ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

CENTER FOR FOOD SCIENCE AND NUTRITION

Assessment on the Outcomes of Promotion of Nutrition Education on Dietary Diversity among Women's of Reproductive Age (15-49 years) and Children Aged 6-36 month in Tigray Regional State Selected Rural Kebeles

BY: Fetene Nega Belachew

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A MSc thesis Submitted to the

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In Partial Fulfillments of the Requirements for the Degree of Master of Science

In

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Supported By:

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DECLARATION

I hereby declare that the thesis entitled "**Assessment on The Outcomes of Promotion of Nutrition Education on Dietary Diversity Among Women's of Reproductive Age (15-49 yrs.) and Children 6-36 month in Tigray Regional State Selected Rural Kebeles**" submitted in partial fulfillment of the requirements of MSc degree in Community Nutrition to the school of graduate ,studies Community Nutrition entirely my original work and to the best of my knowledge, it has not been submitted to any other institution of higher learning for examination.

Signature _____ Date _____

Fetene Nega Belachew

The thesis has been approved for submission by:

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FINAL THESIS APPROVAL FORM

As participants of the board of Examiners of the final MSc. open defense, we declare that we have read and evaluated the thesis prepared by Fetene Nega Belachew under the title allowed "**Assessment on the Outcomes of Promotion of Nutrition Education on Dietary Diversity Among Women's of Reproductive Age (15-49 yrs.) and Children 6-36 month in Tigray Regional State Selected Rural Kebeles**" and recommend for the degree of Master of science in Community Nutrition.

Signed by the examining committee:

Name of Internal Examiner	**Signature**	**Date**
Name of External Examiner	**Signature**	**Date**
Name of the Chairperson	**Signature**	**Date**

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Table of Contents

List of Acronyms

ACGG	Afirica Chicken Genetic Gain
ATONU	Agriculture to Nutrition
BCC	Behavioral Change Communication
CSA	Central Statistical Agency
DD	Dietary Diversity
DDS	Dietary Diversity Score
DID	Difference In Deference
EDHS	Ethiopian Demographic and Health Survey
FAO	Food and Agriculture Organization
FGs	Food Groups
FGI	Food Group Indicator
HH	Household
ILRI	International Livestock Research Institute
IYCF	Infant and Young Child Feeding
LBW	Low Birth Weight
MAD	Minimum Acceptable Diet
MDD	Minimum Dietary Diversity
MMF	Minimum Meal Frequency
NSA	Nutrition-Sensitive Agricultural
NE	Nutrition Education
NGO	Non-Government Organizations
SES	Socioeconomic Status
UNICEF	United Nation Infant and Child Emergency Fund
WASH	Water, Sanitation, and Hygiene
WDDS	Women's Dietary Diversity Score
WE	Women Empowerment
WHO	World Health Organization
WRA	Women of Reproductive Age

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ABSTRACT

Poor nutrition disproportionately affects women and children in rural areas of low and middle income countries. This is linked with 45 % of child death. Mothers/caregivers inadequate knowledge of Infant and Young Child Feeding (IYCF) practices and poor cultural belifes increases the risk of nutrition disorders. Integrating nutrition education with food preference and nutrition-sensitive agriculture has the potential to improve diets, but rigorous evaluation of this approach are limited. Therefore, the present study investigated the outcomes of promotion of nutrition education in the presence and absence of nutrition-sensitive agriculture interventions on WRA and their children dietary intake in the rural farming community.

Quasi-experimental study with two arms 1) NSA+BCC and 2) BCC alone was conducted from February-May 2018 to assess the outcomes of promotion of nutrition education on dietary diversity among women's of reproductive age and children aged 6 to 36 months in Tigray region selected rural kebeles. The study was designed to include 200 mother-child pairs and sampling were directed by using simple random sampling technique to select the study participants. Women and children dietary intake have been measured using qualitative open 24-hrs dietary recall technique adopted from FAO and WHO.

In the baseline assessment, proportion of minimum DD was extremely low (4.9% women and 4.1% children) in the BCC group. At the endline, 20.8% of women and 32.5% children from the NSA+BCC group has met the recommended minimum DD. NSA+BCC significantly improved the proportion of women and children meeting minimum DD, when compared to BCC alone ($P<0.05$). BCC alone had also shown positive trend in dietary diversity between baseline and endline values.

Although both BCC and NSA+BCC improve dietary diversity, the increase in the proportion of children and women meeting the minimum DD was significantly higher when BCC and NSA were combined. Therefore, in rural farming communities integrating BCC that is informed by food preference along with NSA is recommended to improve diets of women and children.

Keywords: BCC; Dietary diversity, Infant and Young Child Feeding, Nutrition education, Nutrition-sensitive agriculture, Tigray.

1. INTRODUCTION

1.1. Background

According to the 2013 Lancet series on maternal and child nutrition, worldwide 3.1 million (45%) of all child death are linked to nutritional disorders consisting of fetal growth restriction, stunting, wasting, and micronutrient deficiencies, along with sub-optimum breastfeeding (Lancet, 2013). Mothers/caregivers inadequate knowledge of infant and young child feeding (IYCF) practice and poor cultural practice increases risk of nutrition disorders amongst under 2 year children. Those who do not get enough diet or key nutrients cannot sustain healthy, and active lives. The result is poor physical and mental development, devastating illness and death, as well as incalculable loss of human potential and social and economic development (FAO, 2011c).

Poor diet negatively affects women during lactation and thus, the infant's diet as it is highly dependent on its mother's diet. Because mothers are responsible to select, purchase and prepare food for themselves as well as for the children. Maternal and child undernutrition is highly prevalent in low and middle-income countries, resulting in substantial increases in mortality and overall disease burden. Globally, around 793 million people are malnourished and the majority of them (98%) reside in developing countries (FAO, 2015). In SSA, roughly one out of four individuals are undernourished (WFP, 2015). Ethiopia is also one of the countries in the Sub-Saharan Africa with the highest rates of undernutrition. According to the 2016 Ethiopian Demographic Health Survey (EDHS) collected data, 38% of children are stunted, 10% are wasted, and 24% are underweight (EDHS, 2016).

Dietary diversity (DD) can be defined as the number of different food groups consumed by an individual over a 24 hours period (Hoddinott and Yohannes, 2002). Ensuring adequate intake of essential nutrients that can promote good health and physical and mental development (Ruel, 2002). In general, one food group or variety does not provide all the necessary nutrient to meet basic nutritional needs and being healthy. Labadarios and colleagues noted that, with more food groups included in daily diet thereis a greater probability of meeting daily nutrient requirements (Labadarios *et al.*, 2011). Therefore, a diet that is sufficiently diverse with international recommendation may reflect nutrient

adequacy (Kennedy *et al*., 2009). Hence, dietary diversity is thus a good indicators of dietary adequacy and quality universally (Oldewage-Theron and Kruger, 2011).

Recently, several studies have shown that DD tools are now being used routinely for characterizing diets and as a proxy of diet quality in developing countries (Arimond *et al*., 2010). Also, DD can be used as a good proxy indicator for measuring nutritional status of pregnant women (Ali *et al*., 2014). To meet basic nutritional needs, World Health Organization (WHO) and Food and Agriculture Organization of the United Nations (FAO) recommend a consumption of at least a minimum of four and five out of seven and ten defined food groups per day for children aged 6–23 months and women of reproductive age (WRA), respectively (WHO, 2010 and FAO and FHI, 2016). However, only 13.8% of Ethiopian children 6–23 months of age have meet the criteria for a minimum DD (EDHS, 2016). Dietary diversity among women was also found to be poor (Zerfu *et al*., 2016).

1.2. Statement of the Problem

Ethiopia has enjoyed a sound economic growth over the past few years with a high GDP growth rate. The current consensus is that, economic growth brought with it positive trends in food insecurity, poverty and undernutrition reduction in both urban and rural areas (World Bank, 2017). Despite this progress, the rate of undernutrition in under 5 children is still a serious public health problem, 42.0% are stunted, 33.0 % are underweight and 15.0% are wasted (Ahmed A. *et al*., 2017). About 28% of all child mortality is associated with undernutrition (UNICEF, 2014). Nearly 22% of women are too thin (EDHS, 2016). The rate of decline in undernutrition has not been matching with economic progress and diet quality remains poor.

Recent findings reported, maternal and children DDS is extremely low in Ethiopia. Only 13.8% of the children were fed with four or more FGs and the percentage of MAD is 7% (EDHS, 2016). A study done in South wollo, 7% of the children ages 6-23 months met the recommended minimum DD (Gebremedhin *et al*., 2017). According to Nguyen and colleagues, the average Ethiopia child eats 1.7 FGs/day and the mean maternal DDS was 2.8 (Nguyen *et al.,* 2013). In Amhara region, most children (74·8%) consumed 1–2 FGs (Gashu *et al.,* 2016). Related finding in Tigray region reported, 10.75% of children aged 6-23 months was received appropriate complementary feeding (Mekbib *et al*., 2014). This

could be due to lack of a sustainable nutrition knowledge about consumption of diversified food, and poor feeding practice. In many resource poor environments, diet quality for WRA is very poor and there are gaps between intakes and daily nutrient requirements (Arimond *et al*., 2010 and Lee *et al.*, 2013). Weldehaweria *et al*. (2016) reported, in Aksum town a total of (56.4%) of lactating mothers had low DDS (Weldehaweria *et al*., 2016). In Tigray Samre Woreda, majority of the lactating mother (71.2%) were not taking additional meal (Haileslassie *et al*., 2013).

Recently, more projects have focused on NSA and food security. However, they were not designed to take in to account women food preference and nutrition education to improve nutrition security. They mostly promote farm production, accessibility of food and income which is not enough to combat the complex problem of poor diets. Because, even if the women have good access to food, poor cultural beliefs, knowledge gap, and attitudes may prevent caregivers from making use of these foods. Hence, we need to test nutrition education tools (BCC and FG checklist communication material) based on women food preference that will change mother's behavior and remind them in sustained way. Hence, evidence on effectiveness of nutrition education tools on DD remains scanty.

1.3.Significance of the Study

- Informing Nutrition Sensitive Agricultural (NSA) program to particularly focus on promotion of nutrition education to improve dietary diversity based on women food preference.
- Nutrition education tools to be tested for effectiveness and sustainability for future use.
- To support nutrition education intervention programs.
- To know the MDDs among women's of reproductive age (15-49) and children (6-36mon) in the study area.
- To link nutrition education on agricultural and food security intervention, it could be one solution to improve dietary diversity and prevent undernutrition.
- To provide information for government policy advocacy on nutrition education.
- Provide reliable and consistent nutrition information to use as a basis for program planners, concerned stakeholders, and education to support women and children.

1.4. OBJECTIVES

1.4.1. General Objective of the Study

The general objective of this thesis is to assess the outcome of promotion of nutrition education on dietary diversity among women's of reproductive age (15-49yrs) and children ages 6-36 months in the rural farming community in the presence and absence of nutrition-sensitive agriculture interventions.

1.4.2. Specific Objectives of the Study

- To identify major drivers of women's food preference for each ten defined food groups.
- To investigate the role of food group checklists communication matrials in improving women and child dietary diversity.
- To investigate the effect of nutrition education based on food choices on women's dietary diversity.
- To investigate the role of integrated nutrition sensitive agriculture with nutrition education intervention on dietary diversity among women of reproductive age and child ages 6-36 months.
- To assess dietary diversity score among women of reproductive age (15-49yrs) and young children aged 6 to 36 months in the study area.

We Hypothesized that:

Null Hypothesis (Ho)

- Nutrition education tools **has no effect** on the improvement of women and children dietary diversity irrespective of participation in NSA activities.
- The combination of NAS intervention and nutrition education tools **has no effect** on the improvement of women and children dietary diversity.

Alternative Hypothesis (H1)

- Nutrition education **can improve** women and children dietary diversity.
- The integration of NAS intervention with nutrition education tools **can improve** women and children dietary diversity.

2. LITERATURE REVIEW

2.1. Nutrition Education

A World declaration and plan of action for nutrition was adopted by delegates from 159 countries and the European Community who pledged to eradicate substantially poverty; widespread chronic hunger; undernutrition, especially among women and children, micronutrient deficiencies, especially iron, iodine and vitamin A; diet-related diseases; impediments to optimal breastfeeding; and inadequate sanitation, poor hygiene and unsafe drinking water (McNulty, 2013).

2.1.1. Definitions of nutrition education

Different definition is being used to describe nutrition education at different time and by different person (organization) to promote healthy eating between and within countries, and between and within entities implementing or supporting such interventions.

Nutrition education is part of applied nutrition that focuses its resources toward learning, adaptation and acceptance of healthy eating habits, according to one's own food culture and scientific knowledge in nutrition, all with the ultimate aim of promoting health of the individual or community. It is a useful strategy in the adoption of therapeutic dietary prescriptions and secondary prevention. It also a set of planned educational activities targeted at certain population groups and aimed at acquiring healthy nutrition behaviors (Gil, 2010).

Nutrition education includes all types of actions designed to change knowledge gap, attitudes and behaviors of individuals or community to contribute to the prevention and reduce malnutrition in all its forms, and any erroneous food consumption, including of course the economic aspect (Mataix Verdú, 2000).

Nutrition education, described as promotion of DD, improving IYCF, or promotion of maternal nutrition, is being integrated into other relevant sectors, the over-riding concern is whether the quality of the activities is sufficient to bring about the desired nutrition practices. Considering the availability of well-validated standardized indicators to measure changes in dietary and feeding practices, which can influence programs to adopt these and use the monitoring results effectively for program improvement (McNulty, 2013).

Nutrition education is an intervention strategy that can be used by governmental, non-government organizations and researchers in their attempts to improve women and child nutritional status. Nutrition education is dietary approach to undernutrition prevention that is ideally complemented with population-level strategies such as healthy eating campaigns (Zhang *et al.*, 2014). However nutritional improvements are multidimensional, mutually reinforcing, and to some extent, overlapping (Nisbett *et al*., 2017).

Nutrition education is defined as training intended to lead to acquired nutrition-related knowledge and skills and be provided from individual (ADA, 2011). "Learning the link between food and health, pleasure, its social and symbolic dimensions, its regional and religious characteristics" (Société Suisse de Nutrition, 2012). It also helps individuals, families, and communities make informed food choices and lifestyles that support their physiological health, economic, and social well-being (USDA, 2012b).

Nutrition education is widespread, with schools, government and health promotion agencies delivering a range of messages that incorporate a nutrition component. Factors that affect nutrition knowledge include age, sex, level of education and socioeconomic status (Parmenter *et al*., 2000). Women tend to have good understanding on nutrition knowledge than men, and this difference has been attributed to their more exposure in food purchasing and preparation or a lower interest in nutrition by men (Parmenter *et al*., 2000; Wardle *et al*., 2000 and Hendrie *et al*., 2008).

Knowledge of nutrition facts, or declarative knowledge may not translate through to skill or process knowledge, essentially the ability to choose healthier foods, understand food labels or select healthier options from a range of foods available. Nutrition knowledge instruments that assess declarative nutrition concepts may have little relevance to the set of knowledge and skills required to make appropriate dietary decisions that promote health. Zoellner *et al*., have more recently used the term 'nutrition literacy' rather than nutrition knowledge and defined this as 'the degree to which individuals have the capacity to obtain, process, and understand nutrition information and skills needed in order to make appropriate nutrition decisions'(Zoellner *et al*., 2009).

2.2. Effect of Nutrition Education on Dietary Diversity

Nutrition education programs are usually targeted at high vulnerable segemnts, such as those who live in lower socioeconomic status, lower nutritional status and low educational level, community. Nutrition education helps people to improve their diet through discussion, demonstration and practice. It is also effective to improve caregiver feeding practices and children's dietary diversity and the frequency by which they are fed (Ickes *et al.*, 2017). The findings show that an nutrition education program that is customized to the participants' needs and preferences for NE can improve specific dietary behaviors and has the potential for improving HbA1c and other clinical outcomes. However, nutrition education was not efficacious on HbA1c (Muchiri *et al.*, 2016).

The need for effective NE to achieve positive changes in family diets and in IYCF practices is more pronounced than ever. There is ample evidence that improving food security alone does not necessarily improve DD or child nutritional status. On the other hand, a review of project evaluations shows that nutritional status can be improved through nutrition education even in the absence of improvements in food security (McNulty, 2013).

In a recent review of the effectiveness of nutrition education, Shi and Zhang, (2010) reported that NE can improve complementary feeding behaviors and child growth. The authors reviewed published results of fifteen interventions and noted that, the effective intervention strategies that are learned from previous successful studies include: "culturally sensitive, accessible, and integrated with local resources" (Shi and Zhang, 2010).

A recent comprehensive review examined the effectiveness of nutrition education research interventions conducted with preschool children, school-aged children, adults, pregnant women and caregivers of infants, and older adults. It also examined the effectiveness of training on professionals and paraprofessionals who provide nutrition education to others. From its examination of about 220 studies conducted between 1980 and 1995, it concluded that nutrition education was a significant factor in improving dietary practices when behavior change was set as the goal and when the education strategies were directed to that goal. It also noted, however, that a wide variety of very different measures were used to assess the effectiveness of programs, that most intervention effects were modest, and that

most interventions did not achieve across the-board success on all study-specified criteria of effectiveness (Contento *et al*., 1995).

A study conducted in South Wollo Ethiopia found that, in predominately food-insecure areas, nutrition education, implementation of nutrition-sensitive agriculture, and husband engagement in IYCF can improve children's DD (Gebremedhin *et al*., 2017).

In recent years' researcher have been investigating the nutrition knowledge can impart favourable dietary and health behavioral changes in a low income population through short term nutrition education on health benefits of all food groups; identification of healthful foods; shopping, cooking, and gardening; and energy balance. In low-income women a short term nutrition intervention using comprehensive nutrition and health education through experiential and interactive lessons, activities, and demonstrations has the capacity to increase nutrition knowledge and favorably change nutrition behaviors. These study suggests that emphasizing experiential learning activities using a holistic approach to increase knowledge of foods can result in favorable behavioral changes in a relatively short time frame (Rustad and Smith, 2013).

Acquisition of knowledge of health benefits of all food groups promotes subsequent dietary behavioral changes, after education on the importance of eating healthfully for disease prevention (such as choosing fresh foods in favor of processed foods, and that herbs and spices can be substituted for added fat and salt); learning how to cook with minimal fat and salt; sampling various fresh and dried herbs and spices; and potting culinary herb gardens (Rustad and Smith, 2013).

In Malawi a cluster randomized controlled trial research reported, Participatory community-based NE for caregivers improved child dietary diversity even in a food insecure area. Nutrition education should be part of programs in food insecure settings aiming at ameliorating food insecurity among communities (Kuchenbecker *et al*., 2017).

2.3. Determinants of Dietary Diversity

Dietary diversity is best indicator of dietary quality and nutrient adequacy. These section summaries some of the major determining factors of dietary diversity. Several studies suggest a positive association between income and dietary diversity (Pollack, 2001; Regmi,

2001; Ruel, 2002, Rashid *et al*., 2006 and Weldehaweria *et al*., 2016). In Cambodia, Reinbott and colleagues noted that wealth, age of the children, and maternal education were the major determinants of food diversity (Reinbott *et al*., 2016).

Dietary diversity are significantly associated with socio-demographic characteristics like age, education, occupation, parity, race and ethnicity. Increasing age and education have been associated with a healthy and diversified food intake in pregnant women. On the other hand females that have less education level, are nonworking and have increased parity, are more prone to an unhealthy non-diverse diet. However, in Pakistan there is a contradiction report by Ali and collogues, there is no significant association was observed between age, parity, gestational age, occupation and DD. Similarly DD was not associated with sociodemographic, or socioeconomic status of pregnant women (Ali *et al.*, 2014).

According to Thiele and Weiss reported, household size, age, sex composition, employment status and level of education were the major determinants of food diversity (Thiele and Weiss, 2003). Furthermore, a study has shown that, there were no significant differences found in DDS and agro-ecological variation. However, literature shows that literacy status of the mother, prior nutrition training, cultivated land size, and the walking distance to a water source is the major determinants of food diversity (Mbwana *et al.*, 2016). Similarly in Ethiopia study reported, educational status of a mother, age of a child, birth order of index child, area of residence, home gardening, husband involvement in IYC and satisfactory media exposure of a mother were significantly associated with providing the minimum dietary diversity (Beyene *et al*., 2015 and Dangura and Gebremedhin, 2017).

Therefore, the average household size in Ethiopia is 4.6 persons. Urban households are slightly smaller than rural households (3.5 persons versus 4.9 persons). Men head the majority of Ethiopian households (75%), with only 1 in 4 households headed by women (EDHS, 2016).This means rural household are more pronounced to low dietary diversity score than urban.

Comparable conclusions were also suggested by Taruvinga, *et al*. (2013) a positive correlation normally exist between education and high dietary diversity. These studies have shown that key determinants that can positively condition rural households to attain high

dietary diversity are: participation in irrigation schemes, gender, education, income, ownership of a home garden and small-livestock (Taruvinga, *et al.*, 2013). These is mainly because of greater awareness and understanding of nutritional health benefits.

2.3.1 Socio demographic factors

Global diet quality varies substantially by age, and sex, and fairly independent heterogeneity is evident for diet patterns based on eating healthier versus fewer unhealthy foods and nutrients. Increases in unhealthy patterns are outpacing increases in healthy patterns in most world regions (Imamura *et al.*, 2015).

Literature has documented the effect of sex of head of the household, marital status, monthly expenditure and presence of old age dependency were factors associated with dietary diversity. Being male sex for the household and married increases dietary diversity by nearly four and three times respectively (Misker, 2016). Married people tend to consume greater variety, perhaps because responsibility for other family members leads to a wider variety of diet items in the household (*Liu et al.,* 2014). According to Girma and Genebo (2002), younger women from 15 to 19 years and older women 45–49 years are the most affected by malnutrition, and this can influence child care (Girma and Genebo (2002). Mothers aged between 18 and 35 years reflects maturity and ability to care for Children well (Isingoma *et al.,* 2017).

Literature shows that, household education level is a key determinant of the type of occupation which one gets, which in turn is likely to influence the income of a person. Household education was positively correlated to high dietary diversity and negatively correlated to low DD. These means, the more educated households are, the more likely they are to attain a high dietary diversity (Taruvinga *et al*., 2013 and Beyene *et al*., 2015). This could be educated mothers are more likely to have information (media exposure), understand the education message, more likely to be engaged in the paid work and might have received lessons on child feeding in the curricula at school.

In Ethiopia Dangura, & Gebremedhin reported that, the dietary diversity score of children from literate fathers was increased by 0.26 as compared to their counterparts (p=0.026). It is also reported that the DDS of infant was increased by 0.21 (p=0.037) for those mothers

that received IYCF education during their post-natal care. Generally DDS of children significantly improved by nutrition education, promotion of husbands' involvement in IYCF and implementation of nutrition sensitive agriculture (Dangura and Gebremedhin, 2017). A study conducted in South Wollo Zone, North Ethiopia concluded that children living in households where husbands are directly involve in IYCF have a significant 13.7% rise in DDS (Gebremedhin *et al*., 2017).

Wealth and age of the child are the most common determinants of child dietary diversity .The older the child and/or the wealthier the household, the more diverse the child's diet was .This indicated the relationship between different food groups by age group which implies that food groups increase as the child age increase. This might be due to late introduction of complimentary feeding and when they start complimentary feeding on time; they included only milk or cereal products like gruel. Other possibility could be mothers may perceive that younger the child, the poor ability of child's intestine to digest solid, semisolid and soft foods (Beyene *et al*., 2015 and Reinbott *et al*., 2016).

2.3.2. Household socioeconomic factors

Dietary diversity is associated with the socioeconomic status of the household or individual. Knowaday's several studies suggest a positive association between income and dietary diversity (Pollack, 2001; Regmi, 2001; Ruel, 2002, Rashid *et al*., 2006 and Weldehaweria *et al*., 2016). Therefore, nations with higher incomes had larger improvements in diet patterns based on healthy items than did nations with lower incomes (Imamura *et al.*, 2015).This could be due to the fact that low income earners recognized to be negatively affected on their preference of quality and quantity of diversified food groups consumed in their feeding arrangements attributable to income.

Knowaday's several studies shows that poor people often do not have access to a diverse food. While access is important, but the awareness of health food groups and its health role will probably have more effect. Furthermore, it is evident that food diversity needs greater cost. There was a significant relationship between the DDS and economic situation. Low socioeconomic status seemed to be associated with low DDS. This is because they lack adequate resource to purchase the essential foods required for good health and well-being of children. Therefore, poor households avoid purchasing foods known to be expensive for

child feeding. For instance, dairy product, egg and flesh food are good source of protein and other recommended nutrient for child health and yet they are often expensive. Thus, those households with higher income had better chances of having diversified diets. The possible reason is that higher income is associated with increased purchasing power which can help in promoting DD (Kiboi *et al.,* 2017 and Morseth *et al*., 2017).

There was significant association between ownership of; radio, mobile phone, bank account, food exchange, and small animals and DDS. Participants who have mobile phones were 1.6 times more likely to have adequate DD than their counterparts who do not. This might be related to their economic status. Participant HH heads who have a mobile phone might have a higher monthly income than those who do not have one (Nega *et al*., 2015).

Having a bank account/savings is also significantly associated with household DD. Participants who have a bank/saving account were three times more likely to have a diversified diet than who do not. Respondents who exchange foods were 2.2 times more likely to diversify their diet compared to those who do not. Those who exchange foods may have the experience of trading surplus foods from their farms for foods that are scarce or totally unavailable at home. This may help to diversify their diet. The women development army reached consensus with the idea (FGD), "Since we usually produce crops on our farm and we can't produce all types of foods, food exchange is very important to eat varieties of foods. But distance of market makes food exchange very difficult, especially for elders, pregnant women, and mothers with children." (Nega *et al*., 2015).
Mass media is usually considered as a reliable source of health and nutrition information hence such messages are likely to be adopted. The level of exposure to mass media is low in Ethiopia. Among both women and men, radio was the most frequently accessed form of media. Therefore, nearly three in four (74%) women and 62% of men have no access to radio, television, or newspapers on a weekly basis and only 5% percent of women and 13% of men have ever used the Internet (EDHS, 2016).

Exposure to IYCF messages on the mass media was positively correlated to high dietary diversity (Dangura and Gebremedhin, 2017). Related study conducted in an urban setting in northwest Ethiopia found that DD is affected by media exposure. Children whose mothers who had been exposed to media had a higher odds of having diversified diet than

those children of mothers who had not been exposed to media (Beyene *et al*., 2015). In India a study also identified that, media exposure as a significant determinant of IYCF practice (Malhotra, 2013). This could have happened due to the promotions of child nutrition related media advertisement in national radio and television.

Exposure to mass media also significantly affected by wealth, education, location and sex. Interims of residency urban women are five times more likely than rural women to read a newspaper at least once a week. The urban-rural gap is also more evident in television viewing; 61% of urban women watch television at least once a week, as compared with 3% of rural women. Nearly 20% of women with more than a secondary education read a newspaper at least once a week, as compared with 4% of women with a primary education. Only 1% of women in the lowest wealth quintile read a newspaper at least once a week, compared with 10% of women in the highest quintile. Men are slightly more likely than women to use the Internet on a daily basis; 36% of men report that they used the Internet nearly every day in the past month, compared with 34% of women (EDHS, 2016).

In Ethiopia south Gonder zone, participant who have a radio was two times more likely to have a diversified diet compared to those who did not have one. This might be attributed to access to information through local broadcasting media, which broadcasts nutrition and health messages as a means of advocating (Nega *et al*., 2015).

Ownership of livestock can impact a household's nutritional status via the family member who controls the income generated from livestock activities. Therefore, there is a positive significant association between ownership of small-livestock and dietary diversity. Households who own small-livestock are more likely to move from medium DD to high dietary diversity. Because, small livestock are easy to keep, easy to trade and contain several food groups (eggs, meat and goat milk) that may provide micro and macronutrients (Taruvinga *et al*., 2013 and Nega *et al.,* 2015). Similarly another study reports, both males and females participate in animal husbandry, but with an additional illiterate female worker a household realizes more than 7 percent higher income from livestock activities. The nutritional outcomes might be affected by livestock ownership in rural India, although with differing patterns across age groups of children (Jumrani and Birthal, 2015).

Refrigerator ownership is also positively correlated with indicators of dietary variety, probably because consumers who own a refrigerator can buy a large quantity and/or variety, smooth out consumption, and reduce shopping frequency. Owning some form of transportation tends to facilitate shopping by reducing the per-trip cost of shopping (both in terms of time and in terms of monetary cost). Transportation also increases the maximum number of groceries the buyer can carry. Both of these features contribute to greater variety in consumption (Liu *et al.,* 2014).

A systematic review suggested that, in low- and middle-income countries, socioeconomic factors and geographical location have an impact on quantities and patterns of food intake with high-SES and urban individuals generally consuming a healthier diet (Mayén *et al*., 2014).

In china, households especially those in rural areas, own farms where they can grow vegetables and raise livestock to replace or supplement purchased food with self-produce food (Liu *et al*., 2014). Dietary diversity is slightly but significantly higher among farm households than among non-farm households, although non-farm household are significantly richer and could therefore afford a more diversified diet. It suggests that the direct access to food through farming can indeed contribute to an improved diet. Dietary diversity generally increases with household expenditure (or income) the correlation is much stronger among the poor compared to the non-poor, among farmers compared to non-farmers, and among subsistence farmers compared to market-oriented farmers. (Ecker *et al*., 2012).

Another cross-sectional study among pregnant women in Laikipia County, Kenya, dietary diversity is indeed associated with the socioeconomic status of the pregnant women. The finding has explicitly showed the critical role of education, occupation, monthly income, household assets, land ownership and maternal morbidity status in the attainment of the MDD and ultimately improved nutrient intake among pregnant women. Those women with higher education had greater odds of attaining minimum DD. This might be so because women with higher education might have acquired essential information on appropriate feeding practices (Kiboi *et al.,* 2017). Similarly, another study in rural Tanzania investigates, literacy status of the mother, prior nutrition training, cultivated land size, and

the walking distance to a water source is the major determinants of food diversity (Mbwana *et al*., 2016).

2.3.3. Home gardening

Home gardening is a farming system one should be able to grow and find a large variety of foods (vegetables, fruits, herbs, annual and perennial plants, condiments, etc.) to meet family consumption requirements see figure1 below. It also an important supplemental source contributing to food and nutritional security and livelihoods. There was a clear association between having a home garden, dietary diversity and with frequency of vegetable consumption. Lactating mothers who did not practice home gardening showed more than two folds higher likelihood of consuming low diversified diets when compared to mothers who practice home gardening (Weldehaweria *et al*., 2016). This might be due to the reason that households with gardens were beneficiary from gardens they own as a means to diversifying their daily food. It also indicated that parents with home gardening would grow vegetables and get additional diet options that enhance the diversity of the household's food sources (Figure 1).

Figure 1. Women and the researcher (me) in the gardens, Taken from the study area Tigray region (2018).

Access to a home garden was positively correlated to high dietary diversity and negatively related to low DD. Rural households with access to home gardens are more likely to move from a medium dietary diversity status into a high DD status. The possible explanation could be based on the fact that, home gardens normally provide a variety of horticultural crops rich in micronutrients like vegetables, fruits and tubers (Taruvinga *et al*., 2013).

Having a home garden also positively associated with the child's diet diversity and with frequency of vegetable consumption. Children from households that grow fruits and vegetables and own livestock, the DDS was significantly increased as compared to their counterparts (Beyene *et al*., 2015 and Dangura and Gebremedhin, 2017). The finding indicates implementation of nutrition sensitive agriculture might be imperative for improvement diversity of children's diet (Dangura and Gebremedhin, 2017). A study in Philippines also concluded preschool children from households with home gardens had higher DDS whether using the all-inclusive dietary diversity score or applying a 10-g minimum intake for each food group compared with children who lived in homes without a garden (Cabalda *et al.,* 2011).

Related findings reported, children in households with gardens were significantly more likely to eat vegetables and vitamin A–rich fruits and vegetables more frequently than those in households without gardens (Cabalda *et al*., 2011). Nutrition education may be an important means not only to encourage households, even those with limited land access, to put up a home garden, but also to change eating and feeding practices.

2.3.4. Participation in irrigation scheme

There was a positive association between being a member to an irrigation scheme and high dietary diversity. Households who participate in rural irrigation schemes have a higher likelihood of attaining a high DD. Irrigation schemes provide an opportunity to grow a variety of cash and domestic horticultural crops which may directly improve their household food groups. Indirectly, cash crops from irrigation schemes can also improve households` food purchasing power. Thus, the association indicate there were positive interactions between irrigation schemes and high DD (Taruvinga, *et al*., 2013).

There is a contradicting report in the case of Akaki Small-Scale Irrigation Scheme, small scale irrigation scheme did not have a role on farm household DD. No matter how these farming households produce more; since they score, ate less diversified food groups, they are food insecure. This is because of a onetime agricultural crop harvesting season, low and fixed price of their product, diseconomies of scale, and low market share and low sales volume problem they faced on. Farmers produce one time per year, because of over

flooding risk fear (Negash, 2015). Related findings in Fogera woreda Gumara kebele households with irrigated and rain-fed agriculture consumed a wider variety of crops but the number of food groups only marginally increased. This can be the reflection of the households' lower understanding about the direct and indirect consequences of undernourishment. Tradition or culture also limits food choice options to the usual Injera with wot, which is usually made of two items (Ayalew, 2009).

Sex, educational level, off farm income, and distance from home to water source are significant determinant factors of household's dietary diversity score in Akaki small scale irrigation scheme (Negash, 2015).

Household wealth index was a major determinant of maternal DD and also a strong independent determinant of birth weight. Maternal DDS was sufficiently higher in women of high socioeconomic class, compared to women of low socio-economic class. Similarly, the food group consumption frequency index was higher in women from households of high wealth index, compared with women of low household wealth index (Saaka, 2013).

In nutritional deprived populations, maternal diet in the third trimester appears to be an important determinant of LBW and that DDS can serve as useful predictive indicator of maternal nutrition during pregnancy and the likelihood of delivering LBW babies (Saaka, 2013).

2.3.5. Market access

Market access has a crucial role in defining the link between farm production and household DD. Market access has dual purpose both to sell part of their harvest, and to purchase diverse foods that improve dietary quality. Better market access could also facilitate farmers' involvement in specialized crop production and thereby to realize increased farm income (Qaim, 2014; World Bank, 2007). Jones *et al.* (2014) indicated that farmers who purchase food from the market might consume a more diversified diet.

Distance to the nearest market is found negatively and significantly affecting the dietary diversity in Ethiopia. This implies that farm-households located nearer to the markets enjoy greater dietary diversity – denoting the prominence of income effect from increased trade opportunities (Sibhatu *et al*., 2015).

In south Gonder zone, focus group discussion also showed that respondents were unable to diversify their diet due to factors such as remoteness of market, lack of transport, and lack of money to purchase different food items. The discussion also revealed that the participants would improve their dietary diversity if they had off-farm income sources and had easy market access for exchanging foods (Nega *et al*., 2015).

2.3.6. Lack of nutrition education

Nutrition education is acquiring knowledge on food varieties with the essential nutrients needed by the body for a healthy life as well as good eating habits that helps in improving the health status of people in order to prevent nutrition related health problems. Nutrition education‘s main goal is to make people aware of what constitutes a healthy diet and ways to improve their diets and their lifestyles. This can be done through different channels, although in general this occurs within schools targeting young children, since food habits in early stages of life are said to determine practices and preferences in adulthood (Eat Well, 2011).

Consumption of diversified diet is an important aspect of human health and wellbeing. The human body requires a well balance of protein, carbohydrates, vitamins, minerals and fats to maintain an optimal level of functionality. The intake of a variety of foods especially fruits, vegetables and grains is encouraged by the World Health Organization (WHO).High levels of uneducated person as well as a lack of nutrition education results in most rural households unable to cater for dietary diversity. Therefore , nutrition education does not only apply to people with food acquisition challenges, but applies to people with adequate food as well as some of them lack the necessary information on how to combine and prepare meals for a balanced diet (Nsele, 2014).

According to the FAO (2005b), nutrition education involves a series of different activities that are interrelated such as giving knowledge, empowering people in personal skills development such as child feeding practices, encouraging people to ensure healthy eating habits, providing important information to the people and encouraging them to develop a culture of eating a variety of macro and micro nutrient rich food. Linking nutrition education activities as interrelated practices may adopt and give birth to new practices for

example, when giving the nutrition advice of eating plenty of vegetables, additional information on how to preserve nutrients in vegetables by applying proper cooking methods should be provided. Nutrition information should be reinforced to different target groups in various forms such as group discussion, role play, drama, demonstration, newsletter, posters, practical sessions, videos and radios in order to be effective and quickly conveyed (FAO, 2005b).

Nutrition education is vital to educate women to adapt to food attaining, preparation and meal patterns to address the incidence of various micronutrient deficiencies. A sustainable nutrition education program would benefit the rural communities by assisting women to make informed nutritious food choices and, therefore, improve the dietary patterns, food habits, food preparation and meal planning skills within an inadequate household budget. Nutrition knowledge should be strengthened in different target groups using numerous forms such as posters, practical sessions, radios and television broadcast in order to be operative and rapidly conveyed even in remote areas (Nsele, 2014).

2.3.7. Cultural beliefs on food

Increasing the production and accessibility of nutrient dense foods alone would not be enough to improve the nutritional status of the women in light of the identified food taboos and misconceptions. According to Mbhenyane *et al.* (2008), food intake is highly influenced by cultural processes. Cultural influence on food habits moves from generation to generation. Culture can lead the people concerned to resist change which might negatively influence production and consumption of food (Mbhenyane *et al.*, 2008).

In Ethiopia Hadiya Zone a cross-sectional study reported that, a quarter of women (27%) avoided at least one type of food due to food taboos. The most common taboo foods were milk and cheese, which were avoided by nearly half of the women in both cases (44.4%). Linseed, fatty meat and banana were also avoided by a small proportion of the women (16%, 11.1 and 8.6%), respectively. In general livestock foods were avoided by over 90% of the women with food taboos. The reasons for avoiding foods include fear of discoloration of the fetus (20%) and fear of abortion (9.7%). The most common reason for the food taboos was fear of difficult delivery as the result of increased size of the fetus due to consumption of nutritious foods. Among the few socioeconomic variables studied,

education and income were found to influence food taboos (Demissie and Kogi-Makau, 2017).

Lack of education in general and lack of nutrition education in particular are the most important factors contributing to observance of food taboos. The less educated women are, the more they observe food taboos. The less educated women are, the more likely it is that they are poor and at the same time observe more food taboos. This observation underscores the importance of educating women and providing nutrition education aimed at changing mothers' attitudes towards appropriate feeding practices (Demissie and Kogi-Makau, 2017).

A number of taboos related to the intake of certain food items (group) and cultural misconceptions that can adversely affect nutritional status of womne was identified. The most common taboos were related to the consumption of green leafy vegetables, yogurt, cheese, sugar cane, and green pepper. Among foods considered to be taboo are leafy vegetables like cabbage. Culturally a community believes that, if a pregnant woman eats leafy vegetables, especially after 8 months of gestation, the leaf passes to the womb and attaches to the baby's head and form what they called "particles". These "particles" are considered harmful to the child and are even considered to cause immediate death to the newborn. Similarly, the consumption of dairy products like milk, yogurt, and cheese during pregnancy is considered harmful to the fetus (Zerfu *et al*., 2016).

A focus group discussion also results "….old people believe that pregnant women should avoid consuming dairy products like yoghurt and cheese, particularly as the gestational age advances. This is because dairy products can pass to the womb and attach to the baby's head… I have seen this happen with my naked eye: a baby born full of milk products on the head… full of cream and cheesy substances… I have witnessed these babies dying immediately after delivery". However, the frequency and extent of the practice varied by maternal age, family composition, and literacy level. Older mothers, from rural villages, and those with no formal education were more likely to practice the taboos than younger and educated ones. Almost all of the participants disfavored weight gain during pregnancy in fear of obstetric complications associated with the delivery of a bigger infant. The consumption of fruits, sugarcane, and some types of vegetables was also perceived to be

associated with having bigger babies, which is believed to lead to a difficult delivery (Zerfu *et al.*, 2016).

In rural areas the low intake of fruits and vegetables as well as a higher intake of carbohydrates (cereals) has been identified as the main reasons for the high rate of nutrient deficient disease. Seasonality also highly influence on food variety, dietary diversity and nutrient adequacy of women in rural areas. Fruits and vegetables consumed by the households are seasonal ones. Some seasons such as autumn and summer have little seasonal fruit and vegetables which results in lower micronutrient intake of the community. Some seasons such as winter and spring have a wide variety of seasonal fruits and vegetables intake which resulted in better micronutrient intake compared to summer and autumn (Nsele, 2014).

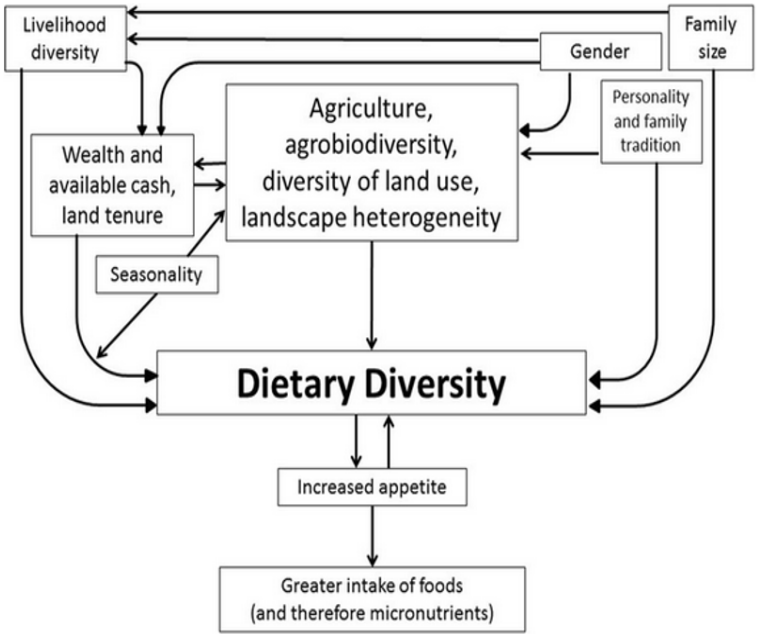


Figure 2. Determinants of dietary diversity. Taken from: Powell *et al. (*2017)

Dietary patterns in India is highly diverse, including traditional vegetarian patterns, those that incorporate high-fat, high-sugar foods and also meat. These review also found that regional variations are great role on changes in dietary patterns (Green *et al*., 2016).

2.3.8. Access to drinking water and electricity

Clean water is a basic need for human life; Furthermore, source of drinking water and electricity access are a major predictor of DD. In Ethiopia, only 57% of rural HHS have

access to an improved source of drinking water and 8% of rural households have access to electricity. Mostly rural households obtain their drinking water mainly from public taps/standpipes 19%, followed by protected springs 14% and tube wells or boreholes 13%. In contrast to rural and urban area, in urban areas, 77% of households have piped water on their premises, compared with 6% of rural households. (EDHS, 2016).

Fetching drinking water is an additional task that could be of great cost to household members, depending on the time spent to obtain it. More than half of rural households (53%) travel 30 minutes or longer round trip to fetch drinking water. In both rural and urban households, adult women are most likely to be responsible for fetching drinking water (17% in urban households and 68% in rural households). In rural areas, female children under age 15 are three times more likely than male children in the same age group to fetch drinking water (13% versus 4%) (EDHS, 2016).

Lactating mothers who reported protected well as a main source of drinking water were more likely to have low dietary diversity than those who reported tap water as main source (Weldehaweria *et al*., 2016). This might be due to the reason that mother who have not tap water are spent more time for searching water and they becomes tired and not ready to prepare more diversified food .

2.4. Women Empowerment and Dietary Diversity

Achieving improved women and child nutritional outcomes is one of the key development agenda of developing countries like Ethiopia. This challenge is manly affects in rural areas due to lack of access to improved food sources, exposure to nutrition education, health facilities, and other infrastructure.Gender inequalities can be both a cause and an effect of hunger and malnutrition. Thus, gender roles to mediate the linkage between particularly in relation to increased food availability and increased income. Therefore, one possible pathway through which agricultural development could improve health and nutrition outcomes is by considering gender roles and gender equity in agriculture.

Ethiopian government is strongly committed to promoting gender equality and women's empowerment, and has adopted a number of institutional and policy measures that support these goals. These measures are, the 1997 Ethiopian Constitution, the 1993 Ethiopian National Policy on Women, the 2005 Family Law, and the Growth and Transformation

Plan (GTP) I and II are among the milestones that further gender equality and empowerment (EDHS, 2016). To strengthen accountability, the government also recently issued proclamation No. 916/2015 that requires all government institutions to address women's issues in policies, laws, and development programs and projects (FDRE, 2015).

Poor intra-household resource allocation has a negative effect on maternal and child nutritional status in developing countries like Ethiopia. Therefore, women empowerment is one of the nutrition sensitive intervention for addressing maternal and child undernutrition and increase health and wellbeing. Literature documents the existence of an association between women empowerment and maternal and child DD. Maternal and children's dietary diversity are linked, not only with the circumstances of the household in general, but also with the status of women in particular. In Ethiopia a study found that, women's empowerment is positively associated to dietary diversity of both children and women. All the empowerment indicators, both in aggregate and separately, are found to have a positive and significant impact on the DD of women and their child. (Yimer and Tadesse, 2015).

Women who are disempowered through lack of control over household resources, time, knowledge, and social support networks constitute a major barrier to improving poor nutritional outcomes in Ethiopia. These is because disempowerment limited the resources that the women had in control and they always relied on someone else to make important decision that affected their diet and that of their child. Similarly, a study in Ethiopia reported that, in addition to the aggregate women empowerment score, group membership, the amount of time spent on paid and unpaid activities, decision on income, and autonomy on production decisions all have a positive effect on the number of food groups consumed (Yimer and Tadesse, 2015).

Studies have shown that, when women's incomes increase they tend to invest more in the diet, education, and health of their family, causing a ripple effect that can benefit entire communities. Because, in most rural households, the responsibility for the nutrition of household members, in general, and for the nutritional outcomes of children, in particular, falls on the mother. A literature shows that, women education are associated with positive impacts on nutritional status. The study estimates that improvements in women's status account for 11.61% of global reductions in the proportion of children who are

underweight, and improvements in women's education secondary enrolments account for 43.01% of global reductions in the proportion of children who are underweight. Taken together, the two indicators accounted for over half of the reductions in child underweight (Smith and Haddad, 2000).

A research shows, gender inequality can be a cause as well as an effect of hunger and undernutrition. The implications of various dimensions of women's empowerment and gender inequality on child stunting is being increasingly recognized. In South Asia, evidence reveals the crucial role of early age of marriage and conception, poor secondary education, domestic violence, inadequate decision-making power, poor control over resources, strenuous agriculture activities, and increasing employment of women and of interventions such as cash transfer scheme and microfinance program on undernutrition in children. Integrating nutrition-specific interventions with measures for empowerment of women is essential to prevent stunting (Vir, 2016).

In developing countries, women has a major role in the agricultural activities. Their activities can include producing agricultural crops, animal rearing, processing and preparing food, fetching water, engaging in trade and marketing, caring for family members and maintaining their homes. However, women's contribution to the agricultural sector is greatly influenced by their health status. Therefore, women to be effective in their responsibilities, women need to maintain an adequate health status. In Ghana, some of the women empowerment indicators - ownership of assets, access to credit, autonomy in production, group membership and leisure time - have a significant impact on women's health status. Income, urban locale, and household hunger are important socio-economic variables that also have a significant impact on women's health status (Ross *et al*., 2015).

2.5. Environmental Influences on Food Preference

The choices people make among foods determine which nutrients enter the body, and influence food production systems through consumer demand. Specific food preference lay the groundwork for long term eating habits. The food choice process incorporates not only decisions based on conscious reflection, but also those that are automatic, habitual and subconscious.

Food choice ‘‘involves the processes by which people consider, select, and consume foods. Specifically, food choice behaviors represent a wide scope of activities including the acquisition, preparation, and consumption of foods’’. Individual food choice is influenced by a combination of structure (household and work environments, financial and other resources, etc.) and personal agency (Blake *et al*., 2008). It is known that eating behavior is highly complex, resulting from the interplay of multiple influences across different contexts and conditions. There is growing interest in the role of the environment in promoting healthy eating. It has been suggested that individual change is more likely to be facilitated and sustained if the environment within which choices are made supports healthful food options (WHO, 2003).

Different types of environmental influences that affect food choices: (1) individual-level factors attitudes, preferences, and biological and demographic factors; (2) the social environment, interactions with family, friends, peers, and others in the community and can impact food choices through mechanisms such as role modeling, social support, and social norms; and (3) the physical environment, multiple settings where people eat or procure food. The physical settings within the community influence what foods are available and accessible and (4) macro-level environmental factors play a more distal and indirect role but have a substantial and powerful effect on what people eat.

According to ecological models, these four broad levels of influence—individual, social environments, physical environments, and macro-level environments—interact, both directly and indirectly to impact eating behaviors (Sallis and Owen, 2002). For example, consider the case of a child’s consumption of milk. Individual factors such as whether the child likes or dislikes milk, social factors like whether the parent drink milk (vegan), physical environmental factors such as whether milk are available in the multiple contexts where children spend their time (home, school, after school) and whether families have easy access to high-quality and affordable produce in their neighborhood, and macro-level factors such as US agricultural policy and economic price structures for the costs of milk all can influence individual eating behavior.

As shown in (Figure 3) developing conceptual models of food choice contributes to clarify food practices and the interaction between individual food-related acts and the larger food

system. Such models have implications for theories about food choice as well as policies and interventions for changing food choices to influence health and the environment. A broad view of food choice and a constructionist approach can yield insights about factors influencing food choice as well as the process. The model indicated that one step toward an improved understanding of food choice, and should be examined further through similar studies with a variety of participants in different settings (Furst *et al*., 1996).

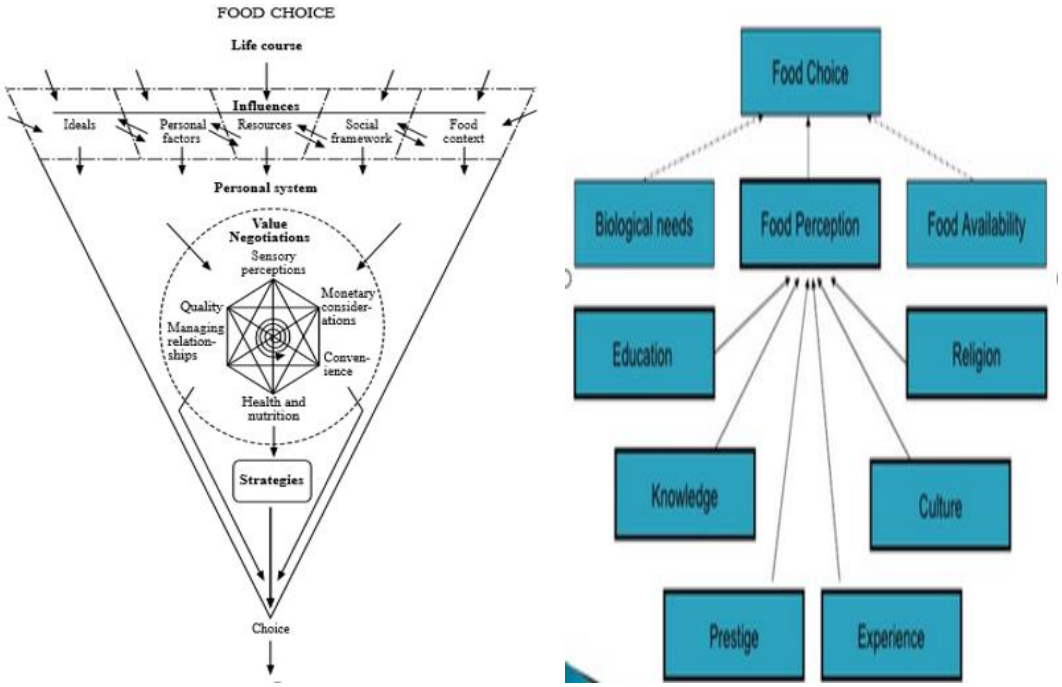


Figure 3. A conceptual model of the components in the food choice process. Taken from: Furst *et al*. (1996).

2.5.1. Social environments

Family and Home Environment: Family members and the home food environment are important factor on dietary intake, especially for children and adolescents. Parents and other family food preparers play central roles in shaping the dietary habits of household members. Food preparers act as nutritional gatekeepers by determining what foods are available in the home, the quantities in which they are stored, and how they are prepared. Parents additionally serve as models for eating behavior, use feeding practices that develop their children's ability to self-regulate intake, transmit nutrition attitudes, and determine the structure of shared meals (Hannon *et al*., 2003 and Savage *et al.,* 2007).

The findings suggest that families should avoid purchasing energy-dense, nutrient-poor products in bulk and storing these products in highly visible locations at home. Fruits, vegetables, and other nutritious foods should be purchased regularly and kept accessible at home. While the family food preparer often assumes primary responsibility for managing the food available at home, their food-purchasing decisions may be influenced by interactions among all members of a family (Baranowski *et al*., 2008)

Research further suggests that the mealtime environment may afect dietary intake. The foods served at meals, the accessibility of food at the table, the size of dinnerware and utensils, mealtime conversation and media use have all been related to the types or amount of food individuals consume. Having vegetables and milk served at dinner during adolescence predicts higher intakes of vegetables and calcium, respectively, in young adulthood (Arcan *et al.,* 2007)**.**

Social and Peer Networks*:* The food preference of individuals are additionally affected by interactions with others, including coworkers, peers, and close friends. Research indicates the context of shared meals is an important influence on eating. However, social norms and attitudes among members of a group may also impact the types or amounts of foods that individuals consume regardless of whether they eat together (Larson and Story, 2009).

Friends, peers, and the context in which social eating occurs may influence the selection of different foods over others. Research shows that, youth and adults tend to consume larger quantities of food when they eat in groups compared to when they eat alone (Herman *et al.*, 2003). This phenomenon, known as the social facilitation of eating, is especially strong when the group is composed of close friends or relatives. Social facilitation may occur because individuals use the behavior of others to judge "appropriate" portions and avoid incurring the stigma of excessive eating. The presence of multiple conflicting norms for portions within a group likely liberates individuals to consume as much food as they would like (Leone *et al*., 2007)

2.5.2. Macro environments

Income and Socioeconomic Status: Women are likely to be responsible for dietary choices not only for their own diet but also for those of their family. Individual, social and environmental factors influence women's eating behaviors and diet. In developing country economic constraints may contribute to the unhealthy food choices in low socioeconomic groups. A simple cost constraint can decrease the nutrient densities of diets and influence food selection in ways that reproduce the food intake patterns observed among low socioeconomic groups. They suggest that economic measures will be needed to effectively improve the nutritional quality of diets consumed by these populations (Darmon *et al.*, 2002).

The environment is defined as the macro- and community-level factors, including physical, legal and policy factors that influence household and individual decision. Higher SES people neighborhoods are more likely to meet healthy eating guidelines than low SES level. Results are similar across ethnic groups (Kaufman, 2002).

Women living in developing countries are particularly at risk for malnutrition during pregnancy due to lower socio-economic, poor diet quality, high intensity of agricultural activity ctivity, and frequent reproductive cycles. Imbalanced or inadequate nutrient intakes and commonly ceral-based diets is common in developing pregnant women countries (Lee *et al.*, 2013).

In high-income countries, high socioeconomic status (SES) is generally associated with a healthier diet, but whether social differences in dietary intake are also present in low- and middle-income countries remains to be established. In low- and middle-income countries, high SES or living in urban areas is associated with overall healthier dietary patterns. However, it is also related to higher energy, cholesterol, and saturated fat intakes. Social inequalities in dietary intake should be considered in the prevention and control of non-communicable diseases in low- and middle-income countries (Mayén *et al.*, 2014).

Cultural Norms and Values: Cultural factors influence food choices and eating behaviors of a community. In developing countries, a substantial number of women avoid specific foods consumption due to cultural beliefs or practice. "The practice of avoidance of foods

due to cultural food beliefs is referred to as food taboos". High prevalence of food taboo practice was reported in several areas of the world. In one of the communities in Nigeria, for example, it was found that about 66% of women avoided milk (Ojofeitimi *et al*., 1982) while in another village, Ebomoyi observed that practically all pregnant women avoided meat 98% (Ebomoyi , 1987). In Ethiopia Hadiya Zone a cross-sectional study reported, generally livestock foods were avoided by over 90% of the women with food taboos (Demissie and Kogi-Makau, 2017).

According to Kebede (2010), cultural diversity is the unique feature of Ethiopia; the country's population composed of about 80 ethnic groups whose cultures are diverse one another. Each ethnic group has its own culture manifested to the widely practiced diet (national foods), way of living, celebrations, dressing and dances at the cities and the cultural fabric intertwining is still continuing (Kebede, 2010). Thus, food selection is highly linked to culture and ethnicity, it is likely that the foods in the home differ in ethnically and socially distinct households. It is also possible that reporting of foods in the home differs by culture and ethnicity.

Food is an expression of cultural identity. Food behaviors are learned through enculturation, which is the process by which culture is transmitted from one generation to the next. Cultural food patterns influence food consumption in several ways; they shape food preferences and perceptions of what kinds of foods are healthy and unhealthy, and dictate what food is eaten, when it is eaten, and how it is prepared. Virtually all cultures use food during celebrations, and many use foods for medicinal purposes (Larson, and Story, 2009).

Meat and poultry consumptions in Ethiopia have associated peculiar cultural practices, for instance: the peoples use the oldest and cultural preservation of meat and prepare traditional dishes from meat, processing and cooking of poultry is a gender based duty and has socio-cultural roles, meat by-products are utilized for preparation of traditional dishes, and the peoples are dependent on limited types of source of animals for meats due to the taboo culturally associated (Seleshe, 2014).

Ethiopians are dependent on limited types of animals for meats due to the taboo associated culturally. Moreover, the consumption of meat and meat products has a very tidy association with religious beliefs, and are influenced by religions. The main religions of Ethiopia have their own peculiar doctrines of setting the feeding habits and customs of their followers. They influence meat products consumption through dictating the source animals that should be used or not be used for food, and scheduling the days of the years in periodical permeation and restriction of consumptions which in turn influences the pattern of meat consumption in the country (Seleshe, 2014). These all cultural beliefs and practice are extremely influence on food choice of a community.

Thus much work has been done on the impact of food taboos on maternal food choice and a negative impact on maternal and child health. Food taboos are closely linked to dietary intakes of women. Food selection is highly linked to culture and ethnicity, it is likely that the foods in the home differ in ethnically and socially distinct households. It is also possible that reporting of foods in the home differs by culture and ethnicity (Bryant *et al*., 2016).

Cultural attitudes and norms not only influence food choices and diet but also perceptions of body image and how obesity is perceived. Refugees from war-torn countries where hunger, malnutrition, and child mortality were prevalent may view a fat child as a healthy child. Studies of Latinos have shown that some parents of obese children believe their children to be healthy and are unconcerned about their children's weight status (National Academies Press, 2002).

Cultural factors for standards of female attractiveness based on a higher body weight can also serve as a protective buffer in promoting higher body satisfaction, such as the standards observed among African American adolescent girls and women, but at the same time present challenges for obesity prevention efforts (Kumanyika and Grier, 2006).

Food Price (Cost): One important factor in food choice for low-income people is the cost of food. There is research demonstrating that diets based on lean meats, vegetables and fruit tend to be associated with higher costs than high-energy-density diets rich in added sugars and fats (Drewnowski and Darmon, 2005; Monsivais and Drewnowski, 2007).

It is clear that food cost plays a significant role in determining eating patterns and health behaviors. Individual food choice is also affected by pricing. Price is an obvious influence on food choice. The cost of food is a much more important element in selection among people with low incomes compared to their counterparts. Price was also rated as more important among women than men. Another interesting observation is that women showing dietary restraint were less influenced by price than the unrestrained. It may be that desire to eat low calorie food outweighs considerations of cost for restrained eaters (Steptoe *et al.,* 1995).

Food prices are a primary determinant of consumption patterns, and high food prices may have negative effects on nutritional status and health, especially among poor people changes. This has important implications for national responses to increases in food prices and for the definition of policies s designed to reduce the global burden of undernutrition (Green *et al*., 2013).

2.6. Measurement of Dietary Diversity

The ideal time to measure dietary diversity in households or individuals depends upon the objective of the survey, season and monitoring activity. It also different from community to community. Thus, rural or agriculture-based communities and non-agriculture-based communities are not measure at same time. Seasonality is not an issue in those who live in non-agriculture-based communities. However, in rural area seasonality is a big issue. Food supplies are still adequate (may be up to 4-5 months after the main harvest).

Dietary diversity has been extensively validated against dietary quality (usually measured as nutrient adequacy) in developed countries. The few validation studies in developing countries confirm previous findings from developed countries of a strong association between diversity and nutrient adequacy (Ruel, 2003).

Information about the individual or household dietary diversity in community can serve as a simple but effective indicator of various parameters that affect the nutrition of people in such groups. Dietary diversity usually measured at the household or individual level through use of a questionnaire. Most often it is measured by counting the number of food groups rather than the food items consumed. The type and number of food groups included

in the questionnaire, subsequent analysis may vary, and interpretation depending on the intended purpose and level of measurement. At the household level, dietary diversity is usually considered as a measure of access to food (e.g., of households' capacity to access costly food groups); while at the individual level it reflects dietary quality, mainly the micronutrient adequacy of the diet (Vakili *et al*., 2013). Although the reference period can vary, it is most often the previous day or week (FAO, 2011).

Measurement of dietary intake is difficult, particularly in samples that are large and powerful enough to find significant associations between these variables. Use of dietary records significantly adds to the burden of respondents and researchers (Penn *et al.,* 2010).

Most dietary diversity indicators use simple counts of foods or food groups, but a number of food or food group classification systems have been used as well as different reference periods, scoring systems and cutoff points to characterize low and high diversity (Ruel, 2003).Research in Mali reported simple counts of food items and food groups can be used as indicators of Dietary diversity and nutrient adequacy. Nutrient adequacy and dietary diversity are different determinants which confirm the differences between the two (Torheim *et al*., 2004).

Dietary diversity is a qualitative measure of food consumption that reflects household access to a variety of foods (FAO, 2013). It has been recognized as a proxy measure for nutrient adequacy (Ruel, 2003). Minimum DD proportion of children ages 6 to 23 mo who received food from four or more out of the standard seven food group side among the core infant and young child feeding (IYCF) indicators (WHO Press, 2008). Dietary scores measured at the individual level are good proxies for overall dietary quality of women living in a poor rural African area. These scores were also shown to be linked with the nutritional status of women (Savy *et al*., 2005).

2.7. Maternal and Child Dietary Diversity and Nutrition Knowledge

Dietary diversity (DD) reflects the presence of adequate micronutrient in the diet and is strongly associated with child health. Dietary diversity was positively correlated with child nutritional status and growth in a variety of studies in developing countries (Ruel, 2003).

A recent study suggests that maternal and child DD are associated. A recent study using demographic and health surveys from Cambodia, Ghana, and Haiti suggests that maternal and child DD are associated. Children whose mothers consumed >5 food groups (on a scale of 0–9 food groups) were 5–9 times more likely to achieve minimum DD compared with those whose mothers consumed <3 food groups (USAID, 2012).

In Ghana, grains were the most commonly food group consumed by mothers (86%) and children (75%). More than half of both mothers and children also consumed other vitamin A fruits and fish. Vitamin A fruits, organ meat and dairy products were the least consumed food groups by both mothers and children. An increase in maternal DD was associated with a significant increase in child DD. Other variables that were positively associated with child DD included child age, maternal age, maternal education (secondary+),occupation, literacy, the three empowerment indicators, antenatal attendance, Wealth Index and place of residence. The number of children under five years in the household was negatively associated with child DD (Amugsi *et al.,* 2015).

Figure 4. Nutrition Education and Diversified Food Groups. Taken from: Guidelines for Measuring HH and IDD (2010) and Access on November 11, 2018: https://www.google.com/mothers+NUTRITION+EDUCATION+in+Ethiopia+image&tbm=isch&source

According to Nguyen and colleagues report the mean maternal DD was highest in Vietnam (4.6), followed by Bangladesh (4.1) and Ethiopia (2.8). Three-quarters of mothers in Ethiopia consumed only 1–3 food groups compared with 31% in Bangladesh and 17% in

Vietnam. Similarly, the mean child DD was highest in Vietnam (4.4), followed by Bangladesh (2.9), and Ethiopia (1.7). About three-quarters of children in Vietnam had a minimum DD compared with only one-third in Bangladesh and 6% in Ethiopia (Nguyen *et al.*, 2013).

Therefore, the more food groups the mothers consumed, the more likely their child attained the minimum DD. Maternal education is significantly associated with child minimum DD in Bangladesh and Vietnam. Maternal knowledge of food diversity and ability to decide on buying food were significantly associated with child DD in Ethiopia and Vietnam respectively (Nguyen *et al*., 2013).

Maternal nutrition appears to play a crucial role in influencing foetal growth and birth outcomes growth. It is also role on breaking the intergenerational cycle of poverty, undernutrition and chronic disease (WHO, 2002 and WHO, 2006). Maternal IDDS is highly associated with reduced risk of LBW. In nutritional deprived populations, maternal diet appears to be an important determinant of LBW and that DDS can serve as useful predictive indicator of maternal nutrition during pregnancy and the likelihood of delivering LBW babies but not preterm delivery. In general Dietary diversity score was positively and significantly associated with infant weight at birth (Saaka, 2013).

Studies indicated that DD in children is an important predictor of acute malnutrition, stunting, and micronutrient intake ((Arimond and Ruel, 2004; Kennedy, 2009 and Bhutta *et al*., 2013). The Ethiopian Demographic and Health Survey (EDHS) 2011 reported that only 4% of Ethiopian children had acceptable DD despite a higher proportion (50%) receiving the minimum recommended feeding frequency (ICF International, 2012). However, based on 2016 EDSHS report in increment in to 7 % show on (Figure 5). Secondary data analysis based on the recent Ethiopian National Food Consumption survey reported only 8.6% of children had acceptable DD (Moges *et al*., 2015).

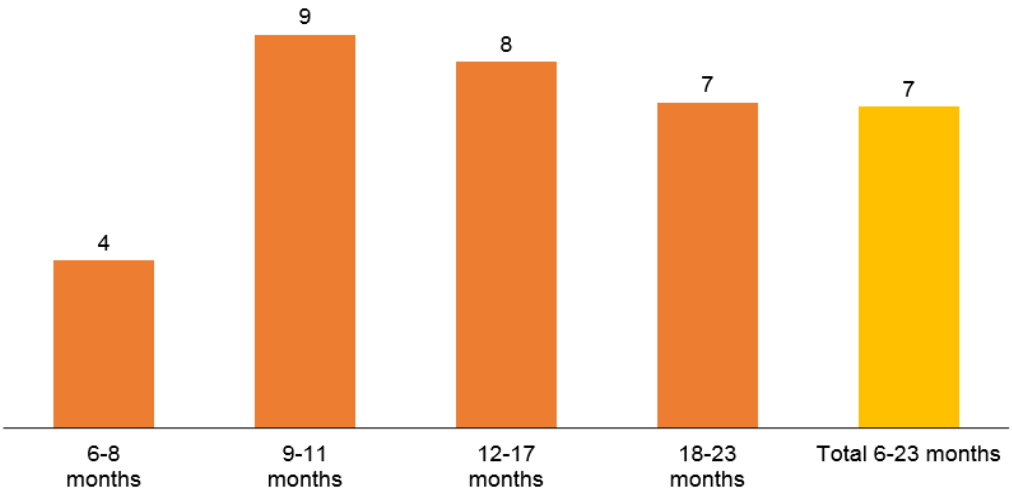


Figure 5. Minimum acceptable diet by age, in months. Taken from: EDHS (2016)

Migration of household to other parts of the continent or neighboring countries to financially support their family. Situations like this increase the risk for individual undernutrition: When a household's food availability and access to food is limited. Thus, under 5 year children, elder people and women are those who are the most affected group. Women's diets decrease with regard to amounts per meal, day, week, and diversity. Monotonous diets in particular negatively affect women during pregnancy and lactation and thus, the infant's diet as it is highly dependent on its mother's diet. Therefore, the growing infant's diet will not meet the nutrient requirements of the first 1,000 days which are regarded as critical to a child's healthy development (Dewey and Adu-Afarwuah, 2008; Victoria *et al*., 2010 and Prentice *et al*., 2013).

2.8. Role of Food Groups Checklists on Dietary Diversity

It is useful to group foods into food groups. A food group is a collection of the foods that contain a similar mix of nutrients (Figure 5). Nutrition guides typically divide foods into food groups and recommend daily servings of each group for a healthy diet. It is useful to prepare dietary guidelines (King *et al.,* 2015).

Classification of food group are varying based on its purpose. The 10 food groups that comprise the MDD-W indicator are: 1. Grains, white roots and tubers, and plantains 2. Pulses (beans, peas and lentils) 3. Nuts and seeds 4. Dairy 5. Meat, poultry and fish, 6.

Eggs 7. Dark green leafy vegetables 8. Other vitamin A-rich fruits and vegetables 9. Other vegetables and 10. Other fruits (FAO and FHI, 2016).

An optimal intake of whole grains, vegetables, fruits, nuts, legumes, and fish, as well as reduced consumption of red and processed meats and sugar-sweetened beverages, can lead to an important decrease—by ~80%—in the relative risk of premature death (Schwingshackl *et al.*, 2017).

Study on fruit and vegetable food behavior checklist showed that based on the correlations with total serum carotenoids, the fruit and vegetable food behavior checklist FBC appears to be valid and reliable for the assessment of fruit and vegetable intake. In addition, fruit and vegetable FBC has a number of advantages over the group-administered dietary recall for evaluating the impact of nutrition education. Overall, the FBC is more user-friendly and less cumbersome for both the clients and nutrition educators. The entire FBC takes less time to administer (10 minutes vs. about 30 minutes), and is less complex and easier to score than the dietary recall. The FBC was simple enough to be self-administered with minimal difficulties (Blackburn *et al*., 2006).

3. METHODOLOGY

3.1. Brief Description of Study Area

This study was conducted in rural part of Tigray regional state of Ethiopia from February to May, 2018 (Figure 6). The region extends from 120° 13' to 140° 54' N and from 36° 27' to 40° 18' E. It is sub-divided into seven administrative zones (1 special zone), 52 Woreda (34 rural and 18 urban) and 814 Kebeles (753 Rural and 61 Urban) in the region. A kebele is the smallest administrative unit in Ethiopia with an approximate 1,000 households. According to the 2017 population projection for Ethiopia, the region has a total population of 5,247,00million of which (2,587,003 males and 2,660,002 females) (CSA, 2017). The livelihood of the population is reliant on subsistent mixed farming and the major agricultural products include the area are teff, wheat, barley and sorghum. The area is also characterized by household food insecurity (Tigray Regional Health Bureau, 2009).

Specifically this study was conducted in the three zone of four woreda Kilte Awulaelo, Saharti Samre, Mereb-Lehe and Tahtay Maychew woreda (Mesanu, Gijet, Mhquan, and Hadush-adi kebele) from Tigray regional state, respectively. Kilte Awulaelo is part of the eastern Zone with an estimated total population of 113, 096 (54,782 males and 58,314 females). Nearly 105,135 of the woreda population is rural. Although Saharti Samre is Part of the Southeastern Zone with a total population of 142,784 (70647 are males and 72137 females). Around 127,548 of the woreda population rural. Mereb-Lehe and Tahtay Maychew woreda are also part of the central Zone with an estimated total population of 118,741 and 111,111 respectively. The woreda has 107,507 and 95,211 of the farmers are reliant on subsistent mixed farming both raised crops and livestock, respectively (CSA, 2017).

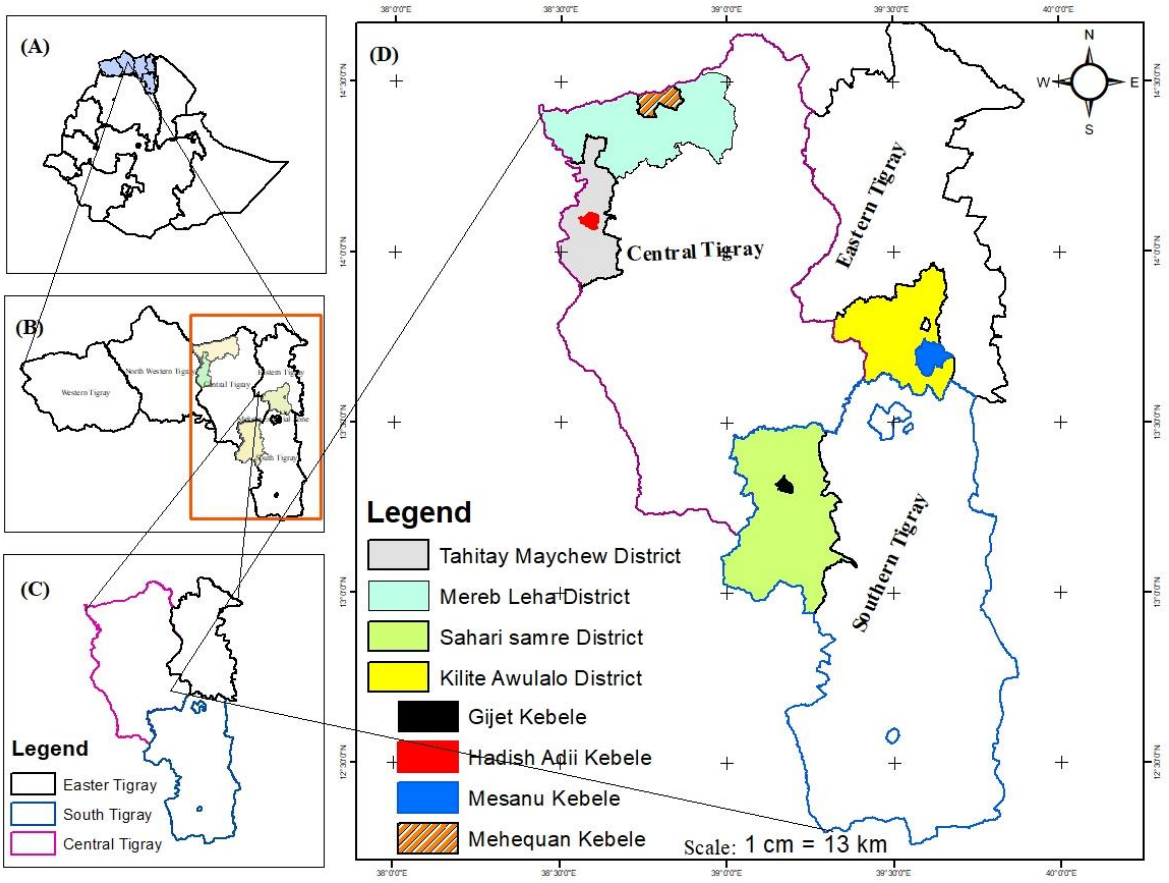


Figure 6. Location Map of the Study Area: (A) Tigray region in Ethiopia; (B) Central Tigray, Eastern Tigray and Southern Tigray zones in Tigray region; (C) Centarl Tigray, Eastern Tigray and Southern Tigray zones; (D) Kilte Awulaelo, Saharti Samre, Mereb-Lehe and Tahtay Maychew districs with (Mesanu, Gijet, Mhquan, and Hadush-adi kebele) in Centarl Tigray, Eastern Tigray and Southern Tigray zones.

ATONU/ACGG Project Overview: Agriculture to Nutrition **(**ATONU) is basically working on improving nutrition outcomes through optimized agricultural investments. It is funded by BMGF and implemented in Ethiopia, Tanzania and recently Nigeria for two year. In Ethiopia, the primary beneficiaries are smallholder farm families in four regional states; Amhara, Tigray, Oromia and Southern Nations Nationalities and peoples' Region. The project targets are women of reproductive age (15-49yrs) and young children in the first 1000 days of life in rural households, where high nutritional demands of pregnancy, development and early childhood must largely be met through food grown, or income earned, on family farms in Ethiopia, Tanzania and Nigeria. The project reaches to 1600 households in all countries. A total of 20 villages from each project countries, are randomly allocated to each of the two intervention arms.

ATONU is working in three zones four Tigray region rural kebeles (Mesanu, Gijet, Mhquan and Hadush-adi). Among all Tigray regional people around 160 possible beneficiaries of the ATONU project consisting of rural farming households lived in this area. Basically the project includes a component of BCC for women empowerment and to influence income expenditure on other nutrient dense foods and promotion of home gardens for improved dietary diversity linked with components on improving farming systems and building up market linkages to increase and diversify production, and improve food security and nutritional status amongst smallholder farmers.

Basically Afirica Chicken Genetic Gain (ACGG) project also works on the promotion of production of high yield and disease resistant chicken (interims of meat and egg production). In all project villages, the inclusion criteria into the ACGG program was, based on history of chicken production for at least two years, household have at least one WRA (15-49 years), keeping of no more than 50 chickens, and willingness to accept, shelter, and feed an additional 25 chickens. Then, the project distributed highly productive and disease resistant chicken for all selected small holder farmers to improve the production of the community as the same time it prevent poverty and increase the DDS (nutritional status of rural community particularly women and children).

3.2. Study Design

Quasi-experimental study was conducted to assess the outcomes of promotion of nutrition education on dietary diversity among women's of reproductive age and children aged 6-36 months in Tigray region selected rural kebeles.

3.3. Sample-Size Determination and Sampling Techniques

Because of various outcomes of interest, and the limited available data for the region, we used the following assumption to calculate our sample size by using G * Power calculator. Median effect size that would allow detection of 0.5 SD difference between the 2 mean.

Assuming, β= 90% power and α= 0.05 significance level.

T-test mean: Difference between two independent means (two groups)

Input: Tail(s) = one
Effect size d = 0.5
α err prob = 0.05
Power (1-β err prob) = 0.90
Allocation ration N2/N1 = 1

Out put: Noncentrslity parameter r = 2.95
Critical t = 1.65
Df = 138
Sample size group 1 = 70
Sample size group 2 = 70
Total sample size = 140
Actual power = 0.90

The sample size was augmented to allow 20% non-response rate. Including a non-response rate of 20% (28), the result of study population sample size was 168 mother-child pairs. However, we increased the sample size to 200 mother-child pairs due to the fear of the participants dropping.

The study was designed to include 200 mother-child pairs from purposively selected rural kebeles in Tigray regional state. These regions and kebeles were selected because ATONU had NSA activities in them. From Tigray region, four kebeles were selected deliberately because they had ATONU and ACGG service. Then from selected kebeles 77 participants was selected from ATONU/ACGG, for NSA+BCC group and 123 participants from out of ATONU/ACGG project for BCC group randomly (Figure 7).

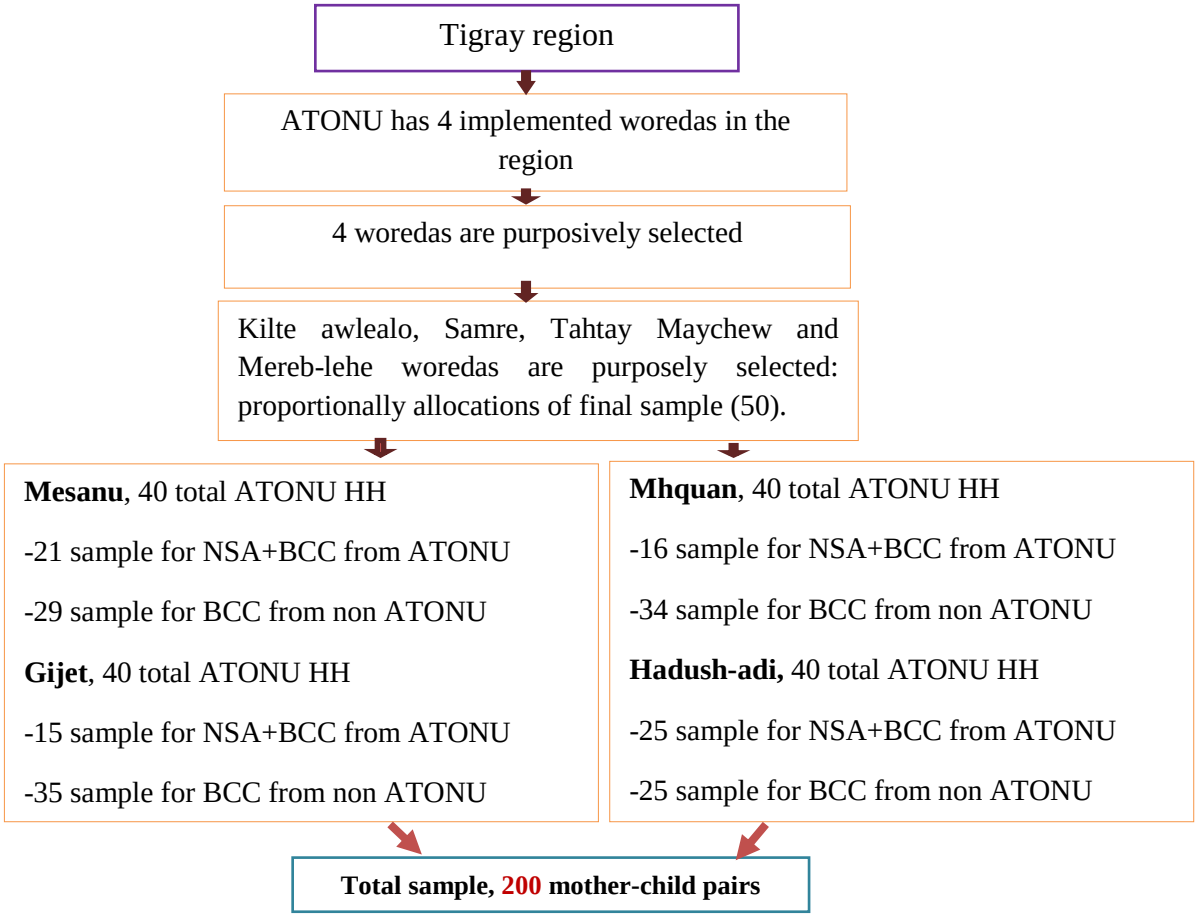


Figure 7. Sampling Procedure Framework.

All women of reproductive age that fulfil the eligibility criteria from selected kebeles were incorporated in this study. Finally, the total sample size were distributed to the kebeles proportionally. The total number of subjects in each kebele were divided by the allocated sample size to get the sampling interval.

The study was carried out in two phases, data were collected for NSA+BCC and BCC groups 1) before the beginning of intervention (baseline data), and 2) after four participants training session for eight weeks (two wise pre month with in 15 day interval) endline data. Measurements include WRA and children DDS and food group checklist communication material usage. Finally both groups have been a frequent BCC and food group checklist communication material flow up for eight weeks. Characteristics of the study group was as follow (Figure 8).

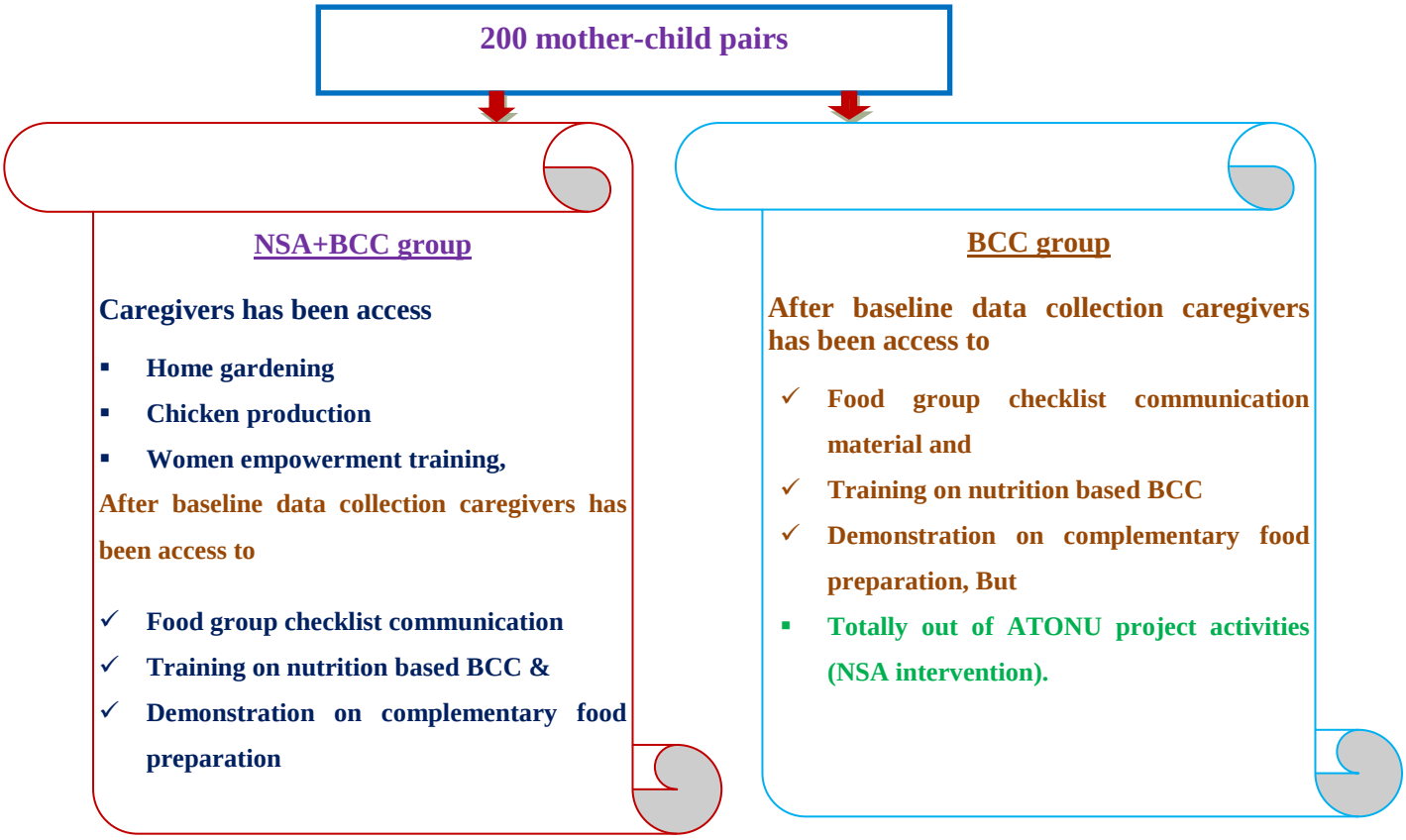


Figure 8. Characteristics of the Study Group Framework.

3.4. Eligibility Criteria

3.4.1. Inclusion Criteria

Only women of reproductive age range between (15-49 yrs.) with children between 6-36 months of age were eligible to participate in the survey. In addition, willingness of subject to participate in the survey, being resident in the sampled area, and being randomly selected. Those who were free from chronic illnesses related to CVD and not taking long term medication that are known to change the dietary intake were included. For the NSA+BCC group also, subjects that have been access to the ATONU and ACGG service (women empowerment traing, home gardening and chicken production) were enrolled for the study.

3.4.2. Exclusion Criteria

Excluding criteria was women who were seriously ill (on medication) that are known to alter the dietary intake or could not respond well due to physical disabilities (e.g., deaf and dumb) were excluded. Subjects, women of reproductive age's < 15 and >49 years old; and children above >36 month, those who not permanent residents in study area and unwilling to participate in the study were excluded.

3.5. Data Collection Procedure in the Field

Firstly from each Kebele the selected women with their children were invited to farmer training center to participate in the survey. Age verifications of the children were conducted at this point by cross checking the birth dates indicated on village lists with the vaccination cards or birth certificate. If the information about age of children is unknown, thus the age was estimated by using a local events calendar, festivals and seasonal rotation or its previous memory (may be drought, good production season etc.). Other document related to data collection procedures are indicated in Figure 9.

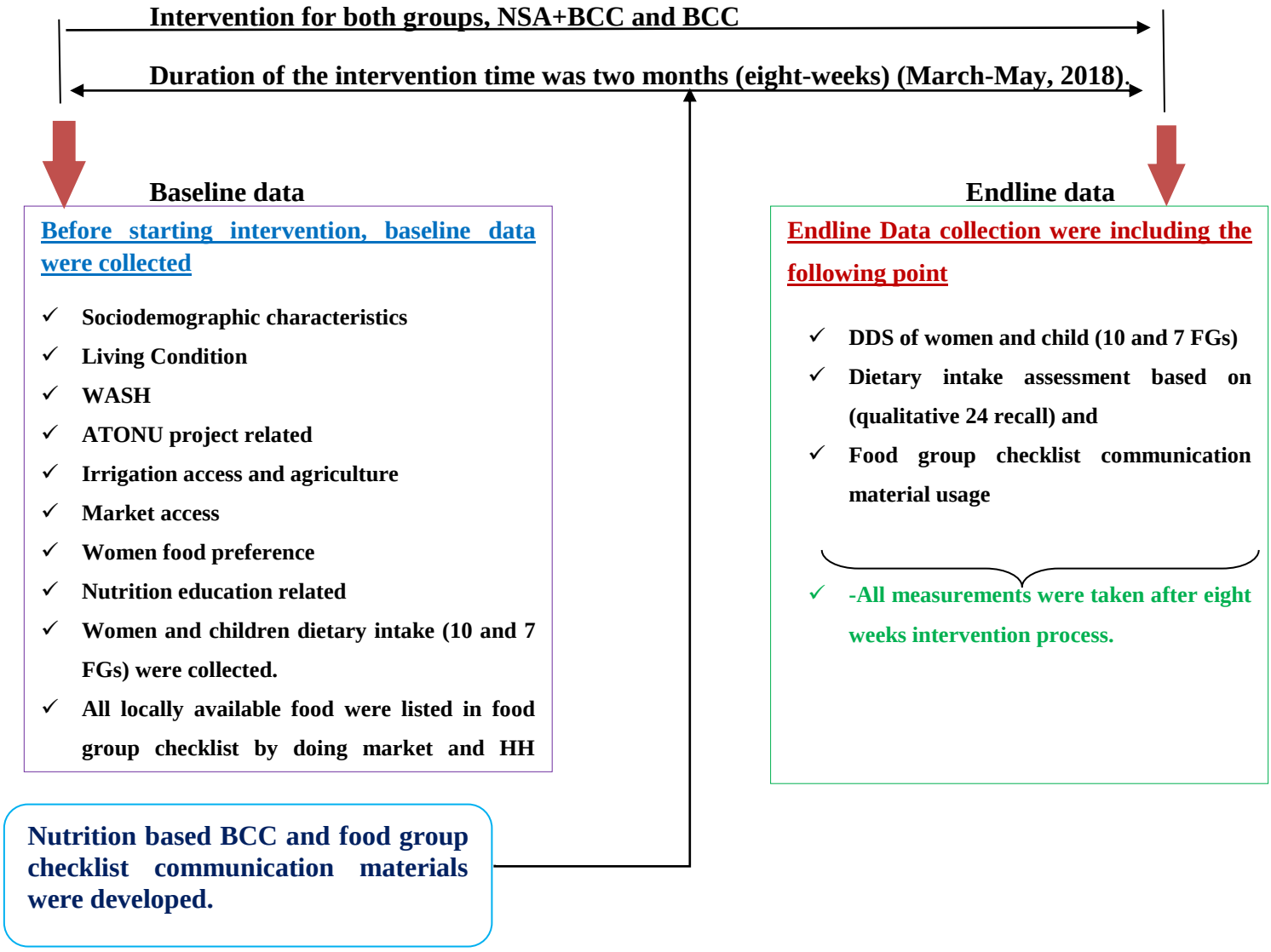


Figure 9. Schematic diagram for data collection procedures.

Then, based on these baseline assessment data nutrition based behavioral change communication guideline and FG checklist communication material were developed to improve the knowledge and skills of mothers/caregivers on nutrition education. Two day rigors trainers training was provided on BCC guideline and FG checklist communication material usage. And then food groups checklist communication material were distributed and door to door participants training was provided for all study subjects by trainers on nutrition based BCC and FG checklist communication material usage for eight weeks.

The training was carried out twice per month with 15 day interval for approximately one hour a day over a period of eight-weeks. The training consisted of five nutrition based BCC nutrition education sessions focusing on: 1) Familiarizing the mothers/caregivers on seven and ten food groups and its daily requirements (cut-off point). 2) Awareness creation about infant and early childhood nutrition (adequate dietary intake at this critical period is fundamental), 3) Promote breastfeeding and optimal complementary feeding (CF) (Practice exclusive breastfeeding from birth to 6 months of age, and introduce complementary foods at 6 months of age while continuing to breastfeed and practice good hygiene, proper food handling and responsive feeding) 4) Awareness creation about maternal nutrition and dietary advice (Increase the quality and quantity of dietary intake to lactating mothers can be the most effective way of improving their health and that of their infants), and 5) Food based awareness creation (about how to use locally available food) (Improved DDS (using different foods that are locally available during different season)) (Annexes 5). Demonstration was also provided on the preparation of a low-cost balanced diet with locally available nutritious foods.

Then data collection were directed to the selected women (15–49yrs) with children ages 6-36 months in the households using structured questionnaire that is based on standardized tools developed by WHO and FAO which is a published operational guideline for measuring MDD. The questionnaire inquires of each of the mothers the type of foods she ate and fed to her index child at home and outside the compound in the last 24 hours (WHO, 2010 and FAO and FHI, 2016). The questionnaire were prepared in English first and then translated to local language Tigrigna by language experts to check for consistency and structured questionnaire.

Two day rigorous training on the concept of the questionnaires and methods of data collection procedures was provided to data collectors and supervisors and 20 data collectors(5 per site), had participated in data collection process. Finally at each kebele, after taking informed consent from the primary caregivers of the study subjects data were collected by trained enumerators from the woreda who were native speakers of the local languages consisting of health extension workers, agriculture extension worker, ILRI staff in the district and a group of people specifically trained in the use of a dietary diversity score (DDs), who conducted the survey and obtained the information from the children's mothers (caregivers).

Finally both groups had a frequent BCC and food group checklist communication material flow up for eight weeks. The two round data collection were included the following point:

Food group checklist usage: about how to use the displayed checklist communication material, the purpose and its frequency.

Minimum Dietary Diversity for WRA (MDD-W) and children (MDD): a qualitative open 24-hour dietary recall were conducted to obtain information on subject's dietary intake. It was conducted by trained interviewers at the home of the subjects. Specifically, the recall period covers from when the respondent awoke the previous day, through the day and night for a 24-hour period. Local feasts or celebration like (Christmas, Easter, and Moulid etc) as well as market days were systematically avoided.

A scale of ten and seven defined FGs were used in assessing the dietary diversity of subjects: included a minimum amount of consumption for the group to count (≥15 g). The relationship between food group diversity and micronutrient adequacy is stronger when very small amounts of a food group are not allowed to "count". Several studies have used a cutoff of ≥15 g (for many foods that is about one tablespoon). So for the purposes of defining "large-enough" quantities, consider if, when consumed, the food is usually consumed by WRA in quantities ≥15 g (Arimond, 2010). In this study, a MDD was defined as the proportion of women of reproductive age (15-49yrs) and children ages 6–36 months who received foods made at least five and four FGs out of the ten and seven defined FGs during the previous 24-hours, respectively (FAO and FHI, 2016 and WHO, 2011).

Using information collected from the 24-hour dietary recall, the DDS for individuals was derived using the FAO guidelines for measuring MDD-W (FAO, 2016). The MDD-W was developed as a proxy indicator to reflect the micronutrient adequacy of women's diets. The ten food groups used for tabulation of this indicator was as follows: 1.Grains, white roots and tubers, and plantains 2. Pulses (beans, peas and lentils) 3. Nuts and seeds 4. Dairy 5. Meat, poultry and fish 6. Eggs 7. Dark green leafy vegetables 8. Other vitamin A-rich fruits and vegetables 9. Other vegetables and 10. Other fruits (FAO and FHI, 2016).

It was also looked at the FGI-7 used to assess the "minimum dietary diversity" as part of the infant and young child feeding indicators (WHO, 2010). The seven FGs used for tabulation of this indicator was as follows: 1.Grains, roots and tubers; 2. Legumes and nut; 3.Dairy products; 4.Flesh foods (meat, fish, poultry and liver/organ meat); 5.Eggs; 6.Vitamin A rich fruits and vegetables, and 7. Other fruits and vegetables. Dietary diversity were assessed based on the number of foods consumed across and within food groups over the immediate past 24 hours, is widely recognized as being a key dimension of diet quality and is reflected in food-based dietary guidelines. A point were awarded to each food group consumed over the reference period, and the sums of all points were calculated for the dietary diversity score for each individual.

If at least one food item of a group were underlined, the corresponding FG was considered as consumed and the interviewer write « 1 » (yes) in the box in the right-hand column of the corresponding food group. If no food item of a group were underlined, the interviewer probed the respondent for these foods that she did not spontaneously mention by reading out the list of food items of this group. When it was certain that no food in that group had been eaten, the interviewer wrote "0" (no). In the boxes, only "0" (no consumption of foods of this group) or "1" (consumption of at least one food of this group) should appear (FAO and FHI, 2016).

Data collection in this way were used to calculate DDS of WRA and under 3 years child, which was a simple count of the different food groups consumed. Dietary Diversity terciles for WRA and children aged 6-36 months was derived from the 10 and 7 food groups recommended by the FAO and WHO guidelines, respectively; MDD and W-MDD. Individual DDS was judged based on their position on the scale.

3.6. Statistical Analysis

All measurements on dietary diversity were taken two times and used for further analysis. The statistical data analyses was performed using SPSS (IBM SPSS Statistics version 20). Finally, I have had a baseline, and endline data for all research groups. Hence comparison of each group were done based on baseline and endline data between group, within group and with national and international standards. Descriptive statics were performed to analysis percentage, mean and SD of results for the following variables socio-demography, living condition, WASH, irrigation, market, women food preference, women and children dietary diversity as well as Normality of data was checked with the Kolmogorov–Smirnov test. Pearson Chi-square and Independent sample t -test was used for categorical and continues data to compare the proportions between and within the NSA+BCC and BCC groups in to the two phases, respectively. Finally, Difference in Deference analysis was performed to investigate the two intervention effect on dietary intake across the two groups.

3.7. Data Quality Control

To assure the quality of the data and to make sure all assessment-team members was able to administer the questionnaires properly, 2-day rigorous training of enumerators were provide regarding the contents of the questionnaire, how to probe the subject, how to handle mixed dish and how to differentiate each food groups. Quality controls of data collection were conducted on a regular basis and the questionnaire was prepared first in English and then translated into Tigrigna, which is the local languages in the different woredas. Through supervision during data collection. At the end of every data-collection day, each questionnaire was checked for its completeness and consistency by the field supervisors and the principal investigator before data entry.

3.8. Ethical Considerations

After the research proposal was approved by the center for food science and nutrition. Ethical clearance was secured from Addis Ababa University College of Natural and Computational sciences ethical review committee. The data were collected after taking informed consent form from the respondent mothers /caregivers of the children.

3.9. Study Variables

3.9.1. Dependent Variable

The dependent variable were women's of reproductive age (15-49yrs) and child ages 6-36 months dietary diversity score.

3.9.2. Independent Variable

The independent variables were Sociodemographic factors, socioeconomic factors, home gardening, exposure to nutrition education, and cultural beliefs on food, women empowerment training, women food preference, access to pure water, mass media, electricity, access to irrigation and market access.

3.10. Operational Definitions

BCC: Social and behavior change addresses the behavioral, social and cultural factors related to individual and population health to promote and sustain healthy environments and healthy lives for individuals and populations. It is the strategic use of communication to promote positive nutrition outcomes, based on proven theories and models of behavior change.

Dietary diversity: can be defined as the number of different food groups consumed by an individual over a 24 hours period.

Food groups; is a collection of foods that contain a similar mix of nutrients.

Inadequate dietary diversity: When women or children have low dietary diversity related to the standard recommendations.

Minimum dietary diversity: is the consumption of four or more food groups from the seven defined food groups for higher dietary quality and to meet basic nutritional needs (WHO, 2010).

MDD-W: is a dichotomous indicator for women of reproductive age (15–49 yars.) have consumed at least five out of ten defined food groups the previous day or night (FAO and FHI, 2016).

Nutrition education: includes all types of actions designed to change knowledge, attitudes, practice, and behaviors of individuals, groups of individuals or populations. The main goal of NE is voluntary adaption of food choices and food and nutrition-related behaviors conducive to health and well-being.

4. RESULT

4.1. Socio-demographic Characteristics of Study Participants

In this study, a total of 200 women of reproductive age (15–49 yrs.) and children aged 6 to 36 months were enrolled at baseline from Mesanu, Gijet, Hadush-adi and Mehquan districts. The study participants were volunteers that are grouped in to NSA+BCC and BCC groups purposively. Accordingly, three month follow-up was completed by 200 mother-child pairs with the response rate of 100%.

Table 1 summarizes socio-demographic characteristics of the study participants. Among the total of 200 mother-child pairs surveyed, the mean age (±SD) of the mother in the NSA and non-NSA groups were 36.5(±7.7) and 29.3(±6.5), respectively. Children's age ranged from 6 to 36 months with a mean age (±SD) of 22.7(±10.1) in the NSA and 21.8(±9.2) non-NSA groups. Among the study children, there were not statistically significance differences on children age (p=0.54) between groups.

Concerning the maternal relationship and marital status between groups comparison. Majority of the participants (81.8% in the NSA and 91.1% non-NSA groups) were biological mothers, and the remaining (18.2% and 8.9%) were primary caregivers to the child. There were statistically significant differences on maternal relationship and marital status (p=0.05) across the two groups.The mean (±SD) household family size of the study participants was 6.5±1.9 (NSA) and 4.3±1.7 (non-NSA). This difference in family size was statistically significant (p=<0.001). The majority (>85 %) of the study participants were orthodox followers.

Out of 200 mothers surveyed, there were statistically significant difference between NSA and non-NSA groups on maternal education level (p=<0.001). With regard to occupational status among fathers of the study children's, there were not statistically significant difference between the two groups (p=0.06). Majority (>80%) of the study participants were farming households (Table 1).

The result of this study shows that, exposure of the mothers/caregivers to mass media was limited. About less than one-quarter of the participants, 19.5, 40.3 and 3.9% were exposused to television, radio and journal (magazine) in the NSA group, respectively.

Based on Pearson Chi-Square test between groups comparison of participants exposure to mass media, no statistically significant differences were found between NSA and non-NSA groups in TV, Radio, and Journal (Magazine) exposure.

In general, comparisons along the NSA-non-NSA groups showed that in both groups in terms of children age, occupation of the mother, occupation of the father and mass media exposure (TV, Radio, and magazine) were not statistically significant (Table 1).

Table 1. Socio-demographic characteristics of study participant (N=200) mother-child pairs and caregivers from selected four rural village of the Tigray region Ethiopia, February 2018

Variables	NSA alone n=77 Mean ±SD/frequency (%)	Non-NSA n=123 Mean ±SD/frequency (%)	*p*-value
Age of children (months)	22.7±10.1	21.8±9.2	0.54
Age of mothers (years)	36.5±7.7	29.3±6.5	<0.001*
Family size	6.5±1.9	4.3±1.7	<0.001*
2-7	52(67.6)	117(95.2)	
8-10	25(32.4)	6(4.8)	
Mothers relationship			0.05*
Biological mother	63(81.8)	112(91.1)	
Primary caregiver	14(18.2)	11(8.9)	
Religion			0.07
Orthodox	67(87)	116(94.3)	
Muslim	10(13)	7(5.7)	
Marital status			0.01*
Married	70(90.9)	96(78)	
Education of the mother			<0.001*
No education	37(48.1)	33(26.8)	
Can read and write only	18(23.4)	9(7.3)	
1-8 primary school	17(22.1)	48(39)	
9-12 secondary school	5(6.5)	30(24.4)	
Above(tertiary)	0(0)	3(2.4)	
Occupation of the mother			0.59
House wife	7(9.1)	11(8.9)	
Farmer	62(80.5)	89(72.4)	
Government employer	1(1.3)	2(1.6)	
Merchant	4(5.2)	10(8.1)	
Daily laborer	3(3.9)	11(8.9)	
Occupation of the father			0.06
None	2(2.6)	2(1.6)	
Farmer	59(76.6)	73(59.3)	
Government employer	3(3.9)	15(12.2)	
Merchant	2(2.6)	10(8.1)	
Daily laborer	11(14.3)	23(18.7)	
Exposure to mass media			
TV	15(19.5)	35(28.5)	0.15
Radio	31(40.3)	35(28.5)	0.08
Journal (Magazine)	3(3.9)	10(8.1)	0.23

Note. *P -values* are from comparison between two groups NSA and Non-NSA using $\mathbf{X^2}$ (Chi-Square), and † Independent sample t -test was used. * Statistically significant difference at *P* value of 0.05. NSA, nutrition-sensitive agricultural.

4.2 Living Condition (Socioeconomic Status) of the study subjects

Greater than one-third of the study participants (36.4%) live in finished floor: ceramic tiles, cement house in the NSA group. The rest 63.6% of the study participant live in made of rudimentary floor: wood planks, bamboo house in the NSA group. For the majority of the study participants in the NSA (62.3%) and (48.8%) non-NSA groups, the roof of their home is covered by wood and steel. The difference in roof type was statistically significant ($P< 0.05$) between groups (Table 2).

The present study reported that, majority of the study participant (79.2% in the NSA and 61.8% non-NSA groups) had a food stock. Therefore, the study revealed that a statistically significance difference were found on having food stock ($p=0.01$) across the two groups (Table 2).

4.3 WASH Related Response of Study Participants

The majority of the households (91.1% in the non-NSA and 77.9% NSA groups) had access to improved water. During the survey period about three-fourth (77% and 78.9%) of the households had access to pipe water as main source of drinking water, and (5.2% and 1.6%) had dug-well, and (16.9% and 10.6%) had lake, pond, river and (13 and 1.6%) had spring water, and the rest (2.6% and 8.1%) had tube well/bore hole in the NSA and non-NSA groups, respectively. Therefore, comparisons along the NSA-non-NSA groups Chi-Square tests showed that, there were a statistically significance deference on access to improved water source ($p=0.009$).

The mean (±SD) distance of the households far from water source was (0.86± 0.7 and 0.72±0.9 km) and travelled for average time (±SD) of (31.75±26 and 28.6±25) minutes to reach the water source and back to home in the NSA and non-NSA groups, respectively. Nearly all study subjects (>95%) were fetched water on barefoot and (>85%) of respondent mother/caretakers was responsible to fetch water in the NSA and non-NSA groups. In addition (>90%) of the participants reported that they stored drinking water in a covered containers in both groups. In general, the following variables did not show significant difference across the two groups in travelling water source from home in km, water source

taken in minute, type of transport used, and responsibility to fetch water and water storing practice (Table 2).

Mothers/caregivers hand washing practice was good among the non-NSA group as compared to their counterparts, 36.6% of the participants in the non-NSA group washed their house by using water alone, while 62.6% and 0.8% did with soap, and traditional washing agent (endod, ash), respectively (Table 2).

Table 2. Living condition and WASH response of study participants (N=200) mother-child pairs from selected four rural village of the Tigray region Ethiopia, February 2018

Variables	NSA alone n=77 Frequency (%)	Non-NSA n=123 Frequency (%)	*P-value*
Kind of house live			0.003*
Rudimentary floor: wood planks, bamboo	49(63.6)	52(42.3)	
Finished floor: ceramic tiles, cement	28(36.4)	71(57.7)	
Material of the roof			0.006*
Grass, leave ,bamboo	26(33.8)	39(31.7)	
Wood, metal, steel, and cement	48(62.3)	60(48.8)	
Cooking usually done			
In the house	36(46.8)	65(52.8)	0.40
In a separate building	23(29.9)	22(17.9)	0.04*
Outdoors	29(37.7)	41(33.3)	0.53
Food stock	61(79.2)	76(61.8)	0.01*
Access to improve water	60(77.9)	112(91.1)	0.009*
Source of drinking water			
Pipe water	57(74)	97(78.9)	0.42
Dug well	4(5.2)	2(1.6)	0.15
Lake, pond, river	13(16.9)	13(10.6)	0.19
Spring water	10(13)	2(1.6)	0.001*
Tube well/bore hole	2(2.6)	10(8.1)	0.10
Distance to water source (Km)	0.86±0.7	0.72±0.9	0.06
Time to water source (minutes)	31.75±26	28.6±25	0.36
Type of transport used			0.31
Barfoot	74(96.1)	121(98.4)	
Animal transport (horse, mule, donkey)	3(3.9)	2(1.6)	
Primarily Responsible to fetch the water			0.51
Mother /respondent	68(88.3)	114(92.7)	
Store drinking water			0.81
Covered	72(93.5)	116(94.3)	
Uncovered	5(6.5)	7(5.7)	
Hand washing with			0.02*
water alone	42(54.5)	45(36.6)	
with soap	33(42.9)	77(62.6)	
Traditional washing agent (endod, ash)	2(2.6)	1(0.8)	

Note. *P* -values are from comparison between groups NSA and Non-NSA, $\mathbf{X^2}$ (Chi-Square-test) was used.

* Statistically significant difference at *P* value of 0.05**.** NSA, nutrition-sensitive agricultural.

4.4. Access to Irrigation and Farm Land

The results showed that, a statistically significance difference were found in access to irrigation (p=<0.001) between groups. In addition, there was a significance difference in access to farming land (p=0.01) and land in hectare (p=0.02) across the two groups. In general, ATONU beneficiaries are more access to irrigation, horticultural crop production and farming land than the non-NSA. While no significance difference were found in ownership of farming land (p=0.25). The mean (±SD) agricultural land size of the study participants was (1.6±8.5 NSA) and (0.40±0.54 hectares non-NSA) groups (Table 3).

Houeholds owned small and large animals are their own role to improve consumption of animal-source foods, dietary diversity and poverty reduction in rural farming community. Among the NSA group, all study participants had higher number of small, (sheep, goat, chickens and beehives) and large animals (milk cow, oxen and pack animal) than those in the non-NSA group. A statistically significance difference was also observed on ownership of small and large animal between the two groups (Table 3).

Table 3. Access to Irrigation, market, and farm land of the study subjects (N=200) mother-child pairs from selected four rural village of Tigray region Ethiopia, February 2018

Variables	NSA alone n=77 Frequency (%)	Non-NSA n=123 Frequency (%)	*P-value*
Access to irrigation	42(54.5)	30(24.4)	<0.001*
Access to farmland	56(72.7)	68(55.3)	0.01*
Land in hectares	1.6±8.5	0.40±0.54	0.02*
Ownership of farm land			0.25
Your own	37(64.9)	53(77.9)	
Family	13(22.8)	9(13.3)	
Rent	7(12.3)	6(8.8)	
Distance to the nearest market (min)	40.2±25	44.4±27	0.32
Type of transport used			0.47
Barefoot	69(89.6)	106(86.2)	
Bajaj	8(10.4)	17(13.8)	
Primarily Responsible go to the market			0.95
Respondent mothers/caregivers	74(96.1)	118(95.9)	
Household obtains food groups			
Own production	53(68.8)	63(51.2)	0.01*
Purchased from village market/shop	56(72.7)	85(69.1)	0.58
Off farm income	25(32.5)	42(34.1)	0.08
Exchange food from market	75(97.4)	115(93.5)	0.21
Own milk cows	48(62.3)	30(24.4)	<0.001*
Own oxen	58(75.3)	35(28.5)	<0.001*
Own Sheep	25(32.5)	11(8.9)	<0.001*
Own Goats	26(33.8)	14(11.4)	0.001*
Own Chickens	64(83.1)	36(29.3)	<0.001*
Pack Animal	44(57.1)	24(19.5)	<0.001*
Own Beehive	10(13)	1(0.8)	0.003*

Note. *P* -values are from comparison between two group NSA and Non-NSA, $\mathbf{X^2}$ (Chi-Square) test was used. * Statistically significant difference at *P* value of 0.05**.** NSA, nutrition-sensitive agricultural.

4.5 Market Access of the Study Participants

Table 3 also shows the market access of the study participants. The mean (±SD) time of the household travelled to reach the nearest local market was (40.2±25 and 44.4±27) minute and a majority of the study participants (>85%) go to market on barefoot, and the remaining (10.4% and 13.8%) use bajaj in the NSA and non-NSA groups, respectively. For the majority of the respondents, mothers (>95%) were primarily responsible to go to the market in both groups. The study investigate that, majority of the study subjects (72.7% and 69.1%), practice food exchange from the village market/shop and (68.8% and 51.2%)

were from own production. Greater than one-third of the study participants (32.5% in the NSA and 34.1% non-NSA groups) had access to off-farm income (Table 3).

In general the present study found, there was no statistically significance differences in distance to the nearest local market, type of transport used, responsibility to go to market practice of food exchange at local market, and off-farm income across the two groups. Other market access related response of the participants are indicated in Table 3.

4.6. Mothers /Women Food Preference

Figure 10 explains the major drivers of women food preference. The assessment of primary caregivers/women food preference showed that, a statistically significance difference were found on some food drivers in food choices based on ease of preparation (p=0.005), and food safety (p=0.04) across the two groups. These means that, ATONU beneficiaries (NSA group) had good understanding on food selection based on food safety as compared with that of the non-NSA group. However, women food preference based on affordability (84.6%), and food healthy (43.9%) was an increase in the non-NSA group than those in the NSA group (Figure 10).

Based on the Pearson Chi-Square test, no significance difference were found in women food preference based on food taste *(*p=0.09), availability of food (p=0.25), affordability (p=0.78), food perceived as healthy (p=0.38), religious and cultural factor (p=0.33), and agro ecological difference (p=0.34) across the two groups.

Overall women food preference analysis observed that, overall women food preference was highly dependent on food taste, easy to preparation, availability, affordability, and religious and cultural value of the food. However, this study found that all study subject in both groups did not give more attention for safety and healthiness of the food during food choice (Figure 10).

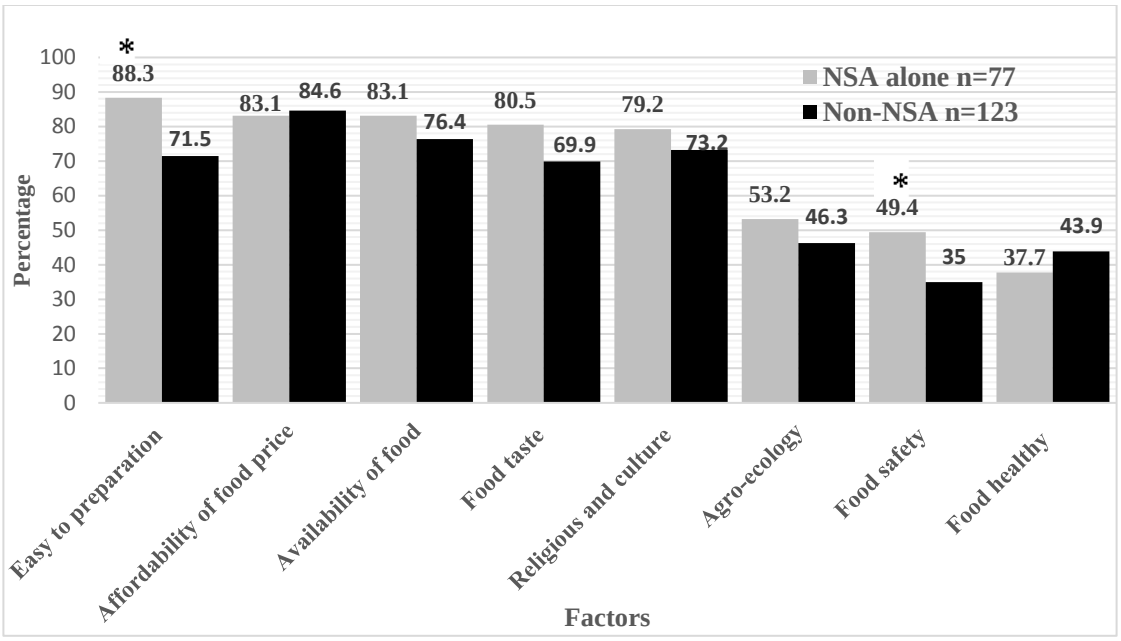


Figure 10. Percentage of the major drivers of women overall food preference in Mesanu, Gijet, Hadush-adi and Mehquan districts, Ethiopia February 2018 (n=200)

Note.*statistically significant difference at *P* value of 0.05 from comparison between two groups NSA and Non-NSA, women food preference according to the $\mathbf{X^2}$ (Chi-Square- test) was used. NSA, nutrition-sensitive agricultural.

4.7. Mothers /Primary Caregivers Nutrition Knowledge and Exposure

The study subject's nutrition information exposure and knowledge assessment was performed in the baseline for the development of BCC guideline.The present study found that, exposure of the mothers/caregivers to IYCF practice program was limited. Women in the NSA group (58.4%) had more exposure to IYCF practice information than those in the non-NSA group (49.6%). Nearly half of the study participant had no exposure to IYCF program in the district.

The majority of the participants (71.4% and 51.2%) reported that they got IYCF practice information from Health Extension Workers (HEWs), followed by health center 23.4% and 31.7% and the rest 26% and 27.6% from mass media in the NSA and non-NSA group, respectively. However, women in the NSA group reported, 57.1% they got IYCF practice information from ATONU project. In general, HEWs has a great role on the delivering of nutrition related information in to the rural community. Because, in rural part of Ethiopia,

HEWs are working at village health post level relatively far to health centers but closest to the community.

Nearly all study participants (> 95%) exclusively breastfed for the first 6 months of ages. The mean ages (±SD) of the children, mothers/caregivers started complementary feeding to their children was (6.5±2.2 and 6.8±1.3) in the NSA and non-NSA groups, respectively. In addition, mothers/caregivers in the NSA group had good understanding about introducing complementary food apart from breast milk for the first time at six months of child ages as per recommended than those in the non-NSA group. Concerning the knowledge of mothers/caretakers about ages of children started family type meal in the non-NSA group were good understanding (12±1.3) than those in the NSA group (12.6±1.3). Hence, majority of the mothers knew that the appropriate time that the children should be start family type meal at twelve months of children age.

The present study revealed that, mothers/caregivers awareness on hand washing practice was good in the NSA group as compared to the non-NSA group, before cooking of food (96.1%), after toilet (80.5%) and after washing child's feces (75.3%). With regard to additional meal consumption during lactating period was limited in the study area. Less than half (<50%) of mothers was ate additional meal in both groups. Other nutrition information exposure and knowledge of the respondent women are indicated in Table 4.

Table 4. Women of reproductive age nutrition information exposure and knowledge scores at baseline assessment in Mesanu, Gijet, Hadush-adi and Mehquan districts, Ethiopia 2018(n=200)

Variables	NSA alone n=77 Mean ±SD /frequency (%)	Non-NSA n=123 Mean ±SD /frequency (%)	*p-value*
Listening maternal and IYCF practice	45(58.4)	61(49.6)	0.222
IYCF practice heard about			
Feeding thick nutrient rich porridge	33(42.9)	36(29.3)	0.05*
Adding egg, quanta etc. with children food	38(49.4)	35(28.5)	0.003*
Feed child 3 or 4 times a day	36(46.8)	45(36.6)	0.15
Feed fruit and vegetable	32(41.6)	31(25.2)	0.01*
Feed animal origin including fasting day	23(29.9)	25(20.3)	0.12
Frequently feeding at a time of diarrhea	27(35.1)	29(23.6)	0.07
Feed diverse diet(4FGs/day) to children	26(33.8)	35(28.5)	0.42
Lessen it from			
Health Centre	18(23.4)	39(31.7)	0.20
Mass media(TV ,Radio, Magazine)	20(26)	34(27.6)	0.79
From ATONU project	44(57.1)	0(0)	<0.001*
From health extension worker	55(71.4)	63(51.2)	0.005*
Breast feeding	75(97.4)	119(96.7)	0.79
Children first received CF	6.5(5-24 mo)±2.2	6.8(5-24 mo)±1.3	0.08
Children start family type food	12.6±1.3	12±1.3	0.16
Heard about health benefit of consuming diversified food for children and women	72(93.5)	97(78.9)	0.005*
Feeding children during fasting period	65(84.4)	99(80.5)	0.48
Ate additional meal during lactating	38(49.4)	60(48.8)	0.93
Lactating mothers should eat more than usual			
To produce more nutritious milk	72(93.5)	104(84.6)	0.05*
For health growth of baby	63(81.8)	95(77.2)	0.58
To prevent mother from micronutrient deficiency	54(70.1)	66(53.7)	0.02*
To balance the energy	24(31.2)	34(27.6)	0.002
Critical time for hand washing			
Before cooking of food	74(96.1)	118(95.9)	0.95
Before eating or feeding child	63(81.8)	102(82.9)	0.84
After toilet	62(80.5)	97(78.9)	0.77
After washing child's feces	58(75.3)	85(69.1)	0.34
After touching dirty things	60(77.9)	99(80.5)	0.66

Note. *P* -values are from comparison between two groups' NSA and Non-NSA, $\mathbf{X^2}$ (Chi-Square test) was used. * Statistically significant difference at *P* value of 0.05**.** ATONU, agriculture to nutrition**;** CF, complementary feeding; IYCF, infant and young child feeding; NSA, nutrition-sensitive agricultural.

4.8. Women of Reproductive Age and Children Dietary Diversity Score

Figure 11 shows percentage of all women of reproductive age and children aged between 6 to 36 months consuming food groups in the baseline assessment in the 24-hrs prior to the survey period. Majority of the mothers reported that, the most commonly consumed food items during the preceding 24 hours were, starch staple food (grain, roots and tubers) (> 95%) and followed by pulses (64.9% and 49.6%) across the two groups. Almost all (> 90%) of the study children was dominantly consuming foods made from grains and followed by egg (41.6%), and legume and nuts (30.1%) in the NSA and non-NSA groups, respectively.

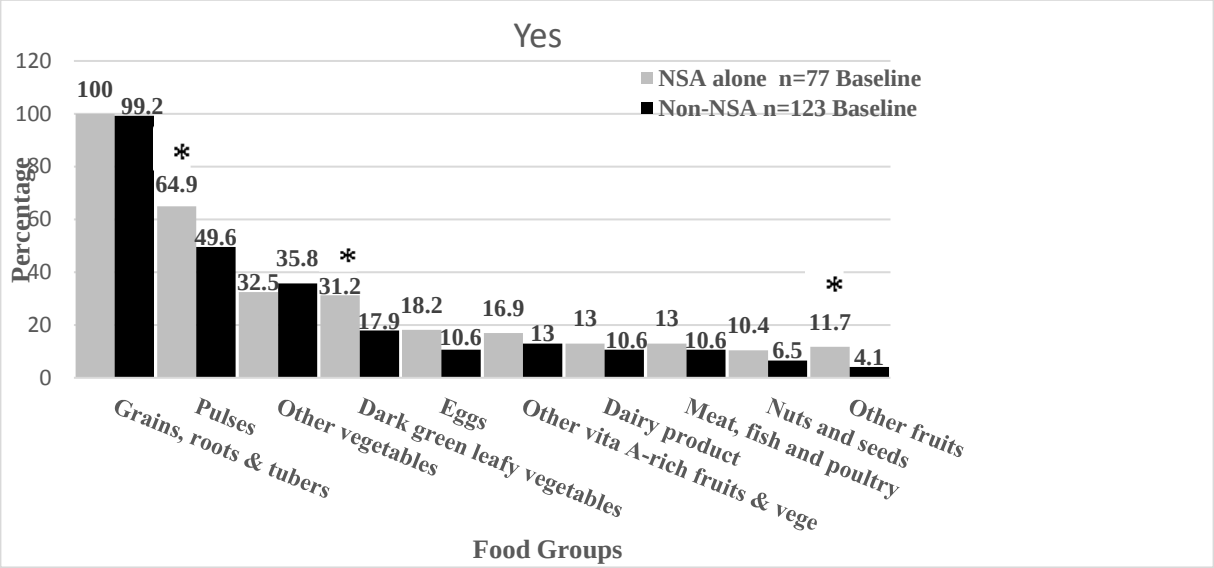
Among the NSA and non-NSA groups, the frequency of mothers/caregivers ate food on the 24-h recall was more than five times per day for (0 and 1%) of the mothers followed by four times per day (5 and 12%) and the rest less than or equal to three times per day (95 and 87%), respectively (data not show).

Data on women of reproductive age DDS was collected using a fourteen-food items dietary diversity questionnaire based on a 24 hour recall period (FAO and FHI, 2016). A significant ATONU (NSA intervention) effect was found on pulse (p=0.03), dark green leafy vegetables (p=0.03) and other fruits (p=0.04) consumption in the NSA group as compared to their counterparts. Women in the NSA group, was also increase in the percentage of consumption of other food groups, such as nut and seed (3.9%), dairy products(2.4%), meat , fish, poultry(2.4%), egg (7.6%), and other vitamin A rich fruits and vegetables(3.9%) higher as compared with that of the non-NSA group. However, consumption of other vegetables (3.3%) was higher in the non-NSA group as compare to NSA group. While consumption of other fruits (4.1%) and nut and seed (6.5%) was extremely low among the non-NSA group. In addition consumption of animal source food was very low across the two groups. Sorghum, teff, wheat, Ethiopian kale and cabbage were the most frequently consumed food item (Figure 11 A).

Data on children aged 6 to 36 months dietary diversity score was collected using eighteen-item food list dietary diversity questionnaire based on a 24 hour recall period (WHO, 2010). Almost all the study children ages 6-36 months (100%) had received pureed, solid,

semi-solid or soft foods over the previous 24 hours. The percentage of consumption of all food groups among studied children aged 6 to 36 months was higher in the NSA group, than those in non-NSA group (Figure 11B). Concerning nutrition sensitive intervention, a significant nutrition-sensitive agriculture intervention effect was also observed in the consumption of meat, fish and poultry (p=0.01), egg (p=<0.001) and other fruits (p=0.05) consumption between groups. A positive impacts were also found on children in the NSA group, also on grain ,roots and tubers(3.4%), legumes and nuts (7.6%), dairy products(5.7%) and vitamin A rich fruit and vegetables (1.6%) higher than those in the non-NSA group. Although consumption of flesh foods (meat, fish, poultry and organ meat) (5.7%) was extremely low in the non-NSA group (Figure 11 B).

A.



B.

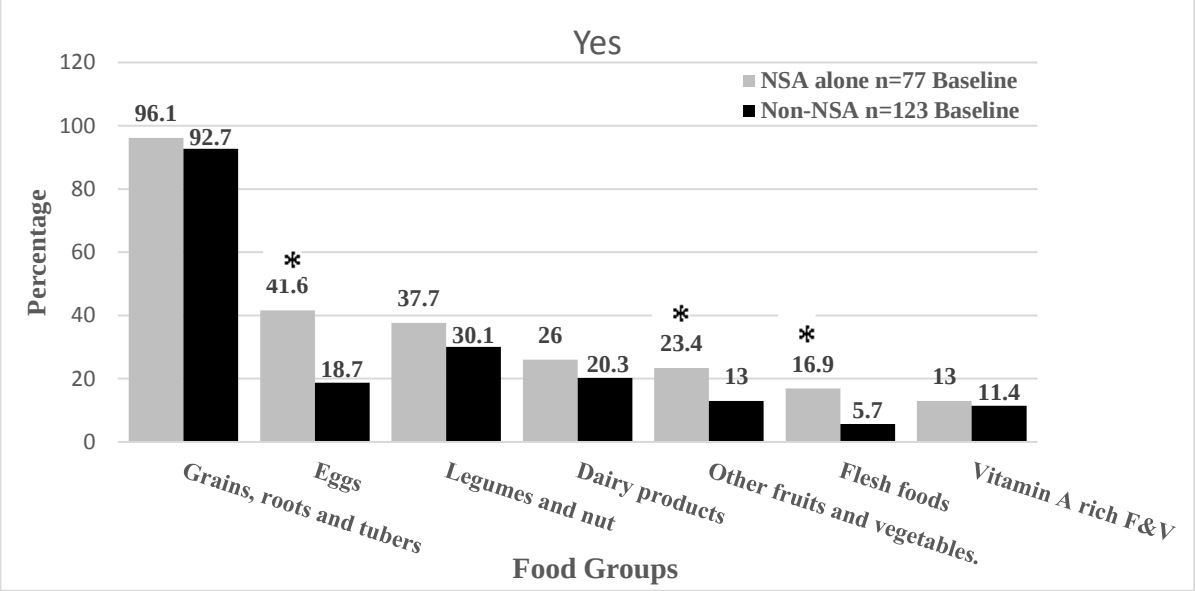


Figure 11 (A-B). Proportion of all women of reproductive age (A) and children aged 6 to 36 month (B) consuming food groups in the baseline assessment.

Note.* statistically significant difference at *P* value of 0.05 from comparison between two groups NSA and Non-NSA, women and children dietary intake according to the $\mathbf{X^2}$ (Chi-Square- test) was used. NSA, nutrition-sensitive agricultural

After eight weeks intensive door to door nutrition education (BCC, and food group communication material) counseling for mothers/caregivers to improve nutrition knowledge and practices, still the most frequently consumed food items in both groups was the starchy staples (grain, roots and tubers), followed by legumes and nuts.While vitamin A-rich fruit and vegetables, eggs, dairy product, meat fish and poultry and other fruits consumption was scanty. However, there was small increase in the endline phases as compared to the baseline. Results from the 24 hour recall showed that, almost all women of reproductive age consumed grain, root and tubers in the two phases across the two groups. From this food items which were consumed by women were mostly injera (Ethiopian stable food (small bread)) made from teff or sorghum).

Looking the DID analysis among women and children, after a tedious four house-to-house training sessions in two weeks interval for eight week on nutrition education (BCC) a positive intervention effects was observed on some food groups ranging from 1-58.5 percentage. Such as consumption of grains, legumes and nut, dairy products, eggs, among children was higher after intervention in the NSA+BCC and BCC groups. In addition consumption of flesh foods, other fruits and vegetables and vitamin A rich F&V was increase in the BCC and NSA+BCC groups (Table 5 B).

Based on DID analysis on women of reproductive age, there was an increase on consumption of some food groups, such as pulses, nuts and seeds, meat, fish and poultry, and eggs across the two groups. Although, consumption of dairy product, other vita A-rich F&V and other vegetables was increase in the NSA+BCC group and grains and other fruits in the BCC group (Table 5 A).

Fluctuations in the consumption and feeding of animal source food (meat, fish and poultry, dairy product and egg), other fruit and vegetables, other vitamin A rich fruits and vegetable as well as other vegetables, among the study women and children were observed in the two phases. Among women, consumption of egg (in the NSA and BCC groups) and dairy product, other vita A-rich F&V and other vegetables in the BCC group, was declined. Regarding children, consumption of flesh foods and other fruits and vegetables was also declined in the NSA+BCC group (Table 5 A-B).

After eight-weeks intervention process comparison between NSA+BCC and BCC groups, in the NSA+BCC group women of reproductive age consumed more dairy product, meat, fish and poultry, eggs, dark green leafy vegetables, and other vita A-rich F&V than their counterparts. However, Pulses, nuts and seeds and other fruits consumption was higher in the BCC group. Among the children, in the NSA+BCC group consumption of grains, roots and tubers, dairy products, eggs, and vitamin A rich F&V was higher than those in the BCC group. Whereas, consumption of legumes and nut, flesh food, and other fruits and vegetables was higher in the BCC group (Table 5A-B).

In general a positive intervention effect were found on NSA+BCC and BCC alone on consumption of specific food items more than 5% like legumes and nut, dairy products, eggs, flesh foods, other fruits and vegetables among children and pulses, nuts and seeds, dairy product, other fruits among WRA at the endline phase across the two groups.

Table 5(A-B). Proportion of women of reproductive age (A) and children (B) received food groups across the two phase and DID from selected four rural village of the Tigray region Ethiopia, February 2018- May 2018

A.

	Baseline		Endline		DID Result (Endline- Baseline)	
Food Groups	**NSA alone n=77**	**None NSA n=123**	**NSA + BCC n=77**	**BCC alone n=123**	**NSA+ BCC n=77**	**BCC alone n=123**
Grains, roots & tubers	100	99.2	100	100	0	**0.8**
Pulses	64.9	49.6	94.8	**95.9**	**31**	**46.3**
Nuts and seeds	10.4	6.5	13	**17.9**	**2.6**	**11.4**
Dairy product	13	10.6	**22.1**	9.8	**9.1**	-0.8
Meat, fish and poultry	13	10.6	**14.3**	11.4	**1.3**	**0.8**
Eggs	18.2	10.6	**16.9**	6.5	-1.3	-4.1
Dark green leafy vege	31.2	17.9	**31.2**	17.9	0	0
Other vita A-rich F&V	16.9	13	**18.2**	8.9	**1.3**	-4.1
Other vegetables	32.5	35.8	**36.4**	24.4	**3.9**	-11.4
Other fruits	11.7	4.1	11.7	**13**	0	**8.9**

B.

	Baseline		Endline		DID Result (Endline- Baseline)	
Food Groups	**NSA alonen=77**	**None NSA n=123**	**NSA +BCC n=77**	**BCC alone n=123**	**NSA+BCC n=77**	**BCC alone n=123**
Grains, roots and tubers	96.1	92.7	**100**	99.2	**3.9**	**6.5**
Legumes and nut	37.7	30.1	85.7	**88.6**	**48**	**58.5**
Dairy products	26	20.3	**31.2**	22	**5.2**	**1.7**
Flesh foods	16.9	5.7	11.7	**13**	-5.2	**7.3**
Eggs	41.6	18.7	**67.5**	30.1	**25.9**	**11.4**
Vitamin A rich F&V	13	11.4	**14.3**	11.4	**1.3**	0
Other fruits and vege	23.4	13	15.6	**20.3**	-7.8	**7.3**

BCC, behavioral change communication; F&V, fruits and vegetables; NSA, nutrition-sensitive agricultural

4.9. Minimum Dietary Diversity among women of reproductive age and Children

Minimum dietary diversity among women of reproductive age (15-49 yrs.) and children ages 6 to 36 months was determined using the standard 24 hour recall technique adopted from FAO and WHO guidelines (FAO and FHI, 2016 and WHO, 2010). The current study found that, mean (SD) DDS of reproductive age women calculated out of the standard ten defined food groups was 4.8(±1.2) and 3.2(±1.1) in the baseline and 4.4(±1.1) and 4.9 (±0.9) endline in the NSA+BCC and BCC groups, respectively. Among the study children aged 6 to 36 months the mean (SD), DDS was also calculated out of the standard seven defined food groups was 3.4(±1.0) and 2.0(±0.8) and 4.7(±0.8) and 3.1(±0.7), respectively. DDS increased for both groups from baseline to endline.

The effect of nutrition education alone and jointly with nutrition sensitive intervention on mean DDS was observed. Nutrition education is crucial to improve caregiver's cultural belief, attitude, eating habit and practice that affect dietary intake of the rural women and their children. Mean DDS among mothers/caregivers was observed to be highest after the intervention process in the BCC group 4.9(±1.1) as compared to their counterparts across the two groups. Regarding children aged 6 to 36 months, mean dietary diversity was also highest in the NSA+BCC group endline phase 4.7(±0.8). In general, mean dietary diversity among studied women and children was consistently higher among the endline phase across the two groups.

Among 200 surveyed mother-child pairs, in the baseline assessment proportion of minimum dietary diversity was extremely low (4.9% women and 4.1% children in BCC group).This means a majority of women (95.1%) and children (95.9%) had at high risk of inadequate intake of micronutrients, defined as less than five and four out of the 10 and 7 defined food groups, respectively (Figure 12 A, B).

In the NSA+BCC group, baseline assessment MDD score among reproductive age women and children aged 6-36 months were highest as compared to the BCC group. In endline assessment, MDD score increasing were found across the two groups (Figure 12(A, B)). Therefore, this study found the effectiveness of nutrition education tools on the improvement of women and children dietary diversity.

Overall, the highest percentage of women and children who reached the recommended minimum DD, consuming at least five out of ten defined food groups and four and more from seven defined food groups across the two phases was 20.8% and 32.5% in the NSA+BCC group, respectively. These means that, they are more likely to have higher micronutrient intake as compared to who did not meet the recommended minimum DD (79.2% and 67.5%) (Figure 12 A, B).

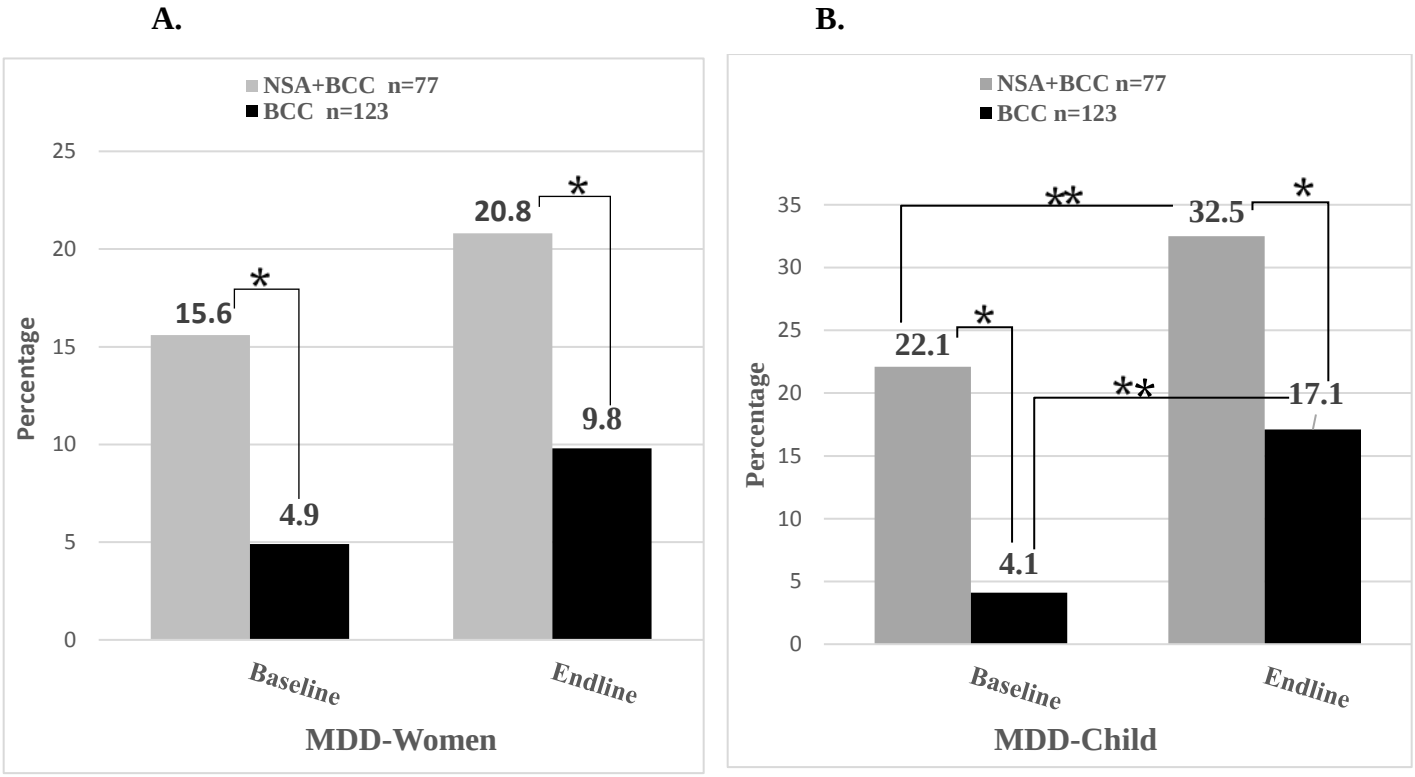


Figure 12(A-B). The proportion of women of reproductive age (15-49 yrs.)(A) and children aged 6-36 month (A) who meting minimum dietary diversity, from February 2018- May 2018

Note. * statistically significant difference at *P* value of 0.05 from comparison between groups NSA+BCC and BCC, women and children MDD score according to the $\mathbf{X^2}$ (Chi-Square- test) was used.

** statistically significant difference at *P* value of 0.05 from comparison within group's NSA+BCC and BCC, children MDD score, **T**-test was used. FGs, food groups**;** MDD**,** minimum dietary diversity.

4.10. Comparisons in MDD among Women and Children Between and Within Groups

The comparison of studied women and children who meting minimum DD between the two phases (between groups) was performed using Pearson chi-Square test. This intervention process was significantly improved in MDD score among women and children across the two groups at baseline and endline assessment with *p*-values 0.01, 0.02 and <0.001, 0.01, respectively. Generally, in both groups among women and children across the two phases who reach the minimum DD was very low. However the positive impact of nutrition education and integrated with nutrition sensitive intervention was shown in the two phase (Figure 12 A-B).

T-test was performed for within group comparison across the three phases. A stastically significance difference were found on those who met MDD among the study children (*p*=<0.001) and (*p*=0.02) in the NSA+BCC and BCC groups, respectively. While, no significance difference were found in minimum DD among studied women (*p*=0.13) in the NSA+BCC and BCC groups (Figure 12 A-B).

Table 6. Difference in Difference (DID) analysis on minimum dietary diversity between baseline and endline phases across the two groups.

Round	**NSA+BCC n=77 (%)**	**BCC alone n=123 (%)**	**DID(NSA+BCC – BCC alone)%**
Women			
Baseline	15.6	4.9	10.7
Endline	20.8	9.8	11
DID (Endline–Baseline)	**5.2**	4.9	**0.3**
Children			
Baseline	22.1	4.1	18
Endline	32.5	17.1	15.4
DID (Endline–Baseline)	10.4	**13**	**-2.6**

Looking DID analysis, there was MDD difference between the two groups. Regarding women and children, a positive nutrition education intervention alone and integrated with NSA intervention impact were observed at the endline phases. In addition, within group a positive intervention effect was found in the NSA+BCC and BCC groups endline phase. Generally, MDD-Women was higher in the NSA+BCC group endline phase by **0.3%** as compared with that of the BCC (Table 6).

Regarding the comparison between NSA+BCC and BCC group among studied children, a positive nutrition education intervention alone and integrated with nutrition sensitive intervention effect were observed in the NSA+BCC across the two phases than their counterparts. Additionally, a positive intervention effect within group was found at endline phase in both groups.

In contrast, children in the BCC group endline phase were more likely to be fed the minimum DD by 2.6% as compared to NSA+BCC group endline phase. The difference in the present study across the two phases is might be due to the fact that the BCC group was lower MDD score at baseline and starting from lower to improve MDD is very easy. In addition, rural farming community are produce more diverse product, the accessibility and availability is not a big issue. The result also shows that, mother/caregivers are more conscious to their children's diet and health than themselves (Table 6).

5. DISCUSSION

The main motivation of the present study was to observe the outcomes of promotion of nutrition education alone and integrated with nutrition sensitive intervention on women of reproductive age (15-49 yrs.) and children aged 6 to 36 months dietary intake in the rural community. To our knowledge, only few studies are published related to the role of nutrition education on dietary diversity in the presence of NSA among children. However, this study uniquely the promotion nutrition education (BCC) in the absence/presence of NSA (home gardening, chicken production, women empowerment training) and observed the outcomes on women and children dietary diversity in rural Ethiopia context. Our study investigated that, mothers/caregivers exposure with nutrition education alone (BCC, and food group checklist communication material usage) and integrated with nutrition sensitive intervention (chicken production, home gardening and women empowerment training) can significantly improve both their own and their children's dietary diversity.

Several recent studies witnessed that, promoting optimal complementary feeding is essential and that it needs to happen in the first 1000 days from conception to 2 years in order to promote optimal growth, health and behavioral development of children and for prevention of risk of malnutrition and micronutrient deficiencies, high infection rate, morbidity, and mortality. Therefore, adequate dietary intake at this critical period is fundamental. Hence, WHO recommends consumption of four or more food groups out of seven defined food groups for children aged 6 to 23 months in order to meet daily nutrient requirements and being healthy (WHO, 2010).

Women of reproductive age and children’s among the BCC group in our study were less likely to consume diversified diet than their counterparts. In particular, we observed a lower consumption of nutrient dense food groups (flesh foods, diary product, eggs, vegetables, and fruits) in the BCC group as compared to the NSA+BCC group. Poor diversified diets negatively affect lactating mothers and thier infant’s diet as the child is highly dependent on its mother’s nutritional status. Therefore, the growing infant’s diet will not meet the daily nutrient requirements of the first 2 years, which are regarded as critical to a child’s healthy development (Victoria *et al*., 2010 and Prentice *et al*., 2013). This variation could be due to the fact that the effect of nutrition education intervention

alone and jointly with nutrition sensitive intervention. Because nutrition education is crucial to improve mother/caregivers cultural belief, attitude, eating habit and practice that affect dietary intake of their own and their children. Therefore, more efforts should be made to improve women/caregivers nutrition knowledge and awareness, as this could improve children's dietary intake. Increasing the production and accessibility of nutrient dense foods alone would not be enough to improve the dietary intake of the women in light of the identified food taboos and misconceptions.

The current study observed that, in rural markets the availability of nutrient dense food groups like meat, fish and poultry, fruits and vegetables are more limited as compared to urban markets. In addition, rural communities have low purchasing power to purchase this food groups. The most recent study in Ethiopia witnessed the influence of market distance to children dietary intake. Children living closer to market area had consumed more diverse diets than those located farther away (Abay and Hirvonen, 2016). Study conducted in Zimbabwe also reported, market participation is positively associated with 13, and 16% increase in, women, and children dietary diversity, respectively (Murendo *et al.,* 2018). In Malawi study found, improving market access is more promising for improving rural smallholder households' diets than is production diversification (Koppmair *et al*., 2017).

5.1. Women of Reproductive Age Dietary Diversity

In our study, we found that the most commonly consumed food items by women were, starchy staples, which is made of teff, sorghum and wheat across the two groups. This could be due to the reason that some of the nutrient-rich food groups particularly animal source foods and fruits and vegetables are not available in to the local market and far to be reached by farming communities mainly due to lack of nutrition knowledge and resources to produce or poor purchasing powers, distance to market, poor eating habits and cultural beliefs. Other studies done in Ethiopia, Axsum town (Weldehaweria *et al.,* 2016), Samre woreda (Haileslassie *et al.,* 2013) and also in other countries South African towns (Chakona, and Shackleton, 2017) and rural Bangladesh (Sinharoy *et al*., 2018) are in agreement with the current studies.

In our study, the proportion of women who consumed flesh food was very low (14.3%) at endline NSA+BCC group, but flesh foods were commonly consumed in rural Bangladesh (82%) (Sinharoy *et al.*, 2018). The lowest consumption of flesh foods, among women is associated with inadequate micronutrient intake (high in micronutrient deficiency) of their own and their children.

The present study observed, the overall mean (SD) DDS of the women of reproductive age was 4.9 at the endline phase BCC group. These findings were higher compared with those of studies conducted in Ethiopia Axsm town 3.4 (Weldehaweria *et al.,* 2016) and other countries 3.9 in rural Bangladesh (Sinharoy *et al.,* 2018) and 3.4 in South African towns (Chakona, and Shackleton, 2017). The highest mean DDS in this findings might be due to the study participant characteristics. Because the study participants had access to nutrition sensitive intervention in addition to nutrition education. Thus, nutrition sensitive intervention could enhance the household access to nutrient-rich food groups, and the consumption of these food groups. The participants can easily get additional food groups such as egg, milk, vegetables from chicken production, livestock and home gardening that was provided by the project. Nutrition education is an important means to change eating and feeding practices. However, the overall proportion of women of reproductive age in our study who achieved minimum DD at endline was lower (20.8%), which suggests that current diets may provide suboptimal nutrients.

5.2. Children Dietary Diversity

The current study illustrated that dietary diversity among children aged 6-36 months is extremely low in the district. Particularly, consumption of animal source foods is consistently lower among the study groups as compare to other studies. In our study, consumption of diary product at endline NSA+BCC (31.2%) is also very low among children aged 6 to 36 months in the district. Lower consumption of animal source food like dairy product may be contributed to higher rates of child micronutrient deficiency and mortality in rural community. These findings are slightly higher with those from various studies conducted in Ethiopia, Amhara region 21.7% (Gashu *et al.,* 2016) and south wollo 21.1% (Geberemedihin *et al.,* 2017), but it is lower than (Dangura and Gebremedhin, 2017) 60.7% and 70.7% (Solomon *et al.,* 2018).

The overall mean (±SD) DDS of the children age 6 to 36 months was increase after the intervention (4.7) in the endline phase NSA+BCC groups. This indicates that mother/caregivers knowledge gaps and also availability, accessibility and affordability of food is the major predictors of dietary diversity. Therefore, it could be realistic to improve maternal and child dietary diversity with giving more attention to nutrition education and NSA intervention. Comparable conclusions were also suggested by Dangura and Gebremedhin, (2017) in Southern Ethiopia. The DDS of children significantly improved by nutrition education and implementation of nutrition sensitive agriculture (Dangura and Gebremedhin, 2017). The findings on children DDS are in agreement with those conducted in other informal settlements in Zimbabwe. Nutrition education improves women and child dietary diversity (Murendo *et al*., 2018). Furthermore, these findings are higher than figures reported in Gashu *et al.,* (2016), 2.0 (Dangura and Gebremedhin, 2017) and 3.1 in Benin (Alaofe *et al*., 2017).

We observed that, very small proportion of children aged 6 to 36 months (32.5 %) met the WHO standards consuming at least four food groups out of seven defined food groups in the preceding day of the survey at endline phase among the NSA+BCC groups. These results are slightly higher than those reported in other country Benin 30.8% (Alaofe *et al*., 2017). These findings also two folds as compared with the EDHS 2016 reports (13.8%) and triple with those of studies conducted in Ethiopia south wollo 7% (Gebiremedihe *et al.*, 2017). But, our finding is lower than study conducted in Zambia 37% (Disha *et al.*, 2012). This indicates that despite being available this food groups in the household, the problem is how to utilize the produced product due to poor mother/caregivers knowledge and cultural beliefs. Furthermore, poor dietary knowledge, cultural beliefs and practice may limit mothers to use the produce food, therefore nutrition education is crucial to improve mother/caregivers attitude, knowledge gap and cultural beliefs to use the available resource effectively.

As expected in an urban setting, children born from mothers who lived in urban areas were reported higher practice of MDD than rural areas. In Addis Ababa, MDD score among children was 59.9% (Solomon *et al*., 2017). In the above study, MDD were higher than the present study 32.5% and findings from rural part of Ethiopia (with MDD of 7%) and also

higher than results analyzed from EDHS 2016 which showed that 14% of children meet MDD, correspondingly (Gebremedhin *et al.,* 2017 and EDHS, 2016). The difference in this findings and the Addis Ababa is might be due to the fact that the present study was conducted in rural community where the households has challenges in accessing a variety of foods because of, poor infrastructure, accessibility, affordability of food and awarness as compared with that of the urban community, which had access to mass media, infrastructure, and education.

Our study witnessed, mothers/caregivers participated in a combined nutrition education intervention with home gardening, women empowerment training, and chicken production is associated with a significant improvement in MDD among women (20.8%) and children (32.5%) after eight-week intervention process in the NSA+BCC groups. This could be due to a positive effects of the integrated agriculture to nutrition and nutrition education alone (BCC) intervention on the consumption of specific food items. Because, nutrition sensitive intervention has role to improve the availability and accessibility of some food varieties as well as nutrition education to promote the use of available foods. A study done in South wollo Ethiopia reached similar conclusions, in predominately food-insecure areas, nutrition education, and implementation of nutrition-sensitive agriculture can improve children's DD (Gebremedhin *et al.,* 2017). Studies in Philippines also concluded preschool children from households with gardens had higher DDS as compared with their counterparts (Cabalda *et al*., 2011). In Benin, positive associations were observed between women's empowerment, and maternal, and child's DD (Alaofe *et al*., 2017).

Findings from the present study suggest that, interventions aimed at home gardening, women empowerment and chicken production are likely to improve maternal and children's diet diversity in the district. However, linking agriculture to nutrition with nutrition education (BCC) is crucial in improving the nutritional status of women and children by supplying low cost high value nutritious, affordable and healthy food groups to the household in a sustainable way. A study done in Bolivia witnessed the present study, nutrition-sensitive investments in agriculture that aim to diversify subsistence agricultural production could plausibly benefit the adequacy of children's diet (Jones, 2015). Lactating mothers who did not practice home gardening also showed more than two folds higher

likelihood of consuming low diversified diets when compared to mothers who practice home gardening. (Weldehaweria *et al*., 2016). In Malawi a cluster randomized controlled trial study conclude, participatory community-based NE for caregivers improved child dietary diversity even in a food insecure area (Kuchenbecker *et al*., 2017).

In the present study, we found that the main goal of nutrition based BCC intervention to enhance women and children dietary intake to meet the daily nutrient requirements. Majorly, we stressed on individual behavioral change, promotion of consumption of locally available nutritious food groups and dissemination of nutrition based information to the mothers/primary caregivers. In addition during the intervention time, we had more attention on the nutritional advantages of consumption of nutrient-rich food groups at least one animal source food, one pulse and nut and two or more fruit and vegetables per day. Hence, after the intervention process endline phase the consumption of MFP, egg, dairy product and fruits and vegetable was increases and leads to adequate energy and nutrient intake across the two groups. This might be due to the reason that women with gardens and chicken production were beneficiary from gardens and chicken they own as a means to diversifying their daily food. It also indicated that women with home gardening and chicken production would get additional diet options that enhance the diversity of their own and their childrens diet.

This is in line with earlier findings, which concluded that education and nutrition education in particular is vital to improve mother knowledge to food choices, preparation and meal patterns to address the incidence of various micronutrient deficiencies. A sustainable nutrition education program would benefit the rural communities by assisting women to make informed nutritious food choices and improve the dietary patterns, food habits, food preparation and meal planning skills within an inadequate household budget. Nutrition knowledge should be strengthened in different target groups using numerous forms such as communication materials, practical sessions, in order to be operative and rapidly conveyed even in remote areas (Nsele, 2014).

The current study has several limitations. First, limitation of this study is the relatively small sample sizes for large ranges of population in the region. Second, missing husband engagement in to the intervention program. Third, the study participant for NSA+BCC

group were selected from the ATONU/ACGG project beneficiaries (households those who have good agricultural practice and resource than those the BCC group due to the sustainability issue of the project). Additionally, for the effectiveness BCC training, in this study the intervention time was very short period. Other limitation of this study was related to seasonality. Our study was conducted from February to May, 2018, when food is relatively plenty at household level than other season. Because, seasonality has also direct impact on their dietary patterns of the household particularly on the rural farm community.

6. CONCLUSION AND RECOMMENDATION

Based on the current findings, the proportion of minimum DD among women of reproductive age and children is very low and consumption of nutrient-rich food groups, animal source food and fruits and vegetables is extremely low in the study district as compared with other countries. However, there was a successful outcomes of nutrition education (BCC) intervention alone and integrated with nutrition sensitive agriculture intervention on the improvements of women and their children's DD.Therefore, mothers/caregivers exposure to nutrition education alone and integrated to nutrition sensitive intervention can significantly improve both their own and their children's dietary diversity in the study area. Nutrition education alone is also able to improve mothers/caregivers' knowledge of the importance of how to utilize the local available nutritious low cost, high impact food groups, food choices and subsequently enhancing both the frequency and quality of their own and their children's diets. Hence, still more effort needs to come up all women of reproductive age and their children ages 6 to 36 months to reach the recommended minimum dietary intake as per international standards.

Therefore, because of this successful outcomes of the intervention, we conclude that this intervention has potential for further adaptation and development to other rural part of Ethiopia. Making nutrition education and nutrition sensitive intervention more effective, active engagement should be needed on a variety of responsible stakeholders from multiple sectors. Nutrition policies, program planners and concerned stakeholders should take in to account about women food preference.

In addition, we recommend that improving infrastructure such as electric power, road, access to improve water source, market, education, and TV, radio and magazines program on nutrition, and engaging husband on nutrition education programs could be critical. Thus, nutrition sensitive intervention and any other programs that work on women and children nutritional status should focus on linking the program with nutrition education.

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ANNEXES

Annex 1: Ethical Clearance Letter

COLLEGE OF NATURAL & COMPUTATIONAL SCIENCES
Addis Ababa University

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Ref. No.
ቁጥር CNSDO/243/10/2018
Date
ቀን January 25, 2018

To Whom It May Concern

The College of Natural & Computational Science Institutional Review Board (CNS-IRB) Committee in its meeting held on 11/01/2018 Minute No. IRB/031/2018 has examined the project proposal entitled "**Assessment of outcomes of the promotion of nutrition education on women's of reproductive age (15-49yrs) and child 6-23 months dietary diversity in Tigray and Region selected rural Kebeles**" by Fetene Nega .

The proposal is conditionally approved for implementation.

With regards,

Shibru Temesgen /Dr./
Dean, College of Natural & Computational Science

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Please Quote our reference number in you correspondence

"Examine all things; hold fast that which is good"

"ሁሉን መርምሩ. መልካሙን ያዙ"

Annex 2: Participant's Information Sheet and Consent Form

Title of the Research: Assessment on the outcome of promotion of nutrition education on dietary diversity among women of reproductive age and children in Tigray reginal state selected rural kebeles.

A. Information Sheet

Name of Principal Investigator: Fetene Nega Belachew

Name of the Organization: College of Natural and Computational Sciences, Center for Food Science and Nutrition, Community Nutrition Program, Addis Ababa University.

The objective of this study is to assess the outcome of promotion of nutrition education on dietary diversity among women of reproductive age (15-49yrs) and children ages 6-36months.

Your cooperation and willingness to participate in the interview, and training on behavioral change communication is very helpful in identifying the impact of nutrition education tools on those dependent variables. I assure you that all information that you give like your personal issues, your answers and ideas are will be kept confidential and secured. You have the full right to refuse from participating in this research. (You can choose not to respond to some or all the questions) and this will not affect you from getting any kind of service. You have also the full right to leave from this study at any time you wish, without losing any of your right. If you are willing to participate, the interview will take about 30-40 minutes. I would like to ask you few questions regarding socio-demographic characteristics; living condition, WASH, nutrition education, dietary assessment of women and child and food preference. Women and children DDS will be collection three times at in a month interval. I appreciate your kindness to be part of the study.

Are you willing to participate? If the answer, yes ☐ Continue

No ☐ Stop and skip to the other participant

B. Consent Form

I_____ am informed on study to be conducted by Masters Student in AAU, College of Natural and Computational Science, on assessment of the outcome of promotion of nutrition education on DD among WRA and children ages 6-36mo.The objective of this study is to assess the outcome of promotion of nutrition education on dietary diversity among women's of reproductive age (15-49yrs) and children ages 6-36mo and participation to this study is voluntary no obligation to answer any questioner there is no harm by not answering the questions and no special benefit by answering the question except knowing my DDS at the end of the study and also the interview will take 30- 40 minutes. I heard all the information mentioned above and willing to participate in the interview.

The main objective of this study is designed to generate information for, Nutrition Sensitive agricultural (NSA) program particularly focus on promotion of nutrition education to improve dietary diversity score among WRA and child under 3 years by food choice, provide information for government policy advocacy on nutrition education, Supporting nutrition education intervention and its impact on women and child dietary diversity. To attain this purpose, your honest and genuine participation by responding to the questions prepared is very important.

1. Name and signature of the study subject agreed to participant as per the above stated information

_____ _____

2. Name of interviewer_____ Signature_____

For more information and question here is the contact address of investigator:

Fetene Nega: Tele: 0910417790; e-mail: fetene.nega@gmail.com

I thank you very much!!

ሕዛል

ሕዛል 1 - ናይ ተሳተፍቲ ቅጥዒ ሓበሬታን ወረቐት ፍቓድ

ርእሲ መፅናዕቲ/ምርምር፡ ኣብ ብሄራዊ ክልላዊ መንግስቲ ትግራይ ዝተመረፁ ቀበሌታት ገፀር ኣብ ሞንጎ መፍረይቲ ዕድመ ዘለዋ ኣንስትዮን ቐልዑንን ኣብ ዝተፈላለየ ዝማዕበለ ስነምግቢ - ዝበልፀገ ስነምግቢ ትምህርቲ ምፍላጥ/ምዕባይ ውፅኢት ምዝና

ሀ. <u>ወረቐት ሓበሬት</u>

ሽም ዋና ተመራማሪ/መፅንዒ - ፈጠነ ነጋ

ሽም ትካል - ዩኒቨርሲቲ ኣዲስ ኣበባ ተፈጥራዊ ተወዳዳሪ ሳይንስ ኮሌጅ ማዕከል ምግቢ ሳይንስን ዝማዕበለ ምግቢ ፕሮግራም ማሕበረሰብ ዝማዕበለ ምግቢ

ናይዚ መፅናእቲ ዕላማ፡ ኣብ ሞንጎ መፍረይቲ ዕድመ ዘለዋ ኣንስትዮ /15-49 ዓመት/ ን ቁልዑ /ዕድመ 6-36 ኣዋርሕ/ ኣብ ዝተፈላለየ ዝማዕበለ ስነምግቢ ዝበልፀገ ስነምግቢ ትምህርቲ ምፍላጥ/ምዕባይ ውፅኢት ንምምዛን እዩ።

ኣብዚ ቃል መሕትት፣ ኣብ ባህሪያዊ ለውጢ ተራኽቦ ስልጠና ናትኩም ምትሕብባርን ናይ ምስታፍ ድሌት ኣብዞም ተፀበይቲ ኣካላት መሳርሕታት ዝማዕበል ስምምዕነት ትምህርቲ ዘለዎ ፅልዋ ኣብ ምፍላይ ኣዝዩ ሓጋዚ እዩ። እትህቡና ሓበሬ ኩሎም ከም ውልቀ ዋኒን፣ መልስኹምን ሓሳባትኩም ሚስጥራዊ ኮይኖም ዝተሓዙ ን ዝሕልው ምኻኖም የረጋግፀልኩም። ኣብዚ ምርምር ካብ ምስታፍ ናይ ምንፃግ ሙሉእ መሰል ኣለኹም። /ዝተወሰኑ ወይድማ ኩሎም ሕቶታት ንዘይ ምምላስ ክትመርፁ ትኽእሉ/ ን እዚ ድማ ዝኾነ ዓይነት ግልጋሎት ኣብ ምርካብ ፅልዋ ኣይህልዎን። ከምኡ ድማ ዝኾነ መሰልኩም እንተይሰአንኩም ኣብ ዝደለኹሞ ዝኾነ ጊዜ ካብዚ መፅናሕቲ ናይ ምለቓቕ ሙሉእ መሰል ኣለኹም። ንምስታፍ ድሌት እንተሃልይኩም እዚ ቃል መሕትት ኣስታት 30-40 ደቒቓ ይወድስ። ኣነ ዝተወሰኑ ማህበራዊ - ዲሞግራፊክ ስነባህሪያዊ፣ ኩነታት መነባብሮ፣ ዋሽ፣ ትምህርቲ ስነ ዝማዕበለ ምግቢ ከምኡ ድማ ናይ ኣንስቲዮን ቐልዑ ዝማዕበለ ምግቢ ምዘናን መረፃ ምግቢ ዝምልከት ዝተወሰኑ ሕቶታት ክሓተኹም እደሊ። ዲዲኤስ ኣንስትዮን ቐልዑ ኣብ ሓደ ወርሒ ፍልልይ ሰለስተ ጊዜ ዝእከቡ ይኾኑ። ናይዚ መፅናዕቲ ኣካል ብምኻንኩም የመስግን።

ናይ ምስታፍ ድሌት ኣለኩም? መልሲ እዎ እንተኾይኑ ☐ ቀፅሉ

የለን እንተኾይኑ ☐ ደው ምባልን ናብ ካልእ ተሳታፊ ምሕላፍ

ለ. <u>ቅጥዒ ፍቓድ</u>

ኣነ_____ኣብ ሞንጎ ዝማዕበለ ስነምግቢ ዝበልፀገ ስነምግቢ ትምህርቲ ምፍላጥ/ምዕባይ ውፅኢት ዲዲን ደብሊውኤርኤ ከምኡ ድማ ቐልዑ 6-36 ኣዋርሕ መፅናዕቲ ብተምህሮ ማስተርስ ዲግሪ ዩኒቨርሲቲ ኣዲስ ኣበባ ተፈጥራዊ ተወዳዳሪ ሳይንስ ኮሌጅ ማዕከል ምግቢ ሳይንስን ዝማዕበለ ምግቢ ፕሮግራም ማሕበረሰብ ዝማዕበለ ምግቢ ንዝኻየድ መፅናዕቲ ሓበሬታ ኣለኒ። ናይዚ መጽናእቲ ዕላማ ኣብ ሞንጎ መፍረይቲ ዕድመ ዘለዋ ኣንስትዮ /15-49 ዓመት/ ን ቁልዑ /ዕድመ 6-36 ኣዋርሕ/ ኣብ ዝተፈላለየ ዝማዕበለ ስነምግቢ ዝበልፀገ ስነምግቢ ትምህርቲ ምፍላጥ/ምዕባይ ውፅኢት ንምምዛንን ከምኡ ድማ ኣብዚ መፅናዕቲ ምስታፍ ብድሌት ኾይኑ ዝኾነ ሕቶ ንምምላስ ግቡእ ዘየለ እንትኮን ኣብ መወዳእታ ዲዲኤስ እንተዘይፈሊጠን ጥራሕ ዝኾነ ሕቶ ብዘይምምላስ ጉድኣት ዘይብሉን ሕቶ ብምምላስ ዝተፈለየ ረብሓ የብሉን ከምኡ ድማ እዚ ቃልምሕትት 30-40 ደቒቓ ይወስድ።

ናይዚ መፅናዕቲ ቐንዲ ዕላማ ኣብ ሞንጎ ደብሊውኤርኤም ትሕቲ 2 ዓመት ቐልዑ ብልጫ ምግቢ ናይ ዝተፈላለየ ስነምግቢ ውጽኢት ንምምሕያሽ ብፍላይ ኣብ ስነምግቢ ምዕባይ ትምህርተቲ ጠመተ ብምግባር ዝማዕበለ ስነምግቢ ግብርና ፕሮግራም ሓበሬታ ንምፍልፋል/ንምእካብ ኣብ ዝማእበለ ስነምግቢ ትምህርቲ፣ ደጋፊ ዝማእበለ ስነምግቢ ትምህርቲ ገምጋምን ኣብ ኣብ ዝተፈላለየ ዝማእበለ ስነምግቢ ኣብ ልዕሊ ኣንስቲዮን ቐልዑ ዘለዎ ጽልዋ ንመንግስቲ ፖሊሲ መልቀቒቲ ሓበሬታ ንምሓብ ዝተነደፈ እዩ። እዚ ዕላማ ነምዕዋት ዝተዳለው ሕቶታት ኣበ ምምላስ ናትኩም ተሓማኒን ሓቂ ዘለዎ ተሳትፎ ኣዝዩ ኣገዳሲ እዩ።

ብመሰረት ኣብ ላዕሊ ዝተጠቐሰ ኣብዚ ዋኒን መጽናዕቲ ንምስታፍ ዝተሰማማዕ

1.ሽምን ኽታምን _____ _____

2.ሽም ሓታቲ _____ ኽታም_____

ንዝበለፀ ሓበሬታን ሕቶ ናይ ተመራማራይ መራኸቢ ኣድራሻ ስዒቡ ዘሎ እዩ።

ፈጠመ ነጋ : ቐፅሪ ስልኪ: 0910417790 e-mail: fetene.nega@gmail.com

ኣዝየ የመስግን

Annex 3: English Version Questionnaires

Questionnaires for assessing the outcome of promotion of nutrition education on dietary diversity among women of reproductive age (15-49) and children (6-36mon) in Tigray reginal state selected rural kebeles.

PART I: Questionnaire (English Version)

01- Questionnaire identification_____

02- Date of interview dd/mm/yy _____/_____/_____

03- Interview started at, __ __: __ __ AM/ PM Time Ended: __ __: __ __ AM / PM

04- Name of the region _____ Woreda _____ Kebele /village_____

05- Interviewer Name_____ Sign _____date_____

06- Supervisor Name_____ Sign _____date_____

07- Name of the respondent (if) _____Sex _____Age_____

08- Role of participant in the study: NSA+BCC group ☐ BCC ☐

PART II. Socio-demographic Characteristics of WRA

S.№	Questions	Option of answers	Skip
1	How old are you?	Age in completed years _____	
2	What is agro ecological characteristics of respondent area?	1.Semiarid (kola) ☐ 2.Warm temperate(weina dega) ☐ 3.Temperate (dega) ☐	
3	What is your religion?	1. Orthodox ☐ 2. Muslim ☐ 3. Adventist ☐ 4. Protestant ☐ 5. Other Specify_____	
4	What is your ethnicity?	1. Amhara ☐ 2. Tigray ☐ 3. Oromo ☐ 4.Afar ☐ 5. Other Specify _____	
5	What is your current marital status?	1. Single ☐ 2.Married ☐ 3. Divorced ☐ 4. Separated ☐	
6	How many family size do you have?	_____	
7	How many male and female live in the household permanently?	1.Male_____ 2.Female_____	
8	What is your relationship to your child?	1.Biological mother ☐ 2.Caretaker ☐ 3.Sister ☐ 4.Other_____	
9	Have you ever attended school?	1. Yes ☐ 2. No ☐	If no skip to q,11

10	What is your educational level of women attained?	1. Can read and write only ☐ 2. 1-8 primary school ☐ 3. 9-12 secondary school ☐ 4. above (tertiary education) ☐	
11	What is the educational level of your husband?	1. Can read and write only ☐ 2. 1-8 primary school ☐ 3. 9-12 secondary school ☐ 4.Above(tertiary education) ☐	
12	What is your current occupation?	1.Farmer ☐ 2. Government employer ☐ 3. Merchant ☐ 4.House wife ☐ 5. Daily laborer ☐ 6. None ☐ 7. Other specify_____	
13	What is your husband occupation?	1. Farmer ☐ 2. Government employer ☐ 3.Merchant ☐ 4.Daily laborer ☐ 5. None ☐ 6. Other_____	

PART III. Living Condition (Economic Status)

S.№	Questions	Option of answers	Skip
1	How many rooms in your house are used for sleeping?	number of rooms _____	
2	What kind of house do you live in? *[record by observation]*	2.Rudimentary floor: wood planks, bamboo ☐ 3.Finished floor: ceramic tiles, cement ☐ 4.Other (specify)_____	
3	What is the main material of the floor? *[record by observation]*	1.Natural floor: earth ☐ 2.Sand ☐ 3.Clay ☐ 4.Dung ☐ 5.Concert ☐	
4	What is the main material of the roof? *[record by observation]*	1. No roof ☐ 2. Grass, leave ,bamboo ☐ 3. Wood, metal, steel, and cement ☐ 4. Other_____	
5	Does the house window? *[record by observation]*	1. Yes ☐ 2. No ☐	
6	Does your household have electricity?	1. Yes ☐ 2. No ☐	
7	Is the cooking usually done in the house, in a separate building, or outdoors? *[there could be more than one answer]*	1.In the house ☐ 2.In a separate building ☐ 3.Outdoors ☐	
8	What type of fuel does your household mainly use for cooking?	1. Wood collected ☐ 2. Charcoal ☐ 3. Electricity ☐ 4. Liquid petroleum gas ☐ 5. Biogas ☐ 6. Animal dung ☐	

	[there could be more than one answer]	7.Agricultural crop ☐ 8. Other_____	
9	Do you have your own? 1.Yes ☐ 2.No ☐ *[there could be more than one answer]*	1. Radio? Yes ☐ No ☐ 2. Mobile phone? Yes ☐ No ☐ 3. Bank account? Yes ☐ No ☐ 4. Refrigerator? Yes ☐ No ☐ 5. Television? Yes ☐ No ☐ 6. Cart Yes ☐ No ☐ 7.Motor bicycle Yes ☐ No ☐	
10	Do you have any food stock?	1. Yes 2. No	**If no skip q,11**
11	If yes, for how long would it feed your family (months)?	1.Two months ☐ 2.Four months ☐ 3. Six months ☐ 4. 8-10 months ☐ 5.More than a year ☐ 6.Other _____	

PART IV. WASH Related Questions

S.№	**Questions**	**Option of answers**	**Skip**
1	Do you have access to improve water source and sanitation?	1.Yes ☐ 2. No ☐	
2	What is the main source of drinking water for members of your household?	1.Pipe water ☐ 2.Dug well ☐ 3.Lake, pond, river ☐ 4.Spring water ☐ 5.Tube well/bore hole ☐	
3	How far is water source from your home in km?	_____Km	
4	How long does it take to collect water and come back to your home?	_____hrs. 1.Barfoot ☐ 2.Animal transport (horse, mule, donkey or camel) ☐ 3.Cart ☐ 4.Bajaj ☐ 5.Bus ☐ 6.Other specify_____	
5	Who usually responsible to fetch the water for your household?	1. Mother /respondent ☐ 2. Husband ☐ 3.Adult man ☐ 4.Other _____	
6	Do you treat your water in any way to make it safer to drink?	1.Yes ☐ 2. No ☐	**If no skip to q,8**
7	How do you treat your water before you drink it?	1. Boil ☐ 2. Add chlorine ☐ 3.Strain it through a cloth ☐ 4. Don't know ☐ 5.Other (specify)_____	
8	How do you store the drinking water?	1.Covered ☐ 2.Uncovered ☐ 3.Other (specify)_____	
9	What is the critical time for hand washing? *[there cloud be more than 1*	1.Before cooking of food ☐ 2.Before eating or feeding child ☐	

	answer]	3.After toilet ☐ 4.After washing child's feces ☐ 5.After touching dirty things ☐ 6.Other specify_____	
11	With what do you usually wash your hands?	1.water alone ☐ 2. with soap ☐ 3.Traditional washing agent (endod) ☐ 4.Other_____	

PART V. ATONU Related Questions

S.№	**Questions**	**Option of answers**	**Skip**
1	Currently, are you a member of ATONU project (beneficiary)?	1. Yes ☐ 2.No ☐	**If yes skip to q,3**
2	If you are not ATONU beneficiary, what is the reason to be excluded from the project? C	1.Lack of information about ATONU ☐ 2.Not fulfil the project criteria ☐ 3. Was not part of ACGG project ☐ 4.I have good sources of income ☐ 5.Other_____	
3	For how long ATONU project has supported you?	_____ year/month	
4	What type of service did you get from ATONU project? *[there could be more than 1 answer]*	1. Home gardening ☐ 2. Women empowerment ☐ 3. BCC training ☐ 4. Chicken ☐ 5. Other _____	
5	Do you have access to a home gardening?	1. Yes ☐ 2.No ☐	**If no skip to q,9**
6	If yes, what type of support did you get from ATONU to improve your home garden? *[there could be more than 1 answer]*	1.Improved Seed ☐ 2.Agricultural skill ☐ 3.Insectside chemical ☐ 4.Other specify _____	
7	What type of horticultural crop (vegetable, fruit) did you grow? *[there could be more than 1 answer]*	1. Cabbage ☐ 2. Carrot ☐ 3. Spinach ☐ 4. Tomato ☐ 5. Pepper ☐ 6. Onion ☐ 7. Kale, ☐ 8. Lettuce ☐ 9. Water melon ☐ 10 Other specify _____	
8	How did you use the produces from your home garden? *[there could be more than 1 answer]*	1.Household consumption only ☐ 2.For sell(income generation) only ☐ 3.Both ☐ 4.Other_____	

9	Have you ever received women empowerment training in the village given by ATONU?	1.Yes ☐ 2.No ☐	**If no skip to q,12**
10	If yes, how many times did you train (discussed) per week?	1. Once a week? Yes ☐ No ☐ 2. Two times/week Yes ☐ No ☐ 3. More >2 time/ week? Yes ☐ No ☐ 4. Almost Every day? Yes ☐ No ☐	
11	If yes, what were the topics discussed? *[there could be more than 1 answer]*	1.Gender Equality related ☐ 2.Provide education for women ☐ 3.Women's participation in decision making on food ,child care and purchasing ☐ 4. Ownership of assets ☐ 5.Housband engagement to support women's activity (child feeding, child care ect) ☐ 6.Women's reach and control over income and other resources ☐ 7.Other _____	
12	What type of benefit do you get from this training? *[there could be more than one answer]*	1.Enhance husband participation in IYCF ☐ 2.Increase access and control of income and resources ☐ 3.Increase ownership of assets ☐ 4.Enhance knowledge about good nutrition and nutritional status ☐ 5. Increase involvement in decision making at all levels ☐ 6.Other _____	
13	Who usually decide how the money (agricultural product) you earn will be used?	1. Respondent/wife ☐ 2. Husband ☐ 3. Respondent & husband jointly ☐ 4. Someone else [parent] ☐ 5. Other _____	
14	Who usually makes a decisions about diet selection for children and yourself?	1. Respondent/wife. ☐ 2. Husband ☐ 3. Respondent and husband jointly ☐ 4. Someone else [parent] ☐ 5. Other _____	
15	Who usually makes a decisions about making major household food purchase?	1. Respondent/wife. ☐ 2. Husband ☐ 3. Respondent and husband jointly ☐ 4. Someone else ☐ 5. Other _____	
16	Have you ever received BCC training in the village used by ATONU?	1. Yes 2. No	

17	If yes, what were the topics discussed?	1.Diversified food consumption and its health benefit ☐ 2.Intrerelation between agriculture and nutrition outcome ☐ 3.Infant and young child feeding practice ☐ 4.Effect of WASH on nutrition outcome ☐ 5.About maternal nutrition ☐ 6.Socio-cultural factors on nutrition ☐ 7.Other_____	**If no skip to q,21**
18	How many time were you trained (discussed) per week?	1. Once a week? Yes ☐ No ☐ 2. Two times/week Yes ☐ No ☐ 3. More than 2 time/ week? Yes ☐ No ☐ 3. Almost Every day? Yes ☐ No ☐	
19	What type of benefit do you get from this training?	1.Enhance knowledge and skill base for improved dietary practices ☐ 2.Increased knowledge about role of agriculture on food and nutrition security ☐ 3.Increased knowledge and awareness on nutritional importance of locally available foods ☐ 4.Enhance WASH practice including food safety and hygiene ☐ 5.Improved maternal, infant and young child fe eding practices ☐ 6.Enhance maternal and child nutrition status ☐	
20	What is the degree of your satisfaction about BCC training?	1. Excellent ☐ 2. Very good ☐ 3. Good ☐ 4. Satisfactory ☐ 5. Not satisfy ☐	
21	What is the degree of your satisfaction about home gardening service?	1. Excellent ☐ 2. Very good ☐ 3. Good ☐ 4. Satisfactory ☐ 5. Not satisfy ☐	
22	What is the degree of your satisfaction about women empowerment training?	1. Excellent ☐ 2. Very good ☐ 3. Good ☐ 4. Satisfactory ☐ 5. Not satisfy ☐	
23	In general, what was the good things from the project (ATONU) and should be continued?		
24	What should be change from the project?		

PART VI. Irrigation Access and Agriculture Related Questions

S. Nº	Questions	Option of answers	Skip
1	Do you have access to participate in irrigation scheme?	1. Yes ☐ 2. No ☐	If no skip to q,3
2	If yes, what type of horticultural plant did you grow? *[there could be more than one answer]*	1.Vegtable (carrot, tomato, spinach, kale, pumpkin, onion,) ☐ 2.Fruit (orange ,mango, guava ,apple, avocado, papaya etc) ☐ 3.Root and tuber (potato ,sweet potato) ☐ 3.Other specify _____	
3	Do you have access to farmland?	1. Yes ☐ 2. No ☐	If no skip to q ,6
4	How many hectares of agricultural land do you have?	_____Hectares	
5	Who is the owner of this farm land?	1.Your own ☐ 2.Family ☐ 3.Rent ☐ 4.Other _____	
6	How many of the following animals does this household own?	1.Milk cow_____ 2.Oxen or bulls_____ 3.Hourse,donkey or mule____ 4.Camel_____ 5.Other specify _____	
7	How many of the following animals does this household own?	1.Sheep_____ 2.Goats_____ 3.Chicken _____ 4.Beehives_____ 5. Other specify _____	

PART VII: Market Access

S.Nº	Questions	Option of answers	Skip
1	How long take the nearest market from your home?	_____hrs.	
	1.1. What type of transport the household use to go to the market?	1.Barefoot ☐ 2.Animal transport (horse, mule, donkey or camel) ☐ 3.Cart ☐ 4.Bajaj ☐ 5.Bu ☐ 6.Other _____	
2	Who is responsible to go to the market?	1.Mother ☐ 2.Husband ☐ 3.Adult man ☐ 4.Other _____	
3	What type of food variety (groups) are available in the market?	1.Grains, white roots & tubers, plantains ☐ 2. Pulses (beans, peas and lentils) ☐	

		3. Nuts and seeds ☐ 4. Dairy ☐ 5. Meat, poultry and fish ☐ 6. Eggs ☐ 7. Dark green leafy vegetables ☐ 8. Other vita A-rich fruits & vegetables ☐ 9. Other vegetables ☐ 10. Other fruits ☐	
4	Where you're household obtains these food items or group? *[there cloud be more than 1 answer]*	1. Own production ☐ 2.Purchased from village market/shop ☐ 3. Other source _____	
5	Do you have off farm income source?	1. Yes ☐ 2. No ☐	
6	What is the source? *[there cloud be more than one answer]*	1. Handicraft ☐ 2. Weaving ☐ 3. Trade in grain and livestock ☐ 4. Selling local food and drinks ☐ 5.Other _____	
7	Do you exchange food from the market?	1. Yes ☐ 2. No ☐	If no skip q,8
8	What are the major food variety or groups do you exchange from the market? *[there cloud be more than one answer]*	1.Grains, white roots & tubers, plantains ☐ 2. Pulses (beans, peas and lentils) ☐ 3. Nuts and seeds ☐ 4. Dairy ☐ 5. Meat, poultry and fish ☐ 6. Eggs ☐ 7. Dark green leafy vegetables ☐ 8. Other vita A-rich fruits & vegetables ☐ 9. Other vegetables ☐ 10. Other fruits ☐	

PART VIII. Women's Food Preference Related Questions

S.№	Questions	Option of answers	Skip
1	What is your overall food preference reason to select the following listed food groups below? *[there could be more than 1 answer]*	1. Food taste(flavor) ☐ 2.Easy to preparation ☐ 3. Availability of the food ☐ 4.Affordability ☐ 5.Helath ☐ 6. Food safety ☐ 7.Is it your ethnic food ☐ 8.Riligous and culturally accepted ☐ 9.Agro ecology difference to grow ☐	
1.1	Grains, white roots & tubers,	Select from 1-9? _____	

	plantains	_____ *[There could be more than 1 answer]*	
1.2	Pulses (beans, peas and lentils)	Select from 1-9? _____ _____ *[There could be more than 1 answer]*	
1.3	Nuts and seeds (sesame, sunflower)	Select from 1-9? _____ _____ *[There could be more than 1 answer]*	
1.4	Dairy product(milk ,cheese, yoghurt)	Select from 1-9? _____ _____ *[There could be more than 1 answer]*	
1.5	Meat, poultry and fish	Select from 1-9? _____ _____ *[There could be more than 1 answer]*	
1.6	Eggs	Select from 1-9? _____ _____ *[There could be more than 1 answer]*	
1.7	Dark green leafy vegetables (Broccoli, Kale ,Lettuce, spinach)	Select from 1-9? _____ _____ *[There could be more than 1 answer]*	
1.8	Other vitamin A-rich fruits and vegetables (ripe mango ,papaya, Pumpkin, carrots, squash , sweet potatoes	Select from 1-9? _____ _____ *[There could be more than 1 answer]*	
1.9	Other vegetables (Onion ,tomato)	Select from 1-9? _____ _____ *[There could be more than 1 answer]*	
1.10	Other fruits(orange, banana, guava, avocado, apple)	Select from 1-9? _____ _____ *[There could be more than 1 answer]*	
2	Among the following, which are the food groups that you are able to grow?	1.Grains, white roots & tubers, plantains ☐ 2. Pulses (beans, peas and lentils) ☐ 3. Nuts and seeds ☐ 4. Dairy ☐ 5. Meat, poultry and fish ☐ 6. Eggs ☐ 7. Dark green leafy vegetables ☐ 8. Other vita A-rich fruits & vegetables ☐ 9. Other vegetables ☐ 10. Other fruits ☐	
3	If unable to grow some food groups, what is your major reason? Please select the reason.	1.Agro-ecological factor ☐ 2.poor productive ☐ 3.Lack of knowledge ☐	

	[there could be more than one answer]	4.Poor cultural belief and values ☐ 5.Other_____	
4	Did you eat any wild food?	1. Yes ☐ 2. No ☐	**If no skip q ,6**
5	If yes, Anything else?		
6	Is there any food variety or group eaten by specific age group and sex (children, male or female)? Why?	Please probe them to select FGs from the two standard guidelines WHO and FAO for child and women respectively. _____Child _____WRA _____Men	
7	What is the common frequency of women's daily food intake?	1. <3 times per day ☐ 2. 4 times per day ☐ 3.More than 5 times per day ☐	

PART IX. Nutrition Education Related Questions

S. №	**Questions**	**Option of answers**	**Skip**
1	Do you have exposure to mass media? 1. TV? Yes ☐ No ☐ 2. Radio? Yes ☐ No ☐ 3. Journal? Yes ☐ No ☐	1.Yes ☐ 2. No ☐	If no skip to q,5
2	If yes, did you listen to any maternal and IYCF practice related program?	1.Yes ☐ 2. No ☐	
3	If yes, how many times did you listen at least once a week, more than once a week, and almost every day?	1. Once a week? Yes ☐ No ☐ 2. More > once a week? Yes ☐ No ☐ 3. Almost Every day? Yes ☐ No ☐ 4.Other _____	
4	If yes, which of the following child feeding practice have you heard? [*there could be more than one answer]*	1.Feeding thick nutrient rich porridge ☐ 2. Adding egg, qunta ..with children food ☐ 3.Feed child 3 or 4 times a day ☐ 4.Feed fruit and vegetable daily ☐ 5.Feed animal origin daily including fasting day ☐ 6.Frequently feeding at a time of diarrhea ☐ 7.Feed divers diet(4FGs/d) to children ☐	
5	If yes: Where did you learn it? [*there could be more than one answer]*	1.Health Centre ☐ 2.Mass media(TV ,Radio, Magazine) ☐ 3.From ATONU project ☐ 4.From health extension worker ☐ 5.Other _____	
6	Has (name of child) ever been breastfed?	Yes ☐ No ☐	If no skip to q,8

7	For how long after birth was (name of child) breastfeed only?	1.For four month ☐ 2.For 5 month ☐ 3.For six month ☐ 4.I don't know ☐	
8	When do you think a child should be first receive complimentary food in addition to breast milk including water?	1.Yes [____ _____]month 2. I don't know	
9	At what age range a child starts to eat same types of foods as consumed by the rest of the family?	1.Before 9 mon ☐ 2.Form 9-11mo ☐ 3.At 12mon ☐ 4.13-23mon ☐ 5.After 23 mon ☐	
10	Have you ever heard about the health benefit of consuming diversified food for children and women before?	1.Yes ☐ 2. No ☐	If no skip to q 11
11	If yes: Where did you learn it?	1.Health Centre ☐ 2.Mass media(tv ,radio, magazine) ☐ 3.From ATONU project ☐ 4.From health extension worker ☐ 5.Other_____	
12	What is vitamin A rich fruit and vegetables? Which one off the following vitamin A rich food *[there could be more than 1 answer]*	1.Orange color fruit & vegetable ☐ 2.Green leafy ☐ 3.Egg ☐ 4.Liver ☐ 5.Breast milk ☐ 6.Cow milk ☐ 7.I don't know ☐ 8.Others _____-	
13	What is iron rich food? Please select foods that are rich in iron? *[there could be more than 1 answer]*	1. Meat ☐ 2. Liver ☐ 3. Egg ☐ 4. Cereal ☐ 5. I don't know ☐ 6.Others_____	
14	When (name of child) had a diarrhea was he/she given animal product and fruit and vegetable?	1.Much less ☐ 2.Somewhat less ☐ 3.About the same ☐ 4.More ☐ 5.Stopped food ☐ 6.Don't know ☐	
15	During fasting period, did you believe that your child can eat animal products (meat, fish poultry, and dairy)?	1.Yes ☐ 2.No ☐	
16	In the past 3 months did you participate in any nutrition education program or cooking demonstration on how to feed a child under 3 years of age?	1. Yes ☐ 2. No ☐	
17	If yes: Where did you attend it? *[there cloud be more than 1 answer]*	1.Health Centre ☐ 2.From ATONU project ☐ 3 Health extension worker ☐ 4.Other_____	
18	Who do you ask for advice when you have a question about feeding your child? *[there cloud be more than 1 answer]*	1. Grandmother ☐ 2.Village Chief ☐ 3.ATONU staff ☐ 4.Health extension worker ☐	

		5.Not asking advice from anybody 6.Other _____	
19	Did you eat any additional meal during lactation period?	1.yes 2.No	>q,21
20	If yes, Anything else?		
21	Why lactating mothers should eat more than usual? *[there cloud be more than 1 answer]*	1. To produce more nutritious milk ☐ 2. For health growth of baby ☐ 3. To prevent mother from micronutrient deficiency ☐ 4. To balance the energy loosed during breast feeding and to regain the energy 5.Other _____	
22	Who do you ask for advice when you have a question about the quality and quantity of diversified food consumption during lactation period? *[there cloud be more than 1 answer]*	1.Not asking advice from anybody ☐ 2.Grandmother ☐ 3.Village Chief ☐ 4.ATONU staff ☐ 5.Health extension worker ☐ 6.Other _____	

PART X. Women's of Reproductive Age DDS Related Questions

Yesterday during the day or at night, did you eat or drink the following FGs?

	Food categories	**Foods below with items commonly consumed in the survey area(s).**	**Consumed** **1.Yes** ☐ **2.No** ☐
A	Any foods made from grains.	Injera ,Porridge, bread ,nifro, kolo, rice, pasta/noodles or other foods made from millet ,sorghum ,maize and teff	☐yes (1) ☐ no (2)
B	Any vegetables or roots that are orange colored inside.	Pumpkin, carrots, yellow sweet potatoes	☐yes (1) ☐ no (2)
C	Any white roots and tubers or plantains.	White potatoes, white yams, manioc/cassava/yucca, cocoyam, taro or any other foods made from white-fleshed roots or tubers	☐yes (1) ☐ no (2)
D	Any dark green leafy vegetables.	Any medium-to-dark green leafy vegetables, including wild/foraged leaves Broccoli, Kale , Lettuce, spinach	☐yes (1) ☐ no (2)
E	Any fruits that are dark yellow or orange inside	Ripe mango, ripe papaya	☐ yes (1) ☐ no (2)
F	Any other fruits	Orange, banana, Avocado , Pineapple ,Guava, lemon ,mandarin	☐yes (1) ☐ no (2)
G	Any other vegetables	Onion ,tomato	☐yes (1) ☐ no (2)
H	Any meat made from animal organs	Liver, kidney, heart or other organ meats or blood-based foods.	☐yes (1) ☐ no (2)

I	Any other types of meat or poultry	Beef, pork, lamb, goat, rabbit, wild game meat, chicken, duck, other birds	☐yes (1) ☐ no (2)
J	Any eggs	Eggs from poultry or any other bird Guinea fowl (koki, zigra,)	☐yes (1) ☐ no (2)
K	Any fish or seafood, whether fresh or dried	Fresh or dried fish, shellfish or seafood	☐yes (1) ☐ no (2)
L	Any beans or peas	Mature beans ,chickpeas or peas (fresh or dried seed), lentils or bean/ pea products, including ,wet, kolo, nifro, siljo, hummus, tofu	☐yes (1) ☐ no (2)
M	Any nuts or seeds	Any groundnut/peanut, Sesame, Sunflower, Flaxseed, or certain nut/seed "butters" or pastes	☐yes (1) ☐ no (2)
N	Any milk or milk products	Milk, cheese, yoghurt or other milk products, but NOT including butter, ice cream, cream or sour cream	☐yes (1) ☐ no (2))

PART XI. Children's Age Between 6-36mo DDS Related Questions

Name of the child _____Sex _____Age_____

Are you a mother/caregiver of a child age between 6-36mo? 1. Yes ☐ 2.No ☐

Name of the mother (caregiver) _____Age_____

Yesterday during the day or at night, did your child eat or drink the following FGs?

№.	**Questions and Filters**	**Coding Categories**
	Dear enumerators, please write down other foods in this box that respondent mentioned but are not in the list below.	**Consumed** **1.Yes ☐ 2.No ☐**
A	Bread, rice, noodles, or other foods made from grains, including thick grain based porridge,injera,kolo, nifro or other foods made from grains such as tef, oats, maize, wheat, barley?	☐**yes (1)** ☐ **no (2)**
B	Pumpkin, carrots, squash, or sweet potatoes that are yellow, or orange inside?	☐**yes (1)** ☐ **no (2)**
C	White potatoes, white yams, bulla, kocho, manioc, cassava, or any other foods made from roots?	☐**yes (1)** ☐ **no (2)**
D	Any dark green leafy vegetables like Broccoli, Kale , Lettuce, spinach	☐**yes (1)** ☐ **no (2)**
E	Ripe mangoes, ripe papayas, or (other local vitamin-a rich fruits)?juice or packed	☐**yes (1)** ☐ **no (2)**
F	Any other fruits, or vegetables, Orange, banana, Avocado , Pineapple ,Guava, lemon ,mandarin orange, onion ,tomato in the form of juice of packed	☐**yes (1)** ☐ **no (2)**
G	Liver, kidney, heart, or other organ meats?	☐**yes (1)** ☐ **no (2)**
H	Any meat, such as beef, pork, lamb, goat, chicken, or Guinea fowl (koki, zigra,)?	☐**yes (1)** ☐ **no (2)**

I	Eggs? Chicken, or Guinea fowl (koki, zigra,).	☐ **yes (1)** ☐ **no (2)**
J	Fresh or dried fish, shellfish, or seafood?	☐ **yes (1)** ☐ **no (2)**
K	Any foods made from beans, peas, lentils, chickpea or nuts(wet, kolo, nifro, siljo)	☐ **yes (1)** ☐ **no (2)**
L	Cheese, yogurt, or other milk products?	☐ **yes (1)** ☐ **no (2)**
M	Any oil, fats, or butter, or foods made with any of these?	☐ **yes (1)** ☐ **no (2)**
N	Any sugary foods such as chocolates, sweets, candies, pastries, cakes, or biscuits?	☐ **yes (1)** ☐ **no (2)**
O	Condiments for flavor, such as chilies, spices, herbs, or fish powder?	☐ **yes (1)** ☐ **no (2)**
P	Grubs, snails, or insects?(not used)	☐ **yes (1)** ☐ **no (2)**
Q	Foods made with red palm oil, red palm nut, red palm nut pulp sauce	☐ **yes (1)** ☐ **no (2)**
R	Any other solid or semi-solid food	☐ **yes (1)** ☐ **no (2)**

PART XII: Checklist Usage Related Questions

S.№	Questions	Option of answers	Skip
1	Did you refer the food group checklist communication material frequently?	1. Yes ☐ 2. No ☐	If no skip to qxx
2	If yes, how many times did you refer the checklist communication material per week?	1. Once a week ☐ 2.Two times a week ☐ 3. More than three times a week ☐ 4.Almost every day ☐ 5.Other specify _____	
3	How did you use the checklist?	1. Used as reference ☐ 2. As alarming tools ☐ 3. To develop good nutritious Complementary feed ☐ 4. Other _____	
4	What was the role of FG checklist communication material in your daily food consumption?	1.Enhance to consume more FGS ☐ 2.Alarm and show to use the local available food easily ☐ 3.It changes the food consumption behavior a sustained way ☐ 4.Familaraize different FGs ☐ 4. Not useful at all ☐ 5.Other _____	

5	What was the challenge to use the checklist communication material properly?	1. Ignorant (forgetting communication material) ☐ 2.Lack of time ☐ 3.Cultural beliefs and values ☐ 4.Economical problem ☐ 5.lack of knowledge ☐ 6.Other _____	
6	What is the degree of your satisfaction about food checklist usage?	1. Excellent ☐ 2.Very good ☐ 3. Good ☐ 4.Satisfactory ☐ 5. Not satisfy ☐	
7	In general, what was the good things from the checklist communication material and should be continued?		
8	What should be change from the food checklist communication material?		

I thank you very much for taking part in this study and your co-operation!!

I also extremely grateful for your time, effort, and commitment!!!

Annex 4: Questionnaire (Tigrigna Version) መጠይቅ

ሕዛል 2 - ኣብ ቻል መሕትት እንግሊዝኛ ጽሑፍ

ርእሲ መፅናዕቲ/ምርምር፡ ኣብ ብሄራዊ ክልላዊ መንግስቲ ትግራይ ዝተመረፁ ቀበሌታት ገፀር ኣብ ሞንጎ መፍረይቲ ዕድመ /15-49/ ዘለዋ ኣንስትዮን ቁልዑ /6-36 ሓዋርሕ / ኣብ ዝተፈላለየ ዝማዕበለ ስነምግቢ - ዝበልፀገ ስነምግቢ ትምህርቲ ምፍላጥ/ምዕባይ ውፅኢት ን ንምምዛን ቃል መሕትት

ክፍሊ 1 - ቃል መሕትት

01. - መፍለይ ቃል መሕትት _____
02. - ዕለት/ወ/ዓ.ም_____/_____/_____ሕቶን መልሲ
03. - ሕቶን መልሲ ዝተጀመረሉ ብ_____ንጉሆ/ድሕሪ ቐትሪ/ዝተዛዘመሉ ብ_____ንጉሆ/ድሕሪ ቐትሪ/ዝተዛዘመሉ
04. - ሽም ክልል _____ወረዳ _____ቀበለ/ቐሸት_____
05. - ሽም ሓታታይ_____ክታም_____ዕለት_____
06. - ሽም ተቐፃሪ_____ ክታም_____ ዕለት_____
07. - ሽም መልሲ ወሃቢ_____ዖታ_____እድመ_____
08. - ኣብዚ መፅናዕቲ ግደ/ተራ ተሳታፊ ፡ ጉጅለ ሕክምና(ATONU) ☐ ቐፅፅር ☐

ክፍሊ - 2 ናይ ደብሊውኦርኤ ማህበራዊ ዲሞግራፊክ ስነባህሪያት

ቐፅሪ	ሕቶታት	መማረፂ መልሲ	7/+ሕለፍ
1	ዕድሜኺ ክንደይ እዩ?	ዕድመ ብዝተዛዘመ ዓመት	
2	ናይ መልሲ ወሃቢ ስነባህሪያት ስነምሕዳር ኸባበቢ ከመይ እዩ?	1. ሓውሲ ቆላ/ቆላ ☐ 2. ሓውሲ ደጉዓ ☐ 3. ደጉዓ/ዝሑል ☐	
3	ሃይማኖትኪ እንታይ እዩ?	1.ኦርቶዶስ ☐ 2.ሙስሊም ☐ 3.ኣድቬንቲስት ☐ 4.ፕሮቴስታንት ☐ 5.ካልእ/ይፀራሕ _____	
4	ብሔርኪ እንታይ እዩ?	1.ኣምሓራ ☐ 2.ትግራይ ☐ 3.ኦሮሞ ☐ 4.ኣፋር ☐ 5.ካልእ/ይፀራሕ _____	
5	እዋናዊ ኩነት ሓዳርኪ እንታይ ይመስል?	1.ዘይተመርዐወት ☐ 2.ዝተመርዐወት ☐ 3.ዝተፋተሐት ☐ 4.ዝተፈላለየት ☐	
6	ክንደይ ዝኣክል መጠን ስድራ ኣለኺ	_____	
7	ኣብ ውሽጢ ስድራ ብቐዋሚነት ክንደይ ተባዕቲዮን ኣንስቲዮን ይነብሩ?	1. ተባዕታይ ☐ 2. ኣነስታይ ☐	
8	ምስ ቐልዓኺ ርክብኪ እንታይ እዩ?	1.ናይ ኣብራኽ ኣደ ☐ 2.ተኽናኻኒት ☐ 3.ሓፍቲ ☐ 4.ካልእ ☐	
9	ቤት ትምህርቲ ኣቲኺ ትፈልጢ‘ዶ ?	1. እወ ☐ 2. ኣይፋልን ☐	የለን እንተኾይኑ ናብ ሕቶ 11 ሕለፍ::
10	ዝረኽብኪዮ ብርኪ ትምህርቲ ኣንስቲዮ ከመይ እዩ?	1. ምንባብን ምፅሓፍ ጥራሕ ☐ 2. ቀዳማይ ብርኪ 1-8 ☐ 3. ካልኣይ ብርኪ 9-12 ☐ 4. ልዕሊ /ላዕለዋይ ትምህርቲ/ ☐	
11	ናይ በዓል ዝኸኺ ትምህርታዊ ብርኺ ኸንደይ እዩ?	1. ምንባብን ምፅሓፍ ጥራሕ ☐ 2. ቀዳማይ ብርኪ 1-8 ☐ 3. ካልኣይ ብርኪ 9-12 ☐ 4. ልዕሊ /ላዕለዋይ ትምህርቲ/ ☐	
12	እዋናዊ ስራሕኺ እንታይ እዩ?	1.ገባር ☐ 2.ሰራሕተኛ መንግስቲ ☐ 3.ነጋዳይ ☐ 4.በዓልቲ ሓዳር ☐ 5.መዓልታዊሰራሕተኛ ☐ 6.የለን ☐	

		7.ካልእ /ይፀራሕ _____	
13	ናይ ሰብኣይኺ ስራሕ እንታይ እዩ?	1.ገባር ☐ 2.ሰራሕተኛ መንግስቲ ☐ 3.ነጋዳይ ☐ 4.መዓልታዊ ሰራሕተኛ ☐ 5.የለን ☐ 6.ካልእ /ይፀራሕ_____	

ክፍሊ - 3 ኩነታት መነባብሮ /ኩነታት ኢኮኖሚ/

ቐፅሪ	ሕቶታት	መማረፂ መልሲ	ሕለፍ
1	ኣብ ገዛኹም ንምድቃድ እተጥቀምሎም ክንደይ ክፍሊታት አለው?	በዝሒ ክፍሊታት _____	
2	እትነብርሉ ገዛ እንታይ ዓይነት እዩ? /ብምምልካት ምምዝጋብ/	1.ስሩዕ ጣሪያ፣ ናይ እንፀይቲ፣ ሸንበቆ፣ ☐ 2.ዝተዛዘመ ጣሪያ፣ናይ ጡብ ንጻፍ፣ሲሚንቶ☐ 3.ካልእ/ይፀራሕ _____	
3	ናይቲ መሬት ቐንዲ ማቴሪያል እንታይ እዩ? /ብምምልካት ምምዝጋብ/	1.ተፈጥሮኣዊ መሬት ☐ 2.ሑፃ ☐ 3.ጭቃ ☐ 4.ሲባ ☐ 5.ዝቦኽዕ(Concret) ☐	
4	ናይቲ ጣሪያ ቐንዲ ማቴሪያል እንታይ እዩ? /ብምምልካት ምምዝጋብ/	1.ጣሪያ የብሉን ☐2.ሳዕሪ፣ ሸንበቆ ☐3.እንፀይቲ፣ ሓጺን ብረትን (korkoro)ስሚንቶ ☐ 4.ካልእ _____	
5	እቲ ገዛ መስኮት/ፍኒስትራ ኣለዎ‘ዶ /ብምምልካት ምምዝጋብ/	1. እወ ☐ 2. ኣይፋልን ☐	
6	እዚ ስድራ ሓይሊ ኤሌክትሪክ ኣለዎ‘ዶ?	1.እወ ☐ 2.ኣይፋልን ☐	
7	ምብሳል ምግቢ ኣብዝሓ ኣብ ውሽጢ ገዛ፣ ኣብ ዝተፈለየ ህንጻ፣ ወይ ኣብ ግዳም ይካየድ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1.ኣብ ውሽጢ ገዛ ☐ 2.ኣብ ዝተፈለየ ሕንፃ ☐ 3.ካብ ገዛ ወፃእ ☐	
8	ስድራኹም ምግቢ ንምብሳል ቐንዲ ዝጥቐሞ ኣይነት ነዳዲ/ዕንፀይቲ፣ ፈሓም /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1.ዝተኣከ በእንፀይቲ ☐2.ፈሓም ☐ 3.ሓይሊ መብራሕቲ ☐4.ፈሳሲ ፃዕዳ /ላምባ፣ ጋዝ ባዮጋዝ ☐ 5ናይ ኽፍቲ ሲባ /ዓኾር☐ 6.ናይ ግብርና እኽሊ ☐ 7.ካልእ _____	
9	ዝስዕቡ ናይ ውልቐ ኣለኩም‘ዶ? 1. እወ ☐ 2. ኣይፋልን ☐ /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1. ሬዲዮ? እወ ☐ ኣይፋልን ☐ 2. ተንቐሳቓሲ ስልኪ? እወ ☐ ኣይፋልን ☐ 3. ሂሳብ ባንክ? እወ ☐ ኣይፋልን ☐ 4. ፍሪጅ? እወ ☐ ኣይፋልን ☐ 5. ቲቪ? እወ ☐ ኣይፋልን ☐ 6. ዓረቢያ? እወ ☐ ኣይፋልን☐ 7. ሞተር ሳይክል? እወ ☐ ኣይፋልን ☐	
10	ዝኾነ መኣከቢ እኽሊ ኣለኩም?	1. እወ ☐ 2. ኣይፋልን ☐	የለን እንተኾይኑ ናብ ሕቶ 11 ሕለፍ
11	እወ እንተኾይኑ ንኽንደይ ዝኣክል ስድራኹም መጊቡ /ኣዋርሕ/?	1.ኽልተ ወርሒ ☐ 2.ኣርባዕተ ወርሒ☐ 3.ሽድስተ ወርሒ ☐ 4.8-10 ኣዋርሕ ☐ 5.ልዕሊ 1 ዓመት ☐ 6.ካልእ_____	

ክፍሊ - 4 ዋሽ ዝዛመድ ሕቶ

ቐፅሪ	ሕቶታት	መማረፂ መልሲ	ሕለፍ
1	ናይ ዝተመሓየሸ ፍልፍል ማይን ጽፈት ተባጽሖ ኣለኹም'ዶ?	1. እወ ☐ 2. ኣይፋልን ☐	
2	ንኣባላት ስድራኹም ቐንዲ ፍልፍል ዝስተ ማይ እንታይ እዩ?	1.ናይ ቡንቧ ማይ ☐ 2.ዝተኹዓተ ጉድጓድ ☐ 3.ሩባ፣ ቃላይ ☐ 4.ከርሰ ምድሪ ማይ ☐ 5.ናይ ቱቦ ጉድጓድ ☐	
3	ፍልፍል ማይ ዝርከበሉ ካብ ገዛኹም ክንደይ ይርሕቅ?	ኪ.ሜ _____	
4	ማይ ንምምፃዕን ናብ ገዛ ስጋብ ትምለሱ ክንደይ ዝኣክል ይወስድ?	ሰዓታት _____ 1.ብእግሪ ☐ 2.ብኽብቲ ምጉዕዓዝ /ፈረስ፣ በቐሊ፣ አድኒ ወይ ግመል/ ☐ 3.ዓረቢያ ☐ 4.ባጃጅ ☐ 5.አውቶቡ ☐ 6.ካልእ /ይጸራሕ_____	
5	ንስድራኩም ኣብዝሓ ማይ ናይ ምምፃእ ሓላፊነት ናይመን እዩ?	1.አደ/መልሲ ወሀቢት ☐ 2.ሰብኣይ ☐ 3.ዓበይቲ አወዳት ☐ 4.ካልእ /ይጸራሕ_____	
6	ንምስታይ ድሑን ንምግባር ማይኩም ብዝኾነ መንገዲ ትሕከሙ'ዶ?	1. እወ ☐ 2. ኣይፋልን ☐	የለን እንተኾይኑ ናብ ሕቶ 11 ሕለፍ
7	ቅድሚ ምስታይኹም እቲ ማይ ከመይ ትሕከምዎ?	1.ምፍላሕ ☐ 2.ክሎሪን ምውሳኽ ☐ 3.ብጨርቂ ምጽላል ☐ 4.ኣይፈልጥን ☐ 5.ካልእ /ይጸራሕ_____	
8	ዝስተ ማይ ከመይ ተቐምጥዎ?	1.ምሸፋን እወ ☐ 2.ኣይሸፈንን ☐ 3.ካልእ /ይጸራሕ_____	
9	ኢድ ንምሕፃብ ቐንዲ ሰዓት/እዋን ኣይናይ እዩ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1.ምግቢ ቅድሚ ምብሳል ☐ 2.ቅድሚ ምብላዕ ወይ ቁልዓ ምምጋብ ☐ 3.ድሕሪ ዓይኒ ምድሪ ☐ 4.ቐልቐል ቐልዓ ድሕሪ ምሕፃብ ☐ 5.ረሳሕ ነገር ድሕሪ ምትንካብ ☐ 6.ካልእ /ይጸራሕ_____	
10	ኣብዝሓ የእዳውኩም ብምንታይ ትሕፀቡ?	1. ብማይ ጥራሕ ☐ 2. ብሳሙና ☐ 3. ባሕላዊ መሕፀቢ ነገር /እንዶድ/ ☐ 4. ካልእ /ይጸራሕ_____	

ክፍሊ - 5 ኣቶኑ ዝዛመድ ሕቶ

ቐፅሪ	ሕቶታት	መማረፂ መልሲ	ሕለፍ
1	ኣብዚ እዋን ናይ ኣቶኑ ፕሮጀክት ኣባል ዲኩም/ተረባሒት?	1. እወ ☐ 2. ኣይፋልን ☐	እወ እንተኾይኑ ናብ ሕቶ 3 ሕለፉ
2	ናይ ኣቶኑ ተረባሒ እንተዘይኮይነኩም ካብዚ ፕሮጀክት ዝተወገድከሙሉ ምክንያት እንታይ እዩ?	1. ብዛዕባ ኣቶኑ ሕጽረት ሓበሬታ ☐ 2. ረቒሓ ፕሮጀክት ዘይምምላእ ☐ 3. ናይ ኤጂጂ ፕሮጀክት ኣካል ኣይነበርኩም ☐ 4. እኹል ፍልፍል ኣታዊ ኣለኒ ☐ 5. ካልእ /ይጸራሕ_____	

3	እዚ ፕሮጀክት ኣቶኑ ንኽንደይ ዝሓክል ሓጊዝኩም?	ዓመት/አዋርሕ_____	
4	ካብፕሮጀክት ኣቶኑ እንታይ ዓይነት ግልጋሎት ረኺብኩም? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1. ናይ ገዛ ጀርዲን/ኣትክልቲ ☐ 2. ምቕልፃም ኣንስቲዮ ☐ 3. ስልጠና ቢሲሲ ☐ 4. ደረውህ ☐ 5. ካልእ /ይጸራሕ_____	
5	ናይ ገዛ ጀርዲን/ኣትክልቲ ተባፅሖ ኣለኹም?	1. እወ ☐ 2. ኣይፋልን ☐	የለን እንተኾይኑ ናብ ሕቶ 9 ሕለፍ
6	እወ እንተኾይኑ ናይ ገዛ ጀርዲን/ኣትክልቲ ንምምሕያሽ ካብ ኣቶኑ እንታይ ዓይነት ድጋፍ ረኺብኹም? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1.ዝተመሓየሸ ዘርኢ ☐ 2.ክህሎት ግብርና ☐ 3.ጸረ ባልዕ ኬሚካል ☐ 4.ካልእ /ይጸራሕ_____	
7	እንታይ ኣይነት ኣትኽልቲ /ተኽሊ፣ ፍረምረ/ተብቁሉ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1.ካብሎካብቺ ☐ 2.ካሮት ☐ 3.ሓምሊ/ስፒናች ☐ 4.ኮሚደረ ☐ 5.በርበረ/ጉዕ ☐ 6.ሽንኩርቲ ☐ 7.ቃሌ(gomen) ☐ 8.ዝኪኒ ☐ 9.habhab ☐ 10.ካልእ /ይጸራሕ_____	
8	ካብ ናይ ገዛ ጀርዲን/ኣትክልቲ ዝርከብ ፍርያት ከመይ ትጥቐምሉ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1. ንስድራ ምግቢ ☐ 2. ንመሸጣ/ፍልፍል ኣታዊ ☐ 3. ክልቲኡ ☐ 4. ካልእ /ይጸራሕ_____	
9	ብኣቶኑ ኣብዚ ቕሽት ዝተወሓበ ስልጠና መቕልጸሚ ኣንስትዮ ወሲድካን ትፈልጣ'ዶ?	1. እወ ☐ 2. ኣይፋልን ☐	የለን እንተኾይኑ ናብ ሕቶ 12 ሕለፍ
10	እወ እንተኾይኑ ኣብ ሰሙን ክንደይ ጊዜ /ዘቲኽን/ ሰልጢንካን?	1. ኣብ ሰሙን ሓደ ጊዜ እወ ☐ ኣይፋልን ☐ 2. ኣብ ሰሙን ክልተ ጊዜ እወ ☐ ኣይፋልን ☐ 3. ኣብ ሰሙን ልዕሊ2 ጊዜ እወ ☐ ኣይፋልን ☐ 4. ዳርጋ ብብመዓልቱ እወ ☐ ኣይፋልን ☐	
11	እወ እንተኾይኑ ዝተዘተየሉ ርዕሲ እንታይ ነይሩ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1. ማዓርነት ዖታ ዝምልከት ☐ 2. ንኣንስቲዮ ትምህርቲምሃብ ☐ 3. ኣብ መግቢ፣ ክንክን ቐልዓን ዕድጊት አወሃህባ ውሳኔ ተሳትፎ አንስቲዮ ☐ 4. ምውናን ንብረት ☐ 5. ናይ ኣንስትዮ ተግባራይት /ቐልዓ ምምጋብ፣ ምክንካን ወዘተ/ ሰብዓይ ንምሕጋዝ ምስታፍ ☐ 6. ኣንስትዮ ኣብ ልዕሊ ኣታውን ካልእ ፍልፍል ምቕፅፃር ምብፃሕ ☐ 7. ካልእ ይፀራሕ _____	
12	ካብዚ ስልጠና እንታይ ዓይነት ረብሓ ረኺብክን /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1.ኣብ ኣይዩሲኤፍ ናይ ሰብኣይ ተሳትፎ ምምሕያሽ ☐ 2.ኣታውን ፍልፍል ተባፅሖን ምቕጽጻር ምውሳኽ ☐ 3.ምውናን ንብረት ምውሳኽ ☐ 4.ብዛዕባ ሰናይ ዝማዕበለ ምግብ ኩነታት ምዕቡል ምግቢ ፍልጠት ምምሕያሽ ☐ 5.ኣብ ኩሉ ብርኺ ኣብ ኣወሓሕባ ውሳኔ ተሳትፎ ምውሳኽ ☐ 6.ካልእ ይፀራሕ _____	

13	እቲ እትረኽብአ ገንዘብ /ፍርሪያት ግብርና/ ከመይ ከምትጥቐማሉ ኣብዝሓ መን ውሳኔ ይሕብ?	1. መልሲ ወሃቢት/ ሰብይቲ ☐ 2. ሰብኣይ ☐ 3. መልሲ ወሃቢትን ሰብኣይ ብሓባር ☐ 4. ዝኾነ ውልቐሰብ/ወለዲ ☐ 5. ካልእ ይፀራሕ _____	
14	በዛዕባ ናይ ቐልዑን ዓርስኽን ምርጫ ምግቢ ኣብዝሓ መን ውሳኔ ይሕብ?	1. መልሲ ወሃቢት/ ሰብይቲ ☐ 2. ሰብኣይ ☐ 3. መልሲ ወሃቢትን ሰብኣይ ብሓባር ☐ 4. ዝኾነ ውልቐሰብ/ወለዲ ☐ 5.ካልእ ይፀራሕ _____	
15	ብዛዕባ ቐንዲ ዕድጊት መግቢት ስድራ ኣብዝሓ መን ውሳኔ ይሕብ?	1. መልሲ ወሃቢት/ ሰብይቲ ☐ 2. ሰብኣይ ☐ 3. መልሲ ወሃቢትን ሰብኣይ ብሓባር ☐ 4. ዝኾነ ውልቐሰብ/ወለዲ ☐ 5. ካልእ ይፀራሕ _____	
16	ብኣቶኒ ዝጥቐምሉ ኣብ ቐሸት ስልጠና ቢሲሲ ረኺብ ክንትፈጣ?	1. እወ ☐ 2.ኣይፋልን ☐	
17	እወ እንተኾይኑ ዝተዘተየሉ ርእሲ እንታይ ነይሩ?	1.ዝተላለየ ፍጆታ ምግቢን ረብሓ ጥዕና ☐ 2.ኣብ ሞንነ ውጽኢት ግብርናን ስነምግቢ ዘሎዎ ርክብ ☐ 3.ተሞክሮ ኣመጋግባ ዕሸላትን ቐልዑ ☐ 4.ኣብ ውፂኢት ስነምግቢ ጽልዋ ዋሽ ☐ 5.በዛዕባ ስነምግቢ ኣዴታት ☐ 6.ኣብ ስነምግቢ ማሕበራዊ-ባህላዊ ምኽንያታት ☐ 7.ካልእ ይፀራሕ _____	የለን እንተኾይኑ ናብ ሕቶ 21 ሕለፍ
18	ኣብ ሰሙን ክንደይ ጊዜ /ዘቲኽን/ ሰልጢንክን?	1. ኣብ ሰሙን ሓደ ጊዜ እወ ☐ ኣይፋልን ☐ 2. ኣብ ሰሙን ክልተ ጊዜ እወ ☐ ኣይፋልን ☐ 3. ኣብ ሰሙን ልዕሊ2 ጊዜ እወ ☐ ኣይፋልን ☐ 4. ዳርጋ ብብመዓልቱ እወ ☐ ኣይፋልን ☐	
19	ካብዚ ስልጠና እንታይ ዓይነት ረብሓ ረኺብክን?	1. ንዝተመሓየሸ ተሞክሮ ዝማዕበለ ምግቢ መስረት ዝኾን ፍልጠትን ክህለት ምምሕያሽ ☐ 2. ብዛዕባ ውሕስና ምግቢን ዝማልበለ ምግቢ ተራ/ግደ ግብርና ዝወሰኽ ፍለጠት ☐ 3. ኣብ ኽባቢ ዝርከቡ ምግቢታት ስነምግባዊ ኣጓዳሲነት ዝወሰኽ ፍልጠትን ግንዛበ ☐ 4. ድሕነት ምግቢን ጽሬት ሓዊሱ ተሞክሮታት ዋሽ ምምሕያሽ ☐ 5. ተሞክሮ ስነኣመጋግባ ወላዳት ኣዴታት፣ ዕሸላትን ንኣሽቲ ቐልዑ ☐ 6. ኩነት ወላዳት ዓዴታትን ዝማዕበለ ምግቢ ቐልዑ ምምሕያሽ ☐	
20	ብዛዕባ ስልጠና ቢሲሲ ብርኪ ዕግበትክን ከመይ እዩ?	1.ኣዝዩ ብጣዕሚ ዕቡቐ ☐ 2.ብጣዕሚ ዕቡቐ ☐ 3.ዕቡቐ ☐ 4.የዕግብ ☐ 5.ኣየዕግብን ☐	
21	ብዛዕባ ግልጋሎት ጀርዲን/ተኽሊ ቢሲሲ ብርኪ ዕግበትክን ከመይ እዩ?	1.ኣዝዩ ብጣዕሚ ዕቡቐ ☐ 2.ብጣዕሚ ዕቡቐ ☐ 3.ዕቡቐ ☐ 4.የዕግብ ☐ 5.ኣየዕግብን ☐	
22	ብዛዕባ ስልጠና ምቕልፃም ኣንስቲዮ ብርኪ ዕግበትክን ከመይ እዩ?	1.ኣዝዩ ብጣዕሚ ዕቡቐ ☐ 2.ብጣዕሚ ዕቡቐ ☐ 3.ዕቡቐ ☐ 4.የዕግብ ☐	

		5.ኣየዕግብን ☐	
23	ብሓፈሻ ኣብዚ ፕሮጀክት ዝነበሩ ጽቡቕት ነገራት (ኤቲኣኤንዩ) ን ክቕፅል ዝግብኡ እንታይ እዩ?		
24	ካብዚ ፕሮጀክት እንታይ ክቕየር ይግባእ?		

ክፍሊ - 6 ተባፅሖ መስሮን ግብርና ዝዛመዱ ሕቶታት

ቑፅሪ	ሕቶታት	መማረፂ መልሲ	ሕለፍ
1	ኣብ መርሃ ግብሪ መስኖ ናይምስታፍ ተበፃሕነት ኣለኹም?	1. እወ ☐ 2. ኣይፋልን ☐	እወ እንተኾይኑ ናብ ሕቶ 3 ሕለፉ
2	እወ እንተኾይኑ እንታይ ዓይነት ኣታኽልቲ ትተኽሉ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1ኣትኽልቲ /ካሮት፣ኾሚደረ፣ ሓምሊ፣ ኽንኩርቲ ☐ 2ፈረምረ /ኣራንሺ፣ ማንነ፣ ኣፕል፣ ኣቮካዶ፣ ፓፓያ ☐ 3.ሱሩን /ድንቺ፣ሽኮር ድንች ☐ 4.ካልእ /ይጸራሕ_____	
3	ናይ ግብርና ግራት ተበጻሕነት ኣለኽን?	1. እወ ☐ 2. ኣይፋልን ☐	የለን እንተኾይኑ ናብ ሕቶ 6 ሕለፍ
4	ናይ ግብርና ግራት ክንደይ ዝኣክል ሄክታር ኣለኽን?	ሄክታር _____	
5	ናይዚ ግብርና ግራት ወናኒ መን እዩ?	1.ናይ ባዕልኽን ☐ 2.ሰድራ ☐ 3.ኪራይ ☐ 4.ካልእ /ይጸራሕ_____	
6	እዚ ስድራ ካብ ዝሰዕቡ ኽፍቲ ክንደይ ዝኣክል ኣለዎ?	1. ናይ ጸባ ላሕሚ_____ 2. ብዕራይ _____ 3. ፈረስ፣ ዓድጊ፣ በቕሊ _____ 4. ግመል _____ 5. ካልእ /ይጸራሕ_____	
7	እዚ ስድራ ካብ ዝሰዕቡ ኽፍቲ ክንደይ ዝኣክል ኣለዎ?	1. በጊዕ _____ 2. ጤል _____ 3. ዶርሁ _____ 4. ንሕቢ _____ 5. ካልእ /ይጸራሕ_____	

ክፍሊ - 7 ተባፅሖ ዕዳጋ

ቑፅሪ	ሕቶታት	መማረፂ መልሲ	ሕለፍ
1	ኣቲ ቐረባ ዕዳጋ ካብ ገዛኹም ክንደይ ዝኣክል ይወስድ?	ሰዓታት _____	
	1.1 እዚ ስድራ ናብ ዕዳጋ ንምኻድ እንታይ ዓይነት ትራንስፖርት ይጥቐም?	1.ብእግሪ ☐ 2.ብኽብቲ ምጉዕዓዝ /ፈረስ፣ በቕሊ፣ ኣድጊ ወይ ግመል/ ☐ 3.ዓረቢያ ☐ 4.ባጃጅ ☐ 5.ኣውቶቡስ ☐ 6.ካልእ /ይጸራሕ_____	
2	ዕዳጋ ናይ ምኻድ ሀላፊነት ዘለዎ መን እዩ?	1.ኣደ ☐ 2.ሰብኣይ ☐ 3.ዓብይ ሰብ ☐ 4.ካልእ ☐	
3	ኣብቲ ዕዳጋ እንታይ ዓይነት ዝተፈላለዩ ምግቢ/ጉጅለ ይርከቡ?	1. እኽሊ፣ ፃዕዳ ሱር ☐ 2. ጥረምረ /ባሎንጋ፣ ዓተርን ትምትሞ ☐ 3. ኒሁግንኣኾሎኒ& ዘርኢ /ሰሊጥን ሱፍ ☐ 4. ውጽኢት እንስሳ ☐ 5. ስጋ፣ ደርሆን ዓሳ ☐ 6. እንቋቑሑ ☐ 7. ጸሊም ሓምላይ ቆጽሊ ኣትኽልቲ ☐ 8. ካልእ ኢታ ኤ ምዕቡል ፍረምረን ኣትኽልቲ ☐	

		9. ካልእ አትኽልቲ ☐ 10. ካልእ ፍረምረ ☐	
4	ስድራኹም እዞም ዓይነት ምግቢ ወይ ጉጅለ ካበይ ረኪብ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1. ናይ ውልቐ ፍርያት ☐ 2. ካብ ቐሸት ዕዳጋ/መደብር ዝተገዝእ ☐ 3. ካልእ ፍልፈል ☐	
5	ካብ ግብርና ወፃኢ ኣታዊ ኣለክን?	1. እወ ☐ 2.ኣይፋልን ☐	
6	እቲ ፍልፍል እንታይ እዩ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1. ናይ ኢድ ስራሕቲ ☐ 2. ምእላም ☐ 3. ኣብ እኽልን ኽፍቲ ንግዲ ☐ 4. ኽባቢያዊ ምግቢን መስተን ምሸጥ ☐ 5. ካልእ /ይጸራሕ_____	
7	ምግቢ ካብቲ ዕዳጋ ትቐይራ'ዶ?	1. እወ ☐ 2. ኣይፋልን ☐	የለን እንተኾይኑ ናብ ሕቶ 8 ሕለፍ
8	ካብቲ ዕዳጋ እንታይ ዓይነት ቐንዲ ዝተለየ ምግቢ ወይ ጉጅለ ትቐይራ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1.እኽሊ፣ ፃዕዳ ሱር ☐ 2.ጥረምረ /ባሎንጋ፣ ዓተርን ትምትሞ ☐ 3. ኒሁግን ኦቾሎኒ ዘርኢ /ሰሊጥን ሱፍ ☐ 4.ውጽኢት እንስሳ ☐ 5.ስጋ፣ ደርሆን ዓሳ ☐ 6.እንቐቐሉ ☐ 7.ጸሊም ሓምላይ ቆጽሊ አትኽልቲ ☐ 8.ካልእ ኢታ ኤ ምዕቡል ፍረምረን አትኽልቲ ☐ 9.ካልእ አትኽልቲ ☐ 10.ካልእ ፍረምረ ☐	

ክፍሊ - 8 ምስ መረፃ ምግቢ ኣንስተዮ ዝዛመድ ሕቶ

ቐፅሪ	ሕቶታት	መማረፂ መልሲ	ሕለፍ
1	ኣብ ዝስዕብ ዝተዘርዘሩ ምግቢ ጉጅለታት ንምምራፅ ሓፈሻዊ መረፃ ምግብኺ ምኽንያት እንታይ እዩ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1. ጣዕሙ/መቐረት ምግቢ ☐ 2. ንምድላው ዝቐልል ☐ 3. ዝርከብ ምግቢ ☐ 4. ብንእሽቶ ዝግዛእ ☐ 5. ጥዑይ ☐ 6. ድሕነት ምግቢ ☐ 7. ጉጅለ ዘርኢ እዩ ☐ 8. ብሃይማኖትን ባህሊ ተቐባልነት ዘለዎ ☐ 9. ንምትካል ዝተፈለየ ስነምሕዳር ☐	
1.1	እኽሊ፣ ፃዕዳ ሱር ኣትኽልቲ ዘ16	ካብ 1-9 ዝተመረፀ?/_____ _____ /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	
1.2	ጥረምረ /ባሎንጋ፣ ኣተርን ትምትሞ/	ካብ 1-9 ዝተመረፀ?/_____ _____ /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	
1.3	ኒሁግን(ኦቾሎኒ) ዘርኢ /ሰሊጥን ሱፍ ኣበባ	ካብ 1-9 ዝተመረፀ?/_____ _____ /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	
1.4	ውፅኢት እንስሳ /ፀባ፣ ኣጅቦን ርግኡ/	ካብ 1-9 ዝተመረፀ?/_____ _____ /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	
1.5	ስጋ፣ ደርሆን፣ ዓሳ	ካብ 1-9 ዝተመረፀ?/_____ _____ /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	
1.6	እንቐቐሉ	ካብ 1-9 ዝተመረፀ?/_____ _____	

		/ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	
1.7	ጸሊም ሓምላይ ቆጽሊ /ፕሮኮሊን፣ ፓሌ፣ ሓምሊ	ካብ 1-9 ዝተመረፀ?/_____ _____ /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	
1.8	ካልኣ ቫይታሚን ኤ ዝማዕበሉ ፍረምረን ኣትኽልቲ/ማንጎ፣ ፓፓያ፣ ዱባ፣ ካሮት፣ ሀብሀብ ምቁር ድንች	ካብ 1-9 ዝተመረፀ?/_____ _____ /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	
1.9	ካልእ ኣትኽልቲ /ሽንኩርትን ኮሚደረ/	ካብ 1-9 ዝተመረፀ?/_____ _____ /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	
1.10	ካልእ ፍረምረ /ኣራንሺ፣ ባናና፣ ኣቮካዶን ኣፕል/	ካብ 1-9 ዝተመረፀ?/_____ _____ /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	
2	ካብ ሞንጎ ዝስዕቡ ክትተኽልዎ ትኽእሉ ኣየናይ ጉጅለ ምግቢ እዩ?	1.እኽሊ፣ ፃዕዳ ሱር 2.ጥረምረ /ባሎንጋ፣ ዓተርን ትምትሞ 3.ኒሁግን(ኦቾሎኒ)ዘርኢ /ሰሊጥን ሱፍ ኣበባ 4.ውጽኢት እንስሳ 5.ስጋ፣ ደርሆን ዓሳ 6.እንቋቑሑ 7.ጸሊም ሓምላይ ቆጽሊ ኣትኽልቲ 8.ካልእ ኢታ ኤ ምዕቡል ፍረምረን ኣትኽልቲ 9.ካልእ ኣትኽልቲ 10.ካልእ ፍረምረ	
3	ዝተወሰኑ ጉጅለ ምግቢ ምትካል እንተዘይከኢልኩም ቕንዲ ምኽንያትኩም እንታይ እዩ? ብኽብረትኩም ምኽንያት ምረጹ /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/?	1. ምኽንያት ስነምግባር 2. ትሑት ፍርያት 3. ሕፅረት ፍልጠት 4. ዝተሓተ እምነትን እሴት ባሕሊ 5. ካልእ_____	
4	ዝኾነ ናይ በረኻ ምግቢ ተመጊብኩም?	1. እወ 2. ኣይፋልን	የለን እንተኾይኑ ናብ ሕቶ 6 ሕለፍ
5	እወ እንተኾይኑ እንታይ ዓይነት?		
6	ብዝተወሰነ ጉጅለ ዕድመን ፆታ /ቆልዑ፣ ተባዕቲዮ ወይ ኣንስትዮ/ ዝተበልዐ ዝኾነ ዝተፈለየ ጉጅለ ምግቢ ኣሎ'ዶ? ንምንታይ?	ብኽብረትኩም ካብ ክልተ ስታንዳርድ መምርሒ ት.ጥ.ዓ ን ት.መ.ገ ናይ ቕልዑን ኣንስትዮ ብቕደም ሰዓብ ንኽመርጹ ኣፃፅኣዮም _____ ቕልዑ _____ኣንስቲዮ _____ተባዕቲዮ	
7	ዝደጋገም ኣንስትዮ ዝወስድኦ ዝተለመደ ምግቢ እንታይ እዩ?	1. ብመዓልቲ ትሕቲ 3 ጊዜ 2. ብመዓልቲ 4 ጊዜ 3. ብመዓልቲ ልዕሊ 5 ጊዜ	

ክፍሊ - 9 ትምህርቲ ዝማዕበለ ምግቢ ዝዛመድ ሕቶ

ቑፅሪ	ሕቶታት	መማረፂ መልሲ	ሕለፍ
1	ንማዕከን ዜና ተባፅሖ ኣለኽን? 1.ቲቪ? እወ ኣይፋልን 2.ሬዲዮ?እወ ኣይፋልን 3.ጋዜጣ?እወ ኣይፋልን	1. እወ 2. ኣይፋልን	የለን እንተኾይኑ ናብ ሕቶ 5 ሕለፍ
2	እወ እንተኾይኑ ምስ ዝኾነ ኣዴታትን ኣይዋይሲኤፍ ተሞከሮ ዝዛመድ ፕሮግራም ሰሚዕኽን?	1. እወ 2. ኣይፋልን	
3	እወ እንተኾይኑ እንተነአሰ ኣብ ሰሙን ሓደ ጊዜ ኣብ ሰሙን ልዕሊ ክልተ ጊዜ ዳርጋ በቢመዓልቲ ክንደይ ጊዜ ሰሚዕኽን?	1.ኣብ ሰሙን ሓደ ጊዜእወ ኣይፋልን 2.ኣብ ሰሙን ዕልሊ ሓደ ጊዜ እወ ኣይፋልን 3.ዳርጋ በቢመዓልቲእወ ኣይፋልን	

4	እወ እንተኾይኑ ካብ ዝስዕቡ ተሞክሮታት ኣመጋግባ ቐልዓ አየናይ ሰሚዕኽን? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1.ሓፊስ ብስነ ምግቢ ዝማዕበለ ግዓት ምምጋብ ☐ 2.ኣብ ናይ ቐልዑ ምግቢ እንቋቐኡ፣ ቋንጣ ምውሳኽ☐ 3.ቐልዑ ኣብ መዓልቲ 3 ወይ 4 ጊዜ ምምጋብ ☐ 4.ፍረምረን ኣትኽልቲ በቢመዓልቲ ምምጋብ ☐ 5.ኣብ እዋን ጾም ሓዊሱተ ዋፅኡ እንስሳ ብቢመዓልቱ ምምጋብ ☐ 6.ኣብ እዋን ተኾማጥ ብተደጋጋሚ ምምጋብ☐ 7.ንቐልዑ ብስነ ምግቢ ዝማዕበለ ምምጋብ ☐	
5	እወ እንተኾይኑ ኣበይ ፈሊጥኽን? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1. ማዕከን ጥዕና ☐ 2. ማዕከን ዜና /ቲቪ፣ ሬዲዮ፣ መጋዘን☐ 3. ካብ ፕሮጀክት ኣቶኑ ☐ 4. ካብ ሰራሕተኛ ኤክስቴንሽን ጥዕና ☐ 5. ካልእ _____-	
6	እዚ /ሽም ቆልዓ/ ጸባ ጡብ ተመጊቡ ይፈልጥ?	1. እወ ☐ 2.ኣይፋልን ☐	
7	ድሕሪ ወሊድ /ሽም ቆልዓ/ ጸባ ጡብ ጥራሕ ንኽንደይ ዝኣክል ተመጊቡ?	1.ንኣርባዕተ ኣዋር ☐2.ንሓሙሽተ ኣዋርሕ☐ 3.ንሸስድስተ ኣዋርሕ☐4.ኣይፈልጥን ☐	
8	ሓደ ቐልዓ ምስ ፀባ ጡብ ምግቢ ማይ ሓዊሱ ተወሳኺ ምግቢ መጀመሪያ ክረኽብ ዝግበኦ መዓስ ይመስለክን?	1. እወ /....፣..../ ኣዋርሕ 2. ኣይፈልጥ	
9	ሓደ ቐልዓ ዝተረፉ ስድራ ዝምገብዎ ተመሳሳሊ ዓይነት ምግቢ ምምጋብ ዝጅምረሉ ኣበየናይ ክሊ ዕድመ እዩ?	1.ቅድሚ 9 ወርሒ ☐ 2.ካብ 9-11 ኣዋርሕ ☐ 3.ኣብ 12 ኣዋርሕ☐ 4.13-23 ኣዋርሕ ☐ 5.ድሕሪ 23 ኣዋርሕ ☐	
10	ቕድመ ሕዚ ቐልዑን ኣንስትዮ ዝተላለዩ ዓይነት ምግቢ ናይ ምውሳኽ ረብሓ ጥዕና ሰሚዕኽን ትፈልጣ?	1. እወ ☐ 2. ኣይፋልን ☐	የለን እንተኾይኑ ናብ ሕቶ 11 ሕለፍ
11	እወ እንተኾይኑ ኣበይ ሰሚዕኽን?	1. ማዕከን ጥዕና ☐ 2. ማዕከን ዜና /ቲቪ፣ ሬዲዮ፣ መጋዘ ☐ 3. ካብ ፕሮጀክት ኣቶኑ ☐ 4. ካብ ሰራሕተኛ ኤክስቴንሽን ጥዕና ☐ 5. ካልእ _____	
12	ብቫይታሚን ኤ ዝማዕበለ ፍረምረን ኣትኽልቲ አየናይ እዩ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1.ቢጫ ሕብሪ ፈረምረን ኣትኽልቲ ☐ 2.ሓምላይ ቆጽሊ ☐ 3.እንቋቐሑ ☐ 4.ጉበት ☐ 5.ናይ ጡብ ጸባ ☐ 6.ጸባ ላሕሚ ☐ 7.ኣይፈልጥን ☐ 8. ካልእ_____	
13	አየናይ እዩ? ብኽብረትኹም ብብረት ዝማዕበለ ምግቢ ምረጹ?	1.ስጋ ☐ 2.ጉበት ☐ 3.እንቋቐሑ ☐ 4.ጥረምረ ☐ 5.ኣይፈልጥን ☐ 6.ካልእ _____	
14	ውፅሒት እንስሳ ፍረምረን ኣትኽልቲ ብምውሳድ እቲ /ሽም ቐልዓ/ ተቐማጥ መዓስ ነይሩዎ?	1.ኣዝዩ ዝነኣሰ ☐2.ውሱን ዝነኣሰ☐ 3.ዳርጋ ተመሳሳሊ ☐4.ዝያዳ ☐ 5.መግቢ ደው ምባል☐6.ኣይፈልጥን ☐	
15	ኣብ እዋን ፆም ዕሸልኹም /ስጋ፣ ኣሳን ጸባ/ ፍርያት እንስሳ ምምጋብ ከምዝኽእል ትኣምና?	1. እወ ☐ 2. ኣይፋልን ☐	
16	ኣብ ዝሓለፉ 3 ኣዋርሕ ኣብ ዝኾነ ፕሮግራም ትምህርቲ ስነምግቢ ወይድማ ትሕቲ 2 ዓመት	1. እወ ☐	

	ቐልዑ ከመይ ከምዝምገቡ ምግቢ ሰሪሕካ ኣብ ምርኣይ ተሳቲፍክን ነይርክን?	2. ኣይፋልን ☐	
17	እወ እንተኾይኑ እዚ መእስ ተሳትፊፍኩም? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1. ማዕከል ጥዕና ☐ 2. ካብ ፕሮጀክት ኣቶኑ ☐ 3. ካብ ሰራሕተኛ ኤክስቴንሽን ጥዕና ☐ 4. ካልእ _____	
18	ብዛዕባ ኣመጋግባ ደቅኽን ሕቶ እንትህልወኽን ንመኽሪ ንመን ትሓታ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1. እነ ሓጎ ☐ 2. ሀላፊ ቐሽት ☐ 3. ካብ ፕሮጀክት ኣቶኑ ☐ 4. ካብ ሰራሕተኛ ኤክስቴንሽን ጥዕና ☐ 5. ካብ ዝኾነ ሰብ ምኽሪ ኣይሓትትን ☐ 6. ካልእ _____	
19	ጡብ ኣብ እተጥቡባሉ እዋን ዝኾነ ተወሳኺ ምግቢ ተመጊብኽን?	1. እወ ☐ 2. ኣይፋልን ☐	ናብ ሕቶ 21
20	እወ እንተኾይኑ እንታይ ዓይነት		
21	ዘጥቡባ ኣዴታት ሕልፊ ዝተለመደ ንምታይ ይምገባ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1. ዝበለፀ ዝማዕበለ ፀባ ንምርካብ ☐ 2. ንዕቤት ጥዕና ቐልዓ ☐ 3. ኣደ ካብ ሕጽረት ስነምግቢ ንምኽልካል ☐ 4. ኣብ እዋን ምምጋብ ጡብ ዝጠፍእ ሓይሊ ንምምዛንን ሓይሊ መሊኻ ንምርካብ ☐ 5. ካልእ _____	
22	ብዛዕባ ኣብ እዋን ምጡባብ ዝተፈላለየ ዓይነት ዝማዕበለ ምግብን ጽፈት ሕቶ እንትህልወኽን ንመኽሪ ንመን ትሓታ? /ልዕሊ ሓደ መልሲ ክህልው ይኽእል/	1. ካብ ዝኾነ ሰብ ምኽሪ ኣይሓትትን ☐ 2. እነ ሓጎ ☐ 3. ሀላፊ ቐሽት ☐ 4. ካብ ፕሮጀክት ኣቶኑ ☐ 5. ካብ ሰራሕተኛ ኤክስቴንሽን ጥዕና ☐ 6. ካልእ _____	

ክፍሊ - 10 ምስ መፍረይቲ ዕድመ <u>ኣንስትዮ</u> ዲዲኤስ ዝዛመድ ሕቶ

ትማሊ ቐትሪ ወይ ለይቲ ዝሰዕቡ ኤፍጂ ተመጊብክን ወይ ሰቲኽን ነይርክን

	መደብ ምግቢ	**ኣብ ታሕቲ ዘሎ ኣብ ኽባቢ ፅንዓት ብዋናነት ዝውሰዱ ዓይነት ምግቢ**	☐እወ (1) ☐ኣይፋልን(2)
ሀ	ካብ እኽሊ ዝተዳለወ ዝኾነ ምግቢ	እንጀራ፣ ግዓት፣ ባኒ፣ ጥጥቐ፣ ቆሎ፣ ሩዝ፣ ፓስታ ወይ ካልእ ካብ ስርናይ፣ መሸላ፣ ጣፍ ዝተዳለወ መግቢ	☐እወ ☐ኣይፋልን
ለ	ኣብ ውሽጡ ቢጫ ሕብሪ ዘለዎ ዝኾነ ኣትኽልቲ ወይ ሱር	ካሮት፣ ቢጫ ምቐር ድንች፣	☐እወ ☐ኣይፋልን
ሐ	ዝኾነ ፃዕዳ ሱር	ፃዕዳ ድንች፣ ፃዕዳ ያም፣ ካዛባ፣ ዩካ፣ ኮኪያል ወይድማ ካብ ፃዕዳ ኣካል ሱር ዘለዎም ዝተዳለው ምግብታት	☐እወ ☐ኣይፋልን
መ	ዝኾነ ጸሊም ሓምላይ ቆጽሊ ኣትኽልቲ	ዝኾነ ማልከላይ ፀሊም፣ ሓምላይ፣ ቕጽላዊ ኣትኽልቲ ናይ በረኻ የሕመልቲ፣ ቕጽሊ ብሮኮሊን፣ ቆስጣ ሓዊሱ፣	☐እወ ☐ኣይፋልን
ሠ	ኣብ ውሽጡ ጸሊም ቢጫ ወይ ቢጫ ዝኾነ ፍረምረ	ጥረ ማንጎን፣ ፓፓያ፣120	☐እወ ☐ኣይፋልን
ረ	ካልእ ዝኮነ ፍረምረ	ኣራንሺ፣ ባናና፣ ኣቮካዶ፣ ሎሚ፣120 መንደሪኒን፣	☐እወ ☐ኣይፋልን
ሰ	ካልእ ዝኾነ ኣትኽልቲ	ሽንኩርትን፣ ኮሚደረ፣	☐እወ ☐ኣይፋልን
ሸ	ካብ ኣካላት እንስሳ ዝተረኽበ ዝኾነ ስጋ	ጉበት፣ ኩላሊት፣ ልቢ ወይድማ ኣካል ስጋን ደም መስረት ዝገበረ ምግቢ	☐እወ ☐ኣይፋልን
ቀ	ዝኾነ ካልእ ዓይነት ስጋ ወይ ደርሆ	ናይ ምራኽ ስጋ፣ ናይ ሀሳማ ሳጋ፣ ጤል፣ ማቲሌ፣ ናይ በረኻ ስጋ፣፣ ዶርሆ ዳክዬ ወይ ካልእ ርግቢት፣	☐እወ ☐ኣይፋልን
በ	ዝኾነ እንቋቐሆ	ናይ ዶርሆ እንቓቐሆ ወይ ካልእ ዝኮኸ ዓይነት ቆቅ ወይ ዝግራ	☐እወ ☐ኣይፋልን
ተ	ትኩስ ወይ ዝደረቐ ዝኾነ ኣሳ ወይ ናይ ባሕሪ ምግቢ	ዝደረቐ ወይ ትኩስ ኣሳ፣ ሼል ኣሳን ናይ ባህሪ ምግቢ	☐እወ ☐ኣይፋልን
ቸ	ዝኾነ ባሎንጋ ወይ ኣተር	ዝበሰለ ባሎንጋ፣ ኣተር፣ ዓይን ኣተር /ተኩስ ወይ ዝደረቐ/ ጥረምረ ፍሪያት ትምቱሞ ወይ ባሎንጋ/ኣተር፣ ጥሉል፣ ቆሎ፣ ጥቐጥቐ፣ ስልጆ፣ቶፋ ሓዊሱ፣	☐እወ ☐ኣይፋልን
ነ	ዝኾነ ኒሁግ (ኦቾሎኒ) ወይ ዘርኢ	ዝኾነ ኦቾሎኒ/ለውዝ፣ ሰሊጥ፣ ሱፍ ኣበባ ዘርኢ ፍላክስ ወይ ዝተወሰነ ኒሁግ /ሰሊጥ ጠስሚ ወይ ቴስተር	☐እወ ☐ኣይፋልን
ኘ	ዝኾነ ጸባ ወይ ፍርያት ጸባ	ፀባ፣ ኣጀቦ፣ እርግሆ ወይ ካልእ ፍርያት ፀባ ግን ጠስሚ፣ ኣይስከሬም፣ ክሬም ወይ መፂጽ ክሬም ዘይሓውስ፡፡	☐እወ ☐ኣይፋልን

ክፍሊ - ii ኣብ ሞንጎ 6-36 ኣዋርሕ ዕድመ ዘለው ቐልዓ ዲዲኤስ ዝዛመድ ሕቶ

ሽም ቐልዓ፡ _____ ዖታ፡ ___ዕድመ፡ _____

ንሰን ኣብ ሞንጎ 6-36 ኣዋርሕ ዕድመ ዘለው ቐልዓ ኣደ/ተኽናኻኒት ዲኽን? ነ. እወ ☐ 2.ኣይፋልን ☐

ሽም ኣደ/ተኽናኻኒት፡_____-_____ዖታ፡ ____ዕድመ፡ _____

ትማሊ ቐትሪ ወይ ለይቲ ዝስዕቡ ኤፍጂ ተመጊብክን ወይ ሰቲኽን ነይርክን

ተ.ቐ	ሕቶታትን መፃረይ	መደባት ኮዲንግ
	ክቡር ሓበሬታ ኣካቢ ብኽብረትኻ እታ መለሲ ወሃቢት ዝጠቐሰቶ ገን ኣብ ታሕቲ ዘለዎ ዝርዝር የዘለ ካልእ መገቢ ኣብቲ ሳንዱቕ ፀሓፍ	☐እወ (ነ) ☐ኣይፋልን(2)
ሀ	ካብ እኽሊ ዝተሰርሐ እንጀራ፣ ግዓት፣ ባኒ፣ ጥጥቐ፣ ቆሎ፣ ሩዝ፣ ፓስታ ወይ ኣብ እኽሊ መሰረት ዝገበረ ከም ስርናይ፣ መሸላ፣ ጣፍ ዝተዳለወ ሓፊስ ግዓት ስገም፣ እፉን፣ ትምትሞ	☐እወ ☐ኣይፋልን
ለ	ውሽጡ ቢጫ ወይ ኣራንጪ ዝኩኒ፣ ዱባ፣ ካሮት፣ ቢጫ ምቐር ድንች፣	☐እወ ☐ኣይፋልን
ሐ	ፃዕዳ ድንች፣ ፃዕዳ ጎደሬ፣ ቡላ፣ ቆጮ፣ ካዛባ፣ ኮኪያል ወይድማ ካብ ፃዕዳ ኣካል ሱር ዘለዎም ዝተዳለው ምግብታት	☐እወ ☐ኣይፋልን
መ	ዝኾነ ማልከላይ ፀሊም፣ ሓምላይ፣ ቐጽላዊ ኣትኽልቲ ናይ በረኻ የሕመልቲ፣ ቐጽሊ ብሮኮሊን፣ ቆስጣ ሓዊሱ፣	☐እወ ☐ኣይፋልን
ሠ	ስበሰለ ማንጎ ዝበሰለ ፓፓያ ወይ /ካልእ ብቫይታሚን ኤ ዝማዕበለ ፍረምረ/ ፅሚቐ፣ ብዝተዓሸገ መልከእ	☐እወ ☐ኣይፋልን
ረ	ካልእ ዝኾነ ፍረምረ ወይ ኣታኽልቲ ኣራንሺ፣ ባናና፣ ኣቮካዶ፣ ሎሚ፣ መንደሪኒን፣ ኣፕል፣ ለሚን፣ ሽንኩርቲ፣ ኮሚደረ በመልዕከ ብዝተዓሸገ መልክእ	☐እወ ☐ኣይፋልን
ሰ	ጉበት፣ ኩላሊት፣ ልቢ ወይድማ ኣካል ስጋን ደም መሰረት ዝገበረ ምግቢ	☐እወ ☐ኣይፋልን
ሸ	ናይ ምራኽ ስጋ፣ ናይ ሀሳማ ሳጋ፣ ጤል፣ ማቲሌ፣ ናይ በረኻ ስጋ፣፣ ዶርሆ ዳክዬ ወይ ካልእ ርግቢት፣	☐እወ ☐ኣይፋልን
ቀ	ናይ ዶርሆ እንቓቕሆ ወይ ካልእ ዝኮኸ ዓይነት ቆቅ ወይ ዝግራ	☐እወ ☐ኣይፋልን
በ	ዝደረቐ ወይ ትኩስ ኣሳ፣ ሼል ኣሳን ናይ ባህሪ ምግቢ	☐እወ ☐ኣይፋልን
ተ	ካብ ባሎንጋ፣ ኣተር፣ ዓይን ኣተር /ተኩስ ወይ ዝደረቐ/ ጥረምረ ፍሪያት፣	☐እወ ☐ኣይፋልን
ቸ	ፀባ፣ ኣጀቦ፣ እርግሆ ወይ ካልእ ፍርያት ፀባ ግን ጠስሚ፣ ኣይስክሬም፣ ክሬም ወይ መፂጽ ክሬም ዘይሓውስ፡፡	☐እወ ☐ኣይፋልን
ነ	ዝኾነ ዘይቲ፣ ስብዒ ወይ ጠስሚ ወይ ካብዚኣም ብዝኾነ ዝተሰርዓ ምግቢ	☐እወ ☐ኣይፋልን
ኘ	ካልእ ኾነ ናይ ሸኮር ምግቢ ከም ቼኮሌት፣ ምቐር፣ ከረሜላ፣ ፓስተ፣ ኬክ ወይ ብሸኩቲ	☐እወ ☐ኣይፋልን
የ	ንጣዕሚ፣ መቐረት ከም ቺሊ፣ ቅመማቅመም፣ ኣትኽልቲ ወይናይ ዓሳ ፓውደር	☐እወ ☐ኣይፋልን
ደ	እንቐረዎብ፣ ቀንድ ኣውጣ ወይ ካልእ በራሪ	☐እወ ☐ኣይፋልን
ጀ	ብቐይሕ ናይ ስዬ ዘይቲ፣ ቐይሕ ናይ ስዬ ለውዝ ዝተሰርሐ ምግቢ ወይ ብናይ ስዬ ለውዚ ዝተሰርሐ	☐እወ

	ስጎ	☐ኣይፋልን
ጠ	ካልእ ዝኾነ ጥንኩር ወይ ሓውሲ ጥንኩር ምግቢ	☐እወ ☐ኣይፋልን

ክፍሊ - 12 ኣጠቓቕማ ቼክ ሊስት ዝዛመድ ሕቶ

ተ.ቑ	ሕቶታት	መማረፂ መልሲ	ሕሰፍ
ነ	እቲ ጉጅለ ምግቢ ቼክ ሊስት ፖስተር ብተደጋጋሚ ትርእይዎ?	1. እወ ☐ 2. ኣይፋልን ☐	
2	እወ እንተኾይኑ እቲ ቼክ ሊስት ፖስተር ኣብ ሰሙን ክንደይ ጊዜ ትርእይዎ?	1. ኣብ ሰሙን ሓደ ጊዜ ☐ 2. ኣብ ሰሙን ክልተ ጊዜ ☐ 3. ኣብ ሰሙን ልዕሊ ሰለስተ ጊዜ ☐ 4. ዳርጋ በቢመዓልቱ ☐ 5. ካልእ ይጸሪሕ_____-	
3	እቲ ቼክ ሊስት ከመይ ትጥቐመሊ?	1. ከም መጣቐሲ ምጥቃም ☐ 2. ከም መንቐዒ መሳርሒ ☐ 3. ጽቡቕ ኣመጋግባ ዝማዕበለ ከም መጣቐሲ ምጥቃም ☐ 4. ካልእ _____-	
4	ኣብ እለታዊ ኣወሳሰዳ መግቢ እቶ ኤፍጂ ቼክ ሊስት ፖስተር ተራ/ ግደ እንታይ ነይሩ	1.ዝያዳ ኤፍጂ ንምውሳድ የማዕብል ☐ 2.ኣብ ከባቢ ብቀሊሉ ዝርከብ ምግቢ ንምጥቃም ዘነቅሕን ዝጠቅምን ☐ 3.ብቐሊ መንገዲ ስነባህሪ ኣወሳሰዳ ምግቢ ይቐይር ☐ 4.ዝተፈላለዩ ኤፍጂ የፋልጥ ☐ 5.ፈጸሙ ኣይጠቐምን ☐ 6.ካልእ_____	
5	እቲ ቼክ ሊስት ፖስተር ብኣግባቡ ንምጥቃም ዘጸገመኩም እንታይ ነይሩ?	1. ኣየድልን /ፖስተር ረስዓዮ/ ☐ 2. ሕጽፈት ጊዜ ☐ 3. ባሕላዊ እምነትን እሴት ☐ 4. ጸገም ኢኮኖሚ ☐ 5. ሕፅረት ፍልጠት ☐	
6	ብዛእባ እዚ ኣጠቃቕማ ምግቢ ቼክ ሊስት መጠን ዕግበትኩም እንታይ እዩ?	1. ኣዝዮ ብጣዕሚ ጽቡቕ ☐ 2. ብጣዕሚ ጽቡቕ ☐ 3. ጽቡቕ ☐ 4. የዕግብ ☐ 5. ኣየዕግብ ☐	
7	ብሓፈሻ ካብዚ ቼክ ሊስት ፅቡቕ ነበር እንታይ ነይሩ ክቕጽል ዘለዎ ኸ		
8	ካብቲ ፖስተር ምግቢ ቼክ ሊስት ኽቕየር ዝግብኦ እንታይ እዩ?		

ኣብዚ መጽናእቲ ብምስታፍኩምን ንምትሕብባርኩም ኣዝዩ የመስግን!!

ከምኡ ድማ ብጊዜኩም፣ ፃዕርኩምን ስልጠኩም ኣዝዩ ተሓቢነ::

Annex 5: Nutrition Based Behavioral Change Communication (BCC) Guideline

1. To meet daily nutrient requirement, women's of reproductive age (lactating mothers), should consume ≥5 FGs daily out of 10 defined FGs.
2. For children ages above 6-36month out of 7 defined FGs they should consume ≥ 4FGs daily.
3. Different foods and food groups are good sources for various macro- and micronutrients, so eating a diverse diet best ensures nutrient adequacy and to be healthy.

Table 1. Ten (10) Food Groups in the MDD-WOMEN

№	10 FOOD GROUPS IN THE MDD-WOMEN
1	Foods made from grains, white roots and tubers and plantains(millet ,sorghum ,maize and teff and White potatoes, white yams, manioc/cassava/yucca, cocoyam, taro)
2	Pulses(beans ,peas and lentils)
3	Nuts and Seed (groundnut/peanut, Sesame, Sunflower, Flaxseed, or certain nut/seed "butters" or pastes)
4	Dairy (Milk, cheese, yoghurt or other milk products)
5	Meat, Poultry ,Fish
6	Eggs
7	Dark green leafy vegetable(Broccoli, Kale , Lettuce, spinach)
8	Other vitamin A rich fruit(Ripe mango, ripe papaya) and vegetable(Pumpkin, carrots, yellow sweet potatoes)
9	Other vegetables (Onion ,tomato, cabbage, okra)
10	Other fruits (Orange, banana, Avocado , Pineapple ,Guava, lemon ,mandarin etc)

Table 2. Seven (7) Food Groups in the IYCF MDDs

№	7 FOOD GROUPS IN THE IYCF MDD
1	Grains ,roots and tubers
2	Legume (beans ,peas and lentils)and Nuts (groundnut/peanut)
3	Dairy products including cheese, yogurt ice cream butter
4	Flash foods(meat, fish, poultry, and liver /organ meat
5	Eggs
6	Vitamin A rich fruits (Ripe mango, ripe papaya)and vegetables(Pumpkin, carrots, yellow sweet potatoes)
7	Other fruits (Orange, banana, Avocado, Pineapple, Guava) and vegetables (Onion, tomato).

№	Key Messages	Scientific Rationale	Types of delivering
1	**Awareness creation about Infant and Early Childhood Nutrition** → **Adequate dietary intake at this critical period is fundamental.**	❖ The period from **birth to 2yrs (1000 day) is a "critical window"** for the promotion of ***optimal growth, health and behavioral development***. - This is a period of a rapid growth (**physical and cognitive/brain**) and high nutrient demand. - If the child doesn't get the required nutrients to support this rapid growth ➢ The risk of **malnutrition and micronutrient deficiencies increases** → **High infection rate, morbidity, mortality** (in the short-term). → **Impairments in intellectual performance, Poor work capacity, Poor reproductive outcomes and overall health during adolescence and adulthood** (in the long-term).	**Home-based counseling**
2	**Promote Breastfeeding and Optimal Complementary Feeding(CF)** →**Practice exclusive breastfeeding from birth to 6 months of age, and introduce complementary foods at 6 months of age while continuing to breastfeed.**	❖ Continue frequent***, on-demand breastfeeding at least 8-12 times day and night until 2 years of age or beyond.*** ❖ Practice **good hygiene, proper food handling and responsive feeding**. ❖ Children need **enriched foods** because ***their stomachs are small, and they cannot eat large amounts of foods at each meal.*** ❖ A child should eat at ***least ≥ 4 FG daily from 7 defined FG*** is important for healthy growth and development. ❖ ***However, out of 4 food groups they should eat at least*** ✓ ***1 animal origin food (Dairy products, meat, fish, poultry and liver/organ meat), Eggs)*** ✓ ***1 pulse(pea, bean ,lentils) and*** **nut** ✓ ***2 or more fruit(orange, guava ,mango ,papaya ,avocado etc)and vegetable(kale, carrot, pumpkin etc) per day*** ❖ ***Plant-based complementary foods*** by themselves are insufficient to meet the needs for certain micronutrients and low bioavailability. ❖ Feed your child animal origin daily **including fasting day.** ASF such as meat, fish, and poultry are more expensive than other foods, but the **benefits and long-term impact on children's development is high**. ❖ Avoid giving drinks with low nutrient value such **as soda, tea, coffee**.	**Home-based counseling**

		✚ Gradually increase food consistency and variety as the infant gets older, adapting to the infant's requirements and abilities. 1. ***By six months-infants*** can eat **pureed, mashed and semi-solid foods** 2. ***By 8 months-*** most infants can also eat **"finger foods"** (snacks that can be eaten by children alone). 3. ***By 12 months-*** most children can eat the ***same types of foods as consumed by the rest of the family*** ✚ Healthy breastfed infant, meals of CF should be provided (***child meal frequency***). ✓ **2 to 3 times per day at 6 - 8 months of age and** ✓ **3 to 4 times per day from 9-11 mon and from 12 - 24 months, with additional nutritious snacks offered 1-2 times/ day between meals.** ✓ **Feed children during and after illness frequently (diarrhea, ARI)**	
3	**Awareness Creation About Maternal Nutrition and Dietary Advice** **→Increase the quality and quantity of dietary intake to lactating mothers can be the most effective way of improving their health and that of their infants**	❖ WRA are particularly **vulnerable to food insecurity and associated nutrient inadequacies.** ✓ Physiological change comes with childbearing. ✓ women have a sociological and cultural vulnerable ❖ Breastfeeding increases a mother's need for different micronutrient like calcium, iron, Zn etc. ❖ Breastfeeding mothers should eat more food than usual 2 additional meal (***650 additional kcal every day***). ❖ Therefore, breastfeeding mother should consume ***≥5 FGs*** daily out of 10 defined FGs.	**Door to Door counseling**
4	**Food Based Awareness Creation (about how to use locally available food).** ***→Improved DDS (using different foods that are locally available during different season).***	▪ Promote nutritional importance of **local available** foods ▪ Aware about **seasonal food** availability and diet diversification. ▪ Promote how to prepare micronutrient rich foods through **home garden and poultry** ▪ **Avoid the existing food taboos** on complementary practice and maternal diet.	**Door to Door counseling**

ሰርዓተ-አመጋገብን መሰረት ያደረገ የባህሪ ለውጥ ማምጫ (BCC) መመሪያ

- ❖ የቀን የንጥረነገር ፍላጎታቸውን ለማሟላት፣ለመውለድ ዝግጁ የሆኑና ወላድ እናቶች (የሚያጠቡ እናቶች) ከ10 ምግብ ምድቦች ውስጥ በቀን ቢያንስ ≥5 የምግብ ምድብ (አይነት) መመገብ አለባቸው.::
- ❖ እድሚቸው 6-23ወርና በላይ የሚሆኑ ህፃናት ከ7 የምግብ ምድብ ውስጥ በቀን ቢያንስ ≥4 እና ከዚበላይ የምግብ ምድብ መመገብ አለባቸው::
- ❖ የተለያየ ምግብና የምግብ አይነቶች ጥሩ የማክሮና ማይኪሮ አልሚ ንጥረነገሮች አላቸው፣ በመሆኑም በየቀኑ የተለያየ የምግብ አይነት መመገብ የተሟላ አልሚ ንጥረነገር እንድናግኝ እና ጤነኛ እንድንሆን ይረዳናል::

ሠንጠረዥ 1. አስር 10 የምግብ ምድብ ለእናቶች እንደ MDD-WOMEN

№	አስር 10 የምግብ ምድብ ለእናቶች እንደ MDD-W
1	***ካብ እኽሊ ዝተዳለወ ዝኾነ ምግቢ ፃዕዳ ሱር*** (እንጀራ፣ ግዓት፣ ባኒ፣ ጥጥቐ፣ ቆሎ፣ ሩዝ፣ ፓስታ ወይ ካልእ ካብ ስርናይ፣ መሸላ፣ ጣፍ ፃዕዳ ድንች፣ ፃዕዳ ያም፣ ካዛባ፣ ዩካ፣ ኮኪያል ወይድማ ካብ ፃዕዳ ኣካል ሱር ዘለዎም ዝተዳለወ መግቢ)
2	***ዝኾነ ባሎንጋ ወይ ኣተር***(ዝበሰለ ባሎንጋ፣ ኣተር፣ ዓይን ኣተር /ተኩስ ወይ ዝደረቐ/ ጥረምረ ፍሪያት ትምቱሞ ወይ ባሎንጋ/ኣተር፣ ጥሉል፣ ቆሎ፣ ጥቕጥቕ፣ ስልጆ፣ቶፋ ሓዊሱ፣
3	***ዝኾነ ኒሁግ (ኦቾሎኒ) ወይ ዘርኢ*** ኦቾሎኒ/ለውዝ፣ ሰሊጥ፣ ሱፍ ኣበባ ዘርኢ ፍላክስ ወይ ዝተወሰነ ኒሁግ /ሰሊጥ ጠስሚ ወይ ቴስተር
4	***ዝኾነ ጸባ ወይ ፍርያት ጸባ*** ፀባ፣ ኣጀቦ፣ እርግሆ ወይ ካልእ ፍርያት ፀባ ግን ጠስሚ፣ ኣይስክሬም፣ ክሬም ወይ መፂጽ ክሬም ዘይሓውስ::
5	ናይ ምራኽ ስጋ፣ ናይ ሀሳማ ሳጋ፣ ጤል፣ ማቲሌ፣ ናይ በረኻ ስጋ::፣ ዶርሆ ዳክዬ ወይ ካልእ ርግቢት፣
6	ናይ ዶርሆ እንቓቐሆ ወይ ካልእ ዝኮኸ ዓይነት ቆቅ ወይ ዝግራ
7	***ዝኾነ ማልከላይ ፀሊምፃ*** ሓምላይ፣ ቐጽላዊ ኣትኽልቲ ናይ በረኻ የሕመልቲ፣ ቐጽሊ ብሮኮሊን፣ ቆስጣ ሓዊሱ፣
8	***ካልእ ብቫይታሚን ኤ ዝማዕበለ ፍረምረ*** ስበሰለ ማንጎ ዝበሰለ ፓፓያ ወይ ፅሚቕ፣ ብዝተዓሸገ መልክእ and ውሽጡ ቢጫ ወይ ኣራንጪ ዝኩኒ፣ ዱባ፣ ካሮት፣ ቢጫ ምቐር ድንች፣
9	***ካልእ ዝኾነ ኣትኽልቲ*** ሽንኩርትን፣ ኮሚደረ፣
10	***ካልእ ዝኮነ ፍረምረ*** ኣራንሺ፣ ባናና፣ኣፕል ፣አቮካዶ፣ ሎሚ፣ መንደሪኒን፣

ሠንጠረዥ 2. ሰባት 7 የምግብ ምድብ ለህፃናት እንደ MDD

№	ሰባት 7 የምግብ ምድብ ለህፃናት እንደ MDD
1	ካብ እኽሊ ዝተዳለወ ዝኾነ ምግቢ ፃዕዳ ሱር ዘለዎም ዝተዳለው ምግብታት
2	ዝኾነ ባሎንጋ ወይ ኣተር(ዝበሰለ ባሎንጋ፣ ኣተር፣ ዓይን ኣተር /ተኩስ ወይ ዝደረቐ/ ጥረምረ ፍሪያት ትምቱሞ ወይ ባሎንጋ/ኣተር፣ ጥሉል፣ ቆሎ፣ ጥቕጥቕ፣ ስልጆ፣ቶፋ ሓዊሱ፣ ወይ ዝኾነ ኦቾሎኒ/ለውዝ
3	ፀባ፣ ኣጀቦ፣ እርግሆ ወይ ካልእ ፍርያት ፀባ ግን ጠስሚ፣ ኣይስክሬም፣ ክሬም ወይ መፂጽ ክሬም ዘይሓውስ::
4	ናይ ምራኽ ስጋ፣ ናይ ሀሳማ ሳጋ፣ ጤል፣ ማቲሌ፣ ናይ በረኻ ስጋ::፣ ዶርሆ ዳክዬ ወይ ካልእ ርግቢት፣(ጉበት፣ ኩላሊት፣ ልቢ ወይድማ ኣካል ስጋን ደም መሰረት ዝገበረ ምግቢ
5	ናይ ዶርሆ እንቓቐሆ ወይ ካልእ ዝኮኸ ዓይነት ቆቅ ወይ ዝግራ
6	ስበሰለ ማንጎ ዝበሰለ ፓፓያ ወይ /ካልእ ብቫይታሚን ኤ ዝማዕበለ ፍረምረ/ ፅሚቕ፣ ብዝተዓሸገ መልክእ and ውሽጡ ቢጫ ወይ ኣራንጪ ዝኩኒ፣ ዱባ፣ ካሮት፣ ቢጫ ምቐር ድንች፣)
7	ካልእ ዝኾነ ፍረምረ ወይ ኣታኽልቲ ኣራንሺ፣ ባናና፣ ኣቮካዶ፣ ሎሚ፣ መንደሪኒን፣ ኣፕል፣ ለሚን፣ ሽንኩርቲ፣ ኮሚደረ በመልዕክ ብዝተዓሸገ መልክእ

ተ.ቁ	ቁልፍ መልእክቶች	ሳይንሳዊ ማብራሪያ	የማድረሻ መንገድ
1	ስለ ህፃናትና ልጆች ስርአተ-አመጋገብና የእድገት ሁኔታ ግንዛቤ ማስጨበጥ (awareness creation) ***→ከእርጉዝና -2ዓመት ባለው ወሳኝ የእድገት ወቅት በቂና የተመጣጠነ ምግብ መመገብ በጣም ወሳኝና ለጤናማ እድገት ጥሩ ነው።***	❖ ከእርጉዝና -2ዓመት (1000 ቀን) በጣም ወሳኝ የእድገት፣ የጤና እና የባህሪ ለውጥ ማምጫ ጊዜ ነው**"critical window"** - ይኸ ጊዜ በፍጥነት የሚታደግበት(በአካልና አእምሮ) እና ብዙ አልሚ ንጥረነገር የሚያስፈልግበት ወቅት ነው። -በዚህን ጊዜ እድገታቸውን በትክክሉ ለማስቀጠል ህፃናት አስፈላጊውን ያህል ንጥረነገር ካላገኙ ➢ በጣም አደገኛ፣ የምግብ ጉዳት እና አልሚ ንትረነገር እጥረት ይጨምራል (ያጋጥማቸዋል)። → ሞት፣በሽታ ተላላፊ በሽታዎች እና መሰል ችግሮች ይጨምራሉ(ባጭር ጊዜ የሚከሰቱ ናቸው). → *ደካማ አእምሮ ወይ በትምህረት ውጤት መውደቅ፣ደካማ የስራ አቅም፣ የወሊድ ችግር ማጋጠም ወይ ጤናማ* አለመሆን እና በወጣትነትና በጉልምስና ወቅት አጠቃላይ የሆነ ጤና ችግር መኖር (በረጅም ጊዜ የሚከሰቱ ናቸው).	***የቤት ለቤት ምክር አገልግሎት***
2	ጡት ማጥባት እና ለህፃናት የተመጣጠነ ተጨማሪ ምግብ መመገብን ግንዛቤ ማስጨበጫ መስጠት ***→ከወልደት አሰከ 6 ወር ጡት ብቻ ማጥባት(ውሃም ቢሆን አለመስጠት)እና በ6ወር ተጨማሪ ምግብ መጀመር(መመገብ) ጡት ማጥባት እንዳላ ሆኖ።***	❖ ቀጣይነት ያለው፣ በመደጋገም በቂ ጡት ማጥባት ቢያንስ ከ8-12 ጊዜ ቀንና ለሊትን ጨምሮ እስከ 2 ዓመት እና ከዚያ በላይ ድረስ። ❖ ሁል ጊዜ የራስን ንፅህና መጠበቅ፣ጤናማ የምግብ አያያዝ እና በህላፊነት፣ በትዕግት ህጻናትን መመገብ ❖ ህፃናት **በአልሚ ንጥረነገር የበለፀገ ምግብ** የፈልጋሉ፣ምክኒያቱም ጨጓራቸው በጣም ትንሽ በመሆኑና በአንድ የምግብ ስዓት ብዙ መመገብ ስለማይችሉ። ❖ እድሚቸው 6-23ወርና በላይ የሚሆኑ ህፃናት ከ7 የምግብ ምድብ ውስጥ በቀን ቢያንስ ***≥4 እና ከዚበላይ የምግብ ምድብ*** መመገብ ለጤናማ እድገትና ሰውንት ግባታ (ጤንነት)ጠቃሚ ነው። ❖ ***ሆኖም በቀን ውስጥ ከ 4ቱ የምግብ አይነቶች ውሰጥ ቢያንስ የሚከተሉትን የሚያሟላ መመገብ አለባቸው።*** ✓ ***1የእንሰሳት ተዋፅኦ(የወተት ተዋፅኦ፣ሲጋ፣አሳ፣የዶሮ ሲጋ፣እንቁላል እና ጉበት፣ልብ፣ኩላሊት)*** ✓ ***1 ጥራጥሬ(አተር፣ባቄላ፣ምስር፣ሽምብራ)እና አቮሎኒ/ለውዝ*** ✓ ***2 እና ከዚያ በላይ ፍራፍሬ (ብርትካን፣ ዘይቶ፣ማንጎ፣ፓፓያ፣አቮካዶ ወዘተ)እና አትክልት(ጎመን፣ካሮት፣ዱባ)*** ❖ ***ከአዝዕርት ውጤት*** የሚሰሩ የህፃናት ምግቦች በራሳቸው ለህፃኑ በቂ የሆነ አልሚ ንጥረነገር የላቸውም እናም ወደ ሰውንትም በጥሩ አይደርስም። ❖ ልጆችን በየቀኑ የእንሰሳት ተዋፅኦ መመገብ **በያም ቀንም ጭምር።** ✚ የእንሰሳት ተዋፅኦ (ስጋ፣ሲአሳ፣ዶሮ) ከሌሎች የምግብ አይነቶች ሲነፃፀር በጣም ውድ ነው።ሆኖም ግን ለረጅም ጊዜ ለህፃናት ጤናማ እድገት ያልው ጠቀሜታ የጎላ ነው። ❖ ለህፃናት ትንሽ አልሚ ንጥረነገር ያለው መጠጥ አለመስጠት ለምሳሌ ***ለሰላሳ መጠጦች ፣ሻይ፣ ቡና***። ✚ ቀስበቀስ ህፃኑ እያደገ ሲመጣ የምግቡም ውፍረት እና አይነት መጨመር አለበት። 4. ***በ6 ወር - ህፃናት በ6 ወራቸው ቀጠን ያለ ገንፎ፣አጥሚት፣የታሸ ምግብ እና በከፈል ጠንከር ያለ ምግብ(የተፈጨ ሲጋ፣አሳ) መመገብ ይችላሉ*** 5. ***በ8 ወር- ብዙ ህፃናት በዚህ ወር "finger foods" ጠንከር ያሉ ምግቦች መመገብ ይችላሉ።*** (በህፃናት ብቻ የሚበላ መቅሰስ). 6. ***በ12 ወር- ብዙ ህፃናት በዚህ ግዜ በተሰብ የሚመገበውን የምግብ አይነት መመገብ ይችላሉ*** ✚ ጤናማ የሆነ ጡት የሚጠባ ህፃን በቀን ውስጥ መመገብ ያለበት እንደሚከተለው ነው። ✓ **ከ6 - 8 ወር የሆነው ህፃን ከ2 እስከ 3 ጊዜ በቀን መመገብ አለበት።** ✓ **ከ 9-11 እና ከ12-24 ወር 3 እስከ 4 ጊዜ በቀን መመገብ ከተጨማሪ በአልሚ ንጥረነገር በበለፀገ መቅሰስ በቀን 1-2 ጊዜ በምግብ መሀል።** ✓ **ህፃናትን በህመማቸው ጊዜ እና ከዳኑም በሁዋላ በተደጋጋሚ መመገብ (ተቅማጥ, ARI)**	***የቤት ለቤት ምክር አገልግሎት***
3	***ስለ እናቶች ጤናማ ሰርአተ-አመጋገብ እና የተመጣጠነ ምግብ መመገብ ጠቀሜታ ግንዛቤ ማስቸበጫ መስጠት*** ***→የሚያጠቡ እናቶች ጥራቱን የጠበቀና ብዛት ያለው ምግብ መመገብ ላራሳቸው እና ለልጆቻቸው ጤንነት ወሳኝ ነው።***	❖ በተለይ ለመውለድ ዝግጁ የሆኑና ወላድ እናቶች (የሚያጠቡ እናቶች) የምግብ ዋስትና አለመኖር እና ለንጥረነገር ማነስ በጣም የተጋለጡ ናቸው።ምክንያቱም ✓ ለመውለድ ሲዘጋጁ አካል ልውጥ ስለሚኖር ✓ እናቶች የሳይኮሎጂካል እና ባህል ተጠቂ ስለሆኑ ነው። ❖ ጡት ማጥባት የእናቶችን የተለያየ ማይክሮኑትረነት(አልሚ ንጥረነገር) ፍላጎት ይጨምራል ለምሳል calcium, iron, Zn ወዘተ። ❖ የሚያጠቡ እናቶች ከምንጊዜውም በላይ ምግብ መመገብ አልባቸው **በቀን *ቢያንስ 2 ተጨማሪ*** ምግብ (***ሁልጊዜ 650*** ተጨማሪ ***kcal)***። ❖ ስለዚህ የሚያጠቡ እናቶች ከ10 የምግብ ምድብ ውስጥ በቀን ቢያንስ ***≥5 የምግብ አይነት*** መመገብ አለባቸው።	***የቤት ለቤት ምክር አገልግሎት***
4	ምግብን መሰረት ያደረገ ግንዛቤ ማስጨበጥ (በአካባቢው የሚገኙ	▪ በአካባቢ የሚገኙ ምግቦች ለጤናና ስርአተ-አመጋገብ ያላቸውን ጠቀሜታ ማስተዋወቅ። ▪ በተለያየ ወቅት ስለሚገኙ ምግቦች እና እንዴት የተለያ ምግብ መስራት እንዳለባቸው ግንዛቤ ማስጨበጥ።	**Door to Door**

	ምግቦች እንዴት መጠቀም እንዳለብን). ***→የተመጣጠነ ምግብ መመገብን ማሻሻል DDS (በተለያዩ ወቅቶች በአካባቢው የሚገኙ የተለያዩ ምግቦችን በመጠቀም የምግብ አይነቶት አማራጭን ማብዛት).***	▪ የጉሮ አትክልት እና የዶሮ ውጤት በመጠቀም እንዴት በአልሚ ንጥረነገር የበለፀገ ምግብ መስራት እደሚችሉ ማስተዋወቅ፡፡ ▪ በህብረተስቡ ውስጥ ያሉ ጎጂ የሆኑ የህፃናት ምግብ አሰራርና የእናቶች ምግብን የተመለከተ ባህሎች ማስወገድ፡፡	**counseling**

Annex 6: Food Group Checklist Communication Material for Women and Children.

Annex 7: Demonstration of the Preparation of a Low-cost Balanced Diet with Locally Available Nutritious Foods.

Annex 8: Food Group Checklist Communication Material Usage from Selected Four Rural Village of the Tigray Region Ethiopia, March 2018- May 2018

Variables	NSA+BCC (n=77)		*P*-value	BCC (n=123)		*P*-value
	Middle line	**End line**		**Middle line**	**End line**	
Refer food group checklist	77(100)	77(100)		123(100)	123(100)	
How many time did you refer			0.001*			<0.001*
Once a week	9(11.7)	2(2.6)		12(9.8)	1(0.8)	
Two times a week	11(14.3)	30(39)		16(13)	33(26.8)	
More than three times a week	26(33.8)	26(33.8)		49(39.8)	62(50.4)	
Almost every day	31(40.3)	19(24.7)		46(37.4)	27(22)	
How did you use the checklist						
Used as reference	30(39)	64(83.1)	<0.001*	48(39)	107(87)	<0.001*
As alarming tools	23(29.9)	53(68.8)	<0.001*	30(24.4)	79(64.2)	<0.001*
To develop good nutritious Complementary feed	61(79.2)	77(100)	<0.001*	113(91.9)	122(99.2)	0.017*
Role of FG checklist communication material						
Enhance to consume more FGS	20(26)	70(90.9)	<0.001*	29(23.6)	116(94.3)	<0.001*
Alarm and show to use the local available food	44(57.1)	52(67.5)	0.313	84(68.3)	90(73.2)	0.629
It changes the food consumption behavior	44(57.1)	50(64.9)	0.523	47(38.2)	82(66.7)	<0.001*
To familiarize different FGs	35(45.5)	68(88.3)	<0.001*	72(58.5)	118(95.9)	<0.001*
Not useful at all	3(3.9)	1(1.3)	0.555	1(1.3)	0(0)	0.605
Major challenges to use the checklist communication material properly						
Ignorant (forgetting communication material)	1(1.3)	0(0)	0.604	7(5.7)	0(0)	0.026*
Lack of time	10(13)	16(20.8)	0.306	11(8.9)	26(21.1)	0.005*
Poor cultural beliefs and values	19(24.7)	28(36.4)	0.179	35(28.5)	20(16.3)	0.037*
Economical problem	62(80.5)	76(98.7)	0.001*	108(87.8)	121(98.4)	0.003*

Note. *P* -values are from comparison within group NSA+BCC and BCC, **T**-test was used.

* Statistically significant difference at *P* value of 0.05**.** NSA, nutrition-sensitive agricultural.

Annex 9: ATONU Beneficiary Response from Selected Four Rural Village of the Tigray Region Ethiopia, February 2018.

Variables	NSA n=77 Frequency (%)
ATONU service	
Home gardening	77(100)
Women empowerment	38(49.4)
Chicken	65(84.4)
How use the produce	
Household consumption	37(56.1)
For sell(income generation)	3(4.5)
Both	26(39.4)
Received women empowerment training	64(83.1)
Train (discussed) per week	
Once a week	64(98.5)
Two times/week	1(1.3)
More >2 time/ week	0(0)
Almost Every day	0(0)
Who usually decide how the money (agricultural product) you earn will be used	
Respondent/wife	20(26)
Husband	25(32.5)
Respondent & husband jointly	32(41.6)
Someone else [parent]	0(0)
Who usually makes a decisions about diet selection for children and yourself	
Respondent/wife	47(61)
Husband	11(14.3)
Respondent & husband jointly	19(24.7)
Someone else [parent]	0(0)
Who usually makes a decisions about making major household food purchase	
Respondent/wife	42(54.5)
Husband	15(19.5)
Respondent & husband jointly	20(26)
Someone else [parent]	0(0)