

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
College of Development Studies
Institute of Population Studies

Farmers' Perception of the Impacts of Population Pressure on the Environment and their Responses: The Case of Dandi Woreda, West Shoa Zone (Oromia Region)

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Addis Ababa

Oct.2010

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Environment and their Responses: The Case of Dandi Woreda, West
Shoa Zone (Oromia Region)

By Fekadu Abdissa

*A Thesis Submitted to the School of Graduate Studies of Addis
Ababa University in Partial Fulfillments for the Requirements of
the Degree of Masters of Science (MSc) in Population Studies.*

Thesis Advisor

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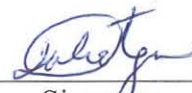
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ACKNOWLEDGMENTS

First of all I praise my God in Christ Jesus who has accomplished all my works in my hand. Indeed, this thesis wouldn't have been materialized, had it not been for his marvelous help. I am grateful to my advisor, Dr. Aklilu Amsalu for his appreciable suggestions from the very beginning of the thesis work. I am greatly indebted to Aderaw Anteneh and Yordanose Seifu for their constructive comments and suggestions in the analysis parts of this thesis. I also extend my gratitude to my wife Genet Gurmessa for her ideal support for the completion of my M.Sc Degree and thesis work. I would also like to extend appreciation to Ato Chalachew Arega, Dula Itana and W/o Sara Iyasu of IPS staff for their collaboration in all aspects. Finally I thank the School of Graduate Studies of Addis Ababa University and Bureau of Finance and Economic Development of Oromia for their financial support for this study.

ACRONYMS

BOFED	Bureau of Finance and Economic Development
BOLEP	Bureau of Land and Environmental Protection
CSA	Central Statistical Agency
DAs	Development Agents
EPA	Environmental Protection Authority
FAO	Food and Agricultural Organization
GFRA	Global Forest Resource Assessment
HHH	Household Heads
IFPRI	International Food Policy Research Institute
JICA	Japan International Cooperation Agency
MOFED	Ministry of Finance and Economic Development
SSS	Sub-Sahara Africa
UNCED	United Nations Conference on Environment and Development
UNFPA	United Nations Fund for Population Activities

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Although interest in the consequences of population pressure on natural resources depletion and environmental degradation are of long standing, widespread and growing public awareness and concern about the linkages between population factors and the environment are relatively recent. Today, concern about the environment has risen to the top of the international agenda and has brought in its wake renewed attention to the population issues (UN, 1992).

A major initial impetus to this concern was given by a report of the world commission on environment and development (UNCED, 1987). The report indicated that rapidly growing population can increase the pressure on resources. It further revealed that more people are using more resources with more intensity than at any point in human history. Fresh water, cropland, forests and biodiversity all show sign of stress at local region and global levels (UNFPA, 2001). In more recent years, questions have been raised regarding the effects of population growth on climate change and biodiversity loss (Panayotou, 2000).

Over the past 50 years, human being has changed ecosystems more rapidly and extensively than in any comparable period of time in human history. According to the 2005 UN Millennium Ecosystem Assessment study, human activity is unsustainably using 60 percent of the ecosystem services that support us, including fresh water, air, forests and wild life (MEA, 2005).

Ethiopia is one of the Sub-Saharan African (SSA) countries known for their fast population growth ,accelerated environmental degradation and structural food insecurity (Tesfaye, 2003).The same study described the challenge that has faced the country in the new millennium as follows;

Ethiopia today, as it enters into the twenty-first century, is in real crises; her development fulcrum within the problematique very much hinges between two axial poles –one of fast population growth rate and the other accelerating environmental resource degradation. Both of these problems together are accelerating mass poverty and destitution as causative factors but they themselves seem to be the twin products of poverty.

If the current trend continues, the purpose for which we use environmental resources (to provide for basic needs and increase the quality of life of a rapidly growing population) will be undermined. In addition, the loss of culturally significant spaces, the lack of resources and arable land, and shifts in climate will negatively affect human welfare. Population growth is considered as one of the threats to world's environment. This is because each person requires energy, space and resources to survive. Hence, rapid population growth in developing countries contribute significant share for environmental degradation, as their livelihoods depend on provision of goods and services from the ecosystem (Kozeill et al. 2002).

Increased stress due to unprecedented growth on human population growth on the limited resources of the earth made resources and population relationship studies one of the most important and urgent needs of many societies. Ethiopia at least before 1970, in relative terms, was self-sufficient in food production. Its natural environment like forest, soil and water resources were in a better condition than the recent phenomena and population growth rate was not exceeding the rate of growth of the economy (Muluneh, 2000). But since 1960 population growth rate started to accelerate, doubled by three- fold and followed by excessive consumption and over use of forest resources and soil. For instance the population growth rate of the country increased from 0.2 percent in 1900 to 1 percent in 1925 and 2 percent 1950. But after the 1950, the population growth rate was increasing rapidly until it reached its peak of 3 percent in 1990. Such high rates of growth virtually doubled the size of population in 60 years for the first time in 1960. Then it takes only 28 years to double the size for the second time in 1988 (CSA, 1994).

Moreover, to meet the basic needs of the ever increasing population, extensive agricultural production was practiced. Agricultural land was extended into forest areas and as a result the forest coverage is depleted (Bielli et al. 2001). Farming in the steep slope would lead to accelerated soil erosion and eventually decrease the productivity of the land, whereby it becomes difficult and probable challenging to meet the growing demands of increasing population size.

Local peoples' attitude and practice on their environment is decisive to the sustainability of resources. Social, economic, political and cultural settings influence the way in which people perceive their environment and react to it (Monique, 2008). The Ethiopian highland (above 1500 m.a.s.l) which constitute 43 percent of the country and 88 percent of the population poses serious environmental problems particularly land degradation due to increasing use of marginal land for agricultural purposes (Shiferaw and Holden, 2001). This makes Ethiopia to have one of the highest rates of soil nutrients degradation in sub-Saharan Africa. The reasons stated for this aggravating situation are population increase, decreasing land holding sizes, deforestation, overgrazing and limited use of appropriate conservation practices (Shiferaw and Holden, 2001).

Farmers' perception of what is happening to their environment (land and forest) due to their growing numbers serves as a basis for any future intervention strategies. Moreover, achieving local participation in population regulation and environmental conservation requires the study and analysis of local peoples' belief, knowledge, attitudes, interests and perception about their population size and physical surroundings. In the face of decreasing environmental resources (both in quality and quantity) caused partly by high population growth, peasants employ a number of mechanisms that help them to overcome this problem. However, studies on peoples' perception and response to population pressure on the environment are few.

In light of the above background, this study is intended to make some contribution on local peoples' responses to population pressure on the environment in Oromia by taking the case of Dandi Woreda of West Shoa Zone, which is the second most populous woreda from the Zonal administration with a population size of 165,803 (CSA, 2010). Like the

country's population, majority of the woreda's population are agrarian society. Accordingly, 84.7 percent of population resides in rural areas while the remaining 15.3 percent is urban dwellers (CSA, 2010).

1.2 Problem Statement

Growing population size is perhaps one of the most important problems being faced by humans today (Bielli et al. 2001). This is because population growth is commonly regarded as one of the most important sources of environmental degradation. Accordingly, the major environmental problem currently threatening Oromia is land degradation. Land degradation in the region could be attributed to deforestation, overgrazing, over cultivation, soil erosion and desertification etc (OBLEP, 2008). In most parts of the region, the present consumption of woods is in excess of production. From these one can conclude that environmental problems-the over use of natural resources and the degradation of ecosystem are increasingly understood to play an important role in increasing human vulnerability, undermining livelihoods and human well being, and creating instability.

Although environmental change threatens all of humanity, people living in the developing world are often the most vulnerable to its effects, as large proportions of these populations are directly dependent on activities such as agriculture, forestry and fisheries for their well-being and survival. These further revealed that land degradation is a great threat for the future and it requires great effort and resources to ameliorate in Ethiopia (Girma, 2001).

Inappropriate land use systems enhance desertification and loss of agro biodiversity at large. Utilization of dung and crop residues for fuel and other uses disturbs the sustainability of land resources. The supply of modern farm inputs like fertilizer, farm machinery and credits are very low. Another study by (Markos, 1997) also indicated that land which is the fundamental resource base of rural people, is suffering from different forms of degradation (erosion, over cultivation, fragmentation etc). By and large, problems associated with land degradation are anticipated to pose the most series development challenges in the country.

In addition to the severity of the problem, there exists a serious lack of knowledge about the dynamics of the effects of population pressure on the environment in the country. This lack of knowledge stems from absence of micro-level studies that deal with nexus type of relationship between population and environmental resources. For Example, the social, institutional and demographic aspects as well as consequences of the drought and famine that occurred in the 1970s and 1980s have not been studied sufficiently. Likewise, studies on farmers' awareness and perception about land degradation are very rare in the country. Therefore for environmentally and socially sustainable development there is an urgent need to promote awareness and understanding of the interdependence of natural, socio-economic and political systems at local and national levels. Understanding the current status regarding the interrelationship between population growth and environment is very important.

This study therefore is meant to assess the perception and response of local communities on the effects of population pressure on the environment of "Dandi woreda" with particular reference to the three Kebeles identified as a sample. Besides, the study will gather useful information on the local people's attitude towards different socio-economic and demographic characteristics.

1.3 Objective of the study

The main objective of this study is to examine public perception about the effect of population pressure on the environment and their responses to cope up with the prevailing environmental problems. In line with the general objective the study specifically:

1. Explores the effects of population pressure in influencing perception of the farmers' about the impacts of population pressure on the environment;
2. Examined the socio-economic factor that affects farmers' perceptions about the impacts of population pressure on the environment;
3. Analyses demographic factor that affect farmers' responses to the impacts of population pressure on the environment; and
4. Examined demographic factor that affect farmers' responses to the impacts of population pressure on the environment.

1.4 Research Hypotheses

Congruent upon the stated objectives, the study will have the following hypotheses:

1. Farmers' Perception about the effects of population pressure on environment is positively correlated with their literacy status.
2. Farmers who have close contact with development agents (DAs) are more likely to be well aware of the effects of population growth on the environment than their counterparts
3. Farmers' who have access to media have better in perception and response to the impacts of population pressure on the environment.
4. As the size of landholding decreases or increases the perception of farmers about the impacts of population pressure on the environment increases or decreases, respectively.
5. Larger family size has better understanding of population pressure on the environment than the small family size.
6. Farmers that made contacts with development Agents have better perceptions and responds to the impacts of population pressure on the environment
7. Participation in social organizations improves the responses farmers made to the impact of population pressure on the environment.

1.5. Significance of the Study

Population pressure is one of the major factors which causes and aggravates land degradation. In Ethiopia degradation rate of ecology outpaced the rate of conservation measures made so far (Abiy, 2002). Among the different factors which influence the implementation of population control and environmental conservation measures, demographic and socio- economic characteristics of the local community is crucial for it is the farmer who adopts, implements and take care of population pressure on environment.

In light of the overall observation the study is intended to make some contribution to studies on local communities' perception to the effects of population pressure on environment and their response in Oromia by taking Dandi Woreda of West Shoa Zone. This study also may help government and non-governmental organizations in the overall planning and implementation programs to alleviate population and environmental related problems in Ethiopia in general and to the study area in particular. Besides, the study will gather useful information on the local peoples' perception of population pressure on the environment and the type of strategies designed to cope up with the existing demographic and socio-economic problems.

The relevance of discussing the conditions of land and forest resources in this study is not only because they are indicators of degradation but also because they are the fundamental basis of survival for peasant life. This is because rural people entirely depend on land and forest resources for their living creating pressure over the available scarce resources leading to ecological degradation.

1.6 Operational Definition of Concepts and Terms.

Presented below are contextual definitions of concepts and terms used in the study.

Population pressure: refers to phenomenon of imbalance between resources of the community and population living within an area due to over-exploitation and over use particularly forest and farm land.

Land degradation: loss of land productivity, quantitatively or qualitatively through various processes such as wind and soil erosion water logging and depletion of soil. Accordingly, land degradation refers to loss of land productivity due to population pressure.

Environmental degradation: refers to the depletion or destruction of resources, renewable and non-renewable resources supposed by human over use and abuse. Hence, environmental degradation implies to the depletion or destruction of resources particularly agricultural land and forest resources.

Perception: refers to individual's awareness/understanding on the impacts of population Pressure on the environment.

Deforestation: refers to the removal of trees without sufficient a forestation because of population pressure.

Age: refers to the number of completed years the person lived since his/her birth.

House hold size: refers to the total number of persons living in the same household.

Literacy status: refers to the number of completed grades in his/her school attendance categorized as illiterate and literate.

Size of farm land: is the area of agricultural farm land that belongs to a given household.

Peoples' response: refers to the way of mitigating or coping mechanisms that is under taken by an individual residence of the study area to the effects population pressure on environment.

1.7 Scope of the study

The scope of this research will be confined to Dandi woreda of west shoa zone by taking three kebeles. Conceptually, this study focuses on farmers' perception of the effects of population pressure on environment and their responses. Accordingly, there is no single satisfactory index of the state of the environment. The relationship between population and environment is usually analyzed or examined in terms of individual resources. Therefore, this research focuses on agricultural land use and forest resources in relation to population pressure that prevails. The other environmental components like water resources, climate change and pollution are not included because they are not easily perceived like others. In general by taking these environmental components (land use and forest resources), this research examines its interaction with demographic and socio-economic condition of the three kebeles selected in the study area.

1.8. Limitation of the study

The study is actually expected to show full picture of farmers' perception on the effects of population pressure on the environment and their responses. Such study by its nature requires long period of time, adequate budget to increase sample size and geographical coverage. Due to these constraints the study is limited only to 403 households selected from three rural kebele administrations of Dendi woreda.

1.9 Rationale of the study Area Selection

Rapid population growth in poor countries is seen as a threat to their development and even to global welfare (Bielli et al. 2001). Rapid population growth ,limited arable land and shortages of employment opportunities in the industrial and service sectors have increased pressure on the forest and grazing land resources in Ethiopia , thus increasing land degradation through exploitation and misuse. Particularly, land degradation is a major problem in the region particularly in the study area according to report of the woreda office of land and environmental protection revealed. Therefore, for the different demographic and socio-economic factor related to environmental problems, this research site is selected .Moreover, Local studies that deal with measurements of public awareness level are very rare in Ethiopia (Hiruy, 2008). Therefore this study which focuses on farmers' perceptions and response of population pressure on the environment may help different institutions in their planning and implementation program to cope up with the ever increasing problem of land degradation in the study area.

1.10. Organization of the Thesis

This thesis is organized into six chapters. Chapter one covers background, statement of the problem, objective, hypotheses, significance of the study, rationale of the study, operational definition of terms and concepts, scope of the study and limitation of the study. Chapter two reviews findings of other studies relevant to this research topic. The review mainly covers theoretical and conceptual framework on the interrelationship between population and environment. Chapter three presents the methodology used. Chapter four presents background of the study area that deals with demographic and socio-economic characteristics of respondents. Chapter five deals with data analysis and discussion of the results on demographic and socio-economic determinants of farmers' perception and responses of the impacts of population pressure on the environment which incorporates results of the bi-variate and multivariate analysis and discussion of major findings. Chapter six summarizes the findings, conclusions and policy implications of the study.

CHAPTER TWO

REVIEW OF RELATED LITRATURES

The literature review begins with the general consideration of approaches and followed by a review of individual studies. More of it focuses on theoretical and conceptual frameworks on the interrelationship between population and environment from global to country level perspectives particularly based on empirical evidences studied in the country.

2.1 Theories on the Interrelationship between Population and Environment

2.1.1 Theoretical issues from Global perspectives

Although population-environment relationships are multidirectional, the majority of recent research focuses on the impacts of population on the environment. The study considered in the present literature review generally reflects this orientation. The specific topics covered by the literature review include agricultural land and forests. The degradation and depletion of energy resources, climate change and loss of biodiversity are addressed indirectly in the context of other issues. For example energy resources are addressed in terms of fuel wood under forest section.

Generally, differences in opinion and approaches characterize the discussions of population and environment relationship in both public and academic context the most debatable. The Malthusian and Boserupian perspectives represent the two dominant historical view points on population – environment relationships. (Malthus, 1798) postulated that where as human population has tendency to grow geometrically, production of food grows only arithmetically. In this way, population growth tends to outstrip the productive capabilities of land resources. In more general terms, the Malthusian view point suggests that limited natural resource place a restriction on population growth (UN, 1994). This view point has informed much popular discourse on

population environment relations, notably by the works of Brown and others (1976), Ehrlich and Holdren (1971 and 1974), and Boserup (1965). However, Boserup (1981) explicitly takes into account technological change. Moreover, Boserup suggested that in some cases population growth and resulting increased population density might induce technological changes that allow food production to keep pace with population growth. Even though Boserup was in favor of optimistic view that argued rapid population growth is essential, it is not applicable to the Ethiopian situation (Lemessa, 2009). This is due to the fact that agricultural technology of the country is at low stage of development. It is important to note that neither Boserup nor Malthus specifically addressed population environment relations *per se* rather land use and food production in relation to population. Both the Malthusian and Boserupian perspective imply linear relationship between population and environment. Malthusian and Boserupian perspective imply direct relationship between population and the environment or between population and technological change and development (UN, 1994 and Catherine 1997). Social and natural scientists have, however, also introduced other nonlinear ways of thinking about population environment relationships. These non-linear views include the “multiplicative” effects between population and other factors (consumption or technology) in producing environmental impacts and “mediating” effect that other factors (socioeconomic, institutional and cultural) may have on population environment relationships.

Implications on general linkages between population and resources, however, are frequently inferred from their work and their ideas probably represent the two dominant historical view points within the topic understudy. Both of these perspectives emphasize the reciprocal, linear, and direct relationships which exist between population and their environment.

Multiplicative perspective present the view that population (size, growth, density and distribution) interacts in multiplicative way with other factors, such as levels of consumption and technology, to have impacts on the environment.

Numerous studies focus on the context in which population and environment relationships occur or the social, cultural, institutional, and political factors which mediate relationships. Social scientists are inclined to consider the impacts of social, cultural and institutional factors on population environment relationships (Catherine, 1997), and much recent research implicitly or explicitly reflects this view point. Bilsborrow (1992) has elaborated a mediating framework for understanding the impacts of population pressure on agricultural land in rural areas in Latin America. This framework considers how socio-economic conditions like governmental policies determined whether population growth leads to technological change in agriculture, soil degradation or out migration (UN, 1994).

Another perspective collapses all social, cultural and institutional factors that mediate population-environment relationships into the larger concepts of 'development' and focuses on the way in which development process mediate population and environment relations. This view focuses on the way in which development process mediate population and environment relations and reflects a dependency perspective (Jolly, 1993). This view point suggested that environmental degradation and population growth were interrelated since both derived from poverty resulting from core- periphery dynamics.

2.1.2 Current Perspectives on Population –Environment Connection

According to (Jolly, 1994) the current theoretical perspectives on the issues of population and environmental degradation are grouped in to four .These are the natural science, the economics, the political economy and the combination perspectives.

The **natural science** perspective draws from the Malthusian outlook as well as from general ecological studies. It emphasizes how human action as outside forces affects the natural environment. This perspective holds that the environment does not have an unlimited ability to meet human demands, and that growing population's will at some point reaches those environmental limits. This stems from the concept that the environment has a natural carrying capacity for sustaining human populations, which cannot be exceeded in the long term without negative consequences. Population growth is

seen as the main source of environmental degradation, and controlling it is an essential element of efforts to protect the environment (Jolly, 1994)

The **economics** perspective holds that environmental degradation is not a result of population pressure *per se*, but of economic inefficiencies and distortions of the market. According to this outlook, conditions such as common property arrangements and agricultural pricing policies give the wrong signals to people, leading them to misuse resources. It emphasizes that, with properly functioning markets, prices will provide appropriate signals to people regarding resource use.

The **political economy** perspective dwells neither on the environmental limitations nor on the economics. It focuses on relations between people and state, especially in developing countries. In this perspective, poverty and the unequal distribution of resources are the root causes of both environmental degradation and population growth. Therefore, the key to solve environmental degradation is to correct distorted political relations and alleviate poverty (e.g., promote income equality and resource redistribution). Reducing poverty will also have a direct effect on reducing population growth (Jolly, 1994).

The **combination** perspective is a synthesis of the other three perspectives. It holds that there are series of ultimate causes of environmental degradation that may bear play in a given area, including poverty, warfare, and poor economic and political policies. Population growth, therefore, may not be the root problem but tends to aggravate the basic root problems. According to this perspective, ensuring environmental protection will require identifying, on a case-by-case basis, the ultimate drivers of degradation. Meanwhile attempts to control population growth will provide some interim reduction in the level of environmental impacts (UN, 1994).

The combination perspective seemingly depicts the situation of environmental problems in developing and poor countries. For instance, in countries or regions (e.g. Asia) where poverty, warfare and political crisis are resolved, growth in population is paralleled by technological change, and its direct impacts on the environmental resources are

minimized. However, although it is true that the causes of environmental degradation are multifaceted, population pressure is the key cause of land degradation in countries of poor political and economic growth. Thus, the natural science perspective more pertinently explains the current population-environment connection in developing countries (Catherine, 1997).

2.1.3 Population Pressure: concepts and definition

Although the equilibrium state between population and resources may be a rare phenomenon, the imbalance between resources and the population living within the territory are more common. Such maladjustment between resources and population give rise to serious stress that may be termed as population pressure (Chanda, 1999).

The pressure of population, according to (Taeuber, 1970) implies shaking of the equilibrium between population and resources due to mounting strain of population. (Clarke, 1970) also seems to share this opinion when he suggests that the pressure of population is caused by the imbalances between human numbers and their needs. (Browning, 1970) considers population pressure as maladjustments between resources of a community and the population. The very fact that a given piece of land can support only a given number of inhabitants under a given set of technical, economic, social and cultural conditions without causing any deterioration of the land itself, is a significant pointer towards such maladjustments.

However, there is no universally accepted definition of pressure of population that encompasses all kinds of population pressure situations, which vary both in space and time. This is because it involves relationship between ecological, social, cultural and historical variables. It was perhaps this realization that prompted (Mabogune, 1970) to suggest that population pressure should be conceived as a result of interaction between three variables (land, people and expectations). According to him, the conditions population pressure would occur if; resources and population are low but expectations are high, resources are low but population and expectations are high, and resources and expectations are low but population is high.

While it is true that Mabogune has succeeded in covering all the variables other than population and resources in just one phrase 'expectations' yet it does not make the task of finding a universally accepted definition of the term 'population pressure' . This is because still there is a question of how to measure the three variables operationally. Such difficulties in the conceptualization and measurements of population pressure explain the inadequacy of information on the subject. Although much has been written about the problem of population at global/continental level, the precise studies at micro level are completely lacking (Chandna, 1999).

2.1.4 Population Pressure and Land Degradation

In developing countries like sub-Sahara Africa rapid population growth contributes to land degradation (UN, 1992; Carr, 2004). The same source indicated that if population growths of these countries are unchecked, resources may be depleted at rates faster than the ability of the country to respond through economic and institutional change. The population's age structure provides an important link between current and future demands for job creation and social services. Generally, the poor households are constrained to degrade resources in order to survive (Preston, 1996). They cut down trees for fuel wood and fodder, overuse agricultural lands and migrate to marginal sites (forest covered areas).

2.1.4.1 Deterministic views of population and environment

The position that population growth leads to the eventual breakdown of resources has had a long history (UN, 1992 and Bielli et al., 2001). Classical economists during the late eighteenth and the nineteenth centuries believed that although technological progress depended up on the minimal population size to generate enough labor and capital savings, excess population would eventually result in severe pressure on the environment (UN, 1994). Malthus and other classical economists argued that the limits of decreasing fertile farmlands would lead to diminishing returns per capita as more labor and other inputs were applied to a fixed land. Further, population continues to grow with improvements in levels of living, resulting in falling real wages and labor productivity.

In contrast, neo-classical economic model emphasized the value of market mechanisms as mediating the effects of population growth and resource scarcities. Larger numbers of people brings about technological and institutional change and encourage the use of more efficient techniques that augment productivity (UN, 1992 and Jolly, 1993).

Boserup (1965, 1981) suggests that increasing population densities induce the shift to progressively labor intensive farming system. This indicates that Easter Boserup emphasizes on innovation and land intensification as a response to population pressure. Using evidence from Africa, she argues that as the number of people per land unit rises and the returns to the land per worker hour begin to fall, pressure for the land to provide for those additional people increases.

2.1.4.2 Middle views on Population and the Environment

A middle views are proposed, depicting population neither causing environmental damages nor contributing to technological change and economic development (UN 1992; Catherine, 1997). Rather, population change factors are seen as indirect causes, working through fundamental processes that contribute directly to declining environmental quality.

2.1.4.3 Population Dynamics Affecting Land Degradation.

Certain population dynamics have significant impact on resource use and environmental quality. These dynamics have persisted for a long time periods although their effects vary from country to country (UN, 1992).

Population size is one of the factors that have significant impact on resource use and environmental quality. According to (UN, 1992) despite declining population growth rates and increasing number of population each year will continue to exert pressure on land and other resources. This is true to most developing countries today where population growth is highest. Thus high population growth in this region increases demands on resources to cope up with rapidly expanding population which will result in

land degradation. The other population variable which has significant impact on environmental resource is age structure. This is because different population composition (age) can have an effect on the environment; this is due to the fact that different population sub groups behave differently (UN, 1992). Different sources revealed that changes in age structure during the past 40 years have produced large annual increments to the labor force of most developing countries, which usually depend on environment resources for survival.

2.2 Empirical Evidences from Ethiopian Perspectives

Available literature (Markos, 1997; Abiy, 2002) indicates that in developing countries like Ethiopia land degradation is one of the greatest threats which strike at the basic resource of the population. The degradation process is so acute in Ethiopia that millions of people have fallen in to poverty. The situation in Oromia is not different. Accordingly, the major problem regarding land use in Oromia is the rapid growth of population (BOLEP, 2008). This has led to fragmentation of farmlands, decrease in sizes of landholding and productivity, an increasing cultivation of marginal land and critical shortage of grazing land are the most notable one.

Similar to the findings of the above authors (Girma, 2001) indicated that because of rapid population growth, large forest and crop areas are required to satisfy the needs of the nations. However, with deforestation, little was done to maintain the vegetation cover, and there was no effective a forestation program. To describe the magnitude of these problem, for instance according to the Global Forest Resource Assessment (GFRA, 2005), between 1990 and 2000, Ethiopia lost an average of 140,900 hectares of forest per year. This amount of an average annual deforestation rates 0.93 percent. Between 2000 and 2005, the rate of forest change increased by 10.4 percent to 1.03 percent per annum. In total, between 1990 and 2005 Ethiopia lost 14 percent of its forest cover or around 2,114,000 hectares (FAO, 2005). This uncontrolled encroachment and clearing of forest land has been taking place and will continue until management plans are put in place. Measuring the total rate of habitat conversion for the 1990-2005 intervals, Ethiopia lost 3.6 percent of its forest and woodland habitat due to firewood collection, conversion of

farmland, over grazing, and use of forest wood for building materials (FAO, 2005). As a result Ethiopia will face a difficult future due to her dependence on forest resources.

Another study by (Aynalem, 2006) regarding land use patterns and environment in Ethiopia also indicated that land productivity is seriously constrained by land degradation in most parts of the country. This, coupled with rapid increases in population numbers and growth rates, brings a rise, rather than a decline, in poverty levels.

The study by Japan International Cooperation Agency (JICA, 1999) also cited the following land use and demographic factors for the country's economic and environmental woes: Population pressures, particularly on the highlands, Conversion of forest land into agriculture, resulting in soil erosion and environmental degradation, and Conversion of crop residues and animal waste into fuel, thus depriving the soil a chance to replenish itself.

Different findings (Aynalem, 2006; Markos, 1997; MOFED, 2008) revealed that Ethiopia is the most environmentally devastated country in Africa. According to this study, every year almost 3 billion metric tons of top soils are washed away. On the other hand, per capita land size has been declining as a result of increasing population as the size of farm households increases; redistribution of the land has continued reducing the pre capital land holding. Currently, according to MOFED (2008), average land size per house hold has fallen to less than 1 hectare in 7 out of the eleven regions or almost 62 percent of the household. This makes a large number of households to be dependent on inadequate and unproductive plots.

Previous studies such as (Mulugeta ,1992) and (Markos ,1997) have shown that farmers' who belong to different social and economic classes exhibit certain demographic characteristics are more likely to perceive and respond to the impacts of population on the environment .To support this (Abiy, 2002; Hiruy,2008; Lemesa,2009) found that in Ethiopia the major social factors that affect farmers' awareness on the effects of population pressure on the environment were educational levels of people ,participation in social organization are most noted.

2.3. Demographic and Socio-Economic Factors Influencing Perception of the Farmers about the Impacts of Population Pressure on the environment and their Responses

According to different scholars of behavioral science, perception, knowledge and attitudes are the main factors determining the individuals' decision-making behavior (Abiy, 2002). Similarly, farmers' perception and knowledge about population pressure as it impacts on the environment determine their response. The farmers' perception of resource degradation and their knowledge and attitude towards alternative conservation techniques constitute some of the very important factors that influence his conservation behavior (though they are) the least sustained and understood subjects in Ethiopia (Belay, 1992).

Now days, the research that explained environmental perception using demographic and socio- economic factors have been advanced. As a result, our understanding of how people view, think about, and aware of the natural environment increased (Lemessa, 2009). This shows that public knowledge of natural resources and their special interest in use of them play a decisive role in conservation and management of different species. However, public perception and responses to environmental degradation varies from individual to individual (Tigist, 2008). Different sources (UN, 1992; Abiy, 2002; Hiruy, 2008) indicated that farmers' perception about the effects of population pressure on the environment are affected by demographic and socio- economic factors. Therefore factors contributing to the unequal perception and responses to environmental degradation due to population pressure are included in demographic and socio-economic variables. These are;

2.3.1. Demographic Factors

A demographic factor (age, sex, household size) affects perception of people on the effects of population pressure on the environment. Accordingly this is taken as one of the variable to be selected for the study area under consideration.

2.3.2 Social Factors

There is marked differences in perception and responses of the public to the environmental problems as a result of population pressure. Thus uneven level of people's perception and response is due to the variation in socio-economic factors (Tigist, 2007). Accordingly; social factors (educational status, contact with DAs, participation in social organizations and access to different sources of information) are believed to have effects on the perception of people on the impacts of population pressure on the environment. Different studies (Abiy, 2002; Hiruy 2008, Lemessa, 2009) have shown in Ethiopia the major social factors that affect farmers' awareness on the effects of population pressure on the environment was educational level of the people, participation in social organization are most noted.

2.3.3. Economic Factors

These refers to the economic status of the people, contact with development agents, size of landholdings and participation in the conservation activities which affect perception of people on the impacts of population pressure on the environment. This is because better access to development agents can improve the ability of rural people to use natural resources more productively and diversify their income sources away from dependence up on natural resources alone (Tigist, 2007). Similarly in Ethiopia poor women and men depend on collecting fuel wood for their livelihood .Especially in areas close to urban market collecting and selling of fuel wood is a major source of living.

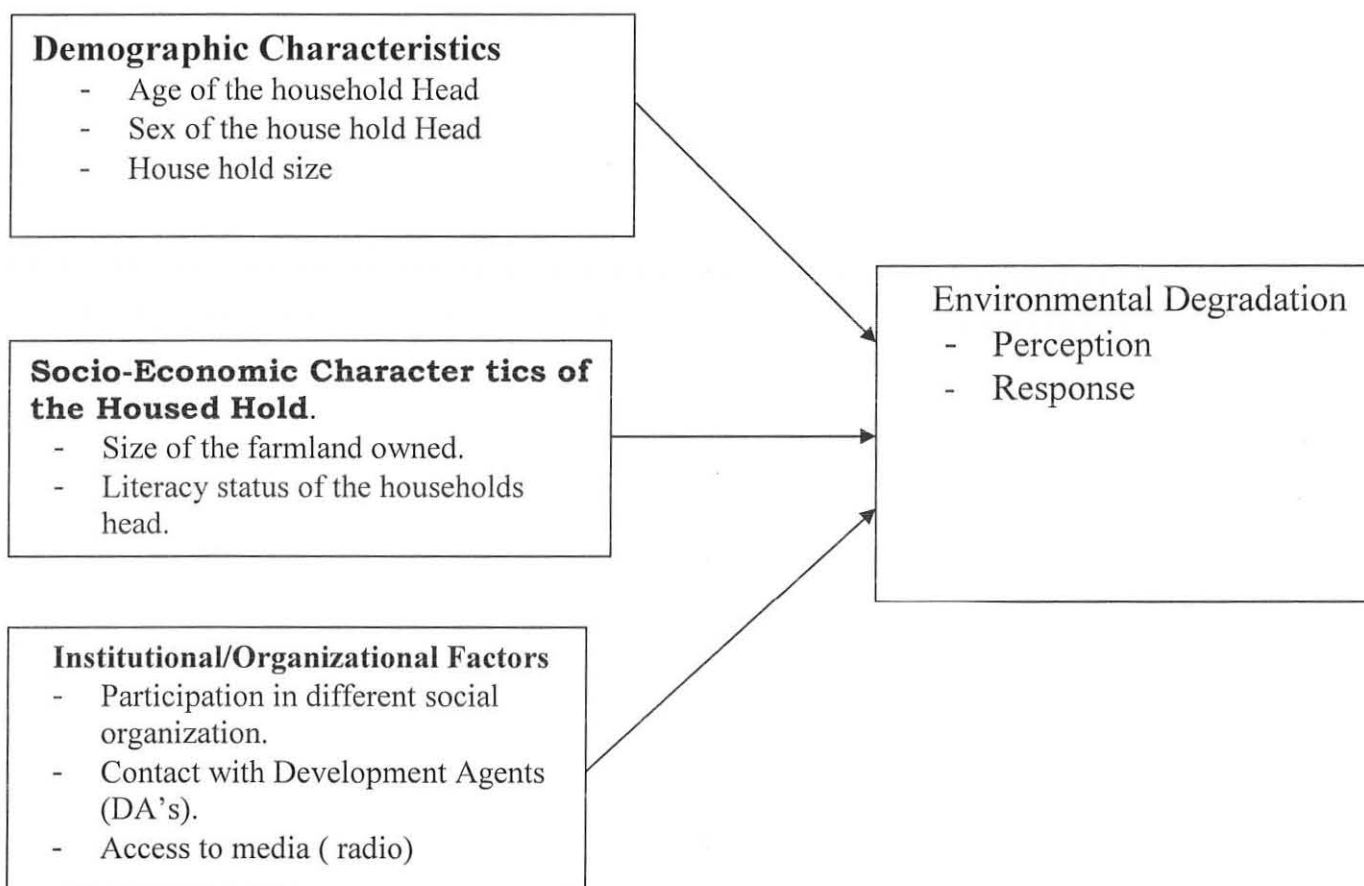
2.4. Conceptual Framework

The main dependent variables that constitute the conceptual framework for this study are farmers' perception and their responses to the impacts of population pressure on the environment. Available literature reviewed indicated that local Communities (public) perception to environmental degradation due to population pressure is affected by different demographic, economic and social factors.

The demographic factors or characteristics refer to household size, age of the house hold and sex of the household head. In addition, there are various economic and social characteristics, which have strong relationship with the perception to the rapid population growth and its impact on the environment.

Educational status of the household head, size of the farm owned, participation in different social organization (Idir, Debo, Mahiber) contact with development agents (DAs) and access mass media are important economic and socio-cultural factor in this section. Continued population pressure causes environmental degradation .Therefore ,enhancing public perception through improving demographic, economic and socio-cultural factors will help to reduce population growth rate and this alleviates the consequent environmental degradation which prevails in the woreda understudy.

Fig. 1. Conceptual framework for the study area dealing with public perception about the effects of population pressure on the environment and their responses.



Source: Developed by the researcher based on literature review

CHAPTER THREE

METHODOLOGY

3.1. Research Design and Approach

This study is cross-sectional in nature.

3.2. Sources of Data

Both primary and secondary data were used for this study. The primary data were gathered through questionnaires, in-depth interview (KI), and observation. While the secondary data used in this study were collected from different institutions/offices like Woreda administration, Agricultural office, Finance and Economic development, CSA, Regional Finance and Economic development particularly the statistics core process team.

3.3 Sample size Determination.

Generally, for this study three rural Kebeles of the woreda (Dano Ejesa Gibe, Gare Harera and Wamura Sako) are selected purposefully. This is because it is believed to be representative as far as the agro-ecology and ethnic composition is considered. The target populations were selected from these three kebeles based on random sampling technique. The sample frame for each selected kebeles was taken from rosters of respective kebeles and the desired number of sample size was determined, and sample is selected in a systematic way using sampling with probability proportional to size methods. Totally the target population was about 403 household heads.

The sample size was determined using the Dixon and Leach's (1978) sample size determination technique.

$$n = \frac{p(1-p)(z_{\alpha/2})^2}{(\epsilon)^2} + 5\%$$

Where

n = is the sample size

P = is an estimate of the population assumed to be perceived the effects of population pressure on the environment i.e. ($P=0.5$).

Z = is the standard normal value corresponding to the desired level of confidence (95%).

α = is the area under the normal curve to the left of or right of Z , $z_{\alpha/2}=1.96$

ϵ = is the maximum acceptable error which is $\epsilon=0.05$.

$$n = \frac{p(1-p)(z_{\alpha/2})^2}{(\epsilon)^2} + 5\%$$

$$n = \frac{0.5(1-0.5)(1.96)^2}{(0.05)^2} + 5\%$$

$$n = 384 + 19$$

$$n = 403$$

The calculated sample size was proportionally allocated to the selected kebeles (see Table 3.1). Sample size for each kebele in proportional allocation was calculated by the formula

$$n_a = \frac{N_a}{N} * n$$

Where

n_a is sample size for kebele a ,

N_a is number of household heads in kebele a ,

N is the total household heads of all the three kebeles that were selected for the study and

n is the total sample size.

Table 3.1. Total Number of Household heads and Number of Sampled Populations by Kebeles.

Kebele	Number of household heads	Sampled population
Dano Ejersa Gibe	284	143
Gare Harera	234	118
Wamura Sako	282	142
Total	800	403

Source: Field Survey

3.4. Data collection procedure

Six interviewers and three supervisors were recruited and hired. Then training was given to both interviewers and supervisors for two days. The study focused effectively on 400 household heads. The remaining 43 household heads were not interviewed since they were not available during field survey. The instruments used for data collection are given as follows. These are:

i. Questionnaire

Structured Questionnaire is used to collect information at household level concerning demographic and socio-economic characteristics of the selected household head. The questionnaire was prepared in English language and translated in to “Afaan Oromoo”. The Afaan Oromoo translated version was tested in the field in a pilot survey for the study areas, to assess the content, clarity, and logical flow of the questions and the time needed on average to fill out a single questionnaire. Depending on the results of the pilot survey the instrument was finalized after corrections and reorganizations.

ii. Interview(KI)

This was used to generate in-depth information on the issues based on interview guideline from the key informants (KI). These KI are locally selected elderly people, Kebele administrators and

development agents. Interviews were also conducted with relevant Woreda sector representative working in population related issues (education, agriculture, youth, women, administration, and health).

iii. Observation

Personal observation on the farmers' land management practice and forest coverage of the area over the past decade has also been made focusing on demographic and socio economic factors.

3.5. Data Processing and Analysis

Some internal consistencies of the data were checked before the actual analysis work started. The quantitative data were entered into the computer for analysis by SPSS program. In order to achieve the stated objectives and test the hypotheses various methods of analysis are employed. Accordingly, the bi-variate analyses are used to show percentage variation among peoples' perception and response to population pressure on the environment. Chi-square is also used to test the nature of association of each independent variable with dependent variables.

In addition, logistic regression model was employed since this technique is the most appropriate tool for analyzing the degree of strength of the relationship between

dependent variables and independent variables when dependent variable is dichotomous taking values of 0 and 1. The general model of the logistic regression equation is:

$$\text{Ln } [p/1-p] = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k$$

Where p is the probability of being perceived/respond, the β 's are the regression coefficients and the x 's are the set of independent (explanatory) variables. The quantity to the left of the equal sign is called a logit. It's the log of the odds that an event occurs. The odd that an event occurs is the ratio of the probability of experiencing the event to the probability of it not occurring (not perceiving/not responding). The coefficients (β 's) in the logistic regression model tell us how much the logit changes based on the values of the predictor variables.

CHAPTER FOUR

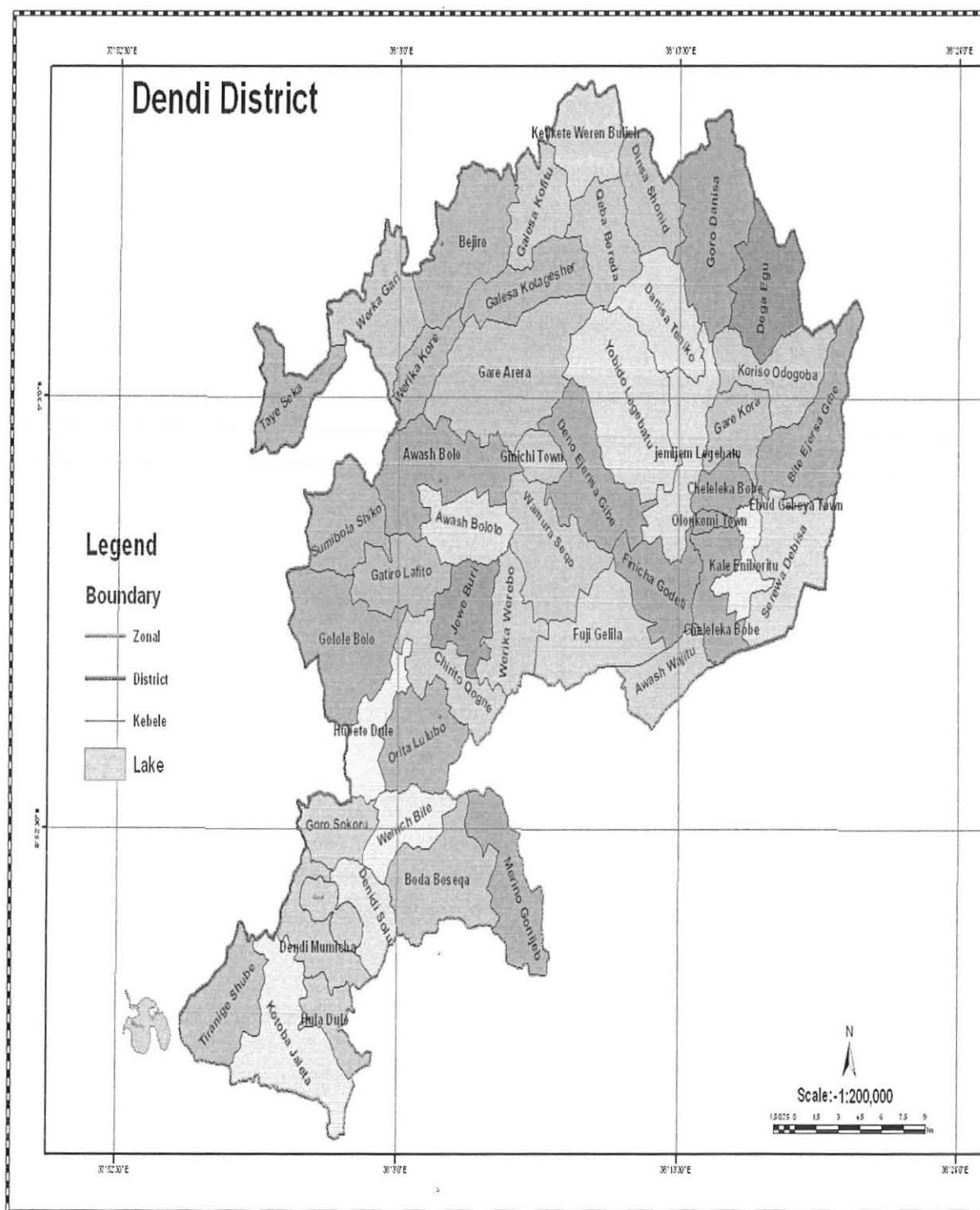
BACKGROUND CHARACTERISTICS OF THE STUDY AREA

4.1 Geographical Setting of the Study Area

Astronomically the study area (Dendi) is located between 8°43'04"N- 9°17'19" N latitude and 37°47'39" E-38°20'47"E longitude (IFPRI, 2006) .The relative location of this area is bounded by Jeldu and Ilfata woreda in the north, Ejere woreda in the east, Ilu woreda in the south-east, Dawo woreda in the south and Ambo in the west. Historically, the name of the district 'Dendi' is derived from Lake Dendi .Today, Dendi is one of the twenty woredas of West Shoa zonal administration in Oromia National Regional State .The total area of the woreda is 105,180 hectares (BOFED, 2007). The woreda is sub-divided into 48 rural and 6 urban kebele administrations. Agro-ecologically it is divided into two agro-climatic zones of dega (21 percent) and woina-dega (71 percent). Distance of the woreda capital (Ginchi) from zonal capital (Ambo) is 35 kilometers while the distance of woreda capital from the regional capital (Finfinne) is 77kms. In addition, in the woreda the relief features consists of plateaus, plains and mountains. Accordingly, the highest and lowest most points of the study area are 3270 and 1500 meters above sea level, respectively (BOFED, 2007).

The same source revealed that land resources, forest resources and soil are the main natural resources that constitute the foundation for the development of the region (Oromia) in general and the study area in particular. Although this woreda has very dense forest and vegetation in the past now days it is decreasing due to increased demand for farmland, deforestation and increased population pressure. At present major types of natural vegetation found in the woreda are forest coverage, wood land reverie, shrub and bush, savanna and others. At the same time wild life resources of the study area also decreased due to human interference (BOFED, 2007).

Fig.2. Map of the Study Area



Source: International Food Policy Research Institute (IFPRI, 2006)

4.2 Demographic and Social Profile of the Study Area

Among the various elements of population characteristics, sex composition, age composition and socio-economic composition hold a prime place for this study. Hence the separate data for male and female are important for various types of planning and for the analysis of other demographic characteristics. The balances between the two sexes affect the social and economic relationships within the community. It is in this context that the discussion pertaining to demographic and socio-economic profile of the study area is presented below.

4.2.1 Age-Sex Composition

The percentage distribution of the population by sex and broad age group show that the woreda has a total population of 165,803(CSA, 2010) .Female population constitute slightly less than half 81,815(49.34 percent) of this population, while the male population constitute the remaining 83,988(50.66 percent). In other words, the sex ratio was 103 males for every 100 females. The lion's share of this population (nearly 84.7 percent) is rural and the remaining 15.3 percent was urban dwellers. The young as defined by less than 15 years make up of 46 percent of this population while the old age (aged above 64 years) population constitutes 4.6 percent of the total .The economically active age group make up of the remaining 49.4 percent of the total population (CSA, 2010). This gives the overall dependency ratio of 102.

4.2.2 Ethnic Composition of the Study Area

Ethnic identity of a person is traced through his /her tribal origin. The distribution of ethnic group as indicated in the CSA, 2010 statistical report revealed that the Oromo are the single most dominant group of the population in Dendi woreda comprising of 96 percent the total population. Amhara ethnic group occupied the second position (3 percent). This was followed by Gurage (0.6 percent) and other ethnic groups make the remaining 0.4 percent of the total population of the woreda

4.2.3 Religious Composition

Information regarding religious affiliation of every member of household is shown in table 4.1. Accordingly, 84.9 percent of the population are orthodox and 8.5 percent, 5.1 percent, 0.8 percent and 0.3 percent were traditional, protestant, Islam, and Catholic population, respectively(CSA, 2010). Those people who belong to the other religion group accounted for 0.4 percent of the population.

Table 4.1 Major Religious Groups of Dendi woreda, 2007.

<i>Major Religious Groups</i>	<i>Number</i>	<i>Percent</i>
<i>Orthodox</i>	<i>140,901</i>	<i>84.9</i>
<i>Protestant</i>	<i>8,469</i>	<i>5.1</i>
<i>Catholic</i>	<i>501</i>	<i>0.3</i>
<i>Islam</i>	<i>1,219</i>	<i>0.8</i>
<i>Traditional</i>	<i>14,039</i>	<i>8.5</i>
<i>Others</i>	<i>624</i>	<i>0.4</i>
<i>Total</i>	<i>165,803</i>	<i>100</i>

Source: CSA, 2010

4.2.4 Educational Characteristics

Of the total population of the woreda aged 5 years old and above (139,551 persons), 84,826 person (60.78 percent) never attended school in 2007 (CSA, 2010). It was only 54,725 people (39.22 percent) of those aged 5 years old and above who either attended in the past or currently attending during the 2007 censuses period. The proportion of population by literacy status varies between urban and rural as well as between male and female population. For instance from the total population who never attended school (84,826 people) 47,637 were female population constituting 56.16 percent of the illiterate population in the study area (Dandi woreda). While the remaining proportion who never attended school from the woreda were 37,189 persons belongs to the male population

accounting for 43.84 percents .This shows that the high rate of illiteracy has been one of the bottlenecks in the rural development of the country/region. The literacy status of household heads in particular and household members in general affects house hold's livelihoods in various ways.

4.3 Background Characteristics of the Respondents

This section presents the background characteristics of the respondents. This is because they are expected to have close relationship in their perception and responses to the impacts of population pressure on the environment. Therefore it is important to present the background characteristics of the respondents in the study area in line with the demographic and socio-economic variables so far discussed under conceptual framework.

4.3.1 Demographic Characteristics

A number of demographic factors play a determining role in the perception and responses of population pressure on the environment. Different studies (Mulugeta 1992, Markos 1997 and Abiy 2002) have indicated that farmers who belong to different social and economic classes' exhibit certain demographic characteristics which are more likely to perceive and respond to the impacts of population pressure on the environment differently.

4.3.1.1 Age-Sex Composition

The age-sex structure refers to the composition a population according to age and sex. Accordingly, data disaggregated by sex of the respondents reveal that female headed households constitute 33(8.25 percent), while male headed make up 377(91.75 percent) of the respondents . This indicates that majority of the households are headed by males. As a result it is also more likely to say that the men are having relatively better control over the resources. Therefore, it is the men that are influencing the decision making process in the society. On the other hand the age distribution of the respondents (household heads) shows that the proportion of the respondents in the age group 20-39 is the lower 142 person (35.5 percents) as compared to age group of 40 years old and above which make up of 258 persons (64.5 percent).

4.3.1.2. Household Size

Households with less than 4 members constitute 44 percent of the respondents. Households with 5-7 members make up 43 percent and those with members greater than 7 members make the remaining 13 percent of the respondents, with average household size of 5.07(seeTable4.2). This is within an acceptable range to the 5.51, 5.52 and 5.24 average household size for Zonal, Regional and National figure as indicated in CSA, 2009.

Table 4.2. Percentage Distribution of Respondents by Household Size, Dandi Woreda 2010.

Household Size	Number	Percent
1-4	176	44
5-7	172	43
≥8	52	13
Total	400	100

Source: Field Survey

4.3.2 Socio-Economic Characteristics

4.3.2.1. Literacy Status

Literacy status is one of the socio-economic factors that influence the perception that people could have on the impacts of population pressure on the environment. Although this study is conducted in rural area where the majority of the people make a living from agriculture the survey reveal that 61.25 percent of the respondents are literates (able to read and write), where as the remaining 38.75 percent are illiterates (see table 4.3)

Table 4.3. Percentage Distribution of Respondents by Literacy Status, Dandi Woreda 2010

Literacy Status	Number	Percent
Illiterate	155	38.75
Literate	245	61.25
Total	400	100

Source: Field Survey

4.3.2.2 Religious Composition

During field survey the respondents were also asked about their religious background. Accordingly, Orthodox is the dominant religion accounting for 75 percents of the respondents. While Protestants, traditional and others constitute 31(7.75 percents), 42(10.50 percents) and 27(6.75 percents) of the respondents (see table 4.5 below

Table 4.4 Percentage Distribution of Respondents by Religion, Dandi Woreda 2010

Religious Groups	Number	Percent
Orthodox	300	75
Protestants	31	7.75
Traditional	42	10.50
Others	27	6.75
Total	400	100

Source: Field Survey

4.3.2.3 Ethnic Composition

According to the field survey, the major ethnic group of the study area is Oromo which accounted for 94 percents and followed by Amhara (4 percents). The remaining 2 percents were shared by other ethnic groups (see table 4.5)

Table 4.5 Percentage Distribution of Respondents by Ethnicity, Dandi Woreda, 2010

Ethnic Groups	Number	Percent
Oromo	376	94
Amhara	16	4
Others	8	2
Total	400	100

Source: Field Survey

4.3.2.3 Farm Size

The relentless exploitation of agriculture that is partly attributed to the rapid growth of population in Ethiopia has made land extremely scarce natural resources. This problem is even more pronounced in rural parts of the country where majority of the population resides. By virtue of being an indispensable part of life, land is changing invariably in configuration getting very small holding per household, and becoming scant supply to farmers in Ethiopia. In order to establish the average farm land and see the relation of perception, the heads of the households were asked questions on farm size. It is evident from the survey data that the average farm size in the woreda was 1.9 hectares per household. Accordingly, from 400 sample population, (36 percent) household heads possess less than 1 hectares of cultivable land. Those household heads who own more than 1 hectare accounts 64 percent of the total sample respondents. Thus, the average land holding per household is almost similar to the 1.71hectare of the zonal average land holding (CSA, 2009).The same source revealed that Regional and National average holding per household is 1.44 and 1.19 hectare.

Table 4.6. Percentage Distribution of Respondents by Landholding, Dandi Woreda 2010

Farm size	Number	Percent
Less or equals to 1 hectare	144	36
Greater than 1 hectare	256	64
Total	400	100

Source: Field Survey

Table 4.5 Percentage Distribution of Respondents by Ethnicity, Dandi Woreda, 2010

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Amhara	16	4
Others	8	2
Total	400	100

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Farm size	Number	Percent
Less or equals to 1 hectare	144	36
Greater than 1 hectare	256	64
Total	400	100

Source: Field Survey

4.3.2.5 Participation in Social Organization

In the survey the respondents were asked whether they are involved or not in different social organizations (idir, equib and religious meeting) operating in their kebele. This is because the necessity of being participant in different social organization is assumed to increase the communities' opportunity to discuss about the impacts of population pressure on the environment and hence increase their awareness level. Accordingly, most household heads (81.5 percent) participate in different social organization, while the remaining 18.5 percent didn't. (See table 4.7)

Table 4.7 Percentage Distribution of Respondents by Participation in Social Organization, Dandi Woreda 2010

Participation in Social Organizations	Number	Percent
Yes	326	81.5
No	74	18.5
Total	400	100

Source: Field Survey

4.3.2.6 Contacts with Developments Agents

The respondents were asked whether he/she has made contact with development agents or not during their day to day life on issues related to population and environment. Accordingly, from 400 sample population 90 percent of household heads had relation with development agents. This was the reality that each administration has at least one health extension and agricultural extension workers as obtained during conducting in depth interview with woreda representatives. Those respondents who had no contact with DA's accounted for 10 percent of the sample household heads (see table 4.8). The number of contact is assumed to increase the respondents chances to feel and discuss population-environment related problems. Therefore this approach paved the way to increase public participation in population and environmental management.

**Table 4.8 Percentage Distribution of Respondents by Contacts with DA's Dandi
Woreda 2010**

Contacts with DA's	Number	Percent
Yes	360	90
No	40	10
Total	400	100

Source: Field Survey

4.3.2.7 Access to Mass Media

During the field survey the respondents were asked about their access or exposure to information on the impacts of population pressure on environment through mass media particularly radio. Out of the total sampled household heads only 5 percent had access to mass media (radio). The rest 75 percent had no access to radio (see table 4.9). In any case, this media has contribution to enhance the level of the communities' perception and provide impetus to the effects of population pressure on environment.

Table 4.9 Percentage Distribution of Respondents by Access to Radio Dandi Woreda 2010

Access to Radio	Number	Percents
Yes	100	25
No	300	75
Total	400	100

Source: Field Survey

CHAPTER FIVE

RESULTS AND DISCUSSION

This section has two parts. The first section explains respondents' perception about the impacts of demographic and socio-economic characteristics on agricultural land degradation and deforestation. The Chi-Square test of independence was employed to assess whether there is an association between the dependent variables (perception and response to land degradation and deforestation) and a set of explanatory variables. When $p\text{-value} < 0.05$, there is a significant association between each of independent variables with dependent variables. The $p\text{-value}$ of 0.05 was used as a significance level or the cut-off point for rejecting or accepting the null hypothesis.

5.1 Analysis of Data on Farmer's Perception to the Impacts of Population Pressure on Agricultural Land use and Forest Resources

The Farmers' perception about the impacts of population pressure on the environment varies depending on the respondents demographic and socio-economic characteristics. Accordingly, an analysis of simple cross tabulation of the independent variable showed the respondents in general have high level perception about the impacts of population pressure on agricultural land and forest resources. Two questions were raised in this regard to see the extent that these communities perceive the issues under discussion.

First, the respondents were asked whether they consider /perceive population pressure as a cause of land degradation and deforestation. Therefore, from the interviewed 400 sample household heads, 75.50 percent and 70.25 percent respondents perceive the impacts of population pressure on agricultural land and forest resources, respectively. Secondly, to measure the perception of the respondents' alternative choices were included in each questions .Because of this the perception of the sample population on the same environmental population problems they gave different reasons depending up on the current situations of their demographic and socio-economic characteristics. The data presented in table 5.1 show percentage distribution of the respondents perceived

impacts of population pressure on agricultural land. Accordingly, this finding showed that 36.09 percent, 24.50 percent 21.53 percents of the respondents replied that land fragmentation, reduction in fallowing period and over- cultivation were perceived causes of the impacts of population pressure on agricultural land, respectively. About 13.58 percent and 4.30 percent of the respondents perceived that population pressure has an impact on agricultural land through over grazing and other factors, respectively

Table 5.1. Percentage of Respondents by Perceived Impacts of Population Pressure on Agricultural land, Dandi woreda, 2010.

Perceived impacts of population pressure on agricultural land	Number	Percent
Land fragmentation	109	36.09
Reduction in fallowing periods	74	24.50
Over-cultivation	65	21.53
Over- grazing	41	13.58
Others	13	4.30
Total	302	100

Source: Own computation

The population which is growing at a very rapid rate annually has been clearing forest and vegetation to satisfy their requirement (Bielli et.al., 2001) .In view of such research findings the respondents were asked whether they perceive population pressure as a cause for forest resource depletion. Hence, 70.25 percent respondents perceived that a growing number of populations adversely affect forest resources. Among these 35.94 percent of them believed that population pressure causes shortages of firewood, 16.72 percent drought,32.74 percent soil erosion, 10.68 percent loss of biodiversity, and 3.92 percents believe that population pressure causes other problems.

Table 5.2 Percentage of Respondents by Perceived Impacts of Population Pressure on Forest land, Dandi Woreda, 2010.

Perceived impacts of population pressure on forest land	Number	Percent
Shortage of fire wood	101	35.94
Drought	47	16.72
Soil erosion	92	32.74
Loss of bio diversity	30	10.68
Others	11	3.92
Total	281	100

Source: Own computation

The result of this finding is acceptable as far as “Dendi woreda by type of fuel for cooking “from CSA, 2010 is concerned. It indicated that among the 6,203 housing units of towns identified by CSA during census period (2007) 5306 and 4662 housing units used to rely on firewood and charcoal, respectively as a fuel for cooking (CSA,2010). Therefore, this much dependence of housing units on forest resources indicate that there is high deforestation in the study area (Dendi).

Although the respondents show high level of awareness about the impacts of population pressure on agricultural land use (75.50 percent) and forest resources (70.25 percent), there is wide gap in perception by demographic and socio-economic characteristics of the respondents.

Table 5.3 Chi-square test of Perception of Population Pressure on Agricultural land by Demographic Characteristics.

Variables	Perception of population pressure on Agricultural land		Total	χ^2 sign.
	Yes	No		
Age of HHH				.000
20-39	83.10(118)	16.90(24)	35.50(142)	
40+	71.50(184)	18.50(74)	64.50(258)	
Total	75.50(302)	14.50(98)	100.00(400)	
Sex of HHH				.191
Male	76.13(287)	23.87(90)	94.25(377)	
Female	65.22(15)	34.78(8)	5.75(23)	
Total	75.50(302)	14.50(98)	100.00(400)	
Family Size				0.002
1-4	70.00(123)	30.00(53)	44.00(176)	
5-7	77.91(134)	22.09(38)	43.00(172)	
8+	86.54(45)	13.46(7)	13.00(52)	
Total	75.50(302)	14.50(98)	100.00(400)	

Source: Field Survey

Table 5.4 Chi-square test of Perception of Population Pressure on Forest land by Demographic Characteristics.

Variables	Perception of population pressure on Forest land		Total	χ^2 sign.
	Yes	No		
Age of HHH				0.000
20-39	76.06(108)	23.94(34)	35.50(142)	
40+	67.05(173)	32.95(85)	64.50(258)	
Total	70.25(281)	29.75(119)	100.00(400)	
Sex of HHH				0.981
Male	70.29(265)	29.71(112)	94.25(377)	
Female	69.57(16)	30.43(7)	5.75(23)	
Total	70.25(281)	29.75(119)	100.00(400)	
Family Size				0.008
1-4	65.91(116)	34.09(60)	44.00(176)	
5-7	70.35(121)	29.65(51)	43.00(172)	
8+	84.62(44)	15.38(8)	13.00(52)	
Total	70.25(281)	29.75(119)	100.00(400)	

Source: Field Survey

5.1.1 Age of the HHH and Perception

The age of respondents mostly has a direct link with the perception of the impacts of population pressure on agricultural land use. Accordingly, from the age group 20-39 years, 83.10 percent believe that population pressure can cause agricultural land degradation compared with 71.50 percent for the second age group (40 and above). This finding indicates that young respondents aged 20-39 were relatively better in perception than those aged 40 and above.

With regard to forest resources, 76.06 percent of the respondents in the age group 20-39 year considered that population pressure has an impact over the forest resources of the study area. While those in the age group of 40 and above perceive less (67.05 percent) as compared to those

in the age group of 20-39 years (76.06 percent). As can be seen from table 5.4, the study has shown statistically significant relationship between age and perception.

5.1.2 Sex of the HHH and perception

The difference in perception of male and female respondents about the impacts of population pressure on the environment is given in table 5.2. Accordingly; higher proportion of male respondents had perception (76.13 percent and 70.29 percents) Considered as population pressure has an impacts over agricultural land use and forest resources, respectively. The corresponding value for female respondents was 65.22 percent (agricultural land use) and 69.57 percent (forest land). However, the Chi-square value was not significant (see table 5.4)

5.1.3 Household Size and Perception

Household size is one of the most important demographic indicators that show person-resource ratio at household level (Markos, 1997 and Abiy, 2002). In view of this argument this finding has shown that the level of perception is higher among the large house hold size (8 members and above) on both agricultural land use (86.54percent) and forest resources (84.62), respectively. Therefore respondents with large household size (8+members) show better level of perception than those with relatively small hose hold size (1-4 members). There is no statistically significant relationship between house hold size and perception as indicated in table 5.3 and 5.4 with respect to demographic characteristics of the respondents .

Table 5.5. Chi-square test of Perception of Population Pressure on Agricultural land by Socio-economic Characteristics.

Variables	Perception of population pressure on Agricultural land		Total	χ^2 sign.
	Yes	No		
Literacy Status				
Literate	84.08(206)	15.92(39)	61.25(245)	0.000
Illiterate	62.00(96)	38.00(59)	38.75(155)	
Total	75.50(302)	14.50(98)	100.00(400)	
Farm size				0.398
≤ 1 hectare	77.08(111)	22.92(33)	36.00(144)	
>1 hectare	74.61(191)	25.39(65)	64.00(256)	
Total	75.50(302)	14.50(98)	100.00(400)	
Contact with DAs				0.001
Yes	78.06(281)	21.94(79)	90.00(360)	
No	52.50(21)	47.50(19)	10.00(40)	
Total	75.50(302)	14.50(98)	100.00(400)	
Participation in social organization				0.000
Yes	77.91(254)	22.09(72)	81.50(326)	
No	64.86(48)	35.14(26)	18.50(74)	
Total	75.50(302)	14.50(98)	100.00(400)	
Access to mass media				0.003
Yes	87.00(87)	13.00(13)	25.00(100)	
No	71.70(215)	28.30(85)	75.00(300)	
Total	75.50(302)	14.50(98)	100.00(400)	

Source: Field Survey

Table 5.6 Chi-square test of Perception of Population Pressure on Forest land by
Socio-economic Characteristics.

Variables	Perception of population pressure on Forest land		Total	χ^2 sign.
	Yes	No		
Literacy Status				0.002
Literate	73.06(179)	26.94(66)	61.25(245)	
Illiterate	65.81(102)	34.19(53)	38.75(155)	
Total	70.25(281)	29.75(119)	100.00(400)	
Farm size				0.781
≤ 1 hectare	72.22(104)	27.78(40)	36.00(144)	
>1 hectare	69.14(177)	30.86(79)	64.00(256)	
Total	70.25(281)	29.75(119)	100.00(400)	
Contact with DAs				0.000
Yes	72.78(262)	27.22(98)	90.00(360)	
No	47.50(19)	52.50(21)	10.00(40)	
Total	70.25(281)	29.75(119)	100.00(400)	
Participation in social organization				0.000
Yes	74.54(243)	25.46(83)	81.50(326)	
No	51.35(38)	48.65(36)	18.50(74)	
Total	70.25(281)	29.75(119)	100.00(400)	
Access to mass media				0.007
Yes	77.00(77)	23.00(23)	25.00(100)	
No	68.00(204)	32.00(96)	75.00(300)	
Total	70.25(281)	29.75(119)	100.00(400)	

Source: Field Survey

5.1.4 Literacy Status and Perception

Education is one of an important socio- economic variable which affects perception of the people (Sahilu, 2004; Hiruy, 2008). Due to this factor higher proportion of the literate respondents are expected to perceive the impacts of population pressure on environment than respondents who are illiterate. Accordingly, out of the total literate respondents, 84.08 percent of them had perception about the impacts of population pressure on agricultural land use. On the other hand , 73.06 percent of the respondents believed that population pressure can cause forest resource depletion .The corresponding proportion for illiterate respondents was 62 percent who consider population pressure has an impact over agricultural land use and 65.81 percent for forest resource depletion ,respectively . This is because the literacy status of the household heads in particular and house hold members in general affects house hold's livelihoods in various ways. Among other, decisions related to livelihood activities and reproductive choices are influenced by households' level of education hence education deserves due attention.

5.1.5 Size of land holding and Perception

In order to examine the relationship between average farm land size and farmer's perception, the head of the households were asked questions related to farm size. Disaggregating respondents by farm size reveal that 36 percent of households owned less than 1hectare, while 64 percent of the total sample population possess greater than one hectare. Thus, the relatively small land holders (< 1ha) are concerned (77.08 percent) than those respondents with farm size greater than 1 hectare (74.61 percent) about the impacts of population pressure on agricultural land use. As it can be seen from table 5.6 the Chi-Square value is not significant.

5.1.6 Contacts with Development Agents and Perception

Respondents were asked on their contact with development agents in their respective kebele administrations .Hence, this finding revealed that high percentage of respondents who had contact with development agents are showing a better level of perception about

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5.1.6 Contacts with Development Agents and Perception

Respondents were asked on their contact with development agents in their respective kebele administrations .Hence, this finding revealed that high percentage of respondents who had contact with development agents are showing a better level of perception about

media. Regarding perception of population pressure on forest land; among those who have access to mass media 77 percent had perception compared with 68 percent for those who have no access to mass media?

5.2 Farmers' Responses to the Impacts of Population Pressure on Agricultural land use and Forest resources

In the previous section an attempt was made to analyze the relationship between the background variables (demographic and socio-economic) and the perception of population pressure on agricultural land and forest resources.

The objective of this section is to find out the kinds of responses made to overcome the impacts of population pressure and environmental degradation. Hence, during survey the respondents were asked questions regarding their responses to agricultural land degradation and deforestation. Among the interviewed respondents 75.50 percents who perceived agricultural land degradation as a problem caused by population pressure 68.00 percent of them explained their different ways of responding mechanisms to maintain soil fertility.

Accordingly, the data presented in table 5.7 shows the percentage distribution of respondents by their responses to agricultural land degradation. 24.27 percent ,19.85 percent ,15.08 ,and 14.33 percent of the respondents used to maintain soil fertility to overcome agricultural land degradation by the use of modern fertilizers ,crop rotation ,terracing and limiting family sizes ,respectively .Still few proportion of respondents practice contour ploughing (11.76 percent) and fallowing (10.30 percent) to maintain soil fertility as a way to mitigate agricultural land degradation caused partly by population pressure prevailed in the area .

the impacts of population pressure on agricultural land use (78.06 percent) and forest resources (72.78 percent). The corresponding percentage for those respondents who had no contact were 52.50 Percent (agricultural land use) and 47.50 percent (forest resources). The Chi-Square results on contacts with DAs and perception of the respondents about the impacts of population pressure on agricultural land use and forest resources have significant association. This finding result is accepted as far as previous studies such as Teshome (1994) and Abiy (2002) is concerned.

5.1.7 Participation in Social Organization and Perception

The effect of participation in social organization is to enhance the level of perception about the impacts of population pressure on the environment (Hiruy, 2008). In view of this finding, the respondents were asked whether they participate in different social organization or not. Accordingly, among the total number of respondents who participate in different social organization, the share of those who perceived the impacts of population pressure on agricultural land use and forest resources were 77.91 percent and 74.54 percent, respectively compared with 64.86 percent in agricultural land use for those who were not participated and 51.35 percent in forest land. It is to be recalled that participation in social organization are also having discussions on the interrelationship between population pressure and environment. As indicated in table 5.5 and 5.6 participation in social organization and perception about the impacts of population pressure on agricultural land use and forest resources showed statistically significant relationship. Hence, the above finding concur the research results of Abiy (2002) and Hiruy (2008).

5.1.8 Access to Mass Media and Perception

Access to mass media would help to increase the level of perception of the rural community in the realization of the impacts of population pressure on the environment. Based on this fact the respondents were asked whether they have access to mass media or not. 87.00 percent of them had perception about the impacts of population pressure on agricultural land as compared with 71.07 percent with those who have no access to mass

Table 5.7 Percentage of Respondents Responding to the Impacts Population Pressure on Agricultural land by the types of Responses to maintain soil fertility, Dendi Woreda 2010.

Types of responses	Number	Percent
Use of chemical fertilizers	66	24.27
Crop rotation	54	19.85
Terracing	41	15.08
Limiting family size	39	14.33
Contour ploughing	32	11.76
Use of fallowing	28	10.30
Others	12	4.41
Total	272	100

Source: Own computation

With regard to forest resources, among the interviewed 70.25 percent who perceived deforestation as a problem caused by population pressure 57 percent were responding to this environmental problems in various ways of environmental conservation (see table 5.8).Hence, tree planting (46.50 percent), wise use of forest resource (19.30 percent) modern farming (16.22 percent)are some of the most common approaches used by the respondents to combat deforestation .Controlled grazing and other approaches are also used by few respondents (17.98 percents)as a way to mitigate forest resource depletion in the area .

Table 5.8 Percentage of Respondents Responding to the Impacts Population Pressure on Forest land by the types of Responses, Dendi Woreda 2010.

Types of responses	Number	Percent
Tree planting	106	46.50
Wise use of forest resources	44	19.30
Modern farming	37	16.22
Controlled grazing	29	12.72
Others	12	5.26
Total	228	100

Source: Own computation

From 70.25 percent respondents 57.00 percent used to conserve environmental resources particularly forest resources .Accordingly, table 5.8 shows the relative percentage distribution of respondents who were responding to the deforestation process in the study. Therefore, the two tables (table 5.7and 5.8) shows that the different types of responses used in the study area .Hence, the preceding discussion presents variation of the target population responses based on their demographic and socio-economic characteristics.

Table 5.9 Chi-square test of Response of Population Pressure on Agricultural land by Demographic Characteristics.

Variables	Response of population pressure on Agricultural land		Total	χ^2 sign.
	Yes	No		
Age of HHH				.000
20-39	79.58(113)	20.42(29)	35.50(142)	
40+	61.63(159)	38.37(99)	64.50(258)	
Total	68.00(272)	32.00(128)	100.00(400)	
Sex of HHH				.913
Male	69.50(262)	30.50(115)	94.25(377)	
Female	43.48(10)	56.52(13)	5.75(23)	
Total	68.00(272)	32.00(128)	100.00(400)	
Family Size				0.007
1-4	64.20(113)	35.80(63)	44.00(176)	
5-7	69.77(120)	30.23(52)	43.00(172)	
8+	75.00(39)	25.00(13)	13.00(52)	
Total	68.00(272)	32.00(128)	100.00(400)	

Source: Field survey

Table 5.10 Chi-square test of Response of Population Pressure on Forest land by Demographic Characteristics.

Variables	Response of population pressure on Forest land		Total	X^2 sign.
	Yes	No		
Age of HHH				0.000
20-39	64.08(91)	35.92(51)	35.50(142)	
40+	53.10(137)	46.90(121)	64.50(258)	
Total	57.00(228)	43.00(172)	100.00(400)	
Sex of HHH				.998
Male	57.29(216)	42.71(161)	94.25(377)	
Female	52.17(12)	47.83(11)	5.75(23)	
Total	57.00(228)	43.00(172)	100.00(400)	
Family Size				1.027
1-4	56.25(99)	43.75(77)	44.00(176)	
5-7	56.98(98)	43.02(74)	43.00(172)	
8+	59.62(31)	40.38(21)	13.00(52)	
Total	57.00(228)	43.00(172)	100.00(400)	

Source: Field survey

5.2.1 Farmers' Responses to the Impacts Population Pressure by Demographic Characteristics.

The objective of this section is to show the differentials in response of the target population by demographic characteristics (age, sex and household size) to the impacts population pressure on the environment.

5.2.1.1 Age of the HHH and Response

Table 5.9 shows that the percentage of the target population who respond to the impacts of population pressure on agricultural land use by age. Accordingly, the relatively young age group (20-39 years) respondents, 79.58 percent responded to the impacts of

population pressure on agricultural land use. The proportion is 64.08 for the impacts of population pressure on forest resource depletion .Hence, the response is less among the relatively old age group (40 years and above) respondents to the impacts of population pressure on agricultural land use (61.63percent) and forest resource depletion (53.10 percent). Previous studies (Markos 1997, Abiy 2002 and Lemessa 2009) also found that the younger age groups respond to the impacts of population pressure better than their counterparts (older age groups).The Chi-Square test reveal significant statistical association by age (see table5.9).

5.2.1.2 Sex of the HHH and Response

Table 5.9 indicated that there are more male respondents responding to the impacts of population pressure on the environment than the female respondents'. Accordingly, about 69.50 percent and 57.29 percent responded to the impacts of population pressure on agricultural land use and forest resource depletion, respectively .While, proportion of responses made by female respondents were 43.48 percent and 52.17 percent for agricultural land use forest resources, respectively. However, the Chi-Square significant test didn't reveal any significant statistical association by sex.

5.2.1.3 Household size and Response

As indicated in table 5.9 household size is another demographic variable which showed differential response among the respondents to the impacts of population on the environment. This is because there is competition among members of the family for the scarce resources. Hence, it is the human interaction that is putting too much pressure on resources and inducing ailment. This survey finding has shown that the larger the household size the greater is the response to the impacts of population pressure on the environment .Accordingly; the household size with 8 members and above is having higher proportion of response 75.00percent on agricultural land use compared with 69.77 percent and 64.20 percent for household size 5-7 and 1-4 ,respectively . On the other hand 59.62 percent of the respondents with household size of 8 members and above responded to forest resource depletion, the relatively lower household size

(1-4 members) has lower proportion of response 56.25 percent .The Chi- Square test doesn't reveal significant relationship between household size and response to forest resource depletion.

5.2.2. Farmers' Responses to the Impacts of Population Pressure on the Environment by Socio- Economic Characteristics

Socio-economic characteristics of the respondents play an important role in influencing the perception and response of an individual towards the impacts of population pressure on the environment. Accordingly, the following variables are treated in detail to see the level of response among the respondents by literacy status, farm size, contact with development agents (DA's) participation in social organization and access to mass media. Previous studies (Abiy 2002, Hiruy 2008) confirmed that these socio-economic variables are some of the factors that affect farmers' awareness and responses on the impacts of population pressure on the environment.

Table 5.11 Chi-Square test of Response of Population Pressure on Agricultural land by Socio-economic Characteristics.

Variables	Response of population pressure on Agricultural land		Total	X^2 sign.
	Yes	No		
Literacy Status				
Literate	71.02(174)	28.98(71)	61.25(245)	0.003
Illiterate	63.22(98)	36.78(57)	38.75(155)	
Total	68.00(272)	32.00(128)	100.00(400)	
Farm size				0.398
≤ 1 hectare	68.75(99)	31.25(45)	36.00(144)	
>1 hectare	67.58(173)	32.42(83)	64.00(256)	
Total	68.00(272)	32.00(128)	100.00(400)	
Contact with DAs				0.001
Yes	78.06(281)	21.94(79)	90.00(360)	
No	52.50(21)	47.50(19)	10.00(40)	
Total	75.50(302)	14.50(98)	100.00(400)	
Participation in social organization				0.000
Yes	77.91(254)	22.09(72)	81.50(326)	
No	64.86(48)	35.14(26)	18.50(74)	
Total	75.50(302)	14.50(98)	100.00(400)	
Access mass media				0.003
Yes	87.00(87)	13.00(13)	25.00(100)	
No	71.70(215)	28.30(85)	75.00(300)	
Total	75.50(302)	14.50(98)	100.00(400)	

Source: Field survey

Table 5.12 Chi-square test of Response of Population Pressure on Forest land by Socio-economic Characteristics.

Variables	Response of population pressure on Forest land		Total	χ^2 sign.
	Yes	No		
Literacy Status				
Literate	58.37(143)	41.63(102)	61.25(245)	0.883
Illiterate	54.84(85)	45.16(70)	38.75(155)	
Total	57.00(228)	43.00(172)	100.00(400)	
Farm size				
≤ 1 hectare	58.33(84)	41.67(60)	36.00(144)	
>1 hectare	56.25(144)	43.75(112)	64.00(256)	
Total	57.00(228)	43.00(172)	100.00(400)	
Contact with DAs				0.087
Yes	58.06(209)	41.94(151)	90.00(360)	
No	47.50(19)	52.50(21)	10.00(40)	
Total	57.00(228)	43.00(172)	100.00(400)	
Participation in social organization				0.006
Yes	60.43(197)	39.57(129)	81.50(326)	
No	41.89(31)	58.11(43)	18.50(74)	
Total	57.00(228)	43.00(172)	100.00(400)	
Access mass media				0.978
Yes	58.00(58)	42.00(42)	25.00(100)	
No	56.67(170)	43.33(130)	75.00(300)	
Total	57.00(228)	43.00(172)	100.00(400)	

Source: Field survey

5.2.2.1 Literacy Status and Response

Education is one of the socio-economic variables affecting public responses to towards the impacts of population pressure on the environment .with regard to literacy status ,as indicated in table 5.11 and 5.12 among the 245 literate respondents ,71.02 percent and 58.37 percent had responded to the impacts of population pressure on agricultural land use and forest resources ,respectively. While in the category of illiterate respondents among the total 155 respondents, 63.22 percent and 54.84 percent had responded to the impacts of population pressure on agricultural land use and forest resources depletion, respectively. Hence this finding shows that the literate respondents are in a better position to respond to the impacts of population pressure on the environment than their counter parts.

5.2.2.2 Farm size and Response

According to the field survey, about 36 percent of the respondents have less than or equals to one hectare, 64 percent of the respondents have greater than one hectare. Accordingly, farmers with $\leq$ one hectare of land response is having higher proportion of response of 68.75 percent on agricultural land 58.33 percent on forest resource .The corresponding figure for size of landholding with one hectare and above is 67.58 percent on agricultural land and 56.25 percent on forest land. However, farm size doesn't show statistically significant relationship with response to both agricultural land use and forest resource.

5.2.2.3. Contact with Development Agents and Response

It is believed that there exists a direct relationship between contact with DAs and response to the impacts of population pressure on the environment .Accordingly; the response made to the impacts of population pressure on the environment is very high among those who have contacts with DAs .Therefore, out of the total 360 respondents who had contacts with DAs, 78.06 percent and 58.06 percent responded to the impacts of

population pressure on agricultural land use and forest resources, respectively. The corresponding proportion of response for the target population who had no contact with DAs, but respond to the impacts of population on agricultural land and forest resources were 52.50 percent and 47.50 percent respectively. This is because contact with DAs may raise the knowledge of the communities in implementing different demographic and environmental responses to the impacts of population pressure on the environment. However, contact with DAs and response to forest land revealed that there is no statistically significant association (see table 5.11 and 5.12).

5.2.2.4. Participation in Social Organization and Response

This section helps to analyze the impacts of participation in different social organization on responses of the farmers' towards the prevailing agricultural land degradation and forest resource depletion. In view of this argument, the respondents were asked whether participation in local social organization helps them to respond to the prevailing environmental degradation. Accordingly, from 81.50 percent respondents who reported to participated in different social organization 77.91 percents responded to the impacts of population pressure on agricultural land use. The corresponding proportion for forest resources were 60.43 percent. This shows that participation in social organization enables the respondents to mitigate the impacts of population pressure on environment. However, the Chi-Square tests of significance "participation in social organization" and "response" has revealed statistically partial association for impacts of population pressure on agricultural land use and forest resource depletion.

5.2.2.5. Access to Mass Media and Response

Access to mass media is crucial in changing knowledge and attitude of the people towards the environment (EPA, 1997). In view of this policy document recognition, the respondents were asked whether they have access to mass media (radio) or not to see their differential response to the prevailing environmental problems caused due to population pressure in the study area. Accordingly, respondents that had access to mass media (radio) were found to be in a better position in responding to the problem than their

counterparts. Hence, from the total number of respondents who had access to mass media (100 people), the proportion of those who respond to the prevailing problem were 87.00 percent and 58.00 percent on agricultural land use and forest resource, respectively. While those respondents without access to mass media but respond to agricultural land degradation by 71.70 percent and forest resources depletion by 56.67 percent. In this case, access to mass media and response to agricultural land use have statistically significant relationship, while the relationship between access to mass media and forest resource depletion doesn't show statistically association as shown in table 5.11 and 5.12 respectively.

5.3 Determinants of Farmers' Perception to the Impacts of Population Pressure on Agricultural land and Forest Resources and their Responses

Logistic regression model is to determine farmers' perception and see their responses to the impacts of population pressure on agricultural land and forest resources. Accordingly, the variables entered in the model are those which showed statistically significant association with dependent variables during the multivariate analysis.

In logistic regression model, the coefficient $\exp(\beta)$ represents the increase or decrease in the log odds of occurrences of an event (perception and response) associated with a unit change in the independent variable controlling for possible confounding effects of all other variables. A positive predictive coefficient ($\beta > 0$) means that the predicted odds increases as the predictor values increase; a negative coefficient ($\beta < 0$) indicates that the predicted odds decrease as the predictor increases; and a coefficient of zero ($\beta = 0$) means that the predicted odds are the same for any value of the predictor. That is the odds ratio is 1. Hence if the value of odds ratio $\exp(\beta)$ is greater than one, the probability of the event (perception and response) is higher for members of that group in relation to the reference category. An odd ratio of less than one indicates lower probability of the event (perception and response) in relation to the reference category. Generally, the detailed discussion of the relationship between each independent and dependent variables are presented in logistic analysis as seen in table 5.13.

Table 5.13 Results of logistic regression for Demographic and Socio-economic Determinants of Perception towards the Impacts of Population Pressure on the Farm land and Forest Resource

Variables	Categories	Perception of population pressure on agricultural land				Perception of population pressure on Forestland			
		B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)
Age of HHH	20-39(RC)								
	40+	-0.980	.259	.001	.375	-0.789	0.331	0.003	0.453
Family size	5-7(RC)								
	1-4	-0.681	.330	.035	.506	-0.349	0.451	0.065	0.411
	8+	0.450	.477	.047	1.568	0.213	0.385	0.087	1.237
Literacy Status	Literate(RC)								
	Illiterate	-2.105	.283	.000	.122	-2.201	0.219	0.004	0.111
Contact with DA's	Yes(RC)								
	No	-0.470	.322	.005	.625	-0.754	0.431	0.000	0.470
Participation in social organizations	Yes(RC)								
	No	-0.518	.454	.000	0.596	-0.389	0.138	0.002	0.678
Access to Mass Media	Yes	1.320	.412	.089	3.743	1.461	0.498	0.048	4.310
	No(RC)								

RC = reference category, -2Loglikelihood= 578.965.

Source: Computed from Survey data

5.3 .1 Age of the HHH and perception

Age of head of the household was found to be significantly related to perception. Those whose age was 40+ years had lower probability of perception about the impacts of population pressure on farmland compared with the reference category (20-39years). The likelihood that they perceived population pressure on farmland is 0.375 times lower than those whose ages were 20-39 ($p < 0.01$). That means, increasing age of household heads

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from 20-39 years to 40 years and above reduces the chance of perception by about 63 percent. Similarly, respondents whose age is 40 years and above had a 55 percent lower likelihood of perceiving population pressure on forestland compared with those whose ages were 20-39 ($p < 0.01$).

One possible explanation for this result may be that the younger respondents have better access to information than their counterparts. The result of this finding is consistent with Lemesa (2009). During the in-depth interview one of the agricultural office representative said that *“The younger age groups are more aware of the impacts of population pressure on the environment and participate in different activities related to environmental conservation.”*

5.3.2. Family Size of the HHH and Perception

Family size shows a strong positive relationship with perception of population pressure on farmland. The result shows that the odds of perceiving population pressure on farmland for families who had 1-4 members was 0.506 times lower compared to those who had 5-7 ($p < 0.05$). Among those having more than 7 members, the odds of perceiving population pressure on farmland was 1.568 times higher ($p < 0.05$), compared to the reference category (5-7). This shows that there is support for hypothesis 5. This may be due to the fact that as family size increases the share of agricultural product obtained for the family members decreases, so that they are aware of population pressure on agricultural land.

Greater family sizes are actually more likely to perceive population pressure on forestland than family with lower number, but this effect is not significant.

5.3.3. Literacy Status and perception

As far as the literacy status of head of the household is concerned, those who were illiterate were less likely to perceive population pressure on farmland as compared with those who were literate ($p < 0.001$). The likelihood of having better awareness about the impacts of population pressure on agricultural land is 0.122 times lower than those who were literate. When we see perception of population pressure on forestland and literacy

status, those who were illiterate were less likely to perceive the effect of population pressure on the forestland as compared with their counterparts ($p < 0.005$). The likelihood of perceiving population pressure on forestland is 0.111 times lower than those who were literate. Therefore hypothesis 1 is accepted.

Literacy is widely acknowledged as benefiting the individual and the society and is associated with a number of positive outcomes for perceiving the impacts of population pressure on the environment. *“One of the major problems for population pressure on the environment is associated with low literacy status of the population.”* Said the woreda office of land and environmental protection representative.

5.3.4. Contact with Development Agents and perception

Contact with development agents (DAs), have strong influence on perception of population pressure on farmland. Having no contact with DAs decreases the probability of perceiving population pressure on farmland ($p < 0.05$). The result shows that those respondents who had no contact with DAs had a 38 percent lower chance of perceiving population pressure on farmland compared with those who had contact with DA's.

Respondents who had no contact with DAs are 0.470 times less likely to have perception of population pressure on forestland compared with respondents who had contact with development agents (DAs) ($p < 0.001$). This confirms the hypothesis that people who have close contact with DA's are more likely to perceive the impacts of population pressure on the environment.

This may be due to the fact that, those who have contact with DAs are more likely to get information on the cause and consequences of environmental degradation (land degradation and deforestation). One of the elderly interviewee explained that *“DAs are most important to inform the community about population pressure on the environment.”*

5.3.5. Participation in social organizations and perception

Participation in social organizations was found to be directly related to the odds of perception. The odds of perceiving population pressure on farmland was 0.596 times lower if respondents were not participating in social organizations than if they were participating in social organizations ($p < 0.001$).

The odds of perceiving population pressure on forestland were 0.678 times lower if respondents were not participating in social organizations than if they were participating in social organizations ($p < 0.005$).

The most possible explanation is that participation in social organizations increases the opportunity to discuss about the impacts of population pressure on the environment. During the in-depth interview one of the kebele administrator said that *“During different meetings of social organizations people commonly discuss the impact of population pressure in relation to resource scarcity particularly to agricultural land.”*

5.3.6. Access to Mass Media and perception

Access to mass media does not seem to have an effect on perception of population pressure on farmland. It is not statistically significant. Access to mass media increases the probability of perception of population pressure on forestland ($p < 0.05$). The result shows that those respondents who had access to mass media are 4.310 times more likely to have perception of population pressure on forestland compared with respondents who had no access to mass media. This may be due to advocacy made through mass media (radio) about the impact of population pressure on forest resources.

5.4. Determinants of Farmers' Response to the Impacts of Population Pressure on Agricultural land and Forest Resources and their Responses

Table 5.14 Logistic Regression Result of the Effect of Predictor Variables on Response of population pressure on Farm Land

Variables	Categories	B	S.E.	Sig.	Exp(B)
Age of HHH	20-39(RC)				
	40+	-0.624	0.176	0.004	0.536
Family size	5-7(RC)				
	1-4	-0.124	0.543	0.021	0.883
	8+	0.981	0.364	0.006	2.667
Literacy Status	Literate(RC)				
	Illiterate	-0.681	0.512	0.021	0.506
Contact with DA's	Yes(RC)				
	No	-0.349	0.276	0.000	0.705
Participation in social organizations	Yes(RC)				
	No	-0.276	0.376	0.001	0.789
Access to Mass Media	Yes	0.725	0.436	0.087	2.065
	No(RC)				

RC = reference category, -2Loglikelihood= 413.397.

Source: Computed from Survey data

5.4.1. Age of the HHH and Response

The association between age of head of the household and response of population pressure on farmland was examined using logistic regression. The model clearly revealed the existence of negative and significant association between age and response.

As indicated in Table 5.14 the odds of responding population pressure on farmland decreases by 0.536 for respondents whose ages were 40 and above compared with the reference category (20-39 years). One possible explanation is that the younger age groups have more access to different source of information to combat the problem of population pressure. The other reason may be young people are more eager to changes.

5.4.2. Family size of the HHH and Response

The net effect of family size and the likelihood of responding for population pressure on farm land increases as size of the family increases. The likelihood of responding to population pressure on farmland decreased by 0.883 for those whose family sizes are 1-4 as compared with the reference category ($p < 0.01$). The odds of responding to population pressure increased by 2.667 times when respondents had family size of 8 and above as compared with the reference category (5-7). The implication of this finding may be that households with large family size are more vulnerable to the problem.

5.4.3. Literacy Status and Response

The result of the logistic regression revealed that literacy status of the respondents have a positive relation with response to population pressure on the farmland ($p < 0.01$). Illiterate respondents are 0.506 times less likely to respond compared with the literate respondents.

5.4.4. Contact with Development Agents and Response

The odds of responding to population pressure for those who have no contact with development agents decreased by 0.705 times as compared with those who have contact with development agents. The hypotheses that contact with DAs increases the chance of responding to the impacts of population pressure on the environment are accepted. The net effect of contact with development agents indicates that the likelihood of respondents to respond on population pressure increases as compared with those who had no contact with development agents.

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5.4.5. Participation in social organizations and Response

As far as participation of respondents in social organization is concerned, those who did not participate in social organizations were less likely to respond to population pressure on farmland as compared with those who participate in social organizations ($p < 0.005$). The odd of responding to population pressure on farmland is 0.789 times lowers than those who did participate in social organizations. This confirms that hypothesis 7 is accepted.

5.4.6. Access to Mass Media and Response

Respondents who had access to mass media are actually more likely to respond to population pressure on farmland than respondents who had no access to mass media, but this effect is not significant. According to the result, the risk of responding to population pressure on farmland for those who had access to mass media were about 2.065 times higher compared with those who had no access to mass media.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1. SUMMARY AND CONCLUSION

During the last few decades, Ethiopia has experienced massive environmental degradation due to population pressure, unwise use of its natural resources and unsound ecological practice. This is because Ethiopia is one of the SSA countries known for their fast population growth and accelerated environmental degradation (Tesfaye; 2003). Furthermore, this condition revealed that as population grows arable land per capita declines and fragmentation through over use increases. Therefore, the environmental degradation and their related problems became the major problems facing Ethiopia in general and the study area in particular. The growing population has increased the demand for agricultural land and forest resources due to their dependency on these resources.

If the current situation continues, the purpose for which farmers use environmental resources- to provide for basic needs and increase the quality of life of a rapidly growing population will be undermined. Local peoples' attitude and practice on their environment is decisive to the sustainability of the resources. The response of the people at large and community of the study area in particular to the impacts of population pressure on the environment, are indeed decisive to the sustainability of resources. People's perception of what is happening to their environment due to their growing numbers serves as a basis for any future intervention strategies. Therefore, for environmentally and socially sustainable development there is an urgent need to promote awareness and understanding of the interdependency of natural, socio-economic and political systems at local and national levels. Understanding the current status regarding the interrelationship between population pressure and environment is very important. Thus, this study focuses on identifying demographic and socio-economic factors which affects public perception and the types of response people made to the impacts of population pressure on agricultural

land use and forest resources in Dandi woreda, west Shoa Zone of Oromia National Regional State.

Moreover, the study is based mainly on household level research involving 400 sample household heads. In the data analysis the univariate, bivariate and multivariate (logistic) regression models were used. The bivariate tables were used to examine the existence of any association between each of the independent and dependent variables. The multivariate analysis was also used to define the individual effects of the different predictor variables after controlling for others.

Regarding the literacy status, 61.25 percent of the sample population were classified as literate(able to read and write), while the remaining 38.75 percent were illiterate. Disaggregating the respondents by farm size, from 400 sample population 36 percent household heads possess less than one hectare of cultivable land while 64 percent owned greater than one hectare of cultivable land. This gives an average farm size of 1.91 hectare of and per household. Generally among the 400 sample population considered in this survey 81.50 percent had participated in different social organization while 90 percent had contact with DA's and access to mass media is lower which is only 25 percent of the sample population.

Analyses of data on farmers' perception about the impacts of population pressure on agricultural land use and forest resource were made. Hence, from the total sample population (400people) 75.50 percent and 70.25 percent perceive population pressure as a cause for agricultural degradation and deforestation, respectively.

A bivariate analysis indicates that the existence of variation in perception based on their demographic and socio-economic background. Accordingly, age and family size shows statistically significant association with the dependent variable (perception). On the other hand also literacy status, contact with DAs, participation in social organization and access to mass media also shows statistical significance association with perception both on agricultural land use and forest resources. The variable which shows significant associations with response to impact of population pressure on agricultural land use are

age, family size, literacy status, contact with DAs, participation in social organizations and access to mass media.

Generally, the relevance of discussing the conditions of land and forest resource in the study area is not only because they are indicators of degradation but also they are the fundamental basis of survival for peasant life. This is because rural people entirely depend on land and forest resource for their living as indicated in this findings. Therefore, degradation of these fundamental resources is believed to have formidable influence on people's behavior. Therefore, on the basis of this and the results of the study we can draw the following conclusion in relation to public perception about the impacts of population pressure on agricultural land use and forest resources. Finally the responses that the communities of the study area undertake to mitigate the environmental problems are addressed. Accordingly:

- The young aged respondents(20-39 years) were relatively better in perception and response about the impacts of population pressure on agricultural land use and forest resources than their counter part aged 40 years and above.
- The level of perception is higher among large household size than the small household size.
- Literacy status of the respondents has strong impact on the perception of the respondents about the impacts of population pressure on the environment.
- Contact with DAs increase farmers perception about the impacts of population pressure on the environment.
- The larger the household size the greater is the response to the impacts of population pressure on the environment.
- Literate respondents are in a better position in responding to the impacts of population pressure on the environment than their counterparts.
- Respondents' participation in social organization increases the likely hood of response to the impacts of population pressure on the environment.

6.2. RECOMMENDATIONS

On the basis of the findings of the study, some important issues are forwarded for policy considerations. Thus individuals, communities, civic society, local, regional, national government officials can employ many strategies to address the complex linkage between population and environment. Therefore, a multi-faceted recommendation is needed, including the following elements.

- Increase family planning services targeting both men and women in order to lower population growth and to relieve pressure on natural resources and social services.
- Give a high priority to raising the status of women by increasing female participation in the educational system at all levels. This is because as indicated in discussion parts of the study, women are at lower level of perception and response to the impacts of population pressure on the environment. This could reflect the different roles given to men and women in the society and the limited opportunities available to women. Thus the decisive role of women and their right to have equal opportunities with man should be enhanced in all aspects.
- Advocacy work towards promoting limited family size and environmental conservation should be strengthened.
- Local indigenous knowledge shall be identified, evaluated, used and /or further developed and used wherever possible to overcome the existing problem in relation to the impacts of population pressure on the environment
- Conditions shall be created that will support community and individual resource users to sustainably manage their own environment and resources.
- Raise public awareness and promote understanding of the essential linkages between population and environment.

The general conclusion from the above discussion is that people at the grassroots level are aware about the different aspects of environmental degradation (land and forest). They are aware about these problems because their survival is directly affected

(food production declines, land shortages fuel wood shortages etc). However, responses to ecological degradation in terms of combating degradation, intensifying agriculture and changing demographic behavior need to be motivated .Hence, intervention approach is necessary to bring about quick change in the agricultural production and environmental rehabilitation as well as demographic situation in these communities.

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ANNEX 1

Questionnaire # 1. To be completed by Household Head

The main objective of this questionnaire is to understand Dandi Woreda's public perception of environmental degradation and their responses towards the prevailing problem. This type of local level study is important for planners and decision makers at different level. Therefore the information that you provide is believed to help concerned bodies understand public opinion and extend local support to control population pressure and environmental degradation based on the public needs and priorities. Accordingly you are kindly requested to give answers freely and openly. Any information you give is kept confidential. Thus, your cooperation is very essential to achieve the desired goal of the study.

Thank you for your cooperation in advance

I. Identification Data

1. Household Head code number _____
2. Date of interview _____
3. Name of Enumerator _____
4. Name of the respondents Kebele Administration _____
 - Village (Gotte) name _____
5. Checked by supervisor _____
 - Signature _____
 - Date _____

II. Demographic and socio-economic characteristics of household head.

➤ This section includes information about the people who usually live in the household.

No	Those who are usual residents	Sex	Age	Relationships to the Household Head	Ethnic Group	Religion	Educational status (For age 5 years & above)		Marital status (For those aged 15 years and above)
		M=1 F=2		Head = 0 Wife/Husband = 1 Son/Daughter = 2 Brother/Sister = 3 Adopted Child = 4 Others specify = 5	Amhara= 1 Oromo = 2 Tigray = 3 Gurage = 4 Others = 5	Orthodox = 1 Protestant = 2 Catholic = 3 Muslim = 4 Traditional = 5 Others = 6	Read & write Yes = 1 No = 2	Highest Grade Complete	Never married = 1 Currently married = 2 Divorced = 3 Widowed = 4 Separated = 5
01									
02									
03									
04									
05									
06									
07									
08									
09									
10									
11									

III. Perception and responses of population pressure on the environment

301. In your opinion, do you think that there is population pressure in your community?

1. Yes 2. No 3. Do not know

302. If yes for Q. #301, how do you respond to this problem of population pressure?

1. Educating young women
2. Reducing early marriage (early child bearing)
3. Being involved in family planning programs
4. If there are others specify _____

1. Yes 2. No 3. Do not know

304. Do you believe population pressure affect the productivity of agricultural land in your kebele administration?

304. Do you believe population pressure affect the productivity of agricultural land in your kebele administration?

305. If yes for Q. #304, how do you describe the effects of population pressure on agricultural land in your community?

2. It causes land

3. Over cultivation

4. Lack of

5. Others (specify)

306. Do you respond to this problem? 1. Yes 2. No 3. Do not know

307. What is/are the manifestation of agricultural land degradation?

2. Reduction in crop yields

3. Drought/famine

4. Others (specify)

308. Do you own cultivable land?

1. Yes 2. No

309. If yes for Q# 308, how do you obtain it?

1. Inherited

3. Rented for crop sharing

2. During re distribution

4. Others specify

310. What is the total land you are using for your needs in timads? Specify as follows

Land use type	Cultivable land	Grazing land	Forested areas	Others specify
Amounts in timad				

311. Do you think there is shortage of farmland in you kebele administration presently as compared to 10 years ago and above? 1. Yes 2. No 3. Do not know

1. Yes 2. No 3. Do not know

312. If yes for Q# 311 what factors are responsible for this shortage of farm land?

1. Population growth

2. In-migration to the area

3. Expansion of urban settlements

4. Others specify

313. How do you respond to the problems related to shortage of farm lands in your locality?

1. Limiting family size

2. Introducing intensive farming techniques

3. Migrating to other area

4. Others specify

314. Do you think the community has a shortage of grazing land? 1. Yes 2. No

315. If yes, what do you think should be undertaken to mitigate this problem?
1. Reduce farmlands to allow grazing lands,
 2. Abandon reforestation areas,
 3. Introduce selected productive cows to reduce live stock population pressure,
 4. Do not know.
316. As compared to the land needs of your household requirements, how do you see your present landholding?
1. It is more than enough
 2. It is just enough
 3. It is insufficient
317. If insufficient what size of land would be enough for your household? (1 hectare = 4 timad)
1. 1 to 2 timad (0.25 hect. to 0.5 hect.)
 2. 3 to 4 timad (0.75 to 1 hect.)
 3. More than 4 timad (> 1 hect.)
318. Do you think that land degradation particularly soil erosion is an environmental problem in your kebele?
1. Yes
 2. No
319. If yes for Q. #318, what are the major causes of soil erosion?
1. Land fragmentation
 2. Absence of following
 3. Over grazing
 4. Over cultivation
 5. Other (specify) _____
320. At present time, do you think that the productivity of your farm land has decreased?
1. Yes
 2. No
321. If yes for Q. # 320, what is/are the main factors responsible for declining in the productivity of farm land? 1 = Yes 2 = No
1. Land degradation due to population pressure
 2. No use of fallowing,
 3. Others (specify) _____
322. How do you maintain the fertility of the soil in your locality's farmland at most?
1. Fallowing
 2. Contour ploughing
 3. Use of modern (chemical) fertilizers
 4. Crop rotation
 5. Limiting family sizes
 6. Others (specify) _____
323. Do you believe that population pressure affects forest resources in your locality?
1. Yes
 2. No
 3. Do not know
324. From your observation of your immediate locality deforestation is -----
1. Increasing
 2. decreasing
 3. No change at all
325. If deforestation is increasing how you do you respond to this problem at most?
1. Tree planting
 2. Wise uses of forest resources
 3. Limiting family size
 4. Modern farming
 5. Controlled grazing
 6. Others (specify) _____
326. In your opinion, what are the disadvantages of deforestation prevailed in your area?
1. Drought
 2. Soil erosion
 3. Shortage of fire wood
 4. Loss of biodiversity
 5. Others specify

327. What is your main source of fuel wood?

- | | |
|-------------------|------------------------|
| 1. Private tree | 3. Markets |
| 2. Natural forest | 4. Others specify..... |

328. If deforestation is considered the main problem in your community, what are the factors for this problem at most?

1. Due to population pressure that leads to new areas of settlements and agricultural activities.
2. Cutting trees for different purposes
3. Lack of environmental education and awareness
4. Due to poverty
5. Others specify _____

329. In the household has environmental degradation ever disused as a problem? . Yes

2.No

330. Do you want to limit the number of your children? 1. Yes 2. No

331. If yes for Q. # 330 what is your desired family size?

- | | |
|-------------------|-------------------------------|
| 1. Less than four | 3. Greater or equals to eight |
| 2. Five to seven | |

IV. Social Organizations/Institution and Information

401. Do you have any contact with development agents or health extension workers?

1. Yes 2. No

402. In which organization employee do you have close contact?

- | | |
|----------------------------------|-------------------------------|
| 1. Development Agents (DA's) | 4. Non-governmental employees |
| 2. Health extension worker (HEW) | 5. Others (specify) |
| 3. Both DA's and HEW | |

403. Based on information obtained from DA's/HEW and the like about population and environmental issues, are you responding to the problem so far discussed with them?

1. Yes 2. No

404. Are there social organizations like "idir", "mahiber" and "equb" in your kebele?

1. Yes 2. No

405. If yes for Q. # 404 do you participate in these social organizations operating in your community?

1. Yes 2. No

406. During discussion on societal problems in your community have you discussed on population and environmental related issues? 1. Yes 2. No

407. In your opinion, can the existing environmental degradation be reversed?

1. Yes 2. No 3. Do not know

2. Questionnaire # 2. In-depth interviews of key informants (Kebele representative and woreda sectoral representative as indicated in methodology section)

1. What does environmental degradation mean?
2. What are the main causes of environmental degradation?
3. How can we prevent environmental degradation?
4. What does population pressure mean?
5. What is your opinion about the current status of your family size as compared to your farm land?
6. Who are more concerned about the impacts of population pressure on the environment?(Basing on age structure)
7. What are the major factors associated with the perception about the impacts of population pressure on the environment?
8. Who are the most important to provide information about the impacts of population pressure on the environment to the community?

Declaration

The thesis is my original work, has not been presented for a degree in any other university and that all sources of material used for the thesis have been duly acknowledged.

Fekadu Abdisa

Student
Date



Signature

18-11-10

I confirm that this thesis has been submitted with my approval as the supervisor of this study.

Abel Amale

Advisor



Signature

17 Nov. 2010

Date