and honey (2.8%). These were reported by 46.4%, 60.5%, 48.2%, 29.5% and 25% of households respectively.

A previous study indicated that in some African countries significant portion of protein is obtained from wild meat. For example, in Cameroon more than 98% of animal protein consumed came from bush meat (Muchaal and Ngandjui 1999). In contrast, our study showed that wild meat was very small (7.7% of the total amount of wild foods) although large proportion (46.4%)

of households reported their dependence on it. Another previous study indicated that 41% of surveyed plants in Debub Omo Zone belonged to vegetables (Tilahun and Mirutse 2010). This was less than our finding (i.e. 52.4%) showing that dependence on wild vegetables was high in the western than the southern Ethiopia. The study showed that larger proportion of households in the indigenous ethno-culture group reported their dependence on wild foods than the non-indigenous ones (Table 6). Honey was reported only by indigenous group because, as field observation showed, almost all non-indigenous households that reported honey production depended on traditional beehives rather than depending on wild source. A previous study indicated that the range of animal species eaten by man includes birds and their eggs, insects, rodents, fish, and larger mammals and the nutritional content of wild meat is comparable to domestic meat (Kajembe et al. 2000). By implication, although the amount of wild foods was much smaller than food from domesticated sources, their role in combating nutritional insecurity was high in our study area.

Table 6 Amount of wild foods by type and % of households depended on them.

Types of wild foods	Amount (kg)	% of total amount (%)	Households reported their dependence on wild foods (of 100%)		% of households depended on WEF (N=220, %)
			Indigenous (%)	Non-indigenous (%)	
Mushroom	2095.25	5.9	75.9	24.1	60.5
Roots	3595.95	10.4	89.9	10.1	49.5
Vegetables	18043.50	52.4	73.8	26.2	64.1
Fruits	3982.30	11.6	79.7	20.3	55.9
Bamboo shoot	1235.30	3.6	98.5	1.5	29.5
Meat	2647.70	7.7	80.4	19.6	46.4
Fish	1915.00	5.6	76.4	23.6	48.2
Honey	968.00	2.8	100.0	0.0	25.0
Total	34453.10	100	55.0	45.0	100.0

Local perception on human health and wild foods nexus

There was a strong believe, mainly by the indigenous people, that wild foods have better capacity to maintain good health conditions for those who depend on them. They attributed the recent increased incidence and frequency of sickness of their family members to the shortage of wild foods. Regarding this, a key informant in Soge Village stated the following: “The cause of my sickness is the shortage of wild foods, especially meat. Formerly, wild animals were easily obtained in our back yard, killed easily, and eaten. Today, one must walk 3 to 4 hours to see an antelope because the land is deforested,” (Mr. Mesha, April 2013). This is similar with the findings of a previous study on collectors in Botswana who often travelled 100km in order to obtain caterpillars for food (Illgner and Nel 2000).

Mesha was an elderly man (belongs to Gumuz ethnicity, one of the indigenous ethno-culture groups) in his 60s who had been persistently sick due to what is locally known as *berd-beshta*, literally means sickness due to cold weather condition. Mesha and his older son, Tesfaye Mesha, visited many health centers and hospitals for treatment. But, Mesha had not recovered from his sickness. The researchers tried to understand the reasons based on the way the father and his son perceived it. Both believed that lack of wild meat caused the sickness explaining that formerly one did not miss at least a dried wild meat in kitchen. The reasons for decreased consumption of wild meat, according them, were two. First, wild animals had been forced to migrate far into remote areas due to increased deforestation. Second, hunting the available mammals had been banned legally although people had continued to practice it in a hidden manner. The perceived medicinal values of wild foods reported in our study area go in line with the findings of many previous studies. A previous study conducted in Lebanon showed that wild foods were perceived to cure most diseases of human beings (Batal et al. 2007). Another study showed that blue-green algae were used as a source of both food and medicine in Chad and China (FAO 2008). Similarly, another study showed that many chronic diseases affecting humans in modern technologic societies were related to declining and altering trends in traditional diets including wild foods (Milton 1999). Therefore, we can generalize that local people’s perception of wild foods in the study area corresponds with the perception of many people around the world who depend on forest for food. However, scientific investigation of the curative ability of the wild foods is still awaiting further research.

Perceived factors determining household's dependence on wild foods

Households were asked about their perception about factors that determined the level of their dependence on wild foods (Table 7). The factors were proposed after field observations and key interviews were conducted with some villagers and office workers of the district. The large proportion (38.6%) of households perceived reduced source as a reason for their low level of dependence on wild foods. This was followed by it was not our culture (20%), hunting and gathering are legally banned (19.5%), wild foods have currently vanished (17.8%) and crop produced is enough (12.3%). The overall observation of these findings indicated that households had the desire to continue to gather and hunt wild foods but the amount they obtained was very low due to the above reasons.

Table 7 Perceived factors determining dependence on wild foods by ethno-culture group

Reasons for Low level of Dependence on wild foods (<i>N</i> = 220)	Ethno-culture Group				Total	
	Indigenous		Non-indigenous			
	No.	%	No.	%	No.	%
Crop Produce is enough	9	4.1	18	8.2	27	12.3
Reduced Source of wild foods	31	14.1	54	24.5	85	38.6
Hunting & gathering are legally banned	14	6.4	29	13.2	43	19.5
Wild foods have currently vanished	12	5.5	26	11.8	38	17.8
It is not our culture	2	0.9	42	19.1	44	20.0
Total frequency (Responded <i>yes</i>)	68	11.2	169	34.1	237	21.5
Grand total frequency (<i>yes + no</i>)	605	55.0	495	45.0	1100	100.0

The study also revealed that there were differences between the ethno-culture groups about the perceived factors. As indicated in Table 7, 4.1% of households in the indigenous group as compared to 8.2% of them in the non-indigenous group reported that crop produced was enough so that they were less dependent on wild foods. Overall, lesser proportion of the indigenous (11.2%) than the non-indigenous (34.1%) ethno-culture groups reported one or more of the five reasons for their low level of dependence on wild foods. This implies that perhaps indigenous households were engaged in gathering and hunting all times of wild foods while the non-indigenous often practice these activities following food insecurity shocks.

Conclusion

This paper examined the contribution of wild foods to household resilience to food insecurity in the green famine belt of Ethiopia taking Belo-jiganfoy district as a case study area. Although the amount gathered and hunted was very small, the high level of factor loading and significant

correlation show that wild foods had considerably contributed to household resilience to food insecurity. The fact that more than half of the wild foods were obtained from wild vegetables implies that they were more abundant than other types during the survey year. The study also revealed that while the contribution of wild foods to human health is significant, the declining dependence on them had caused some health problems which cannot be cured through modern medical treatments, which is also similar with the understanding of forest communities around the world. Although the indigenous households were more actively engaged in wild food collection and hunting, more non-indigenous households (62.5%) than the indigenous group (37.5%) were resilient to food insecurity. This implies that perhaps the number of resilience-enhancing practices (variables) other than wild foods was higher for the non-indigenous than for indigenous households. The fact that the majority of households (56.4%) reported reduced sources of wild foods (38.6%) and wild foods have currently vanished (17.8%) as reasons for their low level of dependence on wild foods implies that households in the study area wanted to rely on wild foods for making their living but such a desire was affected by diminishing and vanishing sources of wild foods. Generally, we concluded that wild foods contributed to household resilience to food insecurity although the amount reported was much less than what was eye-witnessed during semi-participant field observations. Thus, we recommend that a policy that integrates strategies that can ensure sustainable food security and forest development (and hence wild foods) should be formulated and implemented if the overall national goal of ensuring food security is to be achieved.

Reference

- Agea JG, KImondo JM, Okia CA (2011).Contribution of wild edible food plants to overall household diet in Bunyoro-Kitara Kingdom, Uganda. *Agricult J* 6(4):134–144
- Alinovi L, Mane E, Romano E (2008).Towards the measurement of measuring household resilience to food insecurity: applying a model to Palestinian household data. In: SibrianR(ed) *Deriving food security information from national household budget survey. Experiences, Achievements, Challenges*. Rome: FAO, pp 137–152
- Alinovi L, Mane E, Romano E (2009).Measuring household resilience to food insecurity: application to Palestinian household (Working Paper), FAO, Rome
- Assegid A, Tesfaye A (2011).Wild edible trees and shrubs in the semi-arid lowlands of southern Ethiopia. *J Sci Dev* 1(1):5–19

- Batal M, Hamadeh S, Hwalla N, Kabbani N, Talhouk S (2007). Wild edible plants: promoting dietary diversity in poor communities of Lebanon. Final Technical Report American University of Beirut, Lebanon
- Bell J (1995). The Hidden harvest, in seedling, The Quaternary Newsletters of Genetic Resources Action International. <http://www.grain.org/publications/>. Accessed 21 Sept 2015
- Benishangul-gumuz *Region (BGR) (2004). BGR food security strategy document, Assosa, Ethiopia*
- Bharucha Z, Pretty J (2010). The role and values of wild foods in agricultural systems. *Philos Trans R Soc Lond B Biol Sci* 365(1554): 2913–2926
- Canali, Slaviero (2010). Food insecurity and risk management of smallholder farming systems in Ethiopia; European IFSA Symposium, Vienna, Austria
- Ciani F (2012). A resilience-based approach to food insecurity: The impact of Mitch hurricane on rural households in Nicaragua. *JEL Classification*, Q12, Q18, I32, I38
- Debela Hunde, Njoka JT, Zemedede Asfaw, Nyangito MM (2011). Seasonal availability and consumption of wild edible plants in semiarid Ethiopia: Implications to food security and climate change adaptation. *J Horticult Forest* 3(5):138–149
- Dechassa Lemessa, Guinand Y (2000). Wild-Food plants in Southern Ethiopia: Reflections on the role of wild foods and famine foods at a time of drought. In Kenyatta C, Henderson A (eds) *The potentials of indigenous wild foods. Workshop Proceedings Held on 22–26 January*
- Devereux S (2000) *Famine in the Twentieth century. IDS Working Paper 105, Brighton*
- Ermias L, Zemedede A, Ensermu K, Damme PV (2011). Wild edible plants in Ethiopia: a review on their potential to combat food insecurity. *Afrika Focus* 24:2
- Federal Democratic Republic of Ethiopia-Ethiopian Road Authority, FDRE-ERA (2008). *Consultancy Paper for District Integrated Development Study (Group-8); Belojiganfof Integrated District Development Program Study (Final Report)*. Unpublished Document Translated from Amharic Version; Afro-consult and Pan African in Collaboration, Addis Ababa, Ethiopia
- Field A (2005). *Factor Analysis Using SPSS, C8057 (Research Method II). A Manual*
- Food and Agricultural Organization, FAO (2008) *A review on culture, production and use of Spirulina as food for humans and feeds for domestic animals and fish* FAO fisheries and aquaculture circular No. 1034. FAO, Rome

- Guyu F, Muluneh W (2015). Household resilience to seasonal food insecurity: dimensions and magnitudes in the “green famine” belt of Ethiopia. *Appl Sci Report* 11(3): 125–143
- Guyu FD (2012). *Voluntary villagization scheme (VVS) for transforming semi-pastoral communities in Benishangul-gumuz region, Northwestern Ethiopia: challenges and local development indicators. J Sustain Dev Afr* 14:5
- Guyu FD (2014). Ethno-culture disparity in food insecurity status: the case of Bullen District, Benishangul-gumuz regional state, Ethiopia. *Afr J Food Sci* 8:2
- Guyu FD (2015). Household vulnerability to green famine: component-based analysis of indicators in Belo-jiganfoy District (case study area), Benishangul-gumuz Region, Ethiopia. *Appl Sci Report* 9:3
- Haan N, Majid N, Darcy J (2006). A review of emergency food security assessment practice in Ethiopia. Humanitarian Policy Group, HPG Research Report, UN-WFP, Rome
- Holling C.S (1973). Resilience and stability of ecological systems. *Ann Rev Ecol Syst* 4:1–23
- Holling C.S (1996) Engineering resilience versus ecological resilience, engineering within ecological constraints. The National Academy of Sciences
- Illgner P, Nel E (2000). The geography of edible insects in sub-saharan Africa: A study of the Mopane Caterpillar. *Geograph J* 166:4
- Kajembe GC, Mwenduwa MI, Mgoo JS, Ramadhani H (2000). Potentials of non wood forest products in household food insecurity in Tanzania: the role of gender based local knowledge. A Report Submitted to Gender, Biodiversity and Local Knowledge systems (LinKS) to Strengthen Agricultural and Rural Development, Tanzania
- King CA (2008). Community resilience and contemporary agro-ecological systems: reconnecting people and food, and people with people. *Syst Res Behav Sci* 25: 111–124
- Martin-Breen P, Anderies JM (2011). Resilience: A literature review. Arizona State University, New York
- Mavengahama S, McLachlan M, de Clercq W (2013). The role of wild vegetable species in household food security in maize based subsistence cropping systems 2013. *Food Secur* 5:227–233
- Messay M (2013). Resettlement and food security nexus in Ethiopia: A case study from Nonno District, PhD Dissertation, Addis Ababa University. LAMBERT Academic Publishers
- Milton K (1999). Nutritional characteristics of wild primate foods: do the diets of our closest living relatives have lessons for us? *Nutrition* 15:6

- Muchaal PK, Ngandjui G (1999).Impact of village hunting on wildlife populations in Western Dja Reserve, Cameroon. *Conserv Biol* 13:2
- Sakurai T,Kitsuki A, Miura K, Yamauch T, Kanno H (2012).Vulnerability and resilience of household consumption and their determinants: the case of the southern province of Zambia, National Agricultural Research Center for Tohoku Region, Morioka, Iwate, Japan
- Tilahun T, Mirutse G (2010).Ethnobotanical study of wild edible plants of Kara and Kwegu semi-pastoralist people in Lower Omo river Valley, Debub Omo Zone, SNNP, Ethiopia.*J Ethnobiol Ethnomedicine* 6:13
- Tsegay G (2009).Determinants of food security in rural household of the Tigray Region.unpublished MA Thesis Report, Addis Ababa University, Ethiopia

8. Villagization as a Policy Response to Household Food Insecurity: Effects, Constraints and Consequences in Belo-jiganfoy District, Western Ethiopia

¹Guyu Ferede and ²Muluneh Woldetsadik

Ready to be submitted to journals

¹Correspondence

E-mail: guyu_f@yahoo.com

Cell phone: +251-9-12-19-42-72

Department of Geography and Environmental Studies

Addis Ababa University, Ethiopia

²Supervisor

Department of Geography and Environmental Studies

Addis Ababa University, Ethiopia

Abstract

The main intent of villagization is to collect scattered individual peasant settlements into a nucleated village and supply them with basic physical and socioeconomic infrastructures so that they can ensure sustainable livelihoods and food security. The paper examined the effects, constraints and consequences of villagization in Belo-jiganfof district. Data were collected through a cross-sectional survey of 220 households, key informant interviews, and field observations. Accordingly, both quantitative and qualitative data analysis techniques were employed. The results showed that villagization could not ensure food security and enhance resilience of households; rather it had exacerbated their vulnerability to risks. For example, measurement obtained from kcal, resilience-vulnerability spectrum, and household food insecurity access prevalence showed that about 72%, 60%, and 61% of the households were food insecure respectively. Moreover about 55% of them accessed low level of dietary diversity scores per day. The main causes for these were constraints related to ill-planning, inappropriate implementation of the scheme, and their consequences including involuntarism, two-site homes, bad attitude, and the relocated households' desire to return to old settlements. Actual field observations also proved these facts. Thus, villagization scheme had partially failed to address the challenges of households' food insecurity and low level of resilience. Rather it had exacerbated the food insecurity and household vulnerability to related shocks. Therefore, concerned bodies should revisit the plan and implementation processes as well as conduct an in-depth assessment that uses a livelihood framework for a comprehensive understanding which may help planning of appropriate strategy that target at long lasting solution.

Keywords: villagization, effects, constraints, resilience, food insecurity, infrastructure

Background

In Ethiopia, a number of policy analysts have criticized and identified problems associated with those policies and recommended possible solutions to the government for inclusion at the times of revisions. For example, Jayne and Daniel (1995) reviewed available evidence on the potential to promote access to food for vulnerable groups in Ethiopia through food transfer programs and appropriate policies influencing the food marketing system. Amdissa (2006) reviewed and criticized a number of policy issues surrounding rural development focusing on a Plan for Accelerated and Sustainable Development to End Poverty (PASDEP). One of the many policy issues raised in this work is villagization under the umbrella of voluntary resettlement. The

Government of Ethiopia (GoE) (2007) puts eradication of poverty and hunger as the national development policy framework. Guush et al. (2013) evaluated and documented Ethiopia's food security program focusing on implementation of productive safety net and household asset building programmes. Devereux et al. (2014) on their part conducted a study on the food security programmes where these were implemented based on field-based data and recommended some graduation models for Ethiopia. The need for mentioning these examples is to recall the extent to which the government and individual researchers have been working to contribute to the formulation of achievable national development and hence food security policies. Despite these efforts, many of the national policies including resettlement have incurred certain degree of failures.

Villagization is one of those policies that had been implemented in the pastoral and semi-pastoral areas of Ethiopia, mainly in Afar, Somali, Gambella and Benishangul-gumuz regions (BGR). The objective was to supply basic socioeconomic and physical infrastructures to communities gathered in planned villages, according to the New Coalition for Food Security Ethiopia (NCFSE), which had been difficult in scattered forms of villages (NCFSE, 2003a). No doubt, if villagization was implemented as per the principles and policy guidelines set at the outset and the objectives were achieved, that it could have brought the level of development intended to achieve. However, the present reality, mainly in BGR, shows some precursors of failures for a number of factors (Guyu, 2012). In this paper, Belo-jiganfoy district was chosen as a case study area from BGR to conduct an in-depth analysis of the situation of villagization with respect to its contribution to tackle household food insecurity problems and enhancing their resilience.

Villagization is the process that involves gathering of scattered settlements into predetermined centers either voluntarily or forcibly (Sandra, 1987; Messay and Bekure, 2011). It can also be defined as the agglomeration of rural living units to facilitate state administration (Osafokwaako, 2011). It becomes effective if the process is governed by the principles of voluntarism and if it follows a bottom-up approach (Sakamoto, 2003). It involves movement of people over short distance and small scale geographical area mainly based on intra-regional approach. Consequently, the capacity of relocated villagers due to villagization to readjust themselves to a new environment is generally less complex than those due to resettlement processes that involve relocation over a longer distance and inter-regional approach (Guyu, 2012). Here, the conceptual

difference between the present day villagization and resettlement schemes lies in their approaches and the distance each process covers. Most often, the villagization scheme has involved short distance movement and intra-regional approach while the resettlement involves long distance and both intra-regional and inter-regional approaches.

The initial Food and Agricultural Organization (FAO) definition of food security is a framework for adapting to a particular nation's or community's context. In this paper, Degefa's (2005) definition is adopted. Degefa defines it as: "food insecurity refers to a situation when a household is not capable to sufficiently feed its members from either its own production or purchase on market ...". (Degefa, 2005: 10). Failing to achieve sufficient level of expectation is defined as food insecurity. Resilience is defined as the ability of a system to withstand and cope with stresses and shocks (i.e. its ability to persist in uncertain world (Ciani, 2012)). As different ways of defining a system exists, in this paper it refers to households as a system, for which resilience is measured. The models and measurement tools of food security and resilience are dynamic and improved as time passes.

Four components that constitute the conceptual framework of food security (availability, accessibility, consumption, stability) are well discussed in literature (Gross et al., 2000). In this paper, the former three are used as there are no data that can be used to show the reality of the later one as villagization itself had stayed for short duration since its establishment. The household food balance model (HFBM) (Messay, 2013), the household food insecurity access prevalence (HFIAP) as suggested by Coates et al. (2007), the dietary diversity score (DDS) as recommended by Hodidinott (1999), and coping strategies index (CSI) as used in Babatunde et al. (2008) were used to estimate the food insecurity status of households. The resilience index (RI) for each household was constructed using factor analysis methods as used in Alinovi et al. (2008). A combination of these methods was used to explore the effect of villagization as a policy response onto household food insecurity and resilience. Thus, it is essential to highlight the historical account of villagization.

Historically, a number of countries had attempted villagization scheme although it eventually collapsed. The aim of the scheme in all countries is similar as it was to initiate the transformation of rural society to create rural economic and social communities where people would live together and benefit from the development of infrastructure (Dibua and Ibhawoh, 2003). For

example, it was implemented in Russia in the 1930s, in China as well as in Tanzania as part of Ujamaa programme (Dibua and Ibhawoh, 2003). The east African country, Tanzania, had implemented it for about two decades between 1961 and 1982 (Osafa-Kwaako, 2011). Ethiopia had also attempted it during the military socialist government, known as the *Derg*, for nearly a decade. According to Lorgen (1999), the period of Ethiopia's political history of direct relevance to the policy of villagization begins when Haile Selassie's regime was deposed in 1974, in a military coup. But, the actual process of villagization began in 1985 and became nationwide campaign in 1987 and by August 1988 about 12 million people were villagized (Lorgen, 1999). The *Derg* had implemented the programme collecting rural communities into small nucleated villages throughout the country with the objective of promoting rational land productivity; conserve natural resources, and provide access to public services like clean water, clinics and schools, electricity, market and cooperatives (Lorgen, 1999; Messay and Bekure, 2011). A village was planned to host 200 to 300 households, each falling into 100m² compounds. It was also meant for escalating public self-defense and guarantee peace and security throughout the country. Consequently, about 13 million people were villagized by 1989 in 12 of the 14 administrative units, then known as *kiflehagers*, exceptions being Tigray and Eritrea (Lorgen, 1999). However, the scheme eventually collapsed before the *derg* announced the mixed economy (free market reform) in 1990 (Messay and Bekure, 2011).

After a decade from the collapse of villagization process, the government of the FDRE led by the Ethiopian People's Revolutionary Democratic Front (EPRDF) devised new resettlement programmes in 2002. In general in Ethiopia villagization focuses on settling pastoral nomads (Kloos, 1990). Recently as part of the resettlement programme, however, it seems to have targeted at gathering primarily scattered pastoral and semi-pastoral communities in Gambella, Afar, Somali and Benishangul-gumuz regions, the process being theoretically based on the principles of voluntarism (NCFSE, 2003b). The programme is believed to be a key strategy to tackle poverty and food insecurity, and transform the lifestyle of villagized communities. It was planned to gather about 1.5million people in different villages by the end of 2013 and relocations had started in 2010 (BGR, 2010). Theoretically, the failures of the past regime were taken into account in the new plan of villagization prepared by the EPRDF.

In BGR, it was adopted as part of Benishangul-gumuz region food security strategy (BGRFSS). The strategy document mentions villagization as one of the regional priorities upon which all other integrated sectoral contributions should be founded (BGRFSS, 2004). The programme presents a general direction to mitigate the sources of vulnerability such as crop pests, weeds and diseases, livestock disease, malaria and rain failure, in order to build the capacity of households to resist shocks. In this regard, an observation of villagization scheme in BGR shows certain failures due to problems related to implementation mainly at grassroots level (Guyu, 2012). However, there is no empirical study that has so far examined the effect of villagization scheme as a policy response to household food insecurity and resilience. The existing papers almost entirely focus on resettlement scheme. Abbute (1997) started by studying the dynamics of socio-economic differentiation and change in the Beles valley (Pawe) resettlement area located in northwestern Ethiopia. This was followed by Desalegn (1988) who assessed the resettlement scheme in same area (Metekel) (part of the present region of Benishangul-gumu). This was also repeated by Kloos (1990) who reviewed the resettlement scheme by focusing on health problems of households in western Ethiopia including Metekel. Then it was taken up by Yintiso (2004) who overviewed the situation of resettlement scheme of the same period and the same area (Metekel). As far as the surveyed literature for this paper is concerned, only Guyu (2012) seems to have directly taken villagization and conducted a general assessment on Benishangul-gumuz region as a whole. As a result, there has remained a huge research gap in the field of resettlement in general and in villagization scheme in particular. Therefore, this paper was aimed at highlighting the impact of implementing villagization scheme on household food security and resilience in Belo-jiganfoy district, Benishangul-gumuz region, western Ethiopia. Specifically, it examined the current status of household food insecurity and resilience as an outcome of villagization and, the constraints and consequences of the scheme.

Materials and Methods

The study was conducted in the GFB of Ethiopia, defined by Guyu and Muluneh (2015a and b) based on a case study area (i.e. Belo-jiganfoy district), located in BGR (see Figure 2, Chapter 5, page 113 and Figure 1, Chapter 7, page 166). Most households in this part of the country dominantly lead most traditional ways of living, prominent examples being the indigenous people who inhabit the area (e.g. Gumuz, Berta, Mao and Komo ethnic groups). These people who are located in the remotest areas are still practicing hunting and gathering activities as well

as shifting cultivation (Guyu, 2011; Guyu and Muluneh, 2015b). Moreover, the settlement pattern of this part of the country had been highly scattered and not suitable for implementation of development programmes until they were collected into villages in 2010 (BGR, 2010; Guyu, 2011, 2012). As a result, the majority of the people in the region had been living much far away from social, economic and other infrastructures and were poor and food insecure (BGRFSS, 2004). Thus, the government of Ethiopia seems to have, observed this situation and planned voluntary villagization programme as a strategy and begun to implement it since September 2010. Accordingly, BGR was among the four federal regions of the country selected for the implementation of villagization as one of the schemes designed to ensure sustainable food security of rural households (BGRFSS, 2004). Villagization programme was prepared in harmony with the principles and pillars of the national resettlement programmes devised in 2002 (NCFSE, 2003a). It was taken as an integrated component of food security strategies supposed to promote and encourage people to resettle voluntarily on a participatory approach (BGRFSS, 2004). This paper was produced based on Belo-jiganfoyy district¹ taken as a case study area. It was believed that a detailed study of the district can provide a clear picture of the situation of villagization in BGR. The district is one of the 20 districts of BGR located in the southern most part of the region. It is found in Kemashi administrative zone², one of the three zones of BGR, the others being Assosa zone and Metekel zone. It is further subdivided into 10 kebeles³, each being made up of varying number of villages.

According to the Federal Democratic republic of Ethiopia-Ethiopian Road Authority, FDRE-ERA (2008), Belo-jiganfoyy district has an area of 1628km² in which total population of 37471 with 7347 households are living. The district has average population density of 23 persons per square kilometer. Berta, Gumuz, Shinasha, Mao and Komo form the indigenous ethno-culture groups of BGR. All except the Shinasha ethno-culture live in Belo-jiganfoyy district. In addition, there are a number of non-indigenous people living in the region and in Belo-jiganfoyy 'woreda', Oromo and Amahara ethnic groups being the dominant ones.

¹District, according to the administrative structure the Federal Democratic Republic of Ethiopia, refers to administrative unit lower than the zonal level but larger than a 'kebele'.

²Zone is an administrative unit next to regional level.

³Kebele' is the lowest such an administrative unit lower than a district consisting of villages.

The district is characterized mainly by plain topography although certain mountainous features exist with altitude ranging between 1100m and 1450m above msl. Its climate can be categorized as moist tropical that shows very hot temperatures ranging between 20 – 25⁰c during rainy season while its minimum temperature varies from 12 – 20⁰c according to the relief and seasons. Economically, the people in the district depend on agriculture. Malaria is the leading cause of human health problem while livestock sector is also threatened from several diseases. Poor road and other physical infrastructure and socioeconomic services are the main challenges to the district (FDRE-ERA, 2008).

Table1 Distribution of Sample Size by Distance from District Center and Ethno-culture Group

Kebele	Dist.from Soge Town	Tot. hh	Ethno-culture	HH size	Sample HH	Sample (Both)
Senne	>=30km	633	Indigenous	239	28	74
			Non-indigenous	394	46	
Say Dalecha	15-30km	282	Indigenous	180	21	33
			Non-indigenous	102	12	
Soge	<=15km	966	Indigenous	615	72	113
			Non-indigenous	351	41	
Total		1881	Indigenous		121	220
			Non-indigenous		99	

The source population of this study for which the findings were generalized was 7347 households. This population is found between 7000 and 8000. According to the formula suggested by Krejcie & Morgan (1970) used in Agea et al. (2011), if N = 7,000, sample size of 364, and if N=8,000 sample size of 367 is enough, the average being 366 that is statistically representative of the total population. But, considering the relative homogeneity of households within each ethno-culture group (the indigenous and non-indigenous), the sample size was reduced to 220. Accordingly, a cross-sectional survey on 220 households was conducted during the last week of August 2013.

A stratified random sampling technique was employed to ensure the representativeness of the sample households and their size (see Table1). First, 3 kebeles out of 10 in the district were purposively selected based on their distance from district center and road infrastructure. Accordingly, Senne, Say Dalecha and Soge *kebeles* were selected. Second, based on information about total number of population and ethno-culture groups in each kebele, households were divided into two groups: the indigenous and non-indigenous. Third, the number of sample size in

each kebele and ethno-culture group was determined through proportional allocation method. Finally, sample households for interview were selected using simple random method.

As far as data collection is concerned, quantitative data were generated from households using questionnaire survey, observations and, KIIs conducted in each of the sample *kebeles* and district's agricultural office. Generally, data about the current status of food security and resilience as a result of villagization and, the constraints and consequences of the scheme were collected through the above methods. Whether villagization had improved households' food security and resilience, was also assessed asking their perception on "before and after" situation of the scheme.

Both multivariate and descriptive methods of data analyses were employed to assess the situation and draw conclusion. Accordingly, factor analysis was employed to estimate the resilience index based on eight dimensions including income and food access, adaptive capacity, access to basic services, social safety nets, asset possession, stability, cultural bonds and practices, and aspiration of households, which involved a complex procedure.

In addition, HFBM was used to estimate net food available to a household while HFIAP was estimated using a complex procedure. DDS score was estimated as an arithmetic sum of all kinds of food items eaten in the last 24 hours. CSI was estimated as a weighted average of behavioral responses of a household for the question what a household did when there was adequate food or money to access food. Moreover, frequencies, cross-tabulations, means, and standard deviation (STDs) were used to interpret the quantitative data obtained through questionnaire method. For doing this, statistical package for social sciences (SPSS) version 19 was used.

These were enriched through qualitative information obtained through key informant interviews and field observations, which were presented and interpreted in words. The findings were discussed, conclusion was drawn and, recommendations were forwarded to serve as a guideline for practical solutions of the problem by policy makers and implementers. Moreover, future research directions were indicated for further study by scholars interested in the field. Therefore, the study employed both quantitative and qualitative approaches in a mixed fashion that employed a pragmatic paradigm which mixes both the positivist and constructivist approaches.

Above all, in order to secure a reliable and valid data, ethical issues were well addressed. Attempts were made to get the informed consent of each respondent (both sample households and key informants) and building their confidentiality before commencing actual interviews. This was done through explaining the purpose of the study, dispersion of the results, participant rights and risks prior to their participation.

Results and Discussion

Effect of Villagization on Household Food Security in the Surveyed Villages

In theory, a successful resettlement programme (including villagization) should relocate people without major complications although some resettlement schemes may destroy, temporarily or permanently, the lifestyles and living standards of the poor (Gutman, 1994). One of such outcomes of ill-planned and implemented resettlement programmes is food and livelihood insecurities (Lorgen, 1999). The impact of villagization on household food security and resilience was highlighted by analyzing three of the major components of food security: availability, accessibility and consumption. These components were measured, analyzed and supplemented by subjective responses as perceived by sample respondents and information obtained from key informants.

Food Availability: This component was examined based on the average amount of food obtained from all sources as measured in kg. In principle, villagization policy was designed primarily to improve food availability at household level mainly through own production (NCFSE, 2003b). In fact, villagized households had also obtained food from purchasing, borrowing and, collection and gathering of wild foods. The result of the study shows that 719820kg of gross food was obtained by all surveyed households from all sources. Of this, 94.87%, 1.13%, 0.17% and 3.38% was obtained from own produce, purchasing, borrowing and gathering and hunting of wild foods respectively. Using a HFBD, the net food available was determined at 370909kg, which was expected to feed total family size of 922.82 in adult equivalent (ADE). Accordingly, the average amount of food available per ADE was 4.02qtls which was a little less than the average of number of 4.20ADE/household. Taking 2.25qtls/ADE/annum as a minimum requirement as cited from Middlebrook (2001) by (Guyu 2011), 40.5% of households had less than the threshold values and they are considered as food insecure. Of the food insecure households, the majority (65.2%) were members of the indigenous community while the remaining 34.8% were non-

indigenous ones. But, in this case, availability is a crude measure of food security so that it is not a good indicator of food security status because it does not consider the differences in calorie content of different food items. As a result, analysis of other components is required to confirm the above results.

Food Accessibility: Improving household access to food is the other main objective of villagization scheme. Different ways of access to food can be analyzed. However, in this paper HFIAP which is determined from household food insecurity access scale (HFIAS) as recommended by Coates et al. (2007) and CSI following Messay (2013) were used to highlight whether villagization had improved household food security. The analysis of HFIAP shows that about 61% of the households were food insecure. Related to this measure was the household hunger scale (HHS) which shows that considerable proportion of households (44.3%) faced hunger conditions.

The CSI is one of the tools used to understand the impacts of villagization on household food security status. This index is discussed in Maxwell and Frankenberger (1992) and proposed as a method for taking consumption-related strategies and constructing a numerical index by Maxwell (1996) and further suggested by Hoddinott (1999). A number of authors have therefore employed this method; for example, Bababatunde et al. (2008) in Nigeria and Messay (2013) in Ethiopia. Following this recommendations and application of the method, this paper calculates the index based on multiple behavioral responses (0-7) to a single question, “*What do you do when you don not have enough food, and don not have enough money to buy food?*” The index is a continuous measure that shows a household’s position on the scale rather than demarcating between food secure and food insecure. The result shows that about 50.5% of the surveyed households scored CSI less than the mean score. The notion behind CSI is that the higher the score, the more food insecure a household becomes (Hoddinott, 1999). Following the approach used by Mjonon et al. (2009) that takes the average CSI (41.96 in this paper) as a threshold to compare the food secure with insecure with different characteristics, about half (49.5%) of surveyed households were food insecure. This can be considered as a significant score that shows households were food insecure and villagization was not as such successful as expected.

Access to non-farm employment is another objective of villagization that enables households to diversify their income sources and ensure sustainable food security. In this regard, households

were asked to whether villagization improved their access to non-farm activities. 86.6% of them perceived that it did not improve while only 13.4% of them perceived that it improved their access to non-farm employment opportunities. Field observation on such activities in all sample villages confirm that very few households engaged in activities such as selling tea, local alcohols, and small shops.

Food Consumption: In this paper, kcal supply following (Messay, 2013) and the DDS as recommended and employed by FAO-WEP (2008) were analyzed as proxy indicators of food consumption used to understand the impacts of villagization on household food security. The assumption is that all available kilocalorie (kcal) to a household and the reported types of diets were consumed.

The result showed that the surveyed households had obtained on average 1766.56kcal of net food with STD of 1440.1kcal implying that on average there was about 15.9% food shortfall with respect to 2100kcal in the district. Previous study in the resettlement villages of central Ethiopia shows much more food secure and resilient households than the present study area. For example, households in Jiru Gamachu resettlement site (i.e. in central Ethiopia) obtained on average 5767kilokalorie/person/day (Messay, 2009). The average for non-indigenous and indigenous ethno-culture groups was 2000.84 and 1579.95kcal respectively showing, as expected, the larger average kcal for non-indigenous group. The average kcal available for the food secure and food insecure households was 3550.2kcal/ADE/day with STD of 1546.5kcal/ADE/day and 1066.7kcal/ADE/day with STD of 462.77kcal/ADE/day respectively. By observing the mean alone, one may generalize that the area is food insecure as it is much far from the minimum recommended amount of kcal. However, the STD informs that there was a great variation among households in food security status. The analysis of individual household food security status shows that 71.8% of them were food insecure. Previous studies in Ethiopia where villagization was not implemented showed that 56.21% of households in Amhara region (Frehiwot, 2007) and 42.3% in Tigray region (Tsegay, 2009), both in Northern Ethiopia, were food insecure. Another study in resettlement areas of Nonno district in central southwestern Ethiopia found that 21% of households were food insecure while resettlement had improved food security of households where about 79% were food secure (Messay, 2013). The present finding had just confirmed the existing severe food insecurity situations in the western Ethiopia. For example, it was 58% in

Bullen district (Guyu, 2011) and 85% in Assosa district (Dagnachew, 2004). The distribution by ethno-culture groups shows larger proportion of food insecure indigenous (56.2%) than the non-indigenous (41.8%) groups. This also goes in line with the finding in Bullen district where the food insecurity status of the Gumuz (indigenous ethno-culture) areas was 62.5% (Guyu, 2011) implying that food insecurity is much more prevalent among the indigenous ethno-culture than the non-indigenous ones. The reason for this was attributed to the differences in the farming experience between the indigenous and non-indigenous community members. It was indicated that non-Gumuz and the mixed ethno-culture areas had better farming experiences than the Gumuz ethno-culture areas (Guyu, 2011).

With regard to the DDS score, there is no universally accepted single threshold that divides households into food secure and insecure or poor and rich. Rather like all scales, it is a continuous measure that shows households level of dietary energy consumption. For example, $DDS < 4$ food groups was regarded as a lowest, $4 \leq DDS \leq 5$ as medium and $DDS > 5$ as higher score for foods consumed by more than 50% of households in Somalia and Mozambique (FAO-WFP, 2008: 28). It can be estimated by weighting or using it as a simple count (FAO-WFP, 2008:10), this being followed in this paper. Based on this observation, this paper set poor DDS supply at ≤ 3 food groups and better-off DDS at > 5 while DDS of 4 -5 was regarded as medium one. The result shows that only 44.6% of surveyed households were able to consume $DDS > 5$. Considering the medium DDS score as nearly equal to the lower level, about 55.4% of households were subject to consume less dietary diversity. The mean DDS for the surveyed households was 4.89 with STD of 1.34. Previous study in central Ethiopia show that DDS of 3.21 was accessed by household during a period of food shortfall (Messay, 2013:227). The higher DDS in the present study area might be perhaps due to the report of coping items such as wild food by most indigenous households. Overall, more than half of the surveyed households (55.4%) accessed relatively less DDS implies that villagization could not have improved the dietary supply of households. This implies that villagization had not improved households access to increased number of meals as expected.

Effect of Villagization on Household Resilience to Food Insecurity in the Surveyed Villages

It should be noted that all measurements of food insecurity were conducted for villagized households as there was no a household remained unvillagized. With regard to the impact of

villagization on household resilience to food insecurity, their relative position on resilience-vulnerability continuum was examined. The routine classification of the resilience status shows that about 65%, 15%, 16% and 4% of the households were vulnerable, moderately resilient, resilient and highly resilient respectively (Guyu and Muluneh, 2015a). According to this result, only about 35% of the households were resilient while the majority of them (65%) were less resilient or vulnerable to food insecurity. The fact that the majority of the surveyed households were less resilient shows that villagization could to have solved the food insecurity problems. This goes in line with the findings of the analysis of all components of food security that revealed households were vulnerable to food insecurity (Guyu, 2015) showing the theoretical relationship between resilience and vulnerability in which there are treated as a flip side of each other.

The above discussion of the objective measures of the impact of villagization on food security and resilience cannot be complete without analyzing the subjective construction of the impact by households themselves. Different questions were posed to households to compare food security conditions between “before and after” villagization. They were asked whether villagization had improved agricultural productivity and food security. The majority of them, i.e. about 79%, reported that it had not improved the productivity and food security while only about 21% of them reported *yes* to this question. Similarly, households were asked whether poverty and food insecurity increased after villagization. More than 56% of them perceived that at least they had remained or increased after villagization was implemented. Households were asked: ‘*when do use more labor disposal coping strategies in order to combat food shortage?*’ Surprisingly, about 83% of them reported that they had an opportunity to use labor disposal strategies before they were collected into a village while only about 17% of them reported that it was better after villagization. Those who reported *after villagization* might belong perhaps to the host villagers. This result shows that labor disposal coping strategies were in a better situation before villagization. These results were much more than the objectively measured findings discussed above: i.e about. 40%, 72%, 50% and about 55% of food insecure households based on measures of gross food availability, kilocalorie supply, CSI and DDS score respectively (Guyu, 2015). Moreover, the perceived severity of food insecurity was higher than the one measured using HFIAP (i.e. about 61%), and even the finding obtained from the analysis of resilience status (i.e. 60%). In fact, households know more about their food security situation than an external observer who attempts to measure it objectively.

In conclusion, the result of the analysis of all the three components of food security (Guyu, 2015) as well as the resilience-vulnerability continuum (Guyu and Muluneh, 2015a) showed that villagization scheme did not improved household food security as expected. This is similar with the findings of a previous study in BGR where villaguzation failed to improve the food security of mainly the indigenous ethno-culture group, i.e. the Gumuz (Guyu, 2012). This also goes in line with the theory that villagization during the Derg regime destroyed the livelihoods and food security of villagized communities (Lorgen, 1999). The finding however contrasts the finding of a previous study of a resettlement scheme in Nonno district located in southwest central Shewa where the scheme improved food security status of households (Messay, 2013). The fact that smaller percent of surveyed households were food secure and resilient goes in line with the theory that resettlement does not have the same impact on all people as each group, family or individual reacts in accordance with its background and current condition (Gutman, 1994). Thus, the villagization scheme of the Ethiopian government in this part of the country in particular and at national level in general seems to have not addressed the food insecurity problems of the villagized households. Despite its short duration since its implementation, the scheme seems to have partially failed to achieve its objectives. Thus, the process of planning and implementation of villagization scheme at national and local levels must be revisited.

Constraints of Villagization to Improving Food Security and Resilience

Based on the observation of data, the constraints of the success of villagization in addressing food insecurity problems and enhancing household resilience were grouped into three: ill-planning, inappropriate implementation, lack of voluntarism and the outcomes of these. These are generally related to the principles of resettlement (and villagization) that should be adhered to during the planning and implementation phases.

Ill-planning as a Constraint to the Success of Villagization

Different scholars in the field of settlement have identified different factors that limit the success of resettlement programme, villagization in this paper. Factors associated with ill-planning are among them. Inappropriate research process, inappropriate site selection and lack of consultation of both host and potential movers (guests) constitute this category of constraints.

Inappropriate Research and Site Selection: Planning process requires research in order to identify appropriate site for establishing a new village. Identification of appropriate villagization

site is one of the limiting factors that affected the success of the scheme. A number of issues that require the local people's experience and knowledge could be jumped if the assessment process did not consider community participation. In this regard households were asked whether the government bodies made discussions and worked intimately and cooperatively with them. About 71% of them responded *no* while only 29% of them responded *yes* to this question. This shows that the involvement of villagers in research and site selection process was highly limited. This was exaggerated by all key informants in all sample villages reporting that no government representative had consulted them in this regard. This result goes in line with a previous study in BGR in which inappropriate selection of villagization site was one of the constraints to the success of the scheme (Guyu, 2012). In Lorgen's (1999) own words, this is expressed as "sites were selected by urban officials in a top-down manner, with little or no consultation with local people, the sites often lacked adequate water or drainage; some had to be relocated as a result" (Lorgen, 1999). However, for an effective implementation of the scheme, it would have followed on the post-development approach. But, the above finding contradicts with the information obtained from key informants among the government officials such as district experts and, *kebele* and village leaders. These bodies told that awareness creation and consultation about the appropriate sites were made through a series of meetings at *kebele* and district levels. This trend of rejection of views of ordinary dwellers is the usual practice of local level administrators to escape from being accountable to the failure. This can be observed from the statement of one local implementer whom the writer interviewed in his earlier work that the local implementer was going there to collect money in terms of per diem (Guyu, 2012). On the other hand, some households might have been contacted while others were not perhaps due to the usual behavior of rural people who might not be interested in the meetings held so that they missed the information. Such a reluctance of households to participate in such meetings was what all the *kebele* leaders emphasized during the interviews.

The above contradiction in information was harmonized and mediated by the information obtained through field observation. The writer's observation of some newly established and older villages showed a sort of mixed understanding. In some villages, the planning process looked carelessly conducted. For example, the older village known as Leku Gumbi or Lije is already situated immediately near the road along with electricity supply line that runs from Nekemt to Soge (the capital of the district). Moreover, the village has a millstone, some shops, a primary

school and small tea rooms. These basic services were found amidst of the farmlands, vast forest lands, and river water where farmers had begun to practice small scale irrigation. But, the planners relocated the villagers to the Bechbech village, located some 2 to 3 hours long on-foot walking away from older home area. This is what Lorgen (1999) states that for villagized households one of the main challenges in new villages is the long walks to their fields. In addition to missing these basic infrastructures, relocation of households compelled the resettlers to travel longer distance. This had consumed considerable portion of their working hours, which had adversely impacted their farm productivity; consequently they became food insecure. This could be regarded as failure on part of the planning process. On the other hand, new villagization sites such as Senne, Assosa Sefer, Fafate, Hamus Gebeya, Loya seem appropriate. Especially as Senne and Assosa Sefer are situated immediately along the main asphalt road that runs from Addis Ababa through Nekemte to Assosa and that of Hamus Gebeya and Loya situated near the capital town of the district (i.e.Soge), they could be considered as appropriate sites. However, the location of most of these villages does not create comfort for indigenous group as they were brought from forests where they used to hunt and collect wild food. Hence, this has probably hindered them from using wild foods and adversely affected their food security.

The above finding confirms the theory that most resettlement schemes fail to achieve their objectives due to lack of proper national legal resettlement framework, proper policy, planning and consultation with relevant bodies (De Wet, 2004). Therefore, we can generalize that the involvement of the villagers (both host and resettlers) was extremely limited in the study area causing the ultimate failure of the scheme.

Lack of Special Consultation with Host Villagers: Consultations and discussions with the host communities about the importance of villagization is a crucial principle that must be addressed if the programme is to be successfully achieved. It is difficult to achieve the objectives of the programme without the agreement of the host communities that would host more newly coming and resettling people in the areas. In line with the statement by Loreng (1999), the top-down approach to the selection of resettlement sites was one of the main causes of the failure of villagization during the Derg regime. Accordingly, either no or hasty process of consultations held with host communities inevitably leads to confusions about the scheme and eventually ended up with failure. With respect to this principle, households were asked whether they were

consulted about the process of villagization. 85.2% of the relocated and 66.1% of the host villages reported that they were not consulted about the scheme in the area. Information obtained from all key informants in all villages was similar. Both reported that a one day meeting was held 3 or 4 months before the implementation phase to inform that they would be collected into selected sites together with the new comers in a pretext of supplying socioeconomic infrastructure. Some key informants from villages told that they were warned rather than being convinced so that they should accept the scheme. Overall, the findings show that the consultation made with both types of households (mainly the relocated) was very minimal causing the likelihood of failure of the villagization scheme in the area.

Inappropriate Implementation as a Constraint to the Success of Villagization

Data obtained from the household survey and key informant interviews showed the implementation phase of villagization was associated with different problems. Some of the major ones are discussed below.

Lack of Sufficient Awareness Creation: Lack of awareness creation about importance and overall benefits of being villagized to both the host and potential movers was one of the problems faced during the implementation phase (Gutman, 1994). The surveyed households were asked whether they were sufficiently oriented or not about the scheme. The majority (72.7%) of them reported that they did not receive any orientation with regard to villagization while only 27.3% of them reported that they were informed and oriented. This shows that most villagers were disregarded while only very few of them (perhaps government agents among villagers) were oriented while the majority of the public were likely disregarded or neglected. In this regard, the key informants in the district and *kebele* officials (including chair persons and village leaders) maintained that they made sufficient orientation. In contrast, informants selected from villages complained that they were told and warned to respect the government policy in one day meeting. Village level key informants told that they were not clear with the objective of being collected into a village that accommodates a huge number of people in a small village and were not happy with the scheme. Moreover, they believe that nothing was newly introduced into the new villages rather than exposing them and their families to poverty and hunger. From these findings, one can generalize that the villagized households were not well oriented about the long-term and short-term benefits and challenges of villagization. This had led to confusion of households on

deciding to either continue to live in the new village or return to their old settlements. Such confusion might have been the cause of exacerbated level of food insecurity or low level of household resilience to food insecurity.

Lack of Proper preparation: This is one of the basic principles that villagization must adhere to. According to this principle, a minimum infrastructure should be put in place before moving the people. Most villagization schemes failed as a result of inadequate preparation and of not putting in place necessary infrastructure in a newly planned villagization site. The surveyed households were asked whether the basic socio-economic services and physical infrastructures were put in place in the new villages. About 82% of them responded *no* while only 18.2% responded *yes* to the question. The key informants among villagers were asked for clarification of these responses. All informants agreeably informed that the services were already in place rather than being the effect of villagization. In fact, their presence was confirmed by the writer in his field observations. However, the key informants blamed the available services for they are availed only for the sake of availing rather than for practical purposes. It does not mean that all villages were equipped with these services. In some villages, very essential socioeconomic services were absent. For example, electricity was totally absent in all sites until the survey period. Veterinary service was totally absent at Bechbech site; health post and electricity were totally absent at Fuafuate site. Road and electricity were absent in Tenkara, kuta Muri, Anger Meti and Anger Waja villagization sites. Villagization was implemented under these conditions in which many of the villages had no basic services. Even the quality of available facilities as reported by respondents was of inferior quality. For example, many of water points had expired and were not serving the villagers. Similarly, health post, schools, and veterinary services were blamed for their low both material and human resource qualities.

Housing unit is one of the most important basic necessities that would be prepared to the relocated households before forcing them to move. In this regard, almost all (90.5%) of the surveyed households reported that there was no preparation of housing unit for relocated villages. Only 10% of them perceived the existence of housing preparation ahead of relocation of potential movers. Key informants from government offices and villages were asked about this issue. Informants from government offices told that they coordinated the construction of housing units for potential movers. In practice, according to informants of the villages, housing construction

was performed by the movers themselves without the cooperation of the host community. This has certain impact on the success of the scheme, as field observations showed, as such a hasty construction of housing units led to a very poor housing that was observed to be ruined within a year after built. This situation had led some of the households to return to their old settlements found elsewhere.

Consequences of Ill-planning and Inappropriate Implementation

A number of constraints to the success of villagization in addressing food insecurity challenges emerged as a consequence of ill-planning and inappropriate implementation. Some of the main consequences are discussed as follows.

Lack of Voluntarism from the Side of Potential Villagers: Voluntarism is both a major pillar and principle of resettlement schemes including villagization. According to the principle of voluntarism, there is no compulsion; hence villagization should rest on the will of the potential movers. It further states that, also mainly applicable for resettlement schemes that involve long distance movements, the potential movers shall be resettled voluntarily, can return to their original villages if unhappy, have land use right for their holdings in the original homelands for 3 years, and each household shall make decisions to move to new village with or without all or part of family members at the beginning (NCFSE, 2003b). The responses of the surveyed households and key informants were analyzed with respect to these points.

The surveyed households were asked whether they were villagized based on their will or not. The majority of them (75%) reported that they were villagized involuntarily. Only 25% of them reported they were villagized based on own consent and interest. Out of involuntarily villagized, the majority (55%) belongs to food insecure group while only about 19% belongs to the food secure one. This shows that it appears there is strong association between voluntarism and food security status of households. Larger proportion of involuntarily villagized households were found under the food insecure group than voluntarily villagized ones. In connection to this, 55% of the households equated the whole process of villagization with forced eviction that caused detachment from their previous possessions. This relocation has resulted in a physical detachment to movers while it was mainly psychological for the host communities.

In this regard, the key informants selected among government officials were asked about the extent to which the process of implementation was adhered to the principles of voluntarism. All of them told that none of the villagers (mainly the movers) were forced to leave their home area and villagized in the new sites. Rather they were convinced gradually until they become aware of the benefits of being villagized. The informants tried to substantiate their position by noting the case of Leku Gumbi or Lije village where many households refused and were allowed to stay in their former areas. According to this informant, most of the households returned to the previous homes after having built temporary huts in the new villages. The key informants in each *kebele* also confirmed the same by reporting that most indigenous households were engaged in their old settlements for most part of the year. This was also proved by the writer's actual field observations. For example, Lije village consisted of several dwellers who returned from the newly villagized settlements.

The key informants selected from some of the new villages cited many examples of those forced to settle in the new villages. The process of villagization had been at the cost of destroying primary schools, health posts, veterinary services, as well as the relocation of development agents (extension workers-both agricultural and health). They contended that abandoning all these services implies that the government compelled them to resettle in the new sites. In this regard, the key informants among the government officials stated that while allowing people to live the place where they like, the government did not avail infrastructure here and there as it is wasteful and costly as villagization scheme itself is founded on cost minimization development strategies.

The overall observations showed that the people wanted to stay in their previous home villages perhaps due to their inability to predict the potential benefits of living in the planned new villages. Moreover, they might have been asked to move far away from their farmlands and places of cultural attachments such as churches, grave yards, so on. For these villages abandoning basic infrastructures can therefore be considered as forcing people to live in planned villages. This measure of government cannot be detached from the previous regime (i.e. the Derg) so that the failure of the scheme would become probably unavoidable.

Desire to Return to Old Villages, Two-site Homes and Bad Attitude: The overall observation of the above discussions generally shows that villagization was not properly planned and implemented, and most households were villagized without their consent. These conditions had

their own contribution to a number of negative outcomes. Food insecurity and low levels of household resilience were therefore the results of cumulative effects of these negative outcomes.

The resettlement policy document reads that a relocated household has the right to either visit and work on their previously possessed land at their older homes for the next three years, or totally refuse to be relocated and stay there (NCFSE, 2003a). However, it may not mean that they would permanently hold homes at both sites (the older and new). Field observation in the study area shows that households (mainly those newly relocated) had houses at both previous and new villagization sites. Most households had well-constructed houses in their original homes than at the new villagization sites. For example, houses of most newly relocated households in Bechbech site were huts in character, either empty or temporarily occupied by children who were attending schools. As soon as the school was closed, these children used to go to their family living in the older village, known as Leku Gumbi or Lije, located at about 3 hours walking distance from the new village.

The writer also attempted to interview key informants both in the older and new villages. The following question was addressed to an informant living in Lije village: *when will the households stop living in these old villages?* The response was surprisingly quick, short and in question form, “why I stop living here?” I was much attracted with her response and continued my question: *I mean, is there a time you will leave this area and permanently live in your newly inhabited village at Bechbech?* “Oh! My brother living in Bechbech is like living in town where I cannot grow up my children. ...I cannot survive there ... everything I have is found here; ... my farmland, garden, forest, firewood, wild food ... “. The following question was also addressed to a hosting key informant in the new villagization site (Bechbech): *how do you perceive the scheme and addition of new inhabitants to your village?* His responses were similar with those in the old village and he said” “I am not happy with the coming together of people here. Because, we lost grazing land, our gardens became overcrowded, we quarrel frequently each other because of our children and livestock ...The scheme added nothing to us except conflict, thief, overcrowding... ”. This information revealed that the households had developed bad attitudes towards the scheme. The result of questionnaire-based survey confirmed this fact revealing that about 68% of the households had negative attitude towards the scheme. Only about 32% of them reported that they had positive attitude towards it.

In general, the newly relocated indigenous households may return to their original homes all in all. They did not worry about their homes at their new sites and informal information shows that some of them had already sold their houses and transferred to others. However, most of them preferred to occupy homes at both sites perhaps due to their fear of any measure from the government side. The hosting households had also expressed their inconvenience about the scheme. Only some hosting indigenous and most non-indigenous household showed the tendency to return and stay at the new site. From these findings, we can generalize that most indigenous households had the tendency to return and remain in their old villages but came and constructed houses at new villages for temporary discharge of obligations imposed by the government. If the present trend continues to operate, all newly villagized households would return and reside permanently in their previous home unless special conditions are organized so as to attract them into new sites.

Cross-tabulation of the desire to return and food security status was performed to examine the proportion of households desired to return to the old villages. The result showed that about 61% of the respondents had the desire to return to old villages while only 39% of them had the interest to stay in the new villages. Out of those who wanted to return to their old villages, 45.5% belonged to food insecure group while only 15.5% belongs to food secure. This shows that more food insecure households than food secure ones wanted to return. The food insecure households decided to return probably wild foods are more available around the old settlements than the newly established villages. Wild foods were found important sources of food and household resilience to food insecurity shocks (Guyu and Muluneh, 2015b). The key informants proved that they stayed in the new village only because of the fear of the government measures. Overall, most households showed interest to return. But they stayed there suspecting legal measures that might accompany their return.

Conclusion

The paper examined the effects, constraints and consequences of villagization in Belo-jiganfoy district. A questionnaire survey, key informant interviews and semi-participant field observations were conducted to collect data. The results of the survey show that villagization had not brought the desired outcomes including better status of households in terms of attainment of food security and enhanced resilience to food insecurity. For example, the kcal measurement shows that most households (i.e. about 72%) were food insecure. Similarly, the HFIAP shows that 60.9% of the

households were food insecure while about 55% was subject to depend on lower level of DDS. Likewise, about 65% was vulnerable to food insecurity as measured from resilience-vulnerability spectrum. The analysis of households' perception confirmed these results. For example, about 79% of them reported that villagization did not improve their agricultural productivity and food security. About 87% of them reported that villagization did not improve their access to non-farm employment opportunities and hence their food security. Thus, we concluded that villagization could not have improved the food security and resilience statuses in the study area.

The constraints of villagization were related to inappropriate planning and implementation of the scheme, lack of voluntarism and the consequences of these. Hasty research, selection of inappropriate site, and lack of special consultation with both host and guest villagers were the constraints related to ill-planning. Inappropriate implementation as a constraint to the success of villagization included inability to create awareness to the level of expectation and lack of proper preparation. Lastly, the consequences of all these were failing to introduce voluntary action on part of villagers. Rather, it instigated establishment of two-site homes, bad attitude and their desire to return to their old villages.

Thus, villagization scheme was likely to have been unsuccessful at least partly. It had not achieved the objectives of overcoming food insecurity and enhancing household resilience to food insecurity. The intended socioeconomic infrastructures were not in place. Although the idea of resettlement appears wise and sounds good per se, it partially missed the target because of implementation problems perhaps due to lack of bottom-up approach. Therefore, concerned bodies should revisit the plan and implementation processes in order to develop comprehensive understanding and plan appropriate strategy that enables long lasting solution.

Reference

- Abbute, Wolde-Selassie (1997). *The Dynamics of Socio-Economic Differentiation and Change in the Beles-Valley/ Pawe/ Resettlement Area, North Western Ethiopia*. Addis Ababa University, Ethiopia.
- Agea J., KImondo J and Okia C (2011). *Contribution of Wild Edible Food Plants to Overall Household Diet in Bunyoro-Kitara Kingdom, Uganda*, *Agricultural Journal*, 6 (4), 134-144.
- Alinovi, L., Mane, E., and Romano, D. (2008), "Towards the Measurement of Household Resilience to Food Insecurity: Applying a Model to Palestinian Household Data". In Sibrian,

- R., (ed.). Deriving Food Security Information from National Household Budget Surveys; Experiences, Achievement, Challenges, FAO, Rome, 137- 152, Available at <ftp://ftp.fao.org/docrep/fao/011/i0430e/i0430e.pdf>
- Amdissa Teshome (2006).Agriculture, Growth and Poverty Reduction in Ethiopia: Policy Processes around the New PRSP (PASDEP), A Paper for Future Agricultures Consortium Workshop, No. 004. Institute of Development Studies (IDS).
- Babatunde, R., Omotesho O., Olorunsanya, and Owotoki, G. (2008), Determinants of Vulnerability to Food Insecurity: A Gender-based Analysis of Farming Households in Nigeria; *Indian Journal of Agricultural Economics*, Vol. 63, No, 1. PP. 116 – 125.
- BGR (2010).Benishangul-gumuz Region (BGR) Government’s Villagization Programme Implementation Guideline; September, 2010, Assosa; Translated from the Amharic Version
- BGRFSS (2004).Food Security Strategy of Benishangul-gumuz region, Benishangul-gumuz Region Food Security Strategy (BGRFSS), Assosa, Ethiopia
- Ciani, F. (2012).A resilience-based Approach to Food Insecurity: The Impact of Mitch Hurricane on Rural Households in Nicaragua. JEL Classification, Q12, Q18, I32, I38
- Coates, J., Swindale, A. and Bilinsky, P. (2007).Household food insecurity access scale (HFIAS) for measurement of food access: indicator guide. Washington, DC, United States Agency for International Development (USAID) Food and Nutrition Technical Assistance Project (FANTA), Version 3.
- Dagnachew Anberbir (2004) Generic Agri-service Delivery and Farmers’ Differences: The Case of the Natives and Resettled Farmers of Assosa Woreda. Unpublished MA Thesis, Addis Ababa University, Ethiopia
- De Wet, C. (2004).Why Do Things So Often Go Wrong in Resettlement Projects? In Alula Pankhurst and F. Piguet (eds). *People, Space and State: Migration, Resettlement and Displacement in Ethiopia*. Proceedings of the Workshop held by the Ethiopian Society of Sociologists, Social Workers and Anthropologists, 18–30 January 2003 (50-70): Addis Ababa University, Ethiopia.
- Degefa Tolossa (2005).Rural livelihoods, poverty and food insecurity in Ethiopia, A case study at Erenssa and Garbi communities in Oromiya Zone, Amhara National Regional State, PhD Dissertation, Norwegian University of Science and Technology, NTNU, Trondheim.

- Dessalegn Rahmato (1988). Settlement and Resettlement in Metekel, Western Ethiopia; Reviewed work, In: e l'Oriente, Anno 43, No. 1, (MARZO 1988), pp 14 -34, ISIAO. Stable at URL: <http://www.jstor.org/stable/40760225>
- Devereux, D., Sabates-Wheeler, R., Mulugeta Tefera, Sabates, R. and Feyera Sima. (2014). Graduation from Food security Programme in Ethiopia: FAC Ethiopia Final Report Working, No 080. Future Agriculture.
- Dibua B. and Ibhawoh J. (2003). Deconstructing Ujamaa: The Legacy of Julius Nyerere in the Quest for Social and Economic Development in Africa. *Afr. J. Polit. Sci. Vol. 8 No.1*.
- Ellis, F. (2003). Human Vulnerability and Food Insecurity: Policy Implications. Forum for Food Security in Southern Africa. Overseas Development Group.
- FDRE-ERA ((2008). Study on Belo-jiganfoy Integrated District Development Programme (Final Report), Federal Democratic Republic of Ethiopia-Ethiopian Roads Authority (FDRE-ERA), Consultancy Service Offered to District Integrated Development Study (Group-8). By Afroconsult and Pan-African in Collaboration
- Gross R., Schoenebrger H., Pfeifer H. and Preuss H. (2000) The Four Dimensions of Food and Nutrition Security: Definitions and Concepts; FAO-Nutrition and Food Security.
- Gutman, P.S. (1994). Involuntary Resettlement in Hydropower Projects; *Annual Review; Energy Environ. 19:189-210*.
- Guush Berhane, Hoddinott, J., Kumar, N., Alemayehu Seyoum, Michael Tedla, Yisehac Yohannes, Sabates-Wheeler, R. Mulugeta Handino, Lind, J., Mulugeta Tefera and Feyera Sima. 2013. Evaluation of Ethiopia's Food Security Program: Documenting Progress in the Implementation of the Productive Safety Nets Programme and the Household Asset Building Programme. Ethiopia Strategy Support Program II (ESSP II). International Food Policy Research Institute. Institute of Development Studies, University of Sussex.
- Guyu Ferede (2011). Food Security Status of Rural Households Northwestern Ethiopia: The Case of Households in Bullen District of Benishangul-gumuz Regional State, VDM Verlag publishing house, Germany
- Guyu Ferede (2012). Voluntary Villagization Scheme (VVS) for Transforming Semi-pastoral Communities in Benishangul-Gumuz Region, Northwestern Ethiopia: Challenges and Local Development Indicators, *Journal of Sustainable Development in Africa*, Vol. 14, No.5, PP.162 – 196.

- Guyu Ferede (2015). Household Vulnerability to Green Famine: Component Based Analysis of Indicators in Belo-jiganfoy District (Case Study Area), Benishangul-Gumuz Region, Ethiopia. *Applied Science Reports*, 9(3), 139-156
- Guyu Ferede and Muluneh Wold-tsadik (2015a) Household Resilience to Seasonal Food Insecurity: Dimensions and Magnitudes in the “Green Famine” Belt of Ethiopia. *Applied Science Reports*, 11(3), 125-143
- Guyu Ferede and Muluneh Wold-tsadik (2015b). Wild Foods (Plants and Animals) in the Green Famine Belt of Ethiopia: Do They Contribute to Household Resilience to Seasonal Food Insecurity? *Forest Ecosystems*, 2:34.
- Hoddinott J, Guush B, Neha K, Alemayehu ST, Michael T, Yisehac Y, Sabates-Wheeler R, Mulugeta H., Lind J., Mulugeta T. and Feyera S. (2011). Evaluation of Ethiopia’s Food Security Program: Documenting Progress in the Implementation of the Productive Safety Nets Programme and the Household Asset Building Programme
- Jayne, T. and Daniel Molla (1995). Toward A Research Agenda to Promote Access to Food by Vulnerable Groups through Food Transfer Arrangements and Food Markets. Working Paper No.2. Food Security Research Project. Ministry of Economic Development and Cooperation and Michigan University.
- Kloos, H. (1990). Health Aspects of Resettlement in Ethiopia; *Soc. Sci. Med.* Vol. 30, pp.643 – 656
- Krejcie R. and D. Morgan (1970). Determining Sample Size for Research activities. *Edu. Psychol. Measur.* 30:607-610
- Lorgen, C. (1999). The Experience of Villagisation: Lessons from Ethiopia, Mozambique, and Tanzania, Oxfam-GB.
- Maxwell, S. and Frankenberger T. (1992). Household food security: Concepts, indicators, measurements, IFAD and UNICEF, Rome
- Messay Mulugeta (2009b) Causes of Rural Household Food Insecurity: A Case from Kuyu District, Central Ethiopia. *Journal of Sustainable Development in Africa*, 11(4), 286 – 304.
- Messay Mulugeta (2013) Resettlement and Food Security Nexus in Ethiopia: A Case Study from Nonno District. PhD Dissertation Published by LAMBERT Academic Publishers, Germany
- Messay Mulugeta and Bekure Wold-semait (2011). The Impact of Resettlement Schemes on Land-use/Land-cover Changes in Ethiopia: A Case Study from Nonno Resettlement Sites, Central Ethiopia; *Journal of Sustainable Development in Africa*, Vol. 13, No. 2, pp.269-293

- Mjonon, M., Ngidi, M. and Hendriks, S. (2009). Investigating Household Food Insecurity Coping Strategies and the Impact of Crop Production on Food Security Using Coping Strategy Index (CSI). Peer Review Paper; 17th International Farm Management Congress, Bloomington/Normal, Illinois, USA.
- NCFSE (2003a). Voluntary Resettlement Programme (Access to improved land), *New Coalition for Food Security in Ethiopia*, Vol., I, Addis Ababa
- NCFSE (2003b). Voluntary Resettlement Programme (Access to improved land), *New Coalition for Food Security in Ethiopia*, Vol. II, Addis Ababa
- Osafa-Kwaako P. (2011). Long-run Effects of Villagization in Tanzania. A Draft Paper, *JEL Classification: P16, P32, N47*.
- Sakamoto, K. (2003). Social Development, Culture, and Participation: Toward theorizing endogenous development in Tanzania. Unpublished PhD thesis, Graduate School of Asia-Pacific Studies (GSAPS), Waseda University, pp1-21, & 315- 319
- Sandra, S. (1987). Resettlement and Villagization - Tools of Militarization in SW Ethiopia; *Cultural Survival Quarterly*; Issue 11.4
- Tsegay Gebrehiwot (2009). Determinants of s Food Security in Rural Household of the Tigray Region, unpublished MA Thesis, Addis Ababa University, Ethiopia.
- Yintiso Gebre (2004). The Metekel Resettlement in Ethiopia: Why Did It Fail? In Alula Pankhurst and F. Piguet (Eds), *People, Space and the State: Migration, Resettlement and Displacement in Ethiopia*, Workshop Proceedings; 28-30 January 2003; (pp.92-111): Addis Ababa University.

9. Summary and Discussion of Main Findings, Conclusion, Contribution and, Policy Implication

This chapter summarizes and discusses the main findings of the study in relation to existing theories and previous findings. Then, conclusions are drawn based on the discussions and the contributions of the dissertation to both the on-going academic discourses and efforts to establish appropriate policies and strategies to react against food insecurity and famines are suggested.

9.1. Summary and Discussion of Main Findings

With an overarching objective of understanding household resilience to ‘green famine’ in the GFB of Ethiopia, the first three articles in Chapters 2, 3 and 4 of the dissertation examined and established an understanding of the vulnerability context of the study (i.e. the existing shocks and stresses against which resilience should be measured). These chapters examined the extent and severity of household vulnerability to seasonal food insecurity (i.e. a proxy indicator of ‘green famine’) (Guyu, 2015), the determinants of green famine and, the underlying shocks and stresses triggering ‘green famine’. Based on the findings, policy makers may revise and implement intervention strategies that would help households build their resilience by absorbing the shocks and stresses. The next four articles in Chapters 5, 6, 7 and 8 established knowledge about the resilience condition and contributing factors to it. The first include measuring the resilience of households to green famine shock with the objective of understanding households’ capacity of coping with the shock and identifying the main building blocks (dimensions) of household resilience (Guyu and Muluneh, 2015a). This helps actors (both government and non-government) to work towards tackling the impacts of food insecurity and famine based on the identified rank order of resilience dimensions in accordance with their importance ahead of planning and intervening to build resilience. Lastly, the next three articles examined the contributions of, livelihoods, wild foods (Guyu and Muluneh, 2015b) and, villagization scheme to household resilience to ‘green famine’ and related shocks. The present chapter therefore provides the summaries and discussions of the main findings of each article, draw conclusion and, indicate its contributions to both literature and policy.

9.1.1. Vulnerability to Seasonal Food Insecurity, a Proxy indicator of ‘Green famine’

The study investigated the current extent and severity of households’ vulnerability to ‘green famine’ based on almost all components of food security. All indicators showed that food

insecurity was severe and deep-rooted confirming the occurrence of ‘green famine’. In fact, not all of the surveyed households were vulnerable to ‘green famine’ as the study indicated few resilient households. This is related to the theory that “famine cannot be defined solely with reference to the victims because in the process benefits may accrue to one section of the community while losses flow to the other” (Sarracino, 2010:6).

The analysis of different indicators of food security/insecurity revealed the existing extent and depth of ‘green famine’ shock. An analysis of the head count ratio (HCR) based on availability indicator showed 40.5% of the surveyed households were food insecure (Guyu, 2015) while that of the dietary energy supply (DES) showed about 72% food insecure households. Moreover, the observation of the resilience-vulnerability continuum revealed about 65% of food insecure households (Guyu and Mulneh, 2015a). Setting 5 and less food items per household/day (including condiments with 0 weight of nutritional) as a threshold value below which it is poor diet, the DD score, about 69% of the surveyed households depended on less variety of meals, hence low quality food. The analysis of household food insecurity access prevalence (HFIAP) showed about 61% food insecure households.

On average, this result is almost similar with that of some sub-Sahara African countries, for example, the Kwara state of Nigeria, where 75% of the surveyed households was food insecure (Omotesho et al., 2006). But it is alarmingly higher than the findings of previous studies conducted in Ethiopia, for example, the national level undernourishment of 41% between 2005 and 2007 and 28% in 2009/10 (FAO, 2010). This shows that famine in the GFB is likely equivalent with the average situation of sub-Sahara Africa and Ethiopia.

On the other hand, these proportions of food insecure households are similar with previous studies conducted in the GFB of Ethiopia, specifically in BGR. For example, it was 87% in Menge district (BGRFSS, 2004), 85% in Assosa district and 58% in Bullen district (Guyu, 2011; Guyu, 2014). All of these studies are located in the GFB of Ethiopia. Comparison of these results with drought-prone conventional famine areas shows that the findings are either much lower than those convention famine-prone areas, for example, about 56% in Amhara region (Frehiwot, 2007) and 42% in Tigray region (Tsegay, 2009) or similar with them, for example, about 74% in Oromiya zone in Amhara region (Wollo) (Degefa, 2005) and about 73% in Dodota district, Arsi zone, Oromiya (Haile et al., 2005). Overall, these findings show that the extent of the impacts of

‘green famine’ is wide and it is deep-rooted or severe. But, the findings show that the ‘green famine’ was extremely severe and deep-rooted compared to the area characterized by high population density in the central part of Ethiopia (Nonno district, Shewa), where the proportion of food insecure households was 21% (Messay, 2013). This shows that the extent of famine in the GFB is at least similar with that of the drought-prone conventional famine areas and probably much more than the high population density areas of the country. Thus, equal attention should be paid to this part of the country as in the conventional famine areas with respect to policy interventions to alleviate the impacts of ‘green famine’.

Can we conclude the food insecurity situation in the GFB as famine? In general, the findings showed that the food insecurity situation (although seasonal in most parts) was not mere food shortages rather it was acute or severe, and could be regarded as ‘green famine’. Mulugeta (2014) reviewed the scale known as the Integrated Food Security Phase Classification that shows, among other criteria, a minimum of 20% of the total population of an area or a country facing extreme food deficits and very limited ability to cope, to define food insecurity as famine (Mulugeta, 2014). Moreover, the recently emerging theory suggests that famine cannot be defined solely with reference to the victims alone because in the process, benefits may accumulate to one section of the community while, losses flow to the other” (Sarracino, 2010). Thus, simply comparing this theory with the proportion of households that were prone to acute seasonal food insecurity as measured from DES (72%), household food insecurity access prevalence (HFIAP) (61%), household hunger scale HHS (60%), and DD score (69%) indicators (Guyu, 2015) as well as resilience-vulnerability continuum (65%) (Guyu and Muluneh, 2015a), the study generalized that the food crisis of the study area is a ‘green famine’ event. In fact, further investigation of the nature of famine based on the concepts used by victimized people following the recommendation of de Waal (1981) that famines could be better understood if we discard the “traditional” notion of famine, by adopting the concepts used by the people who have experience of suffering famines instead” (Sarracino, 2010:7), is required. Nonetheless, in addition to the above theory and findings, many of the severe types of coping strategies such as borrowing, depending on immature crops, sending household members, and skipping the whole day without eating that were reported in the study area (Guyu, 2015) could be regarded as indicators of famine. Even leasing land for cash was reported as a means of surviving, along with the above coping strategies, are indicators of ‘green famine’ (Mulugeta, 2014). Thus, food

insecurity was not a mere temporary shortage of food but had led to hunger condition which was much deeper than the IFSPC's scale. Therefore, no doubt that 'green famine' is a deep-rooted problem of households in the GFB of Ethiopia.

But, the study did not examine the nature of the 'green famine' (i.e., whether it is famine that kills or famine that leads to mere food crisis) in the study area. While this is future research direction, the present study goes in line with the Martin Ravallion's theory of famine: that is "famines are not strictly linked to a contraction in the aggregate availability of food and, people who experience a threat to their food consumption not necessarily have to face death too" (Sarracino, 2010:6). Thus, the 'green famine' of the study area may be grouped under Martin Ravallion's theory of famine, the one which does not kill, this conclusion being serving until empirical investigation of the nature of the 'green famine' will be conducted.

9.1.2. Determinants of 'Green Famine'

The study identified demographic, socio-economic/cultural, and technological determinants of food insecurity using a binary regression model, taking food insecurity status as dependent variable. The results showed that, regardless of the direction of influence, household size, irrigation use, household head education, household participation in local labor union, aggregate production, farming system and, extravagant consumption were the most important factors affecting food insecurity. These determinants were grouped into, three main categories: demographic factors, socioeconomic and cultural factors and technological factors.

Household size was one of the most significant factors that affected food insecurity positively. *Ceteris paribus*, the finding that an increase in a household size by one member increased the probability of being food insecure is likely to conform with the demographic theory of famine suggested by Malthusians but later narrowed the overall global or national concept of population factor down to household and individual levels by Sen's (1981) entitlement approach to famine (Sarracino, 2010). This result was similar with that of several previous studies conducted in developing countries including Ethiopia that showed statistically significant and positive relationship between household size and food insecurity (Shiferaw et al., 2003; Haile et al., 2005; Omotesho et al., 2006; Bogale and Shimelis, 2009; Bashir et al., 2012; Aidoo et al., 2013). But, the finding contrasts the Boserupian theory of agrarian change and some empirical finding that conform to this theory, for example, Messay (2009) that large family size increases agricultural

productivity and food supply through increased technical innovations and intensification of farming (Boserup, 1965). Population pressure on farmland is not a critical determinant of food security in the present study area. The study showed an average landholding size of 4.5ha/household, which contrasts with 1ha/household of the national average. Rather the majority of the people in the study area were economically unproductive, which placed imposition, through increased level of consumption, on household food stock. In this regard, the surveyed households had on average about 85 economically inactive, for every 100 economically active, household members. This was much higher than the national average of such population of about 48% in 2007 (CSA, 2008). Coupled with the idleness of most household members, this seems to have caused the negative impact of large household size on food security. Idleness of (mainly the indigenous) household members seems to have become the culture of the studied people.

The effect of use of traditional small-scale irrigation on household food insecurity was statistically significant and negative. This obviously shows that this activity minimizes the probability of exposure to food insecurity. This goes in line with the findings of many previous studies conducted in Ethiopia (Degefa 2005; Bogale and Shimelis, 2009). The possible explanation is that in addition to adequate rainfall in western Ethiopia (i.e. the GFB), access to and use of small-scale irrigation enabled households to produce twice a year. This increased access to both income and food from crop production through irrigation especially during times of crop failures. Nevertheless, the information obtained from field observation and key informants working at the district's department of irrigation development showed, the potential of irrigation had been largely unutilized.

Many previous studies revealed that the level of literacy of household head has negative relationship with the probability of being food insecure (Haile et al., 2005; Bashir et al., 2012). More specifically, education and household food security have direct linkages because, mainly in subsistence farming, literate farm household heads are better than their illiterate counterparts in several ways although the role of indigenous knowledge in realizing food security should not be underestimated (Degefa, 2005). The present study is in line with this assertion because it showed that education of household head influenced household food insecurity negatively and significantly. This indicates that households with relatively better educated heads were less likely to be food insecure than those headed by less educated or illiterate ones. This is because better educated household heads had probably better information and skills that enabled them diversify

their livelihoods, improve crop productivity, access means of generating income, and easily forecast possible occurrence of food shortages so that they could plan to tackle it.

Participation in local labor union was found to have significant and positive effect on household food insecurity. This contrasts a previous study conducted in the Central Ethiopia which revealed a positive and moderate effect of household labor supply on availability of food (Messay, 2009). This is perhaps due to the fact that (and as field observation revealed) most of the surveyed households engaged in such union for generating income during times of critical food shortages to purchase food grains rather than using it for regular farming process. This can be seen from the fact that the mean off-farm income earned by the food insecure households was much more than that of the food secure households. Thus, the frequency of participation in labor union increases as the probability of being food insecure increased as opposed to its customary assumption. The positive sign of their relationship does not imply that coping strategies should not be practiced because they were sources of resilience to food insecurity.

Aggregate production is related more to availability component of food security and is the main determinant of household food security/insecurity in rural areas of developing countries (Khan and Gill, 2009). The present finding conforms to the entitlement theory of famines in which the FAD model is considered as an aspect of the FED model, when applied at household or individual levels (Sarracino, 2010). This theory states that food availability at household level minimizes vulnerability to famine shocks or increases resilience to such shocks. In line with this theory and as expected earlier, the probability of being food insecure was negatively and significantly related with aggregate production. This is similar with many previous studies conducted in developing countries including Ethiopia (Shiferaw et al., 2003; Haile et al., 2005). The possible explanation is that households who produced more aggregate production were less likely to be food insecure than those who produced less.

The effect of farming systems on household food insecurity was positive and statistically significant. This goes against the Boserupian theory of agricultural change which stipulates that an increasing population and hence family size stimulates technological innovation and increasing agricultural productivity (Boserup, 1965). This is because despite large number of average household size, high dependence on traditional farming system (i.e. hoes and donkeys or oxen), intensification of farming through repeated land tiling, manure application, and weeding

was infrequent. Many households (mainly indigenous ones) in the study area heavily depended on hoe-based farming system. As a result, the probability of being food insecure was increased by an increased use of hoe-based farming system. This was due to the fact that the use of hoe-based farming system is the most traditional system of agricultural production and households which depended on it might not produce sufficient crop that could support their members throughout the year given the ever increasing trend in population pressure and land degradation that requires modern land management methods and tillages.

Extravagant consumption is a typical example of cultural factors, which is the most influential determinant especially among the indigenous community members. A previous study in the Nonno district (Shewa, Central Ethiopia) indicated that extravagancy and inefficient use of time have both immediate and long-term adverse impacts on the livelihood improvement endeavors and the drive to attain food security (Messay, 2013). In contrast to this study and the general expectation, the statistical analysis revealed that this factor had negative relationship with food insecurity. The possible explanation for the negative relationship is that households which consumed their grains and other resources extravagantly were the better-off ones that produced more and had earned more money from the sale of outputs. The indigenous people of the study area extravagantly consumed their produce immediately after new harvest period through different traditional festivals. This gradually declines and finally depleted their stocks in the summer (rainy) season leaving them starved.

Overall, all categories of factors (demographic, socio-economic, cultural, and technological) were found to determine household food security in the study area. The relationship between the significant variables and food insecurity has ethno-culture implication as the cultural backgrounds and experiences underly them. Thus, intervention strategies that aim at mobilizing economically productive section of the community to involve into production process, creation of awareness about benefits of practicing small-scale irrigation, promoting adult education, creating awareness about the importance of labor unions in regular farming activities, increasing per capita aggregate productivity, helping households shift from hoe-based to oxen-based plough system and better farming methods, and creating awareness about the effects of extravagant consumption of grains and other resources, are urgently required to combat the effects of green famine and enhance household resilience.

9.1.3. Underlying Shocks and Stresses Triggering ‘Green Famine’

Both the present study and other previous studies proved that green famine occurs in the GFB of Ethiopia (Dagnachew, 2004; BGRFSS, 2004; Guyu, 2012, 2014, 2015; CIDA, 2013; Guyu and Muluneh, 2015a). The analysis of household resilience however requires understanding of the underlying shocks and stresses triggering the food insecurity shock because resilience analysis is shock-dependent (Frankenberger et al., 2012). Accordingly, the study identified and categorized the shocks and stresses that triggered green famine through exploratory method following the foot-steps of Maxwell et al. (2013), which identified and grouped hazards into different categories. Almost all categories of shocks and stresses (climate-induced except drought, bio-physical, economic, social, demographic, and culture related as well as the food insecurity shock itself) were identified.

Climatic theory of famines that famines occur due to climate-induced hazards is a traditional view that uses the FAD model to explain famine and primarily consider natural disasters such as drought, floods, etc as triggers (Sarracino, 2010). A close look at each category and each shock/stress shows that climate-induced shocks were not important triggers. Only delayed-onset and early-off-sets in rains and frost that damages the growth of crops were reported by the surveyed households. This conforms to the report by a previous work that attributed erratic nature of rains as a major problem with rains in BGR as reflected in the late onset and early cessation (BGRFSS, 2004). The damages on plants by hailstorms, water-lodging and heavy winds were also reported but with a very small proportion of the surveyed households. Generally this result contrasted some findings of previous studies in northern Ethiopia that showed climate-related hazards (drought) as number one shock (Degefa, 2005; Maxwell et al., 2013). This implies that currently drought is not the primary underlying shock that triggers food insecurity in the western part of Ethiopia.

Almost all shocks induced by bio-physical factors were reported to be the most frequently occurring shocks triggering food insecurity in the study area. Maxwell et al. (2013) put crop pests as 8th in the order of the importance of hazards in northern Ethiopia. In the same part of Ethiopia, a previous study indicated that bio-physical factors such as weeds and pests were causes of food insecurity although their impacts were minor (Degefa, 2005). The present study area located in the western part however puts the impact of plant pests as one of the most important stresses. This was reported by 99% of the households followed by weed infestation, rat plagues and

deforestation respectively. The attack by wild animals and birds, each was reported by 45% of the surveyed households followed by soil infertility and erosion stresses as reported by 33% and 25% of the surveyed households.

With the exception of food price fluctuation reported by 48% households, on average the impacts of the remaining economic-related shocks (animal diseases & death, poverty stress, and backward technology) were very important triggers of food insecurity. But in contrast to the findings of Maxwell et al. (2013) which ranked food price fluctuation as number 2, the present study shows it was not as important as other economic related shocks/stresses.

Likewise, social-related stresses were found to be one of the most important shocks and stresses reported in the study area. Maxwell et al. (2013) placed local conflict as the 9th out of 12 different shocks. In contrast, fear of conflict breakout and actual conflict breakout between ethnic groups were found to be the most significant underlying shocks as reported, respectively, by 85% and 76% of the surveyed households. BGRFSS (2004) puts malaria as a primary cause of human ill-health that draws 40% of labor force away from production. The present study also showed that human disease was one of the most important shocks reported by about 73% of the households. This was almost similar with Maxwell et al. (2013) in which human diseases including human immune-virus/acquired-immuno-deficiency syndrome (HIV/AIDS) were placed as 4th in the rank order of 12 most prevailing hazards in the northern Ethiopia.

Maxwell et al. (2013) put population pressure as the 3rd stress out of the 12 hazards. Similarly, the present study showed that demographic stresses were one of the most important shocks triggering food insecurity shock in the study area. However, the perceived stresses as reported by the surveyed households were in-migration and child-dependency reported by 70.5% and 88% respectively. This finding should not be confused with the original observation that currently population pressure is not a critical determinant of food insecurity in the GFB of Ethiopia. As field observation revealed, such stress seems to have been reported due to the fact that indigenous households had already transferred much of their farmlands to the in-migrants through informal ways of transactions. As a result, there was a public suspicion that they would finally transfer their lands all in all and become starved. As explored by a previous study, transferring land through long term leasing as a means of coping strategy is one of the indicators of green famine (Mulugeta, 2014). The child-dependency per household rather than being the overall population

pressure was the second stress reported. In this sense the population pressure that was reported for this study and that of Maxwell et al. (2013) in which the Malthusian demographic theories are likely applicable are different.

Finally, extravagant consumption and lack of saving culture as culture-induced stresses were reported by about 87% and 29% of the surveyed households respectively. This goes in line with the statement in a previous study in Ethiopia that extravagancy and inefficient use of time have both immediate and long-term impacts on food security (Messay, 2013). Extravagant consumption of grains through different traditional festivals was one of the causes for ultimate depletion of grain stock leading to shortage of food especially among the indigenous households.

Thus, the study recommends that policy strategies shall focus less on alleviating effects of drought but more on bio-physical, social, economic, demographic, and cultural factors triggering 'green famine'.

9.1.4. Household Resilience to 'Green Famine'

This study confirmed that food insecurity is acute and affecting most of the households in the GFB of Ethiopia (Guyu 2015; Guyu and Muluneh, 2015a). In addition, a report shows that districts in BGR such as Sher-Kole and Kurmuk have already faced chronic food shortages as people starve for about 10 months each year even during normal rain years (BGRFSS, 2004). The resilience-vulnerability spectrum shows that about 65% of the surveyed households were vulnerable or less resilient while only about 35% of them were resilient at different levels (Guyu and Muluneh, 2015a). Thus, identifying the resilience dimensions and intervening to build household resilience is essential in areas where the occurrence of food insecurity is unavoidable. One important finding of the study was that it identified the most significant dimensions of household resilience. Accordingly, aspiration was the most important dimension followed by cultural bonds, social safety nets, income and access to food, asset possession, and stability respectively in the order of their importance. Adaptive capacity and access to public services were less important compared to others. This finding goes in line with a previous finding in Palestine, Middle East (Anilovi et al., 2008) and Kenya, East Africa (Anilovi et al., 2010) where most of the above dimensions were found to be important building blocks of household resilience. Thus, any action which targets at enhancing household resilience should focus on the most important dimensions of household resilience to green famine.

9.1.5. Livelihoods and Household Resilience to Food Insecurity

The study showed that the livelihood resources (i.e. natural, physical, human, social and financial capitals) and strategies/activities (extensification/intensification, diversification and migration) showed mixed results. Some components of the capitals and strategies were significant in differentiating between resilience groups while others were not.

Natural Capital: - Households had access to natural capital that help them achieve their livelihood outcomes, farmland, forests, and water resources, being the important sources of household resilience to food insecurity in a number of ways. A previous study showed that land value was important variable that significantly differentiated different livelihood groups in Kenya (Anilovi et al., 2010). In contrast, the present study showed that there was no significant difference between different resilience groups in their mean size of farmland holdings implying that the difference in the resilience levels was not primarily due to differences in the farmland size. Natural capitals were sources of food supplies through crop and livestock production, and wild food gathering and hunting, and fishing (Guyu and Muluneh, 2015b) as well as non-farm income from sale of forest products such as charcoals and firewood. Especially the present finding on wild foods goes in line with a previous study in South Africa in which wild foods (especially vegetables) was an integral component of the main meal of the day and played a role in the management of hunger and specifically micronutrient deficiencies (Mavengahama et al., 2013). Therefore, the contribution of natural capital to household resilience was paramount.

Physical capital: - The study revealed significant difference between resilience groups in households' access to small scale irrigation, all-whether road, and farming systems. Only about 1.2% of the total cultivated farmland involved small-scale irrigation (Guyu, 2015). This was same as the overall national irrigation status, which is highly underdeveloped where only about 1.2% of annually cultivated land involved irrigation (CIDA, 2013). Previous reports also showed the practice of irrigation is almost negligible despite its high potential in BGR (BGRFSS, 2004) and in the northeastern part of Ethiopia (Degefa, 2005). A previous study in Ethiopia indicated that farm implements were generally static in nature causing low labor productivity (Degefa, 2005). In this study too, tools used for farming purpose were dominantly based on hoe-culture as reported by about 68% of the surveyed households. Thus, lack of access to available physical infrastructure was likely to cause households' low level of resilience to food insecurity.

Human Capital: - On average, the surveyed households had about 3 economically active persons per household that would supply labor as compared to the overall average size of 4.2 in adult equivalent (ADE)/household. Although the per capita household size was large enough, as opposed to the Boserupian theory of agrarian change, it did not contribute to increased access to food in the study area perhaps due to the low quality of labor, which is determined by the skill and health status it possesses (DFID, 1999; Degefa, 2005) as well as the idle character of the economically capable members of a household in the study area. Health related problems were likely to have seriously affected the human capital in the study area. Ill-health, mainly due to malaria infection was one of the main challenges to labor productivity and household resilience to food insecurity. Dysentery, diarrhea, and typhoid in addition to issues of sanitation were critical as reported by the health post workers. The study revealed that 69.5% of the surveyed households reported the exposure of at least one household member to malaria infection at least once during the survey year.

A previous study in Ethiopia (although located in urban area) revealed that the physical distance between the community and the health station, overcrowded service provision, unavailability of prescribed medicines and unaffordable prices of the available medicines were the major health related problem (Degefa, 2010). Likewise, in the present study area, the distance between home and the nearest hospital, where quality health services was provided, had also significant impact on the quality of human capital in the study area. The ANOVA test revealed that there was significant difference between different resilience categories in their mean distances between home and nearest hospital. This had a cumulative impact on the households' ability to pursue, as stated by Degefa (2005), livelihood activities including crop production, livestock rearing and non-farm activities. This goes in line with the theory that ill-health is a core dimension of poverty and food insecurity, which in turn may weaken household's capacity of building resilience (DFID, 1999). Thus, overcoming these conditions may be one of the primary livelihood objectives of households (DFID, 1999) that policymaker should help enhance households' resilience to food insecurity being one of those livelihood outcomes.

In theory, lack of education is one of the core dimensions of poverty and food insecurity that ultimately weakens the capacity of households to build their resilience (DFID, 1999). Universal education seems to have been implemented in the study area in terms of coverage. Each and

every kebele in the studied district was supplied at least with a primary school showing that physical access to education was not a challenge to household human capital development. In fact, this goes in line with the statement of Degefa (2010) that distance between home and school was not a problem although this study area is located in the urban area of Ethiopia. Moreover, Degefa (2010) found that dropouts and lack of persisting through secondary schools and other factors such as low educational background of parents, living environments and housing conditions, parents' low financial capacity to purchase stationery materials for their children, and the poor quality of public schools as the causes of poor performance of children in their education. The poor quality of public schools and dropouts are likely to be more associated with the present study area. The ANOVA test showed that there was no significant difference in the mean year of education of household heads between different resilience categories (F-test > 0.001). This shows that education of household head was not significant factor in distinguishing between different resilience levels. Overall, household head level of education, as it also was reflected in children's education, was likely to be the most important cause that threatened their capacity to become resilient in the faces of food insecurity shock and its triggering shocks and stresses. The overall finding goes in line with Degefa's (2005) that the main problems of human capital in his study area relates to lack of skills and being illiterate.

Social Capital: - The widely practiced social resources upon which people draw in pursuit of their livelihood objectives involve reciprocity that may be based on kinship or neighborhood among households (Degefa, 2005). The study found interchange of food and drinks, money and labor as major types of reciprocities practiced by the surveyed households in the study area. One-to-five as a political capital (DFID, 1999) is added to those social capitals in this paper. Social cooperation as a social capital seems the culture of most communities in Ethiopia. One previous study conducted in northeastern Ethiopia (although urban) indicated the strong kinship, neighbor, and formally organized social institutions such as 'idir' to help each other during hard times (Degefa, 2010). Similarly, households in the present study area had reported social relationship in a number of ways. "Senbete" and "idir" are related to religious practices that were reported by 13.5% of the surveyed households. Although reported by small proportion, they have benefits beyond immediate eating and drinking as they arrange loans for the members. "Drink-borde" and "drink-coffee" are sources of social cohesions through which, beyond drinking, neighbors help each other as they make frequent contacts. "Wenfel" and/or "debo" is a labor union arranged to

facilitate farm work. In the study area, this was also practiced as a means of earning income. Seemingly political capital is the one-to-five cell/grouping that had been arranged by the push from government, which is found in the grassroots level. In principle, farm households are grouped into one-to-five cell in order to cooperate in their farming practices. However, there have been some rumors that this cell has a political connotation that the party that governs the state uses to follow-up and control any movement (i.e. bad or good). About 66% of the households reported they engaged and practiced in one-to-five cell in the study area. Therefore, the role social capital played in improving resilience was paramount in the study area.

Financial Capital: - This may include both stocks and regular inflow of money (DFID, 1999). Savings are preferred financial stock (i.e. both in cash and in kind), loans (formal and informal), remittance, and pension (Scoones, 1998:8; Degefa, 2005, 2010; DFID, 1999). The surveyed households did not report the practice of saving cash in formal institution. Building houses in towns was reported only by 4.5% of the surveyed households and it is insignificant resource that belongs to only very few households. Despite small proportion of households having houses in the town, they were sources of earning cash money from renting the houses. As a result, the only way of saving was in-kind (i.e. livestock) as reported by about 57% of the surveyed households. The study indicated that the surveyed households on average possessed about 1.4 tropical livestock unit (TLU)/household with standard deviation of 2.4 TLU. The ANOVA test showed that there was significant difference in the mean TLU holding (F-test < 0.001) between different livelihood groups. Saving cash money was reported by about 29% of the households. On average, households saved about 209.50 Eth. birr and there was no significant difference (F-test > 0.001) in the mean saving between different resilience groups. The practice of informal loans from neighbors and relatives similar with Degefa's (2005) finding had been declining among the surveyed households. During the survey year, only 15% of the surveyed households reported that they got loans (formal and informal) from their relatives and/or neighbors and microfinance institution. But, more than 82% of the loans came from informal institution (i.e. relatives and other neighbors).

Livelihood strategies and activities: - Livelihood strategies is an overarching term used to denote the range and combination of activities and choices that people make/undertake in order

to achieve their livelihood goals (DFID, 1999). They are grouped into three basic clusters: intensification, diversification, and migration (Scoones, 1998; Degefa, 2005).

Intensification of crop cultivation and livestock rearing were not the major practices of the community in the study area because it has vast fertile per capita land. Rather, households prefer to practice a short period fallowing to regain soil fertility. This matches with the Boserupian model of forest fallow level in agricultural change process (Boserup, 1965). Under such a situation, rather extensification of farm land for more production might be practiced. But, attempts to apply chemical fertilizers, and herbicides and pesticides were indicators of farmland intensification.

Although the basic type of livelihood activity in the study area was agriculture (especially crop production), livestock rearing was used as a supplementary activity. The engagement of households in wage laborer, sale of firewood, charcoal and alcohol, practice of petty trades, and wild food collection and hunting were reported showing that households tried to diversify their livelihood activities. As reported by 65% of the households also migrated from a place to another in search of better livelihoods. Thus, although livelihood intensification was little practiced, diversification and migration as strategies were observed well in the study area. On average, all households engaged in about 5 types of livelihood activities although it varies between vulnerable, moderately resilient, resilient, and highly resilient groups.

Thus, any intervention should aim at improving access to natural capitals such as land, forest, and water; physical capitals including all-whether roads, better housing, practice of small-scale irrigation, and use of improved farm tools and farming systems. Moreover, policy measures that improve human capitals such as health and education, social capitals such as reciprocity, labor unions, and one-to-five cell and, financial capitals including both in-cash and in-kind as well as appropriate livelihood strategies need to be designed and implemented.

9.1.6. Wild Foods and Household Resilience to Food Insecurity

The GFB in general and BGR in particular is known for its relatively better cover of forest resources that supplies wild foods to the people living in and around it (Guyu and Mulneh, 2015b). As wild vegetables are easily obtainable, palatable, and have good taste as well as are important sources of vitamins (Kajembe et al., 2000), their contribution to households nutritional

security and resilience was paramount in the study area. Although the amount of wild foods collected and hunted was small, it had significant correlation with IFA indicator of resilience, through which it contributes to resilience. This goes in line with previous studies conducted in Ethiopia where wild plants were found to play significant role in household food security (Tilahun and Mirutse, 2010; Debela et al., 2011). With regard to people's dependence on wild meat, a previous study in a sub Sahara African country (i.e. Cameroon) indicated that significant portion of animal protein (i.e., more than 98%) came from bush meat (Muchaal and Ngandjui, 1999). In contrast, the present study showed that wild meat was very small as it constituted about 8% of the total amount of wild foods although large proportion (46%) of the households reported their dependence on it. Despite small amount reported by households, field observations revealed that wild food items were not missed in daily meal dishes of especially the indigenous households. This shows that wild foods were one of the sources of coping with food shortages and have high potential of enhancing household resilience during times of food shortages.

The study also indicated that wild foods contributed to household resilience through their contribution to human health. The perceived medicinal values of wild foods reported in the study area go in line with the findings of many previous studies. A previous study conducted in Lebanon showed that wild foods were perceived to cure most diseases of human beings (Batal et al., 2007). Another study showed that blue-green algae were used as a source of both food and medicine in Chad and China (FAO-WFP, 2008). Furthermore, a study showed that many chronic diseases affecting humans in modern technologic societies were related to declining and altering trends in traditional diets including wild foods (Milton, 1999). Therefore, we can generalize that local people's perception of wild foods in the study area corresponds with the perception of many people around the world that depend on forest for food and medicine. However, scientific investigation of the curative ability of the wild foods is still awaiting further research, this being the direction of future research. As a result, a policy that pays attention to the development of forest resources from which wild foods are directly extracted is required.

9.1.7. Villagization Scheme and Household Resilience to Food Insecurity

Villagization can be seen as an overarching strategy designed to improve the livelihoods and food security status of rural communities in pastoral and semi-pastoral areas of Ethiopia (BGRFSS, 2004). Many areas in the BGR are dominantly occupied by semi-pastoral

communities and shifting cultivators (Guyu, 2012). Nevertheless, there are areas characterized by mixed farming system where crop cultivation and livestock farming supplement each other. In the study area, villagization had been implemented between 2010/11 and 2012/13 as a policy response to household food insecurity via improving their access to socioeconomic and physical infrastructure.

Although villagization had been short-lived since its implementation, the study showed that it is likely to have failed to achieve most of its objectives. In fact, the scheme is not bad per se in alleviating ‘green famine’ shock if it is implemented in accordance with its underlying principles and pillars. As the policy document reads, villagization is a strategy designed to improve the living standards of rural households, improve their food security and enhance their resilience to both natural and man-made shocks including food insecurity. The study thoroughly examined, whether the scheme contributed to the household food security and resilience and, the effects, constraints and consequences of implementing the scheme. The results showed that villagization could not ensure food security and enhance resilience of households. This finding conforms to a previous study conducted in BGR, western Ethiopia that showed almost the failure of the scheme at the start (Guyu, 2012). Rather it seems to have exacerbated their vulnerability to risks including food insecurity (Guyu, 2015). The main causes for the failure of the scheme were ill-planning, inappropriate implementation of the scheme and, their consequences including involuntarism, two-site homes, bad attitude, and the relocated households’ desire to return to old settlements. The writer’s field observations also proved these facts that many households returned to their old settlements after being relocated to the newly established villages perceiving that life is better there than in the new settlement sites.

9.2. Conclusion

The study was mainly designed to understand, the resilience of households to ‘green famine’ shock based on seasonal food insecurity as its proxy indicator and, the triggering shocks in the GFB of Ethiopia. In order to address this core aim, the study, in its first three chapters, examined the households’ vulnerability to green famine (Guyu, 2015), identified its main determinants and, investigated the underlying shocks and stresses triggering ‘green famine’ via seasonal food insecurity. This is because identifying the shocks and stresses is a prerequisite for resilience analysis as it is shock-dependent (Frankenberger et al., 2012). This is followed by measuring

household resilience to ‘green famine’ (Guyu and Muluneh, 2015a), examining the nexus between rural livelihoods and household resilience to green famine, investigating the contribution of wild foods to household resilience (Guyu and Muluneh, 2015b) and, analyzed the contribution of villagization scheme as a policy response to food insecurity. In order to achieve the above objectives, the study was guided by a framework that combines the resilience and livelihood frameworks. The study employed a cross-sectional survey of households in the case study district selected in BGR, one of the regions that fall within GFB. A mix of quantitative and qualitative research techniques were employed to collect and analyze data. So far, the discussion of the main findings is made. Based on the discussion, the following conclusions were drawn.

In contrast to the public opinion that the GFB is food secure, the study showed that food insecurity was deep-rooted by all measures. The first chapter of this dissertation came up with the occurrence of ‘green famine’ in the studied district (Guyu, 2015). It is termed as ‘green famine’ because it occurs in the environmentally, agriculturally, and demographically conducive areas for food production. Areas in the GFB, for example, BGR, are endowed with natural resources including minerals, water, forest, and land that can be utilized for improving the well-being of the people. The region is also agro-ecologically conducive for growing different types of food and cash crops, raising livestock, beekeeping and fishery (BGRFSS, 2004:7). In spite of these potentials and opportunities, acute seasonal food insecurity has affected the region. Such food insecurity that can be regarded as green famine had remained largely unexplored until Mulugeta (2014). The use of the concept in Mulugeta (2014), as argued in this dissertation, is likely wrong representation of the true essence of ‘green famine’ because the term was applied for investigating the conventional type of famines that occur primarily due to droughts resulting from shortages or failures in rains. Rather the true essence of ‘green famine’ should be defined at least for famine conditions in areas of adequate rainfalls where drought is absent, demographically low population density, and better natural resource endowments mainly adequate average farmland size owned by each household followed by less fragmentation and degradation of land resources.

In general, severe food shortages occurred here but have not been recognized as famine. Almost all the tools and/or indicators used to measure all the components of food security confirmed the prevalence of famine in this greener environment (Guyu, 2015) and households were found the least resilient to the green famine shocks (Guyu and Muluneh, 2015a). There was a considerable

difference between the indigenous and non-indigenous ethno-culture groups, the former being hit hard by the ‘green famine’ shock and, were less resilient.

An essential question is to ask what were the main factors determining household vulnerability to ‘green famine’ in the study area. The study identified demographic, socioeconomic and technological-related factors as the main determinants of household food insecurity in the GFB of Ethiopia. Accordingly, the study concludes that large household size, lack of access to small-scale irrigation, participation in labor union for coping with food shortages, low aggregate production, low level of household head education, participation in local labor unions, dependence on hoe-based farming system and, extravagant consumption were more likely to cause food shortages. Nevertheless, the influence of cultivated land size, wild foods, livestock in general and oxen possession in particular, and aspiration for change and wealth should not be underestimated as they had moderate effect on food insecurity.

The study also explored the underlying shocks and stresses triggered green famine in the GFB in general and in the case study district in particular. The climate-induced shocks (especially droughts) were not then significant causes in triggering food insecurity in the GFB of Ethiopia. Rather, in general, the biophysical, economic, social, demographic, and cultural-induced factors were more important shocks and stresses that characterized the green famine condition. Out of the specific shocks identified by the surveyed households, heavy wind was the only significant climate-related shock that affected food insecurity. Wild animal attacks, infertility of soil, and rat plague were the most significant bio-physical shocks that affected food insecurity. Literacy level of household head, poverty and, child-dependency were the most significant social, economic, and demographic related stresses that affected food insecurity. In general, all categories of shocks/stresses influenced the food insecurity situation of households in the study area.

Similarly, the study identified the main latent dimensions of household resilience to ‘green famine’. Although eight of the latent indicators of resilience were significant, close examination of the Beta coefficients indicated that aspiration to change (ASP), social safety net (SSN) and cultural bond and practices (CLRBP) played the most important role in enhancing household resilience to ‘green famine’ and were most useful components. As a result, policy attention may be given to these dimensions although the contributions of the remaining five latent dimensions: adaptive capacity (AC), asset possession (AP), access to basic services (ABS), IFA, and stability

(S), regardless of the signs of their coefficients, were significant and should be considered. Therefore, households which, had aspired more for change, engaged in more SSN and, more involved in CLRBP, were more resilient to 'green famine' shock than those who did not, reminding policy focus on the former but without ignoring the IFA, AP, S, AC and, SSN respectively.

As GFB was better endowed with rich and green vegetation cover, the study revealed that wild foods contributed to household resilience to food insecurity through contributing to the IFA dimension, most of the wild foods being from wild vegetables. It also revealed that while the contribution of wild foods to human health was considerable, the declining of dependence on them could have caused some health problems which could not be easily resolved through modern medical treatments.

The results of the study also showed that villagization had not brought the desired outcomes, i.e., better status of households' food security and resilience. Rather the food insecurity situation seems to have been exacerbated as observed from all measures of food security and resilience models (Guyu, 2015; Guyu and Muluneh, 2015a). The constraints of villagization were related to inappropriate planning and implementation of the scheme, lack of voluntarism, hasty process of implementation including research, selection of inappropriate site, and lack of special consultation with host villagers. Hasty implementation leading to the inability to create awareness to the level of expectation and lack of proper preparation were also other constraints to the success of villagization. Lastly, the consequences of all these were failing to introduce voluntary action from villagers. Rather, it instigated establishment of two-site homes-one in the old village and the other in the new village site, bad attitude and their desire to return to their old villages. Thus, it may be concluded that villagization scheme seems to have been unsuccessful and could not have improved the food security and resilience status of the households.

9.3. Contribution of the Study

This subsection provides the contribution of the dissertation to both the scholarly efforts to broaden the knowledge in the field of food security, famines and, resilience studies. By doing this, the dissertation extends the existing knowledge, theories, models and concepts of famines and resilience thinking to some extent enhancing the understanding of the characteristics of the

present day famines and the dynamic nature of approaches to understand them such as resilience. This is followed by suggesting certain policy implications and their strategies that may guide policymakers involved in formulation and implementation of policies to combat the challenges of food insecurity and famines.

9.3.1. Contribution toward the Formulation of ‘Green Famine’ Theory

There is huge body of literature that documented the history of famines in Ethiopia and elsewhere in the world. Theories, concepts and models used to explain the historical famines, especially in Ethiopia, have generally focused on climate-induced hazards (i.e. mainly drought), whether it is, predictable as in Ethiopia where it is expected to occur every after 7 – 10 years or, unpredictable and as those occurring suddenly (see Sen, 1981; de Waal, 1989; Devereux, 2000b, 2001; Degefa, 2005; Sarracino, 2010; Mulugeta, 2014). Human and other bio-physical related factors such as wars and diseases are meant to exacerbate the effects of drought. In other words, geographically famines and food insecurity are thought to have occurred more frequently in the drought-prone arid and semi-arid, and high population density areas than in the GFB. For example, in Ethiopia, historical famines have been perceived to have occurred in the northern, eastern, southeastern, central and southern parts. These parts of the country are either drought-prone or, high population density areas, where pressure on land resources is heavy and characterized by land fragmentation. In contrast, the occurrence of famines in what is termed as GFB has been generally overlooked both by researchers and policymakers because it is masked by the evergreen environments. However, many previous studies and especially this particular research output have proved that the GFB is prone to famine, which in many ways differ theoretically and practically from conventional types of famines. Thus, theorizing the causes and triggering shocks and stresses of ‘green famine’ is one of the most important contributions of this research.

‘Green famine’ as a concept first came out from some works few decades ago, in which it is defined as the occurrence and spread of food crises and the resulting famines in the green and enset-dominant livelihood zones of southern Ethiopia (Alemayehu, 2001). Apart from this scholarly work, there has been media coverage on ‘green famine’, many of them being cited in Mulugeta (20014). This initial use of the concept by Alemayehu is likely correct as it relates to the enset-dominant regions, which would be the next destination of famine due to increasing

population pressure and fragmentation of farmlands, vanishing traditional coping mechanisms, and pervasive poverty (Alemayehu, 2001) but the area is characterized by the probability of occurrence of recurrent droughts. The concept is later well explored by Mulugeta (2014) in which it is used to understand famines in the southern highlands of Ethiopia. But, this work seems to have intuitively reserved availability of adequate green vegetation, ample rainfall and, both surface and ground water resources that would enable agricultural production while recommending future research regarding ‘green famine’. But, Mulugeta’s (2014) use of the adjective “green” to studying the 2007/08 famine caused by drought is questioned in the present dissertation. The central debate is that there is no basic difference between the use of ‘green famine’ in the famine conditions occurred during 2007/08 and the conventional famines that have been documented in Ethiopia.

The 2007/08 famine that hit the southern highlands of Ethiopia is an aspect of the historical trend in the recurrent droughts that would inevitably occur every 7-10 years. For example, Mulugeta (2014) himself reviewed and documented such famines between 1957/58 and 2007/08 that suddenly happened and caused mass morbidity and deaths as well as destruction of livelihood basis of the people in the affected areas (Mulugeta, 2014). His map of geographic distribution of historical famines in the country covered only northern, eastern, southeastern and southern Ethiopia, all being drought-prone areas. His analysis of the causes of ‘green famine’ only emphasized the combined nature of the factors as opposed to the earlier focus on climate failure resulting in drought. As a result, there is no clear distinction between the concept of ‘green famine’ and conventional famines as well as between the GFB and conventional famine-prone areas of the country. Only he borrowed the idea of Alemayehu (2001) and other media that only attributed the occurrence of green famines to southern Ethiopia mainly due to recurrent droughts.

In this dissertation, however, the central argument is that there are basic defining characteristics that differentiate ‘green famine’ from conventional famine and, GFB from conventional famine belts of Ethiopia. First, the thesis recognizes Mulugeta’s (2014) combined factors as a cause of green famine. But this thesis argues that a drought that occurs in the situation of prolonged moisture stress is increasingly a dominate cause of famine in Mulugeta’s work, which would rather be a usual and conventional type of famine rather than being ‘green famine’. As a result, the basic defining feature that characterizes ‘green famine’ is a climatically and/or agro-ecologically conducive environment, which may not inhibit agricultural production and, supplies

food to the rural communities/households. It rather appears a non-conventional type of famine that occurs in an evergreen environment with no appreciable moisture stress. In this case, critical shortage or failure of rain that result in drought should not be regarded as a cause of 'green famine'.

Supplementary defining characteristics of the 'green famine' are demographically low population density/pressure, the resulting larger per capita land holding size and, less land fragmentation and degradation, green vegetation cover or high potential for regeneration of degraded vegetation, and adequate availability of both surface and ground water resources that may be used for agricultural production (Guyu, 2015). This dissertation recognizes that these are dynamic variables that may change and be reversed. But such reversals with the exception of climate (i.e. occurrence of drought) are maintained as defining criteria for green famine. In this regard, the theory and framework for analyzing 'green famine' cannot be applied amidst of the hot deserts such as the Denakil, Sahara and Arabian deserts, or the cold deserts such as Gobi in Asia where drought is constant and rainfalls are below 254mm (10 inch). Even in drought-prone areas where drip irrigation (as a result of technological improvements) practiced such as in Israel, the 'green famine' model cannot be applied. But, for the areas with sufficient moisture (i.e. rainfall), the increasing population pressure and the resulting land fragmentation does not restrict the application of 'green famine' model. That is, green famine may be defined for any changes in other defining criteria as long as there is no drought. Second, Mulugeta (2014) used the term 'green famine' to denote a sudden flare up of drought that resulted in mass human mortality and death, and destruction of livelihoods. In contrast, this dissertation argues that green famine should not be always defined for such characteristics of famines that suddenly occur and kill masses and destructs livelihoods immediately unless the causes are natural hazards such as earthquakes, volcanos, and large scale landslide. However, the history of western Ethiopia shows no such large scale destructive natural hazards although the future is unknown.

The basic question is that what causes 'green famine' in the GFB while everything is alright. In Mulugeta's (2014) work, food crises (i.e. defined as 'green famine') were caused by the 2007/08 drought. This was likely to have been exacerbated by, among others, high population pressure and related factors such as land fragmentation and degradation that constrained the production of the previous year. Simply, it was principally drought-induced famine. In the GFB, presently there is no a critical problem of population pressure on land that caused severe fragmentation and

degradation of farmlands. The principal causes of ‘green famine’, as observed in the present research, involve a combination of bio-physical, social, cultural, economic, demographic, institutional, and policy related factors. In other words, drought has never been happened in the area as far as the review of documented history of famine is concerned. Rather the region has hosted a number of people who were hit by famine caused by prolonged drought from the northern, northeastern and southern parts of Ethiopia. Hence, ‘green famine’ is the type of famine resulting from poorly interwoven and synchronized socio-economic, cultural, and institutional settings and it differs from the usual famine type caused by extended moisture stress condition.

Thus, the study contributed toward theorizing ‘green famine’ by identifying and conceptualizing the main determinants and the underlying shocks triggering seasonal food insecurity based on the case study district. The main determinants and triggering shocks of seasonal food insecurity were identified and modeled. The model involved the main demographic, socioeconomic, and technological factors affecting food insecurity occurrence. Similarly, triggering shocks and stresses were categorized as climate (non-drought), bio-physical, economic, social, demographic, and culture, induced/related. Then, the principal specific shocks and stresses of each category were used as independent variable in modeling their relationship with seasonal food insecurity (i.e. proxy indicator of ‘green famine’) occurrence. Thus, this dissertation could be regarded as the first of its kind in providing such a framework for analyzing and understanding ‘green famine’ situation in the GFB of Ethiopia in particular and that of ‘green famine’ areas found elsewhere in the world. Finally, an important underlying base of the theory that governs ‘green famine’ analysis is the ethno-cultural background and experiences of households. Thus, ethno-culture approach to understanding resilience to food and livelihood insecurities can be regarded as another contribution of the study.

9.3.2. Contribution toward Broadening the Theoretical Base of Resilience to Food Insecurity

As its core aim, the study contributed to toward broadening the existing theories of resilience to food insecurity in general and household resilience to ‘green famine’ in particular in the GFB. In this regard, the theory combined the two conventional frameworks: SLF and RF and applied the new framework for understanding, the resilience of households to ‘green famine’ and, its observed and latent variables. This provides a new insights and fertile ground for future use in

analyzing and understanding issues related to ‘green famine’ and resilience to food and livelihood insecurities in the GFB. This sub-section highlights the brief account of theoretical issues related to establishing the adapted framework and how they are organized for the new application as used in this dissertation.

A substantial body of literature has documented theories of resilience to, changes due to shocks and stresses in general and, food insecurity in particular. The concept began as an analytical framework for ecological systems (Holling, 1973, 1996) and later adapted to social systems (Adger, 2000), cultural and social-ecological systems (Walker et al., 2002, 2006; Folke, 2006; Crane, 2010), food systems (Alinovi et al., 2008, 2009; Ciani, 2012; Guyu and Muluneh, 2015a) and, agricultural systems (Abson et al., 2013). This clearly shows that the concept has a multidisciplinary origin although its roots are founded in ecology. This also shows that resilience is a dynamic concept which can be adapted to different systems when the need arises for analyzing and understanding their characteristics. The current exercise of applying the concept and its underlying theories for analyzing ‘green famine’ by combining SLF and RF is an aspect of this dynamic nature of resilience concept.

Livelihoods approach and hence SLF had been a dominant and new way of thinking about the objectives, scope and priorities of development since its emergence between the mid-1980s and 1990s. Nowadays, it is no longer as fashionable as it used to be for some reasons, one of the most important reasons being its focus on a small scale projects, although it is still in use (Anilovi et al., 2010). The emergence of RF for analyzing a system’s properties is an aspect of such a trend in the changing of analytical approaches and today resilience approach has got momentum as a tool in understanding the nature of a system. However, both approaches are combined and applied to analyze and understand households’ resilience to green famine in this dissertation for a number of reasons. In fact, this dissertation is not the first in combining the frameworks for analyzing resilience. Alinovi et al. (2010) compared the strengths and weakness of livelihoods approach and explained the reason for combining the two approaches and, finally applied for the Kenyan case.

The present research output, in this regard, differs from that of Anilovi et al. (2010) in at least three ways. First, the new framework is applied at household level while Alinovi et al. (2010) applied their new model at the level of livelihood systems. Second, the model in the present

dissertation is used to understand the resilience of households to green famine while that of Alinovi et al. is to overall national level nexus between livelihood strategies and food insecurity. The main reason for combining the two approaches include: i) resilience of a system is seen as an outcome variable of SLF and; ii) analysis of the main components of SLF (e.g. vulnerability context, shocks/stresses, livelihood capitals, policy issues and livelihood strategies and activities) is a very crucial pre-requisite for measuring resilience. Third, the underlying base of the framework that shapes the other variables of famine or food crisis in the present dissertation is ethno-cultural background and experiences of households while that of Alinovi et al. (2010) is livelihood systems. This requirement for analyzing household resilience to food insecurity encouraged the effort to combine both approaches to theorize and model household resilience to green famine in the GFB. Thus, this could be regarded as one of the most important contributions of this dissertation. In short, Martin Ravallion's theory of famine that famines do not always cause mass death and Sarracino's (2010) theory of famine process may accrue wealth to a segment of community amidst of crisis is applied in the GFB.

9.4. Policy Implications

In this sub-section, in light of the discussion of the main findings hereinbefore, some policy strategies are recommended for consideration as a supplementary guideline for the future policy formulation regarding resilience and food insecurity (a 'green famine' indicator). It has been recognized that the future direction of addressing the challenges of food insecurity manifested in a form of famine and/or 'green famine' should focus on building resilience of communities or households and their livelihoods (Maxwell et al., 2013) instead of attempting to reduce factors of vulnerabilities. As a result, the recommendations provided here are very essential blueprints for planning, implementing and monitoring a resilience building programmes that should target at tackling the challenges of vulnerabilities (shocks and stresses) in general and food insecurity shocks in particular in the GFB.

9.4.1. Nationwide, new food security policy that proportionally threatens all parts of the country is a critical requirement for Ethiopia if the government is intending to radically reduce the food insecurity and famine (both conventional and ‘green’) shocks.

Ethiopia’s food security policy and programmes have been generally focused on the conventional drought-prone areas. For example, programmes implemented as a recent efforts to building resilient livelihoods such as Productive Safety Net Programme (PSNP) and Disaster Risk Management/Food Security Sector (DRM/FSS) programmes as well as “household package” program (that involves one or more standard interventions such as improved inputs to crop production, livestock fattening, beekeeping and a standard loan agreement with government or microfinance) have been implemented in the chronically food insecure parts of the country (Maxwell et al., 2013). In fact, all the federal regional states of Ethiopia have prepared their own food security strategies in accordance with their existing realities. For example, the core approach of the Benishangul-gumuz region food security strategy (BGRFSS) was minimizing households’ vulnerabilities that hinder production such as malaria, pest and weed infestation, conflict resolution, the principal strategy being villagization (BGRFSS, 2004). Although it has been implemented for more than a decade, this strategy could not have addressed the food insecurity challenges of the region to the level of expectation. As well known, chronically food insecure areas are generally located in either drought-prone or demographically overpopulated or high-density areas that have been characterized by critical rainfall shortages, land fragmentations and the resulting decline in landholding size, and land degradations. As a result, these policy actions ignored the food insecurity and famines that have historically occurred in the GFB of Ethiopia, which has different dimensions compared with the drought-induced ones. However, as indicated by few previous studies and the empirical findings of the present study revealed, acute seasonal food shortages (i.e. green famine) have been faced by the majority of the communities and households in the GFB in general and the indigenous community members in the case study district in particular (Guyu, 2015). Under such a situation, in which ‘green famine’ is as important as conventional famines, the national efforts to reduce (if possible eradicate) food insecurity and famine by only focusing on the conventional drought-prone regions alone will not be easily and shortly attained. Thus, an appropriate food security programmes that can help households/communities escape from such acute seasonal food insecurity shocks should be duly implemented in the GFB of Ethiopia if the national food security objective is to be attained

within the time frame in consideration. This alternative policy programme is substantially different from the conventional drought-prone famine areas as well as the so-called ‘green famine’ situation in southern Ethiopia including the Kembata Tembaro Zone studied by Mulugeta (2014) and others such as Gedio and Sidam Zones. The former should basically be based on addressing the challenges of socio-economic, cultural, and institutional factors while the later should basically be based on addressing the impacts of extended droughts.

9.4.2. Narrowing the disparity in food security status between the indigenous and non-indigenous ethno-culture groups by improving their resilience is essential.

A previous study conducted in one of the districts of BGR (a region located in the GFB of Ethiopia) clearly showed a considerable disparity between the indigenous and non-indigenous ethno-culture areas (Guyu, 2014). The present study conducted in another district located in the same belt concludes that the ‘green famine’ event had a more profound effect amongst the indigenous communities than on the non-indigenous group (Guyu, 2015). Moreover, the study concludes that the two ethno-culture groups have different ability to cope with food shortages and/or have different levels of resilience to green famine (Guyu and Muluneh, 2015a) and differing level of dependence on wild foods as a coping mechanism for enhancing their resilience (Guyu and Muluneh, 2015b). Such disparities in their exposure to green famines, capacity of resilience and coping mechanisms might have arisen due to the variation in their cultural backgrounds and experiences that have direct impact on their practices of production, consumption, saving, and informal safety nets (Guyu, 2014). Thus, the food security policy should be amended by incorporating ethno-cultural background so as to narrow down the differences mainly with regard to the knowledge and skills of production and saving as well as working cultures.

9.4.3. With regard to the determinants of ‘Green famine’, the following interventions should be made.

The study concludes that households which, had larger household size, did not have access to irrigation, had household heads with low level of literacy, participated in labor union for coping with food shortages, produced low aggregate production, depended on hoe-based farming system, and consumed available food extravagantly were more likely to be food insecure than their counterparts. Household size was positively correlated with the probability of being food

insecure suggesting that non-productive members, i.e., economically dependents (mainly the children) of households on average dominate each household. Moreover, as field observations revealed most economically active members of a household were passing idle on working days in villages. In this regard, a technical assistance in the reproductive health should be made in order for the households to, have a proportionate size of productive and non-productive members and, enable their active members involve in productive activities.

There were negative relationships between irrigation use as well as household heads' education and food insecurity suggesting that access to small scale irrigation and education of household head had improved access to food. Therefore, expansion of small scale irrigation development should be further strengthened and adult education should be designed and implemented. The benefits of small scale irrigation should be further taught to farmers by creating different forums of awareness creation among households continuously. Model farmers in using small-scale irrigation can be used to motivate and mobilize others to involve in this activity. Improving the farming systems employed by the households through providing both technical and material assistance is important in order to help them shift from hoe-based farming system to at least oxen-plow system. Above all, awareness should be continuously created until the households/communities understand and minimize extravagant consumption through traditional festivals and ceremonies that deplete their stock several months before the next harvest.

9.4.4. Interventions to react against shocks and stresses triggering 'green famine' are required in order to reduce vulnerability and enhance resilience.

The study identified the underlying shocks and stresses triggering food insecurity and categorized them into climate-induced, bio-physical-related, economic-related, social-related, demographic-related, and culture-related shocks/stresses. Then, it concludes that climate-induced shocks (specifically droughts) were not important ones in triggering 'green famine'. In other words, shocks and stresses under all categories with the exception of drought were triggering factors of green famine. Thus, strategies for interventions to minimize each of these shocks and stresses should be designed and implemented thoroughly.

9.4.5. Which Dimensions of resilience should be focused when planning for intervention to enhancing resilience to food insecurity/'green famine' and reducing the impacts of triggering shocks?

The study disproved the general public opinion that the GFB of Ethiopia is resilient and less vulnerable to hunger and famine. It revealed that the belt is, by all measurements, less resilient and vulnerable to green famine (Guyu 2015; Guyu and Muluneh, 2015a). The study identified the most significant dimensions of household resilience to food insecurity. Aspiration was observed the most important dimension. This was followed by cultural bond, social safety nets, income and access to food, asset possession, and stability respectively in order of decreasing importance. Adaptive capacity and access to public services were less important compared to others. For particular consideration, the most important observable variables of each latent dimension can be identified based on the factor loadings of each variable and their correlation with latent dimension. For example, kilocalorie supply had the strongest correlation with IFA followed by saving, HFIAP, income and coping strategies index (CSI) irrespective of their sign (Guyu and Muluneh, 2015a). The same source indicates the strength of correlation of each observable variable with respective latent dimensions (Guyu and Muluneh, 2015a). Thus, any strategic action which targets at enhancing household resilience should focus on the most important dimensions and specifically observable variables in accordance with their level of importance and should be included in the existing food security policy. Accordingly, in long term rather than merely focusing on strategies that improve agricultural productivity, it is essential to work to strengthening the traditional/cultural and social elements that help people cope with and recover from seasonal food insecurity shocks. In short term, however, the application of formal safety net program needs to be adopted.

Specifically the following interventions are required to improve household resilience to food insecurity. To improve households' IFA conditions, strategies such as creating opportunities for income generating activities, wild food collection, and wage labor opportunities can be improved. With regard to wild foods, although both may be seen as nonviable in the future with increasing modernization, wild food gathering should be, at least on a temporary basis, encouraged as it has dual function, i.e. as direct source of food and indirect source of environmental rehabilitation (Guyu and Muluneh, 2015b). Awareness creation about the use of available human and livestock health services, adoption and implementation of traditional

conflict management strategies to reduce the disapproving attitude amongst the so-called ‘blacks’ (i.e., the Gumuz, Berta, Mao and Komo) and ‘non-blacks’ (mainly the Oromo) should be designed and implemented in order to improve stability. The role of asset disposal may not be a sustainable way of improving resilience while it is unavoidable option where others are absent. In this case, households should be assisted to generate their own physical assets as these are sources of security during shocks. This can be done by providing them startup capital and serious follow up for its implementation.

Although their importance in resilience building is relatively low at present, the contributions of AC and access to ABS may play significant roles in long-term. Therefore, basic services should be improved for building resilience on a sustainable basis. In general, households’ ASP, SSN, and CLRBP play the most significant role in household resilience to green famine and should be considered when planning for intervention. Moreover, the resilience dimensions that had played an intermediate role including IFA, AP and S and those which have long-term importance such as AC and ABS should not be underestimated. Intervention should target at those households with weaker resilience in general and the indigenous community members in particular.

9.4.6. Policy relevance of wild foods to resilience and forest development.

At present, natural forests are relatively abundant in the GFB of Ethiopia in general and BGR in particular (BGRFSS, 2004). This made the belt more important than other parts of the country as it can supply more wild foods to the people living in and around it. Any conservation activity that aims at enhancing wild foods has direct implication for forest development. The study showed that wild foods had significant correlation with IFA indicator of resilience, through which they contribute to resilience (Guyu and Mulneh, 2015a). In addition, the contribution of wild foods to resilience as they served as a source of traditional medicines was paramount (Guyu and Mulneh, 2015b). This shows that wild foods have high potential of enhancing household resilience during times of food shortages. Thus, a policy that pays attention to the development of forest resources from which wild foods is directly obtained are urgently required in the belt. Accordingly, the study recommends that a policy that integrates strategies which can ensure sustainable food security and forest development (and hence wild foods) should be formulated and implemented if the overall national goal of ensuring food security is to be achieved.

9.4.7. Appropriateness of villagization as a policy strategy to reduce food insecurity/'green famine' and enhance resilience.

Villagization scheme is not a bad strategy per se for improving household resilience to food insecurity. However, the present study showed that it had not achieved its objectives to the level of expectation. Villagization could not ensure food security and enhance resilience of households. Rather it seems to have exacerbated the vulnerability of local communities to risks including food insecurity. Therefore, the scheme should be revisited and revised thoroughly in the light of the main causes identified above if it is to be maintained as a strategy for rural development in general and enhancing resilience to food insecurity in particular. The study recommends the proper application of the principles of resettlement proposed by the national food security policy, both volumes I and II (NCFSE, 2003b).

9.4.8. Consideration of Ethno-culture related Issues in policy

The study showed ethno-culture disparity in relation to the level of households' vulnerability to green famine (Guyu, 2015) and resilience status (Guyu and Muluneh, 2015a). There was a difference between the indigenous and non-indigenous community members in this regard. This should be taken as a reminder by the policymakers when designing intervention strategies so that more attention should be given to the cultural variables than the bio-physical determinants of 'green famine' and components of resilience.

9.5. Implications for Future Research

The central argument of this dissertation is that acute but seasonal food insecurity termed as 'green famine' exists in western half of Ethiopia (i.e. the GFB). This assumption, although contradicts the general public perception that this part of the country is food secure, more resilient, or less vulnerable to shocks, it proved to the contrary through the present study using empirical household level data. Such public opinion has led researchers to overlook this part of the country and focus mainly on conventional drought-prone parts of the country. However, the 'green famine' in the western part of Ethiopia is probably as equally critical and important as the conventional drought-prone areas. In fact, one may not expect famine in the region that ends with mass deaths. Out of the three possible categories of famine, i.e. minor famines causing hunger, severe famines causing destitution, and catastrophic famines resulting in mass deaths (de Waal, 1989 cited in Devereux, 2000b), the 'green famine' can be categorized under the minor and

severe categories caused by starvation, breakout of human diseases, livestock diseases and deaths, destruction of livelihood bases, household destitution and dissolution of family. Nevertheless, the author also believes that “famine that kills” (although not in the form of mass death) occurs in the GFB, but this requires further empirical investigation. This calls for scholarly research that investigates whether there exists famine that kills, its characteristics, and its extent. This will provide scientific information about the ‘green famine’ situation for policymakers and government agents to focus on ‘green famine’ situation of the region so that government shall be able to address the challenges of food insecurity simultaneously throughout the country. It is the belief of the author that unless both parts of the country are proportionately considered both in terms of research and policy interventions, the government’s envisions that Ethiopia will ensure sustainable food security and become middle-income nation by 2025 may remain unattainable and dream. Moreover, future research direction may focus on in what respect the ‘green famine’ of the GFB in general and that of the BGR differs from a famine situation that occurs in the agro-forestry areas of the Southern Nations Nationalities and Peoples (SNNP) region of Ethiopia.

Based on the recommendation of a previous study on ethno-culture disparity in food insecurity experience in Bullen district, which is located in GFB (Guyu, 2014), this study tried to examine the ethno-culture difference in vulnerability to ‘green famine’ and resilience to food insecurity. The results revealed that generally indigenous households were more vulnerable, and less resilient, to ‘green famine’ (Guyu, 2015; Guyu and Muluneh, 2015a). This clearly suggests that an ethno-cultural approach to household resilience to shocks and stresses in general and to food insecurity in particular is required. Ethno-culture approach, in this sense, assumes that the resilience of households to shocks and stresses is principally determined by the cultural background of different ethnic language groups and their long-lived experiences in pursuing livelihood strategies and activities. The remaining components of resilience such as demographic, socioeconomic, and bio-physical determinants are perceived to be the outcomes of the culture of ethno-culture groups in this approach. The term ethno-culture may be used as either broad categories of ethnicity (i.e. indigenous and non-indigenous) or each of the specific ethnicity. What matters as a defining foundation is that cultural background and experiences of each ethnic group vary and affect resilience differently although there is an increasing trend in cultural assimilation. Although the approach is principally recommended for the GFB, it can be applied for any shock when studying household/community resilience to it.

Reference

- Abson D., Fraser Even D. and Benton T. (2013). Landscape diversity and the resilience of agricultural returns: a portfolio analysis of land-use patterns and economic returns from lowland agriculture. *Agriculture & Food Security* 2013 2:2.
- Adger, W. (2000). Social and ecological resilience: are they related? *Progress in Human Geography*. SAGE Publications, [online]. <http://phg.sagepub.com/content/24/3/347>
- Aidoo A, Mensah J and Tuffour T (2013). Determinants of Household Food Security in the Sekyere-Afram Plains District of Ghana, 1st Annual International Interdisciplinary Conference Proceedings, pp. 514-521, *AIIC 2013*, 24-26 April, 2013, Azores, Portugal.
- Alemayehu Lerenso (2001). Food Security and Rural Vulnerability in Ethiopia: A Development Perspective. *Ethiopian e-Journal for Research and Innovation Foresight* 4(1), 49-62
- Alinovi L., D'Errico M., Mane E. and Romano D. (2010). Livelihoods Strategies and Household Resilience to Food Insecurity An Empirical Analysis to Kenya, Rome: Available online: http://erd.eui.eu/media/2010/Romano%20et%20al_Kenya%20paper%20r15.pdf
- Alinovi, L., Mane, E., and Romano, D. (2008). "Towards the Measurement of Household Resilience to Food Insecurity: Applying a Model to Palestinian Household Data". In Sibrian, R., (ed.). *Deriving Food Security Information from National Household Budget Surveys; Experiences, Achievement, Challenges*, FAO, Rome, 137- 152, Available at <ftp://ftp.fao.org/docrep/fao/011/i0430e/i0430e.pdf>
- Bashir M, Schilizzi S. and Pandit R. (2012). The Determinants of Rural Household Food security: The Case of Landless Households of the Punjab, Pakistan, Working Paper 1208, School of Agricultural and Resource Economics, University of Western Australia, Crawley, Australia.
- Batal M., Hamadeh S., Hwalla N., Kabbani N. and Talhouk S. (2007). Wild Edible Plants: Promoting Dietary Diversity in Poor Communities of Lebanon. Final Technical Report American University of Beirut, Lebanon
- BGRFSS (2004). Food Security Strategy of Benishangul-gumuz region, Benishangul-gumuz Region Food Security Strategy (BGRFSS), Assosa, Ethiopia
- Bogale A. and Shimelis A. (2009). Household level determinants of food insecurity in rural areas of Dire Dawa, Eastern Ethiopia. *African Journal of Food and Agriculture, Nutrition and Development* 9(9), 1914-1926

- Boserup E. (1965). *The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure: Earthscan Publication Ltd, London*
- Ciani F. (2012). A resilience-based Approach to Food Insecurity: The Impact of Mitch Hurricane on Rural Households in Nicaragua. JEL Classification, Q12, Q18, I32, I38
- CIDA (2013). Assessment of CIDA's Food Security Strategy and Funding in Ethiopia; Canadian Food Security Policy Group, Ethiopia; Canadian International Development Agency (CIDA).
- Crane T. (2010). Of models and meanings: cultural resilience in social–ecological systems. *Ecology and Society* 15(4):19. [online] URL: <http://www.ecologyandsociety.org/vol15/iss4/art19/>
- CSA (2008). Summary and Statistical Report of the 2007 Population and Housing Census; Population Size by Age and Sex; Federal Democratic Republic of Ethiopia, Population Census Commission Central Statistical Agency (CSA).
- Dagnachew Anberbir (2004). Generic Agri-service Delivery and Farmers' Differences: The Case of the Natives and Resettled Farmers of Assosa Woreda. Unpublished MA Thesis, Addis Ababa University, Ethiopia
- de Waal A. (1989). *Famine that kills, Darfur, Sudan, 1984 - 85*, Oxford: Clarendon Press.
- Debela Hunde, Njoka J., Zemedede Asfaw, and Nyangito M. (2011). Seasonal availability and consumption of wild edible plants in semiarid Ethiopia: Implications to food security and climate change adaptation. *Journal of Horticulture and Forestry* 3(5), 138-149
- Degefa Tolossa (2005). Rural livelihoods, poverty and food insecurity in Ethiopia, A case study at Erenssa and Garbi communities in Oromiya Zone, Amhara National Regional State, PhD Dissertation, Norwegian University of Science and Technology, NTNU, Trondheim.
- Degefa Tolossa (2010). Some realities of the urban poor and their food security situations: a case study of Berta Gibi and Gemechu Safar in the city of Addis Ababa, Ethiopia. *Environment and Development*: 22: 179. [online]:<http://eau.sagepub.com/content/22/1/179>
- Devereux, S. (2000b). *Famine in the twentieth century*, IDS Working Paper 105, Brighton: Institute of Development Studies,
- DFID (1999). *Sustainable Livelihoods Guide sheets Framework*; Department for International Development (DFID).
- FAO (2010). *The Status of Food Insecurity in the World: Addressing Food Insecurity in a Protracted Crises*. Food and Agricultural Organization (FAO) of the United Nations, Rome.

- FAO-WFP (2008). Food Consumption Score: Construction of the FCS, World Food Programme-Food and Agricultural Organization, Rome, Italy.
- Folke C. (2006). Resilience: The emergence of a perspective for social–ecological systems analyses. *Global Environmental Change* 16(2006):253-267.
- Frankenberger T., Langworthy M., Spangler T. and Nelson S. (2012). Enhancing Resilience to Food Security Shocks, (White paper), Draft.
- Guyu Ferede (2011). Food Security Status of Rural Households Northwestern Ethiopia: The Case of Households in Bullen District of Benishangul-gumuz Regional State, VDM Verlag publishing house, Germany
- Guyu Ferede (2012). Voluntary Villagization Scheme (VVS) for Transforming Semi-pastoral Communities in Benishangul-Gumuz Region, Northwestern Ethiopia: Challenges and Local Development Indicators, *Journal of Sustainable Development in Africa*, Vol. 14, No.5, PP.162 – 196.
- Guyu Ferede (2015). Household Vulnerability to Green Famine: Component Based Analysis of Indicators in Belo-jiganfoy District (Case Study Area), Benishangul-Gumuz Region, Ethiopia. *Applied Science Reports*, 9(3), 139-156
- Guyu Ferede and Muluneh Wold-tsadik (2015a). Household Resilience to Seasonal Food Insecurity: Dimensions and Magnitudes in the “Green Famine” Belt of Ethiopia. *Applied Science Reports*, 11(3), 125-143
- Guyu Ferede and Muluneh Wold-tsadik (2015b). Wild Foods (Plants and Animals) in the Green Famine Belt of Ethiopia: Do They Contribute to Household Resilience to Seasonal Food Insecurity? *Forest Ecosystems*, 2:34.
- Haile H., Alemu Z. and Kudhlande G. (2005). Caused of Household Food Insecurity in Koredegaga Peasant Association, Oromiya, Ethiopia. Working Paper. Faculty of Natural and Agricultural Sciences, Department of Agricultural Economics, University of the Free State, South Africa.
- Holling, C. (1973). Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics*, Vol.4, (1973), pp. 1- 23;
- Holling, S. (1996). Engineering Resilience versus Ecological Resilience. *Engineering within Ecological Constraints*. The National Academy of Sciences
- Kajembe G., Mwenduwa M., Mgoo J. and Ramadhani H. (2000). Potentials of Non Wood Forest Products in Household Food Insecurity in Tanzania: The Role of Gender Based Local

- Knowledge. A Report Submitted to Gender, Biodiversity and Local Knowledge systems (LinKS) to Strengthen Agricultural and Rural Development, Tanzania
- Khan R. and Gill R. (2009). Determinants of Food Security in Rural Areas of Pakistan. The paper was presented in National Conference on Socio-Economic Stability in Pakistan. February 16-17, 2009 at Sarhad University of Science and Technology, Peshawar, Pakistan.
- Mavengahama, S., McLachlan, M. and de Clercq, W. (2013). The role of wild vegetable species in household food security in maize based subsistence cropping systems 2013, *Food Security*, 5:227–233
- Maxwell D., Vaitla B., Gimay Tesfay and Nigussie Abadi (2013). Resilience, Food Security Dynamics, and Poverty Traps in Northern Ethiopia. Analysis of a Biannual Panel Dataset, 2011 – 2013; Feinstein International Center, Tufts University.
- Messay Mulugeta (2009a). Challenges and Opportunities of Voluntary Resettlement Schemes in Ethiopia: A Case from Jiru Gamachu Resettlement Village, Nonno District, Central Ethiopia. *Journal of Sustainable Development in Africa*, 11(3), 83 – 102.
- Milton K. (1999). Nutritional Characteristics of Wild Primate Foods: Do the Diets of Our Closest Living Relatives have Lessons for Us? *Nutrition*, 15:6
- Muchaal P. and Ngandjui G. (1999). Impact of Village Hunting on Wildlife Populations in Western Dja Reserve, Cameroon, *Conservation Biology*, 13:2.
- Mulugeta Lolamo (2014). Green Famine in Ethiopia: Understanding the Causes of Increasing Vulnerability to food Insecurity and Policy Responses in the Southern Ethiopian Highlands, PhD Dissertation, University of Sussex,
- NCFSE (2003a). Voluntary Resettlement Programme (Access to improved land), *New Coalition for Food Security in Ethiopia*, Vol., I, Addis Ababa
- NCFSE (2003b). Voluntary Resettlement Programme (Access to improved land), *New Coalition for Food Security in Ethiopia*, Vol. II, Addis Ababa
- Omotesho OA, Adewumi M.O. Muhammad-Lawal A. and Ayinde OE. (2006) Determinants of Food Security among the Rural Farming Households I Kwara State, Nigeria. *African Journal of General Agriculture*, 2(1), 7-15
- Sarracino F. (2010). Explaining Famines: A critical Review of Main Approaches and Future Causal Factors. NAF working paper series, No. 10/12.
- Scoones I. (1998). Sustainable Rural Livelihoods: A Framework for Analysis, IDS Working Paper 72

- Sen A. (1981). Ingredients of Famine Analysis: Availability and Entitlements. *The Quarterly Journal of Economics* 96.3:433 – 464.
- Shiferaw Bekele, Kimer R. and Gladwin C. (2003). Determinants of Food security in Southern Ethiopia. A Paper Presented at the 2003 American Agricultural Economics Association Meetings in Montreal, Canada
- Tilahun Teklehaymanot and Mirutse Gidey (2010). Ethnobotanical study of Wild Edible Plants of Kara and Kwego Semi-pastoralist People in Lower Omo river Valley, Debub Omo Zone, SNNP, Ethiopia, *Journal of Ethnobiology and ethnomedicine*, 6(13).
- Tsegay Gebrehiwot (2009). Determinants of s Food Security in Rural Household of the Tigray Region, unpublished MA Thesis, Addis Ababa University, Ethiopia.
- Walker B., Carpenter J., Anderies N., Abel G., Cumming M., Janssen L., Lebel J., Norberg G. and Pritchard R. (2002). Resilience management in social-ecological systems: a working hypothesis for a participatory approach. *Conservation Ecology* 6(1): 14. [online] URL: <http://www.consecol.org/vol6/iss1/art14>
- Walker, B., J. Anderies, P. Kinzig, and P. Ryan (2006). Exploring resilience in social-ecological systems through comparative studies and theory development: introduction to the special issue. *Ecology and Society* 11(1): 12. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art12/>

APPENDICES

Appendix (A): Questionnaire

Dear Respondent,

I am Guyu Ferede, a PhD student at Addis Ababa University in the Department of Geography and Environmental Studies. Currently I am conducting a research that aims at investigating “resilience of rural households to ‘green famine’” in Benishangul-gumuz Region with emphasis on Belo-jiganfo district, located in western Ethiopia. You are one of the randomly selected household heads from this district to respond to the questions in this questionnaire. The study is expected to help understand the current level of rural household resilience to green famine and its main dimensions. Such understanding is expected to help the government and concerned bodies when planning to work to build households’ resilience in the district in particular and in the region in general. Thus, your responses are highly valuable, will be held in utmost confidentiality and, will be used only for the analysis of this research. For this purpose, you will not be identified by name. Your participation in responding is considered voluntarily and there will not be any monetary return. However, copies of the findings of the study may be sent to you upon your request. So, be free to respond to all questions in the questionnaire. This may take about 1 to 2 hours to respond and the researcher would like to thank you for devoting your precious time to this common goal.

Thank you in advance for your cooperation!

*Code of Enumerator: - _____

I. Basic Information Regarding Household Head

1) Please, fill out the following table with appropriate response.

s/n	Information	Answer
1	Date of interview	
2	Respondent's identification (ID) code	
3	Name of Kebele	
4	Name of Village	
6	Sex	1. Male 2. Female
7	Age (in years)	
8	Religion	1) Orthodox 2) Protestant 3) Muslim 4) Traditional 5) Others (specify)--
9	Ethnicity	1) Gumuz 2)Berta 3) Mao 4) Oromo 5) Amhara 6) Others (specify)--
10	Marriage S	1. Single 2. Married 3. Divorced 4.widowed 5. Polygamy 6. Others--
11	Residential status	1.In-migrant (New comer) 2.Rresident
12	Place of origin if you are in-migrant	
13	Duration of Stay at current residence (in years)	
	Reason for migration if in-migrant:	1) marriage 2)Join-relatives 3)villagization 4)--
14	Date/month/Year of Birth	
15	Education	1. Illiterate 2. Read & Write 3. Grades: __ 4. Others-----
18	Number of permanent members	Male = Female =
20	The roof of house:	1. grass/straw 2.Corugated iron sheet
21	Main Occupation	1. Farmer 2. Daily Laborer 3. Both 4. Others (specify)---

II. Demographic and Socioeconomic Characteristics of Household Members

1) Please, give appropriate information including head of the household in the table:

S/n	Name of Family Member	R/n with household Head	Age (yrs)	Sex M/F	Marital Status	Educational level	Economically (Active/ Inactive)	Current Occupation
1								
2								

“Economically inactive”, if permanently sick, disabled, aged, etc and cannot involve in economic activities for much of his time over the past cultivation year.

- 2) How many children are currently at school? _____.
- 3) If there is “economically inactive” member, what is the reason? (Multiple answers is possible):
 1. Sick repeatedly
 2. Permanently sick
 3. Permanently disabled;
 4. Aged or too old;
 5. Too Young (less than 10 years);
 6. Others (specify) _____.

III. Access to Agricultural Assets, Production, and Food Security

3.1. Access to Farmland

- 1) Do you have an access to farmland for practicing agriculture? 1. Yes 2. No
- 2) Indicate your ownership type on land and its amount:

S/n	Ownership Type	Amount	
		(In hectare)	(In Timad)
1	Own land		
2	Got on Sharecropping basis		
3	Rented for one or more years		
4	Freely got from a relative for a year or more		
5	Other Type (specify)---		

- 3) How long do walk on foot to arrive the nearest farm plot? _____ min/hours.
- 4) How do you perceive the quality of soil of your farmland currently?
 1. Fertile
 2. Medium
 3. Poor
 4. Other (Specify) _____.
- 5) Total amount of farmland you cultivated during the 2012/2013 crop year? ____ ha.
- 6) Have you given your farm plot out on a sharecropping basis during 2012/13?
 1. Yes
 2. No
- 7) If “Yes” to No.6, indicate the reasons to giving land out for sharecropping? (Multiple Answers are possible)
 1. Illness of household head
 2. Lack of draft power
 3. Unable to purchase farm inputs (fertilizer, herbicides,
 4. Land is excess land & crop shared is enough
 5. Lack of seed
 6. Household head is Aged (elderly) and unable to work
 7. Others (specify) _____.

8) Have you sharecropped in farm plot? 1. Yes 2. No

9) If “Yes” to No.8, indicate the reasons for sharing land in? (Multiple answers are possible):

1. I have no land totally;
2. I have land but not sufficient;
3. To substitute fallowed land;
4. I have land but exhaustively degraded and infertile;
5. I have land but too small to support my family;
6. Others (specify)_____.

3.2.Information Regarding Crop Production

1) Give the type and amount of crop obtained from sharecropping land in or out during 2012/2013 crop year: _____

2) Indicate type and amount of crop production in the following table for 2012/13 crop year:

Type of crop	Cultivated land (ha)	Production (quintals)	Seed reserve (kg)	Sold (kg)	Income from Sale (birr)	Reasons for sale
Cereals (Tot)						
Maize						
Sorghum						
Millet						
Teff						
Oil seed (Tot)						
Sesame						
Nug						
Telba						
Groundnut						
Legume (Tot)						
Haricot bean						
Soya bean						
‘Appo’						
Cheek pea						
Adenguware						
Root-Crop (Tot)						
Boya						
Yam						
Anchote						

Godere						
Vegetable (Tot)						
Pumpkin						
Pumpkin leaf						
Cabbage						
Kale						
Green pepper						
Red pepper						
Onion						
Garlic						
Tomato						
Carrot						
Kawa						
Fruits (Tot)						
Mango						
Orange						
Lemon						
Banana						
Others----						

3.3. Access to Small-Scale Irrigation and Amount of Crop Produced from It

- 1) Do you have irrigable land in addition to other plots? 1. Yes 2. No
- 2) If “Yes” to No.1, have you cultivated crops on it? 1. Yes 2. No
- 3) If “Yes” to Q1&2, indicate the type of crop produced, amount and income from its sale (if any).

s/n	Type of Crop	Mark “√” if Grown	Amount Produced	
			In Quintal	In Birr (if Sold)
1	Maize			
2	Banana			
3	Cabbage			
4	Kale			

5	Onion			
6	Carrot			
7	Tomato			
8	Chat			
9	Others (specify)			

- 4) If you have irrigable land but have not cultivated it, indicate your reasons. (Multiple answers are Possible): 1. Lack of Awareness about its benefits 2. Lack of skill and Knowledge
3. The Produce from non-irrigable plots is sufficient 4. I have alternative activity so that I ignored it at it is time wasting 5. Others (specify)--
- 5) Indicate the amount of grain under each of the following conditions during 2012/2013

Type	Source, Produce, Seed Reserve (SR), Purchase, Borrowed, Sold and Lost (in qtls)						
	Own Production	Purchased	Borrowed	Aid	Sold	Lost	SR
Sorghum							
Maize							
Millet							
Teff							
Haricot bean							
Soya bean							
Cheek pea							
Appo							
Groundnut							
Sesame							
Egg							
Meat-cattle							
Meat-Chicken							
Milk (liter)							
Butter							
Food oil							

Wild-roots							
Wild-fruits							
Wild-vegetable							

3.4. Saving and Post-Harvest Challenges

- 1) Have you ever been saving an amount of grain or money thinking tomorrow?
 1. Yes
 2. No
- 2) If “Yes” to No.1, what types of saving you have used to practice?
 1. Cash saving : _____ birr;
 2. In-kind saving (Livestock, grain, etc):_____
- 3) Post-harvest challenges that may lead to later food shortage & rank according to its importance.

Problems	Yes/No	Rank
Lack of saving tradition (over selling, over-consuming, etc)		
Lack of other sources of Income except grain sales		
Selling much at the time of low price		
Selling for paying government tax (over taxation)		
Extravagant consumption due to wedding, ritual ceremonies, etc		
Excessive consumption during labor cooperation (debo, wonfel)		
Selling grains for buying beverages		
Lost by rodents , insects, etc due to poor storage facilities		
Others (specify) ---		

- 4) What solutions can you suggest to overcome post-harvest losses of grain? _____
- 5) Who is the most responsible for saving or extravagant use of grain stock from the crop yield?
 1. Husband
 - 2) wife
 - 3) Both

3.5. Access to Farm Inputs and Technology

- 1) Did you use modern inputs (selected seed, fertilizer, herbicides, chemicals, etc)?
 - A. Yes
 - B. No
- 2) If “No” to No.1, state your reason(s). (Multiple answers are possible):
 1. Land is fertile
 2. Too expensive & not profitable
 3. Harmful to the soil
 4. Not available at market
 5. I gave all my land out to sharecroppers
 6. Shortage of money to buy

7. Government did not give me on credit; 8. Others (specify) ----

3) If “Yes” to No.1, indicate the type and amount of farm technologies (inputs) you used for the last crop year? (Multiple choices are possible):

s/n	Inputs/technologies		Yes /No	Amount	Monetary value
1	Hoe-plough	Number of labor engaged in plowing			
		Estimated land in (ha)			
2	Oxen-plough or donkey-plough (number of pairs)				
3	Tractor (Rented)-part or all of farm plot (ha)				
4	Small-scale Irrigation-land cultivated (ha)				
5	Veterinary service (number of livestock served)				
6	Chemical Fertilizer	UREA (in kg)			
		DAP (in kg)			
8	Manure (amount in Kg)				
9	Selected seed (amount in Kg)				
10	Herbicide (in liters)				
11	Pesticide (amount in liters)				
12	Line-sawing of seed (amount in ha)				
13	Extension follow-up (Never, daily, once or twice/week)				
14	Others (specify)---				

3.6. Constraints of Crop Production

1) Describe main Constraints of Crop Production: Multiple answers are possible. (Give rank order as: 1st, 2nd, 3rd, etc according to their seriousness).

s/n	Constraints	Rank	s/n	Constraints	Rank
1	Land/Soil-Related Constraints		3	Socio-economic Challenges	
	Shortage of cultivated land			Shortage of oxen	
	shallow topsoil			Shortage of Seed	
	Soil Infertility			Shortage of labor	
	Drainage problems			Shortage of draft power	

	Soil erosion			Low price of product	
	Insufficient landholding size			Shortage of fertilizer	
	Rocky (stoniness)			Shortage of farm implements	
	Silt deposition over seedlings			Health problem of household head	
2	Climate-Related Challenges			Inadequate facilities	
	Shortage of rainfall			Failure to use irrigation	
	Too much rainfall			Dependence on Rain-fed farming	
	Off-set delays & early off-set in rains			Backward farm technologies	
	water logging			Labor wastage	
	Erratic rain			Culture of saving in cash & kind	
	Hail storm		4	Biological Constraints	
	Windy rains (Destructive)			Pest infestation	
	Flooding			Plant disease	
	Frost Damage			Weed infestation	
				Birds attack onto crops	
				Wildlife (Apes, pigs, etc) attacks	
				Weed Infestation	
				Insect Infestation	
				Rat Plague	
5	Others (specify) ---				

2) Estimate the number of days you devote to working in your farm fields and other activities per week: _____

3.7. Livestock Production:

1) Indicate the following information about your livestock production

s/n	Type of Asset	Owned (produced) (Ha, No.)	Monetary value (birr)	Sold (No)	Income from sale (birr)	Reason for sale
1	Farmland (ha)					
2	Mango, Banana, Papaya, etc					
3	Livestock (No.)					

	Oxen					
	Bulls					
	Cows					
	Calves					
	Heifers					
	Goat					
	Kid					
	Sheep					
	lamb					
	Donkey					
	Mule					
	Poultry					
4	Bee hives					
	Honey					
	Wax					
	Others					
5	Agricultural Capitals					
	Plough (Maresha)					
	Mofer					
	Kenber					
	Wegel					
	Machid					
	Hoe (Adoma)					
	Axe					
	Scissors					
	Spade (Akafa)					
	Gejera					
	Others (specify)---					

3.8. Constraints to Livestock

- 1) Please, indicate the type, number, monetary value of animal lost and reasons for loss if any (including chicken): _____.
- 2) Indicate which of the following constraints of livestock are common in your area and you faced during 2012/2013: (show your choice using “√” mark and their rank order as: 1st, 2nd, 3rd, etc) according to their seriousness.

s/n	Constraints	Choice “√”	Rank Order
1	Livestock diseases		
2	Traditional means of stock management		
3	Lack of market for livestock & its products		
4	Lack of knowledge & skill of raising		
5	Lack of Veterinary services		
6	Low quality of veterinary service		
7	Lack of access to better breeds		
8	Shortage of grazing land		
9	Shortage of water		
10	Wild animal attacks (e.g. hyena, etc)		
11	Marshy area		
12	Thief		
13	Lack of modern fodder supply		
14	Seasonal drought causing fodder shortage		
15	Tick infestation		
16	Inaccessibility of market for the product		
17	Long distance to market		
18	Poor transportation to market center		
19	Others (specify)----		

3.9. Food Security Information

- 1) Did you worry whether your farm production feeds your family until the next harvest?
 1. Yes
 2. No
- 2) If “Yes” to No.1, for how long can it feed your family? _____ Months

3) How do you perceive your current food security status?

1. Food secure; 2. Food insecure

4) Who assisted you during the time of food shortage?

1. Government food aid 2. Relatives 3. Neighbors other than relatives
4. Others (specify) ---

5) Indicate the amount of food you got from any source of assistance. _____ kg.

6) What was the type of assistance?

Grain ____ kg; Food oil ____ liters; Cash money ____ birr; others (specify) __

7) Information on Dietary diversity and food frequency

7.1. Indicate the type of food items available in your meal over the last 24-hours (1-day).

Food item & Form	s/n	Time of Meal							
		Break f.		Lunch		Dinner		Others	
		Item	Form	Item	Form	Item	Form	Item	Form
	1								
	2								
	3								
	4								
Others----									
Tot. (No.)									

Food Items can be Cereals, pulses, Vegetables, meat, wild food, etc.

Form can be Porridge, Injera, Chimbo, Bread, Roasted, Boiled, etc

8) How do you perceive the number of food items in your daily meal?

1. Very low /insufficient 2. Medium/enough 3. Sufficient 4. Very high

9) Information on Household Food Insecurity Access Score (HFIAS) and Hunger scale (HHS)

9.1. Put “0” if you “Never” experience the events under each question; otherwise respective number of your choice (1, 2, or 3) if your answer is “yes” to the occurrence. Write a number of your choice under “response column”.

0. Never (No) 1. Rarely (once or twice in past 30 days)
2. Sometimes (3 to 10 times in the past 30 days)
3. Often (more than 10 times in the past 30 days)

s/n	To each of the following, What has happened in the past 30 days?	Response
1	Did you worry that your household would not have enough food?	
1.1.	If 'yes' how many days within the month?	
2	Were you or any household member not able to eat the food kinds you/s/he preferred because of a lack of resources?	
2.1.	If 'yes' how many days within the month?	
3	Did you or any household member have to eat a limited variety of foods due to lack of resources?	
3.1	If 'yes' how many days within the month?	
4	Did you or any household member have to eat some foods that you/s/he did not want to eat because of lack of resources to obtain other types of food?	
4.1	If 'yes' how many days within the month?	
5	Did you or any household member have to eat a smaller meal because there was not enough food?	
5.1	If 'yes' how many days within the month?	
6	Did you or any household member have to eat fewer meals/day because there was no food?	
6.1	If 'yes' how many days within the month?	
7	Was there ever no food to eat in your household because of lack of resources to get food?	
7.1	If 'yes' how many days within the month?	
8	Did you or any household member go to sleep at night hungry because there was not enough food?	
8.1	If 'yes' how many days within the month?	
9	Did you or any household member go without eating anything a whole day and night?	
9.1	If 'yes' how many days within the last month?	

10) Indicate the Coping Strategies your household used

10.1 Indicate the type of behavioral coping strategies and number of days your household members depended on the following Coping Strategies

How many days you employed the following Coping Strategies employed over the past week (7 days)?	Frequency (0-7 day)
a) Rely on less preferred and less expensive foods	
b) Borrow grain from a friend or relative	
c) Depend on wild foods (Gathering & hunting)	
d) Harvest immature crops (maize, haricot bean, etc)	
e) Send household members (children) to eat elsewhere	
f) Reduce number of meals eaten per day	
g) Limit adult consumption for feeding small children	
h) Feed working members & abandoning non-working	
i) Limit portion size at mealtimes	
j) Skip entire day (s) without eating	

10.2. Asset Disposal Based Coping Strategies

a) Sell domestic assets for buying grain		
b) Sell farmland to buy food grain		
c) Lease land in exchange of grain or cash to buy food grain		
d) Sell farm ox or milk cow to buy grain		
e) Sell other a livestock-bull, heifer, calf, donkey, etc to buy food grain		
f) Sell small animals (goat, sheep, chicken, etc) to buy grain		

10.3.Labor Disposal Coping Strategies Based

a) feed on early maturing crops during food shortage		
b) Sell labor for buying food or in exchange of food grain		
c) Sell charcoal to buy food grain		
d) Sell firewood to buy food grain		
e) Migration to nearby towns for wage labor to remit to family		
f)Working on others' farm as a wage laborer to buy food grain		

IV. Information on Vulnerability to Shocks/Stresses

1) To which of the following types of shocks/stresses you were vulnerable to? Indicate the frequency of occurrence of each shock (Multiple answers are possible):

Type of Shock/Stress		Response
Climate-induced Shocks	Delayed-onset-&-early-offset (yes/no)	
	Hailstorm (yes/no)	
	Water-lodging (yes/no)	
	Heavy wind (yes/no)	
	Frost (yes/no)	
Biophysical-induced shocks	Weed infestation (yes/no)	
	Plant pests (e.g. Fungus) (yes/no)	
	Rat Plague (yes/no)	
	Wild animal Attacks (yes/no)	
	Erosion stress (yes/no)	
	Deforestation stress (yes/no)	
	Bird attacks (yes/no)	
	Soil infertility (yes/no)	
Economic-related shocks/stress	Animal diseases & death (yes/no)	
	Poverty stress (yes/no)	
	Backward technology (yes/no)	
	Price fluctuations	
Social-related shocks/stress	Human diseases (yes/no)	
	Conflict (yes/no)	
	Fear of Probability of conflict breakout (yes/no)	
	Child at school (number)	
	Literacy of Household head (number of years)	
Demographic stresses	In-migration (yes/no)	
	Child-dependency (Child<15 years)(number)	
Culture-induced shocks	Extravagant consumption (yes/no)	
	Saving Culture (Yes/no)	

Food Insecurity	Perceive occurrence of food insecurity (yes/no)	
-----------------	---	--

V. Off-farm Practices:

1) Indicate the Off-farm Activities and Income generate from them:

Activities	Income (birr)	Who are engaged in? (Husband/wife/son/daughter)
Daily Wage laborer in Agriculture		
Traditional beekeeping		
Sale of Borde/Tela		
Sale of Arake		
Sale of Basketry products		
Sale of Pottery products		
Daily wage laborer in Non-farm activities		
Petty trades		
Others---		
Sale of Firewood		
Sale of charcoal		
Sale of Construction materials		
Sale of farm tools (Mofer, Kenber, etc)		
Others---		
Aid (in cash or kind) from Gov't/NGOs		
Income from Remittances		
Others (specify)--		

2) What do you do with the income earned from off-farm sources?

1. Buy food grains
2. Buy Non-food items (soap, cloths, etc)
3. Buy spices (including food oil, salt, red pepper
4. Pay tax
5. Buy beverages
6. Buy Farm implements
7. Buy Fertilizers
8. Others (specify) ----

3) How many days you drink beverage per week on average? _____ days.

4) Do you chew chat? _____; If “yes” how many day per week? _____ days.

- 5) If you have not been engaged in off-farm activities, indicate the constraints for either lack of sufficient and viable income from off-farm activities in your household. (Indicate their Rank in order of seriousness as: 1st, 2nd, 3rd, etc)

s/n	Constraints	Yes / No	Rank
1	Lack of access to Off-farm job opportunities		
2	Lack of access to credit services		
3	Negative attitude towards some activities		
4	Shortage of start-up capital		
5	Inability to work (disabled, illness, old-aged)		
6	Limited knowledge and Skill		
7	Lack of Raw materials for available activities		
8	Lack of Market for products		
9	Poor infrastructure to support activities		
10	Lack of forests for forest-based products		
11	Others ---		

- 6) How do you rate the role of education in diversifying income and ensuring food security?

1. Very high 2. High 3. Moderate 4. Very low

- 7) Do you have access to formal credit services? 1. Yes 2. No

- 8) If “No”, what are the reasons? (Multiple Answers are possible):

1. I have sufficient money 3. Because of High Interest rates
 2. The Service is not available 4. Do not know what to do with it
 5. Others (specify) _____

- 9) If “yes”, where did you get it? From: _____

- 10) What was the type of credit you got? 1. Cash 2. Fertilizer

3. Others (specify) _____

- 11) What did you do with the credit? _____

VI. Information on Resilience:

6.1. Aspiration:

- 1) Have ever aspired to change and become wealthy? Yes/no: _____

- 2) Do you engage in work actively? Yes/no: _____

- 3) Do you want to change your current job? Yes/no: _____
- 4) Have you invested on assets such as land to achieve your aspiration? Yes/no: ____
- 5) Do have exposure to information such as market, extension service, etc? Yes/no: __
- 6) Do you have a strong relation with internal & external institutions? Yes/no: ____

6.2.Social Institution as a Safety Net

- 1) Indicate a Social Organization in which you have participated in? (Multiple answers are possible):

s/n	Type of Social organization	Yes/ No	Who Participate in? (H, W, S, D)
1	Idir		
2	Iqub		
3	Mahiber		
4	Senbete		
5	Village 'Drink coffee' ceremony		
6	Borde Cerrmony		
7	Wenfel		
8	Oxen Cooperation (Mekenajo)		
9	Ox(en) renting in exchange of grain		
10	Ox(en) renting in exchange of labor		
11	One- to- five group formation		
12	Ox(en) help-to-ox-less households		
13	Others (specify)---		

H = Husband, W = Wife, S = Sons, D = Daughter

- 2) Indicate other safety nets from which food grain or cash you get and its monetary value:
Rank them in order of their frequency as 1st, 2nd, 3rd, etc

s/n	Type & Sources of Assistance	Grain (Kg)	Cash (birr)	Rank Order
1	Remittances elsewhere			
2	Government Relief aid			
3	NGOs aid			

5	Inheritance (specify)---			
6	Assistance from Relatives			
7	Job Assistance each other			
8	Reciprocity (in grain, food, etc)			
9	Assistance from Neighbors			
10	Church or mosque aid			
11	Borrowing Grain or Money			
12	Occasional food invitation to neighbors			
13	Sharing food and beverage with neighbors			
14	Sharing grain stocks to hungry households			
15	Others (specify)-----			

6.3. Gathering and Hunting Wild foods for Consumption

- 1) Please tell me whether your family has been engaged in collecting and/or gathering wild foods during 2012/13 crop year? 1) Yes 2) No
- 2) Identify the type of wild foods and estimate the amount that your family has collected over the past crop year (2012/13).

s/n	Source of wild food	Yes		No	Type
		Estimated (Kg)	Who engaged in? (H, W, S, D)	Reason	
1	Mushroom (all type)				
2	Wild Boya				
3	Bamboo shoots				
4	Wild Fruits				
5	Wild meat				
6	Wild Honey				
7	Honey				

Type can be: Wild Fruits: Fuya, Dakua, Gorka, Dakuwa, Awawa, Qula, Fuka, Angula, Kula,

Diwa, Wola (Woli-tsapa), Woli-Shuuwa, others: _____

Wild meat: Edible antelopes, Non-antelopes, Pigs, Fish, Others: _____

Honey: Bee, Tinign (hela), Tazima, others: _____

- 3) Is there tradable wild food that your family used to sell? 1) Yes 2)No
- 4) If yes, estimated income from sale of wild foods during 2012/2013 was _____birr.
- 5) If you don't depend on wild foods, what are the reasons? (Multiple answers are possible):
1. Food from farm produce was enough so that no need for collecting wild food
 2. Sources of wild food are highly diminishing
 3. I do not totally feed on wild foods
 4. Wild food sources are not totally available currently
 5. Because collecting or hunting is forbidden by law although locally available
 6. Others (Specify) ---
- 6) How do you rate the contribution of wild food currently in household meal in your locality?
1. Very low 2. Low 3. Medium 4. Significant 5. Very Significant
- 7) What is the current status of wild foods in your locality?
1. Totally vanished 2. Rarely available 3. Available 4. Sufficiently available
- 8) If wild food source has either totally vanished or gradually diminishing to vanishing stage, what do you think are the causes? (Multiple choices are possible):
1. Forest/environmental degradation 2) Extreme exploitation
 3. Diminishing of harbors (forest & water bodies) 4) Land is covered by cropland
 4. Others (specify) ----

6.4. Information on Household Expenditure

- 1) Indicate the amount of food grain requirement covered by purchasing over the past year. ___kg
- 2) Indicate average **expenditure** for your household food and non-food items during 2012/13

Source of Expenditure	Type of Item	Expenditure Total (Birr)
Purchasing food Items	Grains (Cereals & Legumes)	
	Meat	
	Drink (soft/alcohol)	
	Coffee/spices	
	Food oil	
	Others----	
Purchasing	Clothing for household members	
	Soap, hair oil, gas, etc	

Non-food Items	Renting land	
	Buying land	
	Buying ox(en)	
	Buying other livestock	
	Farm inputs (fertilizer, seed, pesticide, veterinary drug, etc)	
	Farm implements (Axe, hoe, plough, etc)	
	Others--	
Expense for social/cultural Ceremonies	Wedding	
	Tiskar	
	Idir/senbete	
	Holidays	
	Mahiber	
	Religious institutions (church, Mosque, traditional beliefs)	
Government Related Expense	Taxation	
	In Support of Millennium Dam	
	In support of development organizations	
	In Support of political parties	
	In Support of Other development activities	
Food & borde preparation for work unions (debo, wonfel)		
Paying for daily laborers for farm activities (weeding, harvesting, etc)		
Education of Children		
Health Related Expenditure		
Others (specify)---		

3) Who decides on the type of items purchased above? (Multiple answers are possible):

1. Husband 2. Wife 3. Sons 4. Daughters

6.5. Household Physical Access to Public Services

1. Indicate whether your household has access to the following public services:

Type of Public Service Accessed	“√” if agree	Characterization of Service	Fig.
Health Post		Distance travelled to nearest Health Post (km/ hours)	
Clinic		Distance travelled to nearest Clinic (km/ hours)	
Health Station		Distance travelled to nearest Health Station (km/hours)	
Hospital		Distance travelled to nearest Hospital (km/ hours)	
Veterinary clinic		Distance traveled to nearest center (km/hours)	
School (Grade1-8)		Distance travelled to the nearest school (km/hours)	
School (Grade 9-12)		Distance travelled to nearest school (km/hours)	
Clean water		Distance traveled to fetch it (km/hours)	
Tele (mobile)		Member of household that have mobile (number)	
TV/radio		Whether a household owns TV/Radio or not	
Dry-weather Road		Distance traveled to the nearest DW road (km/hour)	
All-weather Road		Distance traveled to the nearest AW road (km/hour)	
Mode of transport for humans		1. On-foot 2. Animal back 3. Animal-dragged four-wheeled cart 4. vehicular	
Mode of transport for Non-human		1. Animal back 2. Human-power 3. Animal-dragged four-wheeled cart 4. vehicular	
Market		Distance travelled to the nearest market area (km/hours)	

2) How many times you or your household members were sick during 2012/13 and for how many days you were asleep? Sick_____ times and slept _____times in the year.

6.6. Stability of households

s/n	Indicators	Response
1	Skill Training (Hh head & members)	1. Yes 1. No
2	Educational level (Grade level)	Grade _____
3	Employment status of household head	1. Employed 2.Unemployed
4	Number of household members lost their job/unemployed	Number_____
5	Income Stability	1. Increased 2. Same 3. Decrease
6	Income from Safety Net or Assistance (amount in birr)	
7	Assistance Stability	1. Increased 2. Same 3. Decreased

8	Health Stability (frequency of sick members of household last year)	
9	Marriage stability	1. Unstable if married/not ever divorced, widowed, etc 2. Stable otherwise
9	Shocks to Livestock	
10	Shocks to Crops	

6.7.Cultural Background of Household

- 1) What religion/belief do you follow? _____
- 2) Indicate what your region dictates you to do for the needy/poor neighbors? (Multiple answers are possible): Tick “√” under “Yes” if you believe in and practice otherwise, under “No”

s/n	Religious Dictation	Yes	No
1	Feed the needy		
2	Dress the needy		
3	Borrow Money or grain to the Needy		
4	Help them Draft power for tilling land		
5	Lend them milk cow during hard times		
6	Visit the patient		
7	Pay ‘Zeka’ to the mosque		
8	Others (specify) ---		

- 3) Are you receiver or giver of the above dictations of religion? 1. Receiver 2. Giver
- 4) How many hours do you spent praying per month in a religion you belong to? ____hour
- 5) Have you ever assisted money/grain/food, etc to a neighbor?
- 6) If “No”, skip; if “Yes”, indicate the amount in a unit. _____
- 7) Or, have you received any assistance from your neighbor? Indicate the type and amount: ____
- 8) Which of the following cultural traditions (Reciprocity) are practiced in common and bond a member of a community in your locality? (Multiple choices are possible):

s/n	Reciprocities	Indicate if Practiced	
		Yes	No
1	Borrowing grain each other		
2	Borrowing cash to each other		
3	Sharing available grain stock stored each other during hardships		

4	Helping each other in cash, grain or clothing		
5	Job Assistance to each other (other than Debo and Wenfel)		
6	Working together in a labor union (Debo, Wenfel)		
7	Sharing food (including milk, butter) each other		
8	Temporarily giving ox(en) or milk cow each other to solve ones problems during adversities		
9	Others (indicate) ---		

9) Are you Recipient of Giver of the above processes of reciprocities?

1. Recipient 2. Giver

6.8. Security perception

- 1) Do you feel confidence in your land ownership that it is yours always? 1. Yes 2. No
- 2) Have you ever been evicted from your area or farmland over the past 10 years?
1. Yes 2. No
- 3) If “Yes”, how many times? _____ times
- 4) What was the Cause of eviction? (Multiple choices are possible):
1. Government 2. It is the earlier occupation of who claim the farmland
3. Breakout of ethnic conflict 4. Others (specify) ----
- 5) Do you feel that there is a possibility of ethnic conflict breakout in your district or kebele?
1. Yes 2. No
- 6) Is there any such conflict you remember that broke out recently? 1. Yes 2. No
- 7) What do you think is the source and cause of the conflict, if any you remember recently occurred? _____
- 8) For how many years have you cultivated your current land without eviction? ____years
- 9) Has any of your livestock ever been stolen? 1. Yes 2. No
- 10) Did you get it back? 1. Yes 2. No
- 11) If yes, how did you get it back? _____
- 12) How is legal protection of in the locality?
1. Very weak 2. Weak 3. Medium 4. Strong 5. Very strong
- 13) Security issues that may affect resilience of households to food insecurity.

s/n	Security Indicators	Response: 1. Yes 2. No	Rank in their Importance
1	Land Tenure Security		
	Have Strong Sense of Land Ownership		
	Have Got Land Certificate		
	Probability of being evicted from Own Land		
2	Displacement Related Security		
	Eviction & instability due to Large-scale Investment		
	Displacement & instability due to Villagization		
	Eviction due to conflict with neighbors		
3	Probability of Ethnic Conflict		
	Peaceful Ethnic Co-existence		
	Current status of ethnic relations		
	Inter-ethnic marriage status		
	Mutual Affection between ethnic group		
	Legal protection of crimes & Supremacy of law		
	Probability of Occurrence of ethnic conflict		
4	Livestock Security		
	Probability of being Attacked by Wildlife		
	Probability of being Stolen by Thief		
	Probability of being Killed by Diseases		
	Probability of being Died due to livestock disease, marshy area, etc		

VII. Information on Villagization

- 1) What was your status & role during villagization in this village?
 1. Resident & Recipient
 2. New villager & Displaced
- 2) When did Villagization take place in this village? _____
- 3) What is your feeling (attitude) towards current villagization scheme?
 1. Strongly Favor; 2. Favor; 3. Disfavor; 4. Strongly Disfavor; 5. Indifferent

- 4) Is there any land you have lost due to villagization? 1. Yes (How much? ____ha) 2. No
- 5) Do you think you can survive without hunting and gathering under your current asset situation including land? 1. Yes 2. No
- 6) Have you decided to continue to live in this new village? 1. Yes 2. No
If no, what do you do? _____
- 7) What has happened to the following land possession before and after villagization?

s/n	Type of Land-use Type	Amount (hectares)		Quality (Fertile, infertile, degraded, etc)
		Before villagization	After Villagization	
1	Backyard (garden)			
2	Cropland (Farm field)			
3	Common Grazing Land			
4	Common hunting fields			
5	Common Gathering fields			
5	Common Forest land			
6	Others (specify)---			

- 8) Do you think that you are going to face risks of land shortages/infertility/less productivity
- 9) Have you been given “New” land or remain on part or all of the previous land?
1. New 2. Previous
- 10) If you have got “new land,” how do you perceive its quality compared to previous land?
1. More fertile 2. Same 3. Less fertile
- 11) What is the distance of your new village site from the old village? _____ hours on foot walk.
- 12) Do you think your income from all sources have been increased or decreased after villagization?
1) Increased 2) Deceased 3) Remain the same
- 13) Was there any training given to you on alternative income generating activities?
1. Yes 2. No

- 14) If 'yes', to what extent it assisted you? 1. None 2. Not much 2. Good 3. Very good
- 15) How do you compare the quality of housing before and after villagization?
 1. Same before and after villagization 2. It was better before than after
 3. It is better after
- 16) Describe the access problems of Health services and facilities before and after villagization. (Multiple Answers are possible):

s/n	Type of Health Service/facility	1. Yes 2. No	Distance in Km or Meters from village
1	Health Post		
2	Health Station		
3	Hospital		
4	Family planning Service		
5	Sanitary training services		
6	Delivery services		
7	Others (specify)-----		

- 17) What is the distance of your new village site from the old village? ____hrs on foot walk.
- 18) What are the reductions you have faced as a result of being displaced?
 1) Hectares in farmland 2) Number of working days per year 3) Income from Non-farm activities 4) Income from selling of farm yield 5) Income from labor wage
 6) Others (specify) -----
- 19) Estimate the average number of days you used to work per year. Before villagization _____days per year. After villagization _____days per year.
- 20) Describe the type of job opportunity you have lost or gained after villagization?
 New Job opportunities created _____
 Jobs lost _____
1. Do you think your income from all sources have been increased or decreased after villagization? 1. Increased 2) Deceased 3) Remain the same
- 21) What assistances had been made to you to at least sustain or improve your livelihood during implementation of villagization? (Multiple answers are possible):

- 1) Draft animal (Ox or donkey) 2) Farm Implements 3) Seed
 4) Fertilizer 5. Cash Credit 6) Others (specify) ---

- 22) How do you compare the quality of housing before and after villagization?
 1. Same before and after villagization 2. It was better before than after
 3. It is better after
- 23) Have you ever been alienated because you are strange to others? 1. Yes 2. No
- 24) How do you perceive your food security situation before and after villagization?
 1. The same before and after villagization
 2. It was good before than after villagization
 3. It is better after villagization
- 25) When do think is your dish filled with diverse meal or food?
 1. Before villagization 2. After villagization
- 26) List the types of food that have so far missed due to relocation or villagization including wild foods. _____
- 27) How do you perceive the current condition of diseases prevalence as compared to before villagization?
 1. Very high 2. High 3. Same as before 4. Low 5. Very low
- 28) What is the main cause of illness in your village?
 1. Malaria 2. Water borne intestinal diseases; 3. HIV & other STDs; 4. Others ---
- 29) Do you remember a people in your locality ever sick of or died of a disease in this village?
 1. Yes 2. No
- 30) Fill out the following table about the number of people you remember or heard of in your village that have got sick or died of diseases or other risks before and after villagization?

s/n	Cause of Morbidity or Mortality	Number Before Villagization		Number After Villagization	
		Sick	Died	Sick	Died
1	Malaria				
2	HIV/AIDS				
3	Other STDs				
4	Water borne diseases				
5	Lung TB				

6	Cancer				
7	Hunger				
8	Conflict with neighbor				
12	Others (specify)----				

31) Indicate access to Health services and facilities (multiple Answers are possible):

s/n	Type of Health Service/facility Available	2. Yes 2. No	Distance in Km or Meters from village
1	Health Post		
2	Health Station		
3	Hospital		
4	Family planning Service		
5	Sanitary training services		
6	Delivery services		
7	Others (specify)----		

32) What are the major constraints to access health services and facilities? (Multiple answers are possible):

s/n	Major Constraints	Rank in order of their Importance (1 st , 2 nd , etc)
1	Distance from home	
2	Lack of Money to pay for the service	
3	Lack of Awareness about modern medication	
4	Availability of Traditional therapy	
5	Others (specify) ---	

33) Indicate the type of common property you have lost as a result of villagization partly or as a whole.

s/n	Type of Common Property Lost	1. Yes 2. No	Rank in order of their Importance (1 st , 2 nd , etc)

1	Grazing land		
2	Hunting ground		
3	Forest for gathering wild food, construction materials, artifacts, etc		
4	Forest for shifting cultivation		
5	Rivers for fishing		
6	Rivers/other areas for mining		
5	Others (specify) ---		

Thank You!

Appendix (B): Checklist for Focus Group Discussion (FGD):

I. History

- 1) Overall history of Belo-jiganfoy: Administrative, Population size, density, migration, land resource, forest, animals, development infrastructures, etc

II. Land and Its Resources

- 1) Trends in the conditions of natural resources of the district?
- 2) Trends in forest cover, condition of water bodies,
- 3) Local land tenure, distribution, access, fertility issues,
- 4) Land Distribution-government, purchase, inheritance, etc
- 5) Conditions of agricultural land.
- 6) Perception on trends in land size over long period of times
- 7) What has happened to land possession after villagization?
- 8) Major problems of agricultural (crop and livestock) production?

III. Poverty and Food Security:

- 1) Do you expect poverty and food insecurity under green environment?
- 2) What are the major indicators of food insecurity?
- 3) Perception towards poverty and food insecurity? Causes of poverty and food security?
- 4) Cultural implication of poverty and food security
- 5) What determines sustainable supply of food?
- 6) Crop cultivation, livestock and food security

- 7) Wild food and food security.
- 8) Food insecurity and poverty condition of Indigenous or non-indigenous?
- 9) How do people cope with food shortage?
- 10) Who do you think are the most resilient to food insecurity shocks?
- 11) How do neighbors help each other to minimize food insecurity problems?
- 12) What cultural traditions help solve food insecurity and enhance resilience to it?
- 13) What cultural practices cause food insecurity?
- 14) In which months are people vulnerable to food insecurity? Why?
- 15) How do you perceive government intervention through different policies (villagization, land distribution, redistribution, extension, investment, etc)?
- 16) If any, what is your attitude towards food and cash aid?
- 17) Socio-economic infrastructure?

IV. Social Institutions and household food security and resilience

- 1) Kin relationships and food security?
- 2) Social organizations: Debo, wenefel, one-to-five formation, other reciprocities
- 3) Social institutions: Idir, iqub, mahiber,, coffee drink ceremonies, etc
- 4) How these affect food security and households' resilience to food insecurity?

V. Livelihood Activities and food security

- 1) Farm and off-farm activities?
- 2) The extent to which they are practiced?
- 3) Their role in cash earning and food security (household economy)?
- 4) Does villagization have improved access to socio-economic infrastructures?
- 5) How has villagization enhanced food security and resilience to food insecurity?
- 6) Challenges to ensuring food security
- 7) What should be done to improve food security and enhance resilience?
- 8) What is more?

VI. Dependence on Wild foods

- 1) Type of Wild foods usually eaten?
- 2) The Source of wild foods?
- 3) Season of hunting and gathering o fishing?
- 4) Reason for depending on wild foods? Cultural? Food Shortage?
- 5) Perception on its availability?

VII. Coping Strategies Score

7.1. Consumption-based Coping Strategies. Indicate the Severity Level of each coping strategy:

1, if Least severe 2, if Moderately severe 3, if Severe & 4, if Very Severe

Possible Coping Strategies employed over the last 24-hours (1-day)	Rank of Severity Weight
a) Rely on less preferred and less expensive foods	
b) Borrow grain from a friend or relative	
c) Borrow cash from lending individuals or institutions to buy food grain	
d) Depend on food aid from government or NGOs	
e) Purchase grain on credit	
f) Depend on wild edible foods (Gathering & hunting)	
g) Harvest immature crops (maize, haricot bean, etc)	
h) Consume seed stock held for next season	
i) Send children to eat else with neighbors	
j) Send household members to beg food or money to buy food	
k) Limit portion size at mealtimes	
l) Limit adult consumption for feeding small children	
m) Feed working members & abandoning non-working	
n) Reduce number of meals eaten in a day	
o) Skip entire day (s) without eating	
Others (specify if any)---	

7.2. Coping Strategies Based on Asset Disposal

a) Sell domestic assets for buying grain	
b) Sell farmland to buy food grain	
c) Lease land in exchange of grain or cash to buy food grain	
d) Sell farm ox or milk cow to buy grain	
e) Sell other a livestock-bull, heifer, calf, donkey, etc to buy food grain	

f) Sell small animals (goat, sheep, chicken, etc) to buy grain	
--	--

7.3.Coping Strategies Based on Labor Disposal

a) Grow early maturing crops to feed households during food shortage	
b) Sell labor for buying food or in exchange of food grain	
c) Sell charcoal to buy food grain	
d) Sell firewood to buy food grain	
e) Migration to nearby towns for wage labor to remit to family	
f) Working on others' farm as a wage laborer to buy food grain	

VIII. Food Diversity Perception

- 1) How many meal types you eat per day on average?
- 2) How do you perceive your current meal diversity?
- 3) Can you compare with the pre-villagization period?
- 4) Which type of meal you have lost and gained after villagization?

Thank you!!

Appendix (C): Checklist to Conduct Key Informant Interviews (KII)

Current Organization in which you are working in _____,

Responsibility _____

Line of work and Expertise _____

I. Guiding Questions to Administrators & Experts at Different Level

- 1) How do you perceive your accountability to the people you are serving for?
- 2) How do you respond to the questions of the people in the district?
- 3) Do you think there is a prevalence of food insecurity in the district? If “yes” tell me the nature (Transitory, Seasonal, or Chronic).
- 4) What indicators of food insecurity do you observe or what empirical information on the food security condition of people in Benishangul-gumuz region (BGR) and specifically in Kemashi Zone and Belo-Jiganfoy district? Please, tell me in detail?
- 5) How do you define food security in your opinion?

- 6) What do you think are the challenges to meet food requirements of the people in the district?
- 7) Please, tell me the specific factors that affect household food supply and access?
- 8) What policy frameworks and its approaches do you know have been applied to enhance food security in BGR and in the district in particular?
- 9) Do you have idea about “Building Resilience”, specifically “Building resilience to food insecurity?” Please tell me in detail.
- 10) What are the basic principles of resilience to food insecurity? Or, what does resilient food system look like? Or, what type of households are said to be resilient?
- 11) If you have no idea about “Building Resilience,” what other options of policy strategies do you have so far implemented to overcome the problem of shortage of food or food insecurity?
- 12) Please, tell me in detail the overall trend in crop productivity, its challenges, opportunities and prospects.
- 13) To what extent is the agricultural, health, and education extension packages have been effective? Tell me in detail?
- 14) What are the main challenges to agriculture (Crop, livestock production), health extension and expansion of education?
- 15) How do you perceive the difference in exposure to food insecurity among different ethno-cultures (the Indigenous and Non-indigenous) in the district?
- 16) Which ethno-culture group(s) has frequently faced food shortage?
- 17) What short-run and long-run measures have you ever attempted to address the problems of food shortage in the district?
- 18) What non-farm, off-farm, and on-farm income generating activities other than crop production are available to farmers in order to improve their living conditions?
- 19) What do you think are the main challenges to agriculture-i.e. livestock production and specifically Crop production?
- 20) Have you ever been engaged in the planning and implementation of the recent villagization program in BGR?
- 21) Or, are you familiar with the basic principles of population resettlement/villagization?
- 22) What was the rationale behind villagization? Please, tell me in detail.
- 23) How can villagization solve food insecurity problems in the district?
- 24) Do you think every household is happy with villagization? Why? Tell me in detail.

- 25) Do you think villagization is successful and sustainable? How? Please, tell me in detail?
- 26) Please, tell me the reason why the government does not implement the development activities at farmers' original areas?
- 27) Do you believe that the government fulfilled its promises in pre-and post villagization periods? Tell me in detail.
- 28) Please, tell me in detail about the process of implementation (moving or transporting potential villagers and settling them on the new site).
- 29) What new things do you think are brought with villagization that would have improved household food security?
- 30) Describe the socio-economic infrastructures made available to new villages but were not available in the original areas.
- 31) Do you think the displaced households are staying and will stay at the new village site? How?
- 32) What changes have been occurred to household farmland size, housing condition, income generating mechanisms, communal resources (forest, water, grazing fields, etc) after villagization?
- 33) Is there any problems related to agricultural activities like death of farm animals, soil degradation, deforestation, scarcity of farmlands, weather conditions, etc?
- 34) Have you or your office evaluated the current socio-economic status of households in the district? If 'yes', what was the finding of the evaluation? Tell me in detail?
- 35) What are the major constraints to agricultural productivity (both crop production and animal husbandry) in the area?
- 36) Are there NGOs or any international humanitarian aid providers involved in food security? If Yes, how do you evaluate the assistance?
- 37) How do you evaluate the general livelihoods and food security status of the households? Please, tell me in detail.
- 38) Do you think the region is politically stable? If Yes, what are the indicators.
- 39) Is there any ethnic conflict you remember that had occurred recently? If Yes, what was the cause? How was it stabilized? Tell me in detail.

II. Guiding Questions to Agricultural Experts (Zonal/District/Kebele)

A) Guiding Questions to Experts of Crop Production

- 1) What does the overall trend in crop productivity, its main challenges, opportunities and prospects look like? What should be done to mitigate the challenges/constraints?
- 2) Do you think low productivity of crops is the cause of food insecurity in the district?
- 3) How do you perceive the role of agricultural extension services in ensuring food security?
- 4) What technical assistance did you provide to improve agricultural production?
- 5) How does villagization help in improving household resilience to food insecurity?
- 6) How do people cope with food shortage when crop produced from their own is insufficient?
- 7) Do you think the displaced households are staying and will stay at the new village site? How?
- 8) What assistance did you provide to the farmers to enhance the productivity of agriculture?
- 9) What changes have been occurred to household farmland size, housing condition, income generating mechanisms, common resources (forest, water, grazing fields, etc) after villagization?
- 10) Is there any problems related to crop production such as soil degradation, deforestation, scarcity of farmlands, weather conditions, etc?
- 11) How do you evaluate the general livelihoods and food security status of the households?
Please, tell me in detail.
- 12) Which ethnic group is more vulnerable to food shortage?

B) Guiding Questions to Livestock Experts and Veterinary Service Providers

- 1) What do you know the history of livestock production in BGR and in particular in the district?
- 2) Please, tell me in detail the overall trend in livestock productivity, its challenges, opportunities and prospects.
- 3) What are the main challenges to livestock production?
- 4) Is there any problems related to livestock production such as death of farm animals, cows, etc and scarcity of pasture land, etc?
- 5) What major animal diseases affect the livestock sector in this area? How do you describe its seriousness?
- 6) Has any attempt been made to mitigate these problems? If 'yes' please tell me in detail by citing specific example(s).

- 7) Do you think that there are sufficient and efficient veterinary services in your area?
- 8) Explain problems related to pasture and water for livestock consumption.
- 9) Which ethnic groups own farm animals and other livestock? Why do you think are others not?
- 10) Add more ...

C) Guiding Questions to Irrigation Experts

- 1) Please, tell me the type and condition of water resources of the district.
- 2) Tell me the overall trend in crop productivity, its main challenges, opportunities and prospects.
- 3) How many times do farmers produce per annum in the district?
- 4) To what extent is the agricultural extension packages have been effective? Tell me in detail?
- 5) What amount of land in the district (percent/hectare) is suitable for irrigation in the district? How much of it is cultivated? Why irrigation is not well practiced in the District?
- 6) Are there farmers practicing small-scale irrigation for both crop and livestock production? Tell me in detail the problems associated with small-scale irrigation?

D) Settlement/Villagization and Food Security Experts (Zonal/District/Kebele)

- 1) Do you think food insecurity is prevailing in the district? If “yes”, what are the causes?
- 2) What is the nature of food insecurity, if “yes”? Chronic, seasonal or transitory?
- 3) Villagization had been implemented over the last three years (2010/11 – 2012/13). Did the program cover all communities and households and/or ethnic groups of the district?
- 4) Do you believe that all the principles and pillars of villagization been appropriately addressed? Please, explain in detail.
- 5) Describe the process of implementation of villagization programme in the district.
- 6) Do you believe that it can solve the food security problems of the households? If yes, explain in detail in what way it can solve the problem.
- 7) What do you think is the reason for villagization program? Why the government does not attempt to ensure food security of villagers in their original areas rather than gathering them?
- 8) Please, tell me in detail about the relocation process of villagers? Were all the villagers collected based on their will? Explain in detail.
- 9) Do you think that the villagization program is successful throughout the district?
- 10) If yes, please tell me how it is successful and if no, how it is unsuccessful in detail.

- 11) What can the government do if the people refuse and return to their original area?
- 12) What were the specific problems of villagers when they were in their original areas? And what do you think are the causes of the problems?
- 13) Do you think that villagization is the best option to mitigate the problems of food insecurity mainly for the indigenous ethno-cultures?
- 14) If 'No' what other options were there?
- 15) What are the challenges and opportunities of villagization?
- 16) Do you have information about villagers who returned after villagized?
- 17) Have your office or any government body evaluated the effectiveness of current socio-economic status of villagers after villagization in *Belo-jiganfo*?
- 18) If 'yes' please tell me, in detail, the findings of the evaluation. What problems were identified during the evaluation processes?
- 19) How do you evaluate the general livelihoods and food security status of villagers? Please, tell me in detail.
- 20) What infrastructures are built to rehabilitate the villagers?
- 21) Do you think that they are adequate and accessible?
- 22) If 'No' is there any plan to improve the infrastructure in the near future? Please, explain that in detail.
- 23) Have the villagers been given any skills training by either governmental or nongovernmental organizations in view of diversifying their activity and attaining sustainable food security?
- 24) Has the national food security program been implemented in the district?
- 25) If “yes”, please describe those programmes and the processes and activities so far done in an endeavor to ensure food security.
- 26) What do you think are the major factors affecting food security at household or community levels? Please, describe in detail.
- 27) Do you think climate related factors are the most responsible for the prevailing type of FIS? If “Yes”, explain in detail how it acts against food supply?
- 28) Is there any evidence of climate change in the study area? If “yes” tell me the evidences from your expertise or observation? And, how does it related to food security?
- 29) Have you ever heard of whether anyone died of hunger or hunger-caused disease? If yes, which ethnic group it belongs to?

III. Guiding Questions to Economic Growth and Food Security Officials

- 1) What do you know about the economy and food situation in the district?
- 2) Have you or your office evaluated the current socio-economic status of households in the district? If 'yes', what was the finding of the evaluation? Tell me in detail? What problems were identified during the evaluation processes?
- 3) Are there NGOs or any international humanitarian aid providers involved in food security?
- 4) How do you evaluate the general livelihoods and food security status of the households? Please, tell me in detail.
- 5) What special treatment was undertaken to different ethnic groups in the district?
- 6) Has the national food security program been implemented in the district?
- 7) If “yes”, please describe those programmes and the processes and activities so far done in an endeavor to ensure food security.
- 8) Have you ever heard of whether anyone died of hunger or hunger-caused disease? If yes, which ethnic group it belongs to?

IV) Guiding Questions to Credit Service Providers (Regional/Zonal/District)

- 1) How do you perceive the credit service provision in the district?
- 2) Do you think all households are accessible to the service?
- 3) What are the main challenges to provision of credit services?
- 4) Which ethno-culture group(s) has frequently faced food shortage? What do you think are the reasons?
- 5) Please tell me the overall process of credit supply in the district?
- 6) Do you think the beneficiaries invest the money they got from your organization for which it is intended?
- 7) What short-run and long-run measures have you ever attempted to address the problems of food shortage in the district?
- 8) How many people are beneficiaries of credit service from your organization?
- 9) How does villagization contribute to provision of credit services?

V) Guiding Questions to Health Service Providers (District/Kebele)

- 1) What are the major problems affecting human health? Please tell me in detail their seriousness?
- 2) Where do people get treatment?
- 3) To what extent is the health extension package has been effective? Tell me in detail?
- 4) What are the main challenges to health service provision?
- 5) Which ethno-culture group(s) has frequently faced health problems? What do you think are the reasons?
- 6) What short-run and long-run measures have you ever attempted to address the problems of food shortage in the district?

VI) Key Informant Guide: For Village Elderly, Religious Leaders

- 1) Your Name, age, Ethnicity, Religion, Marital status, Household Size: Male=__ Female= __
- 2) Household Composition (in terms of age, sex)
- 3) Birth place and residence: In-migrant or resident?
- 4) Please tell me changes in landscape with reference to settlement (density and patterns), agriculture, infrastructure, forest cover, etc
- 5) What has happened to land resources: vegetation, soils, water resource and wildlife distribution, etc
- 6) Your perception towards the status and use of Rivers for different purposes (crop production, livestock rearing, irrigation, drinking, etc).
- 7) How do you perceive towards land holding size in the area?
- 8) Your perception on extension package,
- 9) Perception towards land reform and redistribution mainly following villagization?
- 10) What does trends in population size; density, ethnic composition, etc look like in this area? Increased or decreased?
- 11) How do you perceive towards increase population, large family size, etc
- 12) How have you observed ethnic relations in the district? Is there a tension and probability of occurrence of conflict? What do you think are the causes of tension? Tell me in detail.
- 13) Do you remember the time when such an ethnic conflict occurred? Tell me, if yes, in detail the overall consequences of the conflict.
- 14) How do you perceive food security and hunger in the district?

- 15) The major type of staple foods and foodstuffs, cash crops of the district and your kebele.
- 16) How do you perceive food shortage in your household and in the area? What about poverty?
- 17) How do you your locality define poverty in your perception? Or, who are destitute, poor, medium, or rich?
- 18) Who do you think are most resilient to food insecurity? The destitute, poor, rich, medium? Or Female-headed, male-headed? Or the indigenous or non-indigenous? Household with large family size or small size? Etc? (By resilience I mean to cope with and recover from shocks of food shortage).
- 19) Tell me in detail the resilience history of your and other households in the district.
- 20) How do people cope with food shortage?
- 21) Do you and people in your village depend on wildfood? When? Which group?
- 22) How do you see the role of villagization in reduction of poverty and food insecurity and improving the resilience capacity of households?
- 23) How do you perceive the role of non-farm activities in improving resilience?
- 24) Perception towards role of DAs in improving agricultural productivity and ensuring food security.
- 25) Your perception of villagization in improving the socio-economic infrastructures.
- 26) Was it on the basis of your will? How? Why?
- 27) How was the government promises addressed?
- 28) How do you perceive towards private agricultural land investment: In terms of land possession, impact on local people, its environmental consequences and suitability of conditions for the investors themselves?
- 29) What challenges does it have faced? And what opportunities are there for the development of the investment itself?
- 30) How do you perceive towards such investment with regard to its role in local food security?
- 31) Perception towards land resource competition between local people and investors.
- 32) Do you have observed any conflict between investors and settlers on farmland?
- 33) If yes, how and who settled it?
- 34) Your perception on Social Institutions and relations? Idir, Mahiber, Iquib, senbete, etc.
- 35) How do they affect your produce and food security?
- 36) Do they encourage or discourage savings? How these may improve household resilience?

- 37) Are there NGOs involved in the process of ensuring sustainable food security? Name them and tell what they have so far done something to you.
- 38) How do you perceive their assistance in improving resilience?
- 39) What were the direct and indirect benefits that your household obtained so far from their intervention?
- 40) Conditions and role of livestock in ensuring food security or enhancing resilience capacity during food shortage?

IV. Social and Economic Organization

- 1) One-to-Five Organization (economic, food security implication)
- 2) Formal Safety Net organization ; Other informal (Traditional) organizations

Thank you!

Appendix (D): Checklist to Conduct Case Studies (CS)

I. Informant's Information

- 1) Date of Interview _____ Kebele _____, Village _____
- 2) Please tell me about yourself with regard to: Name, age, sex, education level, family size: males and females, Residential status and place of birth, Marital status, responsibility in his kebele/village.
- 3) For how long have you lived in this kebele?
- 4) If you are in-migrant, why did you decide to come here? And where and where did you come from?
- 5) Did you have information on the presence of better life in your current residence?
- 6) Have you ever experienced death of own household? What do you think were the cause and reasons?
- 7) How do you evaluate the ethnic conflict in the area?
- 8) What do you think are the main health problems in your household, and the community as a whole?
- 9) Are there any disable persons among the household members? What is the type and cause of such disability?
- 10) How many of your household members can work (active and inactive members due to age, diseases, disability, etc)?

II. Land Possession

- 1) How many ‘timads’ or hectares of land do you have currently?
- 2) How did you access to this land? Have you got certified your land?
- 3) Do you think that the land you have is yours? And can you exchange it whenever you want?
- 4) Do you think that your current land was sufficient to produce crop that can support your family throughout the year?
- 5) If it is not sufficient what did you do to produce more?
- 6) Please, tell me the type of land use and amount of hectares each constitute.
- 7) Can you tell me the amount of hectares you have before and after being gathered into this villagization site?
- 8) What are the major problems of your land possession? Please, tell me in detail.
- 9) What is your responsibility in this kebele?

III. Wild foods and Food Security

- 1) Have ever been relied on wildfood? If yes, tell me the type and amount you have collected and hunted and consumed during the 2012/13 crop year.
- 2) When do you mostly depend on wildfood?
- 3) Does wildfood culturally acceptable in your community?
- 4) How do you describe the role of wildfood in your daily meal and particularly during food shortage?
- 5) In your observation, which ethnic group(s) most relay on wildfood?
- 6) Do you think that large-scale land investment in the district has affected the situation of wildfood? How Please explain it in detail?
- 7) Do you have access to wild fishing? Please, tell me in detail its contribution to your meal.

IV. Livestock possession

- 1) Do you have livestock?
- 2) If no, tell me what happened to it?
- 3) Please, tell me the type and number of livestock you have currently?
- 4) Do you have farm ox(en)? If yes how many? If no, how did you cultivate your land this year?
- 5) What challenges has your livestock faced? Tell me in detail.
- 6) Is there any change in the livestock health and pasture conditions after you dislocation to new villagization site? Explain in detail.

V. Poverty and Food Security/insecurity

- 1) Do you think there is food shortage in your area? And in your household?
- 2) Who is poor? Explain in detail the indicators in your own perception.
- 3) How do you perceive poverty?
- 4) What causes poverty at household level?
- 5) What should be done to alleviate household poverty in your opinion?
- 6) And who is responsible to reduce poverty?
- 7) What is the relationship between rich and poor?
- 8) What are the major criteria to be rich or poor?
- 9) How do you define food insecurity?
- 10) Do you think your household is highly vulnerable to food insecurity? How and why?
- 11) For how long you face food shortage in this year? Tell the exact months under which you most suffer from food shortage?
- 12) What do you think are the reasons behind food insecurity?
- 13) How severe is food insecurity this year as compared to the other prior years?
- 14) How has food shortage affected your household and the community in your locality?
- 15) How did you cover the gap in your food supply and requirement?
- 16) Did you get assisted, purchase or borrow some portion of grain?
- 17) If purchased, what was the source of cash for purchasing grain?
- 18) Do you think there is relationship between poverty and food insecurity?
- 19) How do you perceive yourself? Do you categorize yourself under destitute, poor, medium, or rich? How?
- 20) Do you remember a terrible and difficult time in your life with regard to security such as ethnic relations, conflict, asset security-i.e. land, livestock, sense of membership of that locality, etc), poverty and food supply? Tell me in detail.
- 21) In your opinion, are you falling into poverty, emerging from poverty or remaining poor, if you perceive you are poor?
- 22) Explain whether large family is an indicator of poverty or not.

VI. Villagization and Food security

- 1) How was your response to governments' actors during implementation of villagization and after you have been settled here?
- 2) What is your feeling regarding government policy of villagization?

- 3) Were you here or came from other village due to villagization?
- 4) If you are receiver of dislocated households, are you happy of that? Why?
- 5) If you came from other village, were you willing to be dislocated from your original area? Why?
- 6) Did the concerned body give you orientation about the benefits of villagization?
- 7) Please, tell me about the benefits as told by those oriented you and as you have actually benefited.
- 8) What are the socio-economic infrastructures developed in your new village site?
- 9) Do you believe that the current villagization programmed improved your access to infrastructures and your food security status? How?
- 10) What has happened to your access to farmland after villagization compared to pre-villagization areas?
- 11) How long it takes to your farm plot before and after being dislocated?
- 12) Do you want return to your original village? Why?
- 13) How do you perceive the promise of government and current availability of infrastructure?

VII. Crop production)

- 1) How many hectares of land do you have for crop cultivation? Its quality, Sufficiency?
- 2) How much of this did you cultivate for the year 2012/13 in hectare?
- 3) Please, tell me the problems of your farm land?
- 4) Is all the land you cultivated belongs to you? If no, who does the land belongs to?
- 5) If no, why don't you have had your own?
- 6) Tell me the type and amount of crops produced over the last year (2012/13).
- 7) How do get it compared to 2011/12 harvest year?
- 8) Do you think that the crop produced this year is enough to feed your family until the next harvest?
- 9) If your answer is no, why?
- 10) To what extent do you think this may enhance household resilience?
- 11) For how long can own produce cover household food requirements?
- 12) If any shortage occurs, how do cover the remaining months when your family cannot have food and money to buy it?
- 13) How much of your food requirement can be sufficed by purchasing grain, aid, borrowing, etc? And during which period of a year?

- 14) Do you think large-scale agricultural land investment has an impact on your land access and food security? If yes, how?
- 15) How are agricultural land large-scale investment and food insecurity related?
- 16) How is such investment related to sources wild edible food?
- 17) What are the major challenges of your agricultural activities? By agricultural activities I mean both crop cultivation and raising livestock.
- 18) Have you practiced a small-scale irrigation for crop cultivation?
- 19) What changes have been introduced into this sector after the new villagization program is implemented?

VIII. Livestock production

- 1) Livestock possession and its Role in Improving food security and resilience capacity?
- 2) What do you observe about the change of productivity (milk and butter) of your livestock over time? Increase/decrease? Why?
- 3) How many oxen or donkeys do you have currently?
- 4) Which farm method do you employ? Oxen/donkey or hoe? Why?
- 5) What is the main purpose of oxen? If you depend on donkey or hoe?
- 6) Was there a time when you lost your livestock? What were the causes? How did you recover?
- 7) Do you think that livestock possession improves your resilience capacity to food shortage? How?
- 8) What are the major attacks to your livestock?
- 9) How do you compare the situation before and after villagization?
- 10) Perception on pasture situation?
- 11) What is the nature of tenure relations on grazing land/ Own/communal?
- 12) If shrinking, what do you think are the reason(s) for the shrinking of pastureland at your sites?
- 13) How do you perceive the situation of communal land at all sites
- 14) Tell me more about livestock situation.

IX. Off-farm activities

- 1) Have you ever been engaged in other activities (off-farm and non-farm) than agriculture so far? Mainly in the year 2012/13?
- 2) Please, describe the type of those activities other than agriculture you have been engaged in?

- 3) Can you guess the amount of many you have earned from these non-farm activities in the year 2012/13?
- 4) What are the major constraints to practicing non-farm activities in your household?
- 5) How many of your family members have been participating in these activities?
- 6) Are there some non-farm opportunities created by government for you? Describe them if any.
- 7) What more non-farm opportunities have been created as a result of villagization?
- 8) How do think can these sources enhance your resilience to food insecurity?

X. Climate Conditions and agriculture

- 1) Do you think that climate conditions are changing in this district and in your locality?
- 2) If yes, what are the indicators that show it is changing?
- 3) How has rainfall, temperature or frost affected your produce (both crop and livestock)?
- 4) Is there a change in the volume of water in rivers and springs compared to previous state?
- 5) What do you think are the major causes of climate change, if any?
- 6) What do you know are the indicators of climate change in the area?
- 7) How do you cope with this change in climate?
- 8) What impacts do you think it has on agriculture and food security?
- 9) What measures do you think can be used to control it?
- 10) Have you ever been engaged in watershed management practices in your area?
- 11) What are those watershed management practices?
- 12) How do you relate large-scale land investment on run-off and climate change in the region and in the district?
- 13) Do you have an experience of famine?
- 14) How do you define famine (hunger)?
- 15) What are the causes of famine (hunger) in your area?
- 16) Do you have an experience of erratic rainfall distribution that has affected your produce?
Explain in detail.
- 17) Too much or too little rainfall, frost, late or early rains, etc experiences?

XI. Access to Social, cultural, and Infrastructures

- 1) Educational status of your household members?
- 2) How long do you travel to reach all-weather road? And how does it affect your access to market?

- 3) What are the major health problems of your household? How long do you travel to reach at the nearest health post/station?
- 4) Does your household have access to health posts or health stations? How is the quality of the service
- 5) What are the problems related to education of your household? How long do you travel to arrive at the nearest school?
- 6) What is your educational level?
- 7) How many of your children are currently attending school?
- 8) What religion do you follow? How many hours you spent at praying at the church or mosque?

XII. Coping Mechanisms

- 1) How do you and the community in your locality react against food shortage?
- 2) Do you have learnt from experience in the past about food insecurity and its coping mechanisms?
- 3) Please, tell me the role government played to overcome food shortage problems in your locality.
- 4) Have you ever received food assistance from
- 5) What should individuals and you as an individual household head do overcome the problem?
- 6) Please tell me what do you think should be done to reduce problems of food insecurity by the community and the government?
- 7) What type of aid do you and the community need to overcome the problem?
- 8) Have you ever relied to some extent on wildfood sources as part of your meal?
- 9) Please, tell me the current status of wildfood sources in the district and in your locality.
- 10) What are the major problems of wildfood supply and access problems including fishing?
- 11) Are there some groups which have coped better than others? Why? How?
- 12) Are there some groups which have coped worse than others? Why? How?

XIII. Ethno-culture and Food security

- 1) How is your relationship with the other ethnic groups in the district and in your kebele?
- 2) What do you think may be the main sources of disagreement with other ethnic groups?
- 3) Which ethnic group do you think are the most vulnerable to food insecurity? why?
- 4) Please, tell me whether there existed differences in working culture between different ethnic groups (mainly between indigenous and non-indigenous).
- 5) What do you know about the saving culture of indigenous and Non-indigenous ethnic groups?

- 6) Who do you think are extravagantly consume their produce? Indigenous or Non-indigenous?
How?
- 7) Please, tell me food and local beer (borde) or tella preparation for communal labor working (debo) in both indigenous and Non-indigenous ethno-cultures.
- 8) Is there difference in going for farm work between the two groups? Who are late and who are early?
- 9) Who do you think can survive under current changing conditions of land size and fertility, environmental, social, cultural and economical? Why?

XIV. Technology Used

- 1) Do you have an ox (en) or donkey(s) for tilling land?
- 2) If no, how did you cultivate your land?
- 3) Does your household used to practice hoe-culture?
- 4) Please, tell me agricultural inputs you applied during 2012/13?
- 5) Tell me whether you have practiced irrigation. How does it helped you in solving problems of food insecurity?
- 6) If there is anything you would like to ask, comment or say, the word is free!

XV. Access to Capital

A) Access to natural capital

- 1) Tell me the amount of land size? Its quality, sustainability perception?
- 2) How did you access the land you cultivate currently?
- 3) Is it you own or sharecropping in/out?
- 4) How do you perceive changes in holding size before and after villagization?
- 5) Tell me communal about your access to communal land and its uses.
- 6) What are the main problems of farmland?
- 7) Land management practices?
- 8) Your access to water for human and livestock use
- 9) Problems of water use
- 10) Access to natural vegetation and its situation?
- 11) Problems in relation to the exploitation of natural vegetation
- 12) Suitability of climate conditions?

B) Financial capital

- 1) What was the amount of crops (cereals and cash) in the year)? Reserve money (in cash)?

- 2) Perennial crops grown (size and income from their sale per year)
- 3) Types of technological inputs under use and the power to purchase?
- 4) Livestock owned (types and size); Constraints to livestock raising?
- 5) Non-farm activities that the head and other members undertake
- 6) Income from non-farm activities and purposes for which the money is used
- 7) Main expenditures (tax, purchase consumer items, contributions for formal and non- formal institutions)
- 8) Housing situation and home utensils; Possessions of farm equipment and other assets?

C) Social capital (social relations and networking)

- 1) Participation in informal institutions (Idir, *iqub*, , neighborhood coffee drinking, attending church/mosque ceremonies – for prayer, weddings)
- 2) Participation in labor organizations (Debo, wenefel, etc)
- 3) Labor support from neighbours, relatives
- 4) Gifts from relatives (in cash or grain, livestock)
- 5) Draft power assistance to/from neighbors or relatives
- 6) Raising stock for someone in the form of ribi or *Adera* arrangement
- 7) Grain and loan during deficit period; Cash loan in times of need?
- 8) Donation of food (milk, borde, etc to/from somebody else in the village)
- 9) Remittance from/to individuals/institutions
- 10) Benefits from either government or NGO or relief food aid; Others,

D) Physical capital (availability and access to rural infrastructure)

- 1) Health service, School, Potable water source, Credit, Irrigation, Market and fair price (for both selling and purchasing)
- 2) Technological inputs (fertilizers, herbicides, insecticides, etc.); Agricultural extension
- 3) Veterinary service; Access and affordability of medicines for human use

E) Government intervention (rural policies)

- 1) Intervention into village redistribution, and one-to-five formation,
- 2) Land redistributions; Villagization; Extension intervention,
- 3) Encouragement through model prizes,

Thank you!

Appendix (E): Guide to Conduct Field Observation

I. Physical Set-up

- 1) Agro-climate (kola, dega or w/dega)
- 2) Current situation of water bodies including rivers to compare with their history as interviewed from Informant Interviews, CSs and FGDs
- 3) Relief (plain, plateau, mountain, cliff and steep slopes)
- 4) Current forest situation of the district mainly to compare with its history
- 5) Land-use pattern
- 6) Large-scale agricultural land investment
- 7) Soil types and situations
- 8) Forest cover situations
- 9) Wildlife (animals)

II. Population and Settlement

- 1) Population density and size
- 2) Family size some households
- 3) Settlement/village patterns
- 4) Housing conditions of villagers
- 5) Ethnicity
4. Religion
5. Cultural value, traditions
6. Stability of villagers in new site
7. Social relations, neighborhood, network, reciprocity

III. Livelihoods and food security Situations

1. Main source of living (farming system): mixed farming, agro-pastoralism, non-farm activities, etc
2. Farm technologies (oxen-plow, hoe-plow, input-utilization, etc)
3. Cropping pattern (dominant crop types in terms of area cultivated and size of harvest during 2012/13), storage facilities, etc
4. Type of livestock raised, density, means of raising (modern or traditional)
5. Non-farm/off-farm activities: availability, options and constraints

6. Socio-economic infrastructure such as transport, market, extension services, water supply and access, health, education, etc.
7. Whether households are self-sufficient
8. Whether they practice coping strategies
9. Whether they depend on wild foods.
10. Physical indicator of household poverty in terms of households' asset, livestock possession, etc.
11. Whether people engage in non-farm and off-farm income generating activities (IGAs) in the area.
12. Whether households get transfers, remittances, aid, or gather wildfood from communal sources.
13. What types of households are most vulnerable to food insecurity? Which ethnic group?
14. What are the people's main coping mechanisms? Which of these mechanisms seem sustainable and/or viable?
15. Cooperatives

IV. Infrastructure

- 1) School; Health posts/stations; Water supply; Roads; Transport mode; Telephone
- 2) Administrative services (e.g. police stations, etc)

V. Social Organizations

- 1) Village coffee ceremonies; Participation in Idir, Iqub; Work unions (Debo, wenfel, labor assistance, etc); Reciprocities

VI. Assistancess

- 1) Government aid (food grain, food oil, cloths, farm implements, oxen, etc)
- 2) NGOs aid (cash and/or kind); Religious aids; Relatives aid
- 3) Remittances (Cash and/or kind), etc

VII. Villagization

- 1) Old and New Villages,
- 2) Infrastructures in both villages
- 3) Housing Units

Thank you!