ADDIS ABABA UNIVERISTY SCHOOL OF GRADUTE STUDIES COLLEGE OF DEVELOPMENT STUDIES DEPARTMENT OF FOOD SECURITY

THE ROLE OF TARGETED SUPPLEMENTARY FEEDING (TSF) ON CHILD NUTRITION UNDER THE AGE OF FIVE IN SOUTH NATION NATIONALITIES PEOPLE REGION

CASE OF MAREKO WORDA

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Acronyms

AIDS .....Acquired Immune Deficiency Syndrome

CBN .....Community Based Nutrition

CF.....Complementary Feeding

CSB .....Blended Corn Soybean

DRMFSS.....Disaster Risk Management and Food Security Section

ENA .....Essential Nutrition Action

EHNRI .....Ethiopian Health and Nutrition Research Institute

EOS .....Expanded Outreach Strategies

FAO.....Food and Agricultural Organization

FMOH .....Federal Ministry of Health

GDP.....Gross National product

HIV .....Human immune Virus

GMP .....Growth Monitoring and Promotion

HEW .....Health Extension Workers

HO.....Health Office

HFA.....Height -For- Age

HSDP .....Health Sector Development Program

IDA .....Iron Deficiency Anemia

IDD .....Iodine Deficiency Disorder

MND .....Micro-Nutrient Deficiency

MAM.....Moderately Acute Malnutrition

MUAC.....Mid-Upper arm Circumference

NCD .....Non- Communicable Disease

NNP.....National Nutrition Program

NNS.....National Nutrition Strategy

OTP .....Outpatient Treatment program

PEM .....Protein Energy Malnutrition

TSF.....Targeted Supplementary Feeding

SFP.....Supplementary feeding program

SMART.....Standardized Monitoring and Assessment of Relief Transition

SNNPR.....South Nation Nationalities People Region

SPSS .....Statistical package of social scientists

VAD.....Vitamin ‘A’ Deficiency

WFA .....Weight-For-Age

WFH .....Weight-For-Height

WFP .....World Food Program

WHO.....World Health organization

UNHCR.....United Nations Human Right commission

UNICEF .....United Nations Children’s Fund

Abstract

The study has been conducted with the general objectives of investigating relative recovery and growth rates of moderately wasted children under the age of five receiving blended corn Soya bean (CSB) as a supplementary food. It has examined the role of targeted supplementary feeding, the nutritional content of home-made complementary foods and determinants of targeted supplementary feeding programs and forwarded possible solutions for the effectiveness of the program.

In order to elicit the required primary data: Household survey questioners, key informant interview, nutritional Laboratory analysis and anthropometric measurement tools have been utilized. Moreover, to support the primary data, secondary data analysis and observation have been undertaken to acquire relevant information. Field visit was conducted as it is believed to provide better understanding of what was actually happened on in the ground.

The result of the study reveals that 71.8% of respondents were illiterate, the rate of recovery of children were 67.1%, the protein and fat content of sampled complementary foods were very low, 77.3% of respondent were practiced Intra-household sharing of ration and the prevalence rate of diarrhoea was 42.5%. Accordingly, the effectiveness and efficiency of targeting supplementary feeding programs are affected by different variables like, food insecurity of the household, educational status, family size, socio-cultural system, knowledge, perceptions and practices of mothers/caregivers. Also the knowledge, commitment, decision making ability of implementing organizations as well as responsible personnel has paramount importance for the attainment of program objectives. Moreover, access to improved health and education services, clean water and sanitation, and regular monitoring and evaluation play pivotal role for the program.

In addition to the above basic problems, intra-household sharing, duration of feeding, timing of supplementation, the degree of targeting and nutritional status of entrants are the major determinant factors of targeted supplementary feeding program. Therefore, to improve the effectiveness of the program, improving health services and income

generating mechanisms, capacity building and awareness creation programs, close supervision and impact evaluation programs, the commitment of professionals and partners and improving the nutritional continent of home-made complementary foods are highly required.

CHAPTER ONE

1. INTRODUCTION

1.1 Background

Ethiopia is one of the least developed countries in the world, with a per capita Gross National Income (GNI) in 2004 of US$110 (World Bank, 2006). The majority of the population resides in the rural areas and has limited access to any type of modern health institutions. Potential health service coverage was 86.7% in 2007. Proportion of deliveries attended by skilled health personnel 16.4%, contraception acceptance rate 33.3%, life expectancy at birth 53.4 years for males and 55.4 years for females (FMOH: Health indicators 2007).

According to World Bank (2005), Ethiopia has the highest rate of malnutrition in Sub-Saharan Africa. The prevalence of malnutrition imposes significant costs on the Ethiopian economy as well as society. Until recently, the broad multi-sectoral factors contributing to malnutrition had been insufficiently emphasized, with the focus placed on addressing food security as the primary means to address nutritional insecurity.

Children are the most vulnerable group in any society. Their growth is mainly influenced by genetic programming and external influences. Nutrition is one of the external factors which influences the growth and normal functioning of the body. It serves to meet the requirement for cell multiplication and for the process in which the growing tissues and organs take an increased complexity of function (WHO 2003). Thus, nutritional status in early life is important for laying down the foundation of healthy adulthood through its effect on growth and development and subsequent on quality of life, productivity and economic development in later adult life (Ebrahim, 1991).

Inadequate nutrition in children can manifest itself in several ways and it is most commonly assessed through the measurement of weight and height. A child can be too short for his or her age (stunted), have low weight for his or her height (wasted), or have low weight for his or her age (underweight). A child who is underweight can also be stunted or wasted or both. Each of these indicators captures a certain aspect of the problem. Weight is known to be a sensitive indicator of acute deficiencies; whereas height captures more chronic exposure to deficiencies and infections. Wasting is used as a way to identify severe acute malnutrition. Inadequate nutrition may also manifest itself in overweight and obesity which is commonly assessed through the body mass index. Micronutrient malnutrition caused by deficiencies in vitamins and minerals can manifest itself through such conditions as fatigue, pallor associated with anemia (iron deficiency), reduced learning ability (mainly iron and iodine deficiency), goiter (iodine deficiency), reduced immunity, and night blindness (severe vitamin A deficiency) (Zewedie and Haile G, et al 1992).

Complementary feeding means giving other foods in addition to breast milk. The aim is to introduce smoothly a soft digestible diet containing adequate calories, proteins and other micronutrients (especially iron, zinc, calcium, vitamin A, vitamin C and folate), free of contamination (pathogens, toxins or harmful chemicals), without much salt or spices, easy to prepare from family foods, easy to eat and easily accepted by the infant, in an appropriate amount, and at a cost that is acceptable by most families. Complementary foods are introduced at the weaning stage of a child's development. At this stage, infants undergo a period of rapid growth; therefore, adequate diet is crucial. Nutrition in the early years of life is indeed a major determinant of growth and development and also influences adult health. The nutritional needs of infants and young children are significantly different from those of the rest of the population (**www.who.int/nutrition/topics/complementry-feeding/en**).

The composition of complementary foods meet the specific nutritional needs of infants especially 6-23 months children, providing the accurate amount of proteins, carbohydrates, lipids, fibers, minerals and vitamins with limitations for salt, sugars and saturated fat. Complementary foods undergo higher safety and quality control

compared to regular foodstuffs to protect the fragility and to take into account the vulnerability of the infant and the young child.

Mareko *Woreda* is one of 13 rural *Woredas* in Gurage zone, SNNPR. Koshe town, the capital of the *woreda* is located about 113 kilometres North-West of Awassa the capital of SNNPR and 160 km from Addis Ababa. It is bordered to the East by Oromia region, to the West by Meskan *woreda*, to the North by Oromia region, and to the South Silte zone. Administratively, Mareko is divided into 25 rural *kebeles*. The *Woreda* has an estimated population of 64,436 with 10,052 children (15.6% of the total population) aged between 6 and 59 months (CSA, 2007).

Since children are the economic assets of the country and their future development outcome can be influenced by their nutritional status, the impact of targeted supplementary feeding on child nutrition need to be understood better. Some studies on the role of targeted supplementary feeding are available at national and regional levels. However, detailed studies to point out the significance and future prospective at the grassroots level like Mareko *Woreda* in which child malnutrition are highly prevalent which are lacking. This study, therefore, will thoroughly examine the role of targeted supplementary feeding on child nutrition in *Mareko Woreda,* SNNP region to suggest appropriate intervention strategies.

1.2 Statement of the Problem

Malnutrition poses a salient and relentless obstacle to economic development in Ethiopia. The continuing human costs incurred for the many malnourished Ethiopians are enormous. Many individuals are unable to attain their full social and economic potential and contribute creatively to their own and to the nation's economic well-being. It is no surprise if one hears that Ethiopia seeks sustainable human and economic development, thus cannot afford to fail in paying attention to child and maternal nutritional issues (Benson, 2005).

Children in Ethiopia suffer from poor health and the country has one of highest rates of infant and child mortality rates in the world; ranked 20th on the top list of under five children mortality in the world in 2006 (UNICEF, 2006). The recent national infant

and under-five mortality rate estimates are 77 and 123 deaths per 1,000 live births, respectively (CSA 2005).

According to the estimates 1 out of 13 children born in Ethiopia dies before reaching age one year, while 1 out of 8 children born in Ethiopia dies before the age of five years. About 90% of mortality in under-five is caused by illness during the neonatal period (prematurely, asphyxia and neonatal sepsis), pneumonia, malaria, diarrhea and measles (FMOH, 2004).

Mareko is one of the *Woredas* in Gurage zone where malnutrition is highly prevalent under the age of five among the *Woredas* of Gurage zone according to 12th and 13th round Enhanced Outreach Strategies (EOS)/Targeted Supplementary Feeding (TSF) of Federal Ministry of Health (FMOH)/United Nations Children's Fund (UNICEF) screening results. Besides, the knowledge and practice of mothers/caregivers about homemade complementary foods are very low. The numbers of TSF beneficiary children are increasing from time to time even though the program have been undertaking since 2004; because of different factors like: intra-household sharing, targeting problem and delay of distribution. Thus, it is of interest to investigate the role of targeted supplementary feeding on child nutrition under the age of five and to identify the determinants of TSF in case of Marko *Woreda* SNNP region.

1.3 Objective of the Research

1.3.1 General Objective

To investigate relative recovery and growth rates of moderately wasted children under the age of five receiving blended Corn Soya Bean (CSB) and vegetable oil as a supplementary food.

1.3.2 Specific Objectives

1. To evaluate the role of TSF on child nutrition by examining the nutritional status of children who are receiving CSB and vegetable oil for 45 days.

2. To identify potential determinants of Targeted Supplementary Feeding (TSF).

3. To evaluate the nutritional content of homemade complementary foods and local food crops.

4. To propose appropriate local blends of complementary foods.

1.4 Research Questions

- What percent of moderately malnourished children are recovered?
- Do locally prepared complementary foods provide all the necessary nutrients for child growth and development?
- What are the major determinants of TSF?

1.5 Significance of the Research

The level of acute and chronic malnutrition of under age of five children, especially in rural areas and slum towns are getting worsen from time to time because of household food insecurity, awareness level of the mothers/caregiver, and mismanagement of resources, bad culture, and other factors. To reduce the consequences of acute and chronic malnutrition on life and health of children; Federal Ministry of Health (FMOH) with the collaboration of World Food Program (WFP) and United Nation Children's Fund (UNICEF) designed intervention programs, like TSF. So studying the effectiveness, efficacy and extent of problems of TSF program and level of stakeholders' participation will help to identify some of the constraints for the improvement and to create enabling environment for program implementers. Therefore, the findings of the research will have the following significances:

- To suggest appropriate blended complementary foods from locally available cereal and leguminous food products. Moreover, to recommend possible solutions for the effectiveness of TSFP. Thus, it helps to Ministry of Health and Stakeholders to design efficient implementation strategies.
- To initiate and increase level of awareness of concerned bodies and partners to extend their effort in the area of supplementary and complementary

feeding and other programs, so as to achieve the common goals of improving child nutrition.

- To initiate other researchers for further and/or an in-depth study on the importance and limitations of supplementary and complementary feeding programs in order to improve and provide quality of service on the area particularly in Mareko *Woreda*.

1.6 Scope and Limitations of the Study

The main focus of this study is examining and describing the immediate and underlying causes of targeting supplementary feeding and the role of independent variables on children nutrition under the age of five. The effectiveness of the program is affected by the range of both internal and external to TSF. However, this study examines the role of targeted supplementary feeding on child nutrition and nutritional laboratory analysis on home-made complementary foods.

Besides, due to time and budget constraints, the study assesses the macronutrient status of home-made complementary foods only. This may constrain the generalization to be drawn concerns the nutritional laboratory analysis. Besides, due to issues related to confidentiality or unclear reason (the income of the household and the selling practice of rations) could not be fully found from respondents' and this also other limitation. Had this information been obtained, it would have been possible to correlate the income level of the household with the degree and number of malnourished children in the household and could be also proved the perception of the household on recovery rate of entrant children.

1.7 Organization of the Study

The Paper is organized in to five chapters. Chapter one deals with the introductory remarks. The second chapter consists of review literature and conceptual frame work (casual analysis). The fourth chapter deals with the presentation and analysis of various data collected from different sources. In the final chapter conclusion and possible recommendation are presented.

CHAPTER TWO

2. LIRERATURE REVIEW

2.1 Assessment of Child Growth and Nutrition

2.1.1 Why do we do a nutrition survey?

According to Standardized Monitoring and Assessment of Relief and Transition (SMART) methodology (2006), whether due to starvation, loss of appetite, malabsorption, or psychological causes, children who have not taken a sufficient amount of food do not grow, and under more sever circumstances, they lose weight. Decreased growth rate is assessed by comparing the ratio of a child's height to weight to a reference standard for the child's age. For an individual, these measurements are used to decide whether the person is admitted to a supplementary feeding program or treated for severe malnutrition. At the population level the same measurements are used in the survey to estimate what proportion of a population as a whole is moderately or severely malnourished.

Malnutrition in the context of SMART methodology takes three forms: 1) failure to grow results in height stunting; 2) loss of body tissue results in wasting, and 3) accumulation of fluid results in nutritional edema (also called kwashiorkor, or hunger edema). The prevalence of each of these is assessed during a nutrition survey by recording age, measuring weight and height, and examining for edema. Other forms of malnutrition such as micronutrient deficiency are not usually assessed during a nutrition/mortality survey; even though they may be very important causes of morbidity and mortality. Most micronutrient deficiency diseases do not cause stunting or wasting, and their prevalence cannot be determined from anthropometric measurements.

2.1.2 Methods of Assessing Child Growth and Nutrition

Growth is often assessed using anthropometric measurement of which common measurement includes length/height, weight, and Mid-Upper Arm Circumference (MUAC) and head circumference. However, nutritional assessment methods also take many other forms appropriate to characterizing different stage of nutritional deficiency. These approaches include clinical assessment, nutrient balance, and functional indicators of nutritional deficiency (biological, biochemical and molecular technique), anthropometric methods and measurement of optimal nutrient intake (WHO/FAO 2004). Wasting among children aged 6 to 59 months is used as a proxy indicator for the general health and wellbeing of the entire community. This assumes that children aged 6 to 59 months are the most vulnerable group in the society, at least as vulnerable as each of the other age groups (Johon Chimwemwe Phuka 2009).

In practice, age 6 to 59 months is much easier to measure than other population groups. Young children are generally at home, the parents are usually concerned about their children and willing for them to be measured and they are not embarrassed by (nor are there as many cultural restrictions about) taking off their clothes (UNICEF 2006).

There are a few other very basic reasons why children aged 6 to 59 months are a good group to survey. First of all, policymakers are used to seeing and acting upon this type of data. There is a lot of experience with surveys of this age group, affording those using the data to make decisions the opportunity to compare the new survey with previous surveys (SMART methodology 2006).

2.1.3 Standardization of Anthropometric Measurement

To interpret growth measurement appropriately, anthropometric measurement indices are use full. The indices are calculated by combining at least two anthropometric measurements (WHO 1995). The anthropometric indices are used to compare an individual child or a group of children with reference population and they can be adjusted for age and sex. In children, the most commonly used anthropometric indices are weight-for-height, height-for-age and weight-for-age for wasting, stunting and underweight respectively (WHO 1995). The common expressions of anthropometric

indices in children are Z-score, percentiles, or percent of median. These reporting systems are defined by WHO as follows:

- Z-score - the deviation of the value for an individual from the median value of the reference population divided by the standard deviation of the reference population.

- Percentile - the rank position of an individual on a given reference distribution, states in terms of what percentage of the group the individual equals or exceeds.

- Percent of median - a ratio of a measured value in the individual to the median value of the reference population expressed as a percentage.

Because of better utilization characteristics, World Health Organization (WHO) recommended use of Z-score to standardize, weight and height and assessment of malnutrition level (WHO 1995). The Z-score system is preferable because it satisfies all of the following four characteristics:

A Z-score of less than -2 or greater than +2 is considered as evidence of malnutrition; the lower extremity is regarded as under-nutrition and above extremity as regarded as over-nutrition.

2.1.4 Why invest in nutrition?

According to World Bank (2006) Repositioning of Nutrition as a Central of Development; improving nutrition contributes to productivity, economic development, and poverty reduction by improving physical work capacity, cognitive development, school performance, and health by reducing disease and mortality. Poor nutrition perpetuates the cycle of poverty and malnutrition through three main routes: direct losses in productivity from poor physical status and losses caused by disease linked with malnutrition; indirect losses from poor cognitive development and losses in schooling; and losses caused by increased health care costs. The economic costs of malnutrition are very high; several billion dollars a year in terms of lost Gross Domestic Product (GDP). Relying on markets and economic growth alone means it

will take more than a generation to solve the problem. But specific investments can accelerate improvement, especially programs for micronutrient fortification and supplementation and community-based growth promotion. The economic returns to invest in such programs are very high (World Bank 2006).

2.1.5 Improved Nutrition increases Productivity and Economic Growth

Good nutrition is a basic building block of human capital and as such, contributes to economic development. In turn, sustainable and equitable growth in developing countries will convert these countries to "developed" states (World Bank 2006).

There is much evidence that nutrition and economic development have a two-way relationship. Economic development contributes to improve nutrition, but more importantly, improved nutrition drives stronger economic growth (World Bank 2006).

Table 1: Sources of Nutrients and their Roles in Brain Functioning

Nutrients	Common food sources	Role in cognitive function
Iron	Liver, spinach, asparagus, clams, beans, peas, enriched bread, cereal.	• Transports oxygen to brain • Involved in red blood cell formation • Deficiencies can impair the child's ability to concentrate (Pollitt, 1993)
Protein	Meat, fish, seafood, eggs, dairy products, grain products, legumes.	• Provides the amino acid tyrosine needed for the release of key neurotransmitters, resulting in increased alertness and motivation (Wurtman, 1988).
Fat	Oils, salad dressings, butter, Margarine, lard layers on meat. Most fats are hidden because they are added during food Preparation.	• In combination with protein, sustains glucose breakdown longer • Carrier of fat-soluble vitamins A, D, E, and K and essential fatty acids, which form nerve cell

		membranes. • Over- or under-consumption can trigger a neurotransmitter imbalance (Garrison & Somer,1995).Fruits
Chlorine	Produced in the body and provided in several food sources: egg yolks, meat, wheat germ, peanuts, and soybeans.	• Needed to produce acetylcholine • Low levels have been associated with memory loss. • May improve memory performance (Mark & Mark, 1989).
B vitamins	B1 (thiamin): enriched breads and cereals, pork, peas, pecans B6: chicken, fish, whole grains, egg yolks, bananas, avocados B12: liver, meat, eggs, dairy Products.	• B1: promotes the body's ability to use glucose. • Deficiency can result in mood changes and reduced attention span (Garrison &Somer, 1995). • B6: involved in acetylcholine metabolism and activity. Deficiency can impair memory (Garrison Somer, 1995). • B12: supports formation and maintenance of myelin sheaths that surround nerve cells. • Inadequate intake results in memory loss, confusion, and impaired physical function (Garrison & Somer, 1995).
Antioxidants (A and E)	Vitamin A: liver, eggs, cheese, milk, yellow and orange vegetables Vitamin E: dark leafy vegetables, cabbage, eggs, tomatoes.	• Vitamin A helps cell growth and fights infection. • Vitamins E & A protect brain and body against free Radicals, which cause cell destruction. • Vitamin E deficiency can affect the nervous system by interfering with the normal nerve myelination (Garrison & Somer, 1995).

Source: *UNU (1985)*

2.2 Food, Nutrition and Malnutrition

2.2.1 Food and Nutrition

Under-nutrition is not just about the lack of food. An individual's nutritional status is influenced by three broad categories of factors, food, care and health and also adequate nutrition requires the presence of all three. Poor infant and young child feeding and care along with illnesses such as diarrhea, pneumonia, malaria, and HIV/ AIDS often exacerbated by intestinal parasites are immediate causes of under-nutrition. Underlying and more basic causes include poverty, illiteracy, social norms and behavior. Maternal nutrition and health greatly influence child nutritional status. A woman's low weight for height or anemia during pregnancy can lead to low birth-weight and continued under-nutrition in her children. At the same time maternal under-nutrition increases the risk of maternal death during childbirth. Household food security often influenced by such factors as poverty, drought and other emergencies has an important role in determining the state of child and maternal nutrition in many countries (UNICEF 2009).

2.2.2 Food Security versus Nutrition Security

It is important to distinguish between food security and nutrition security, two quite different terms often used interchangeably in the literature. Food security, an important input for improved nutrition outcomes is concerned with physical and economic access to food of sufficient quality and quantity in a socially and culturally acceptable manner. Nutrition security is an outcome of good health, a healthy environment and good caring practices in addition to household-level food security. For example, a mother may have reliable access to the components of a healthy diet, but because of poor health or improper care, ignorance, gender, or personal preferences, she may not be able to or may choose not to use the food in a nutritionally sound manner, thereby becoming nutritionally insecure. Nutrition security is achieved for a household when secure access to food is coupled with a sanitary environment, adequate health services, and knowledgeable care to ensure a healthy life for all household members (World Bank 2006).

A family (or country) may be food secure, yet have many individuals who are nutritionally insecure. Food security is therefore often a necessary but not sufficient condition for nutrition security.

2.2.3 Manifestations of Food and Nutrition Insecurity

According to UNICEF (2009); tracing progress on child and maternal nutrition: under-nutrition in children can manifest itself in several ways and it is most commonly assessed through the measurement of weight and height. A child can be too short for his or her age (stunted), have low weight for his or her height (wasted), or have low weight for his or her age (underweight). A child who is underweight can also be stunted or wasted or both. Each of these indicators captures a certain aspect of the problem. Weight is known to be a sensitive indicator of acute deficiencies, whereas height captures more chronic exposure to deficiencies and infections. Wasting is used as a way to identify severe acute malnutrition.

Inadequate nutrition may also manifest itself in overweight and obesity, commonly assessed through the body mass index. Micronutrient malnutrition, caused by deficiencies in vitamins and minerals, can manifest itself through such conditions as fatigue, pallor associated with anemia (iron deficiency), reduced learning ability (mainly iron and iodine deficiency), goiter (iodine deficiency), reduced immunity, and night blindness (severe vitamin A deficiency).

2.2.4 What is Malnutrition and who is affected?

The term malnutrition covers a broad range of clinical conditions in children and adults that result from deficiencies in one or a number of nutrients. Under nutrition on the other hand, usually refers to an insufficient consumption or intake of energy, protein or Micronutrients, which in turn leads to nutritional deficiency. This assumes that there is a recommended level of food intake below which probably of nutritional deficiency is greatly increased.

Pacey and Payne (1985) defines malnutrition as:

"*A state in which the physical function of an individual is impaired to the point where she or he cannot longer maintain adequate performance in such process as growth, pregnancy, lactation, physical work, resisting and recovering from disease***"**

According to Helen Young (2001) in Food Security in Sub-Saharan Africa of nutritional strategies; malnutrition has greatest impact on rapidly growing infants and young children and can seriously harm their physical and mental development. Protein energy malnutrition which is the most common form of malnutrition occurring among infants and pre-school children covers a range of clinical disorders that are the result of an adequate intake of energy and protein as well as other nutrients. Marasmus and kwashiorkor are the two clinical forms of protein energy malnutrition. An insufficient intake of particular minerals and or vitamins in the diet can lead to specific deficiency disorders, for example vitamin A deficiency (xerophthalmia), iodine deficiency disorders(goiter and cretinism), nutritional anemia(iron and folate), niacin deficiency(pellagra), vitamin C deficiency (scurvy), etc.

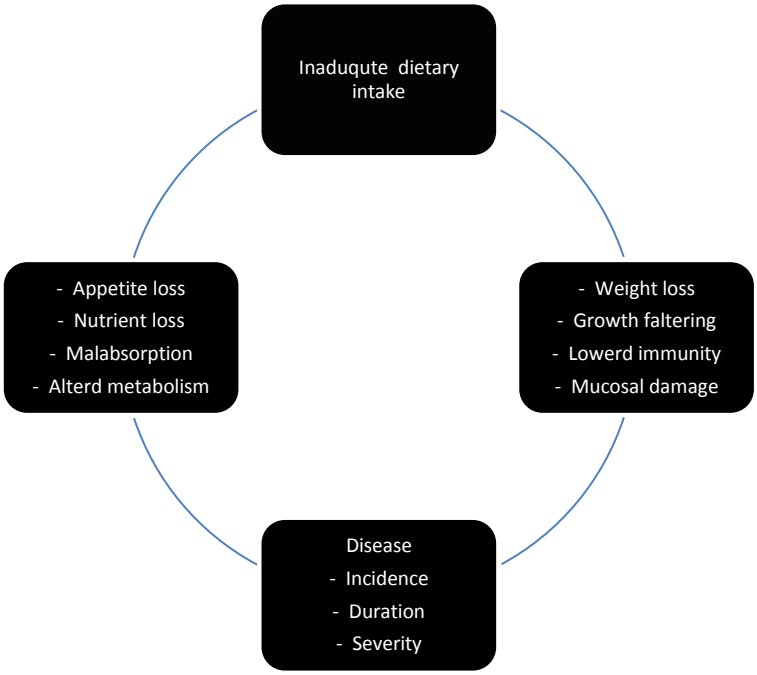
Figure 1: The Vicious Cycle of Malnutrition

Source: *Modified from World Bank (2002a); Bhagwati et al (2004)*

The two immediate causes of malnutrition that affect the individual directly are inadequate food intake and disease (Illness). A healthy diet includes amounts of all types of nutrients. When the intake and balance of these nutrients is insufficient the bodies responds by either producing a characteristic nutritional deficiency or by failure to grow leading to malnutrition.

Health and nutrition closely linked, as disease contributes to malnutrition, while malnutrition makes an individual, more susceptible to disease. The relationship is therefore cyclical: the one exacerbates the other as shown below in the infectious cycle.

Figure 2: The Malnutrition Infection Cycle



Source: *Tomkins and Waston (1989)*

2.3 EOS/TSF and Community Based Nutrition

2.3.1 EOS/TSF Program

In 1995 Ministry of Health and UNICEF begun implementing various programs aimed at improving the health status of children. In June 2004, a new approach called the Enhanced Outreach Strategy (EOS) was developed to deliver a package of essential preventive health services every six months to children aged 6 to 59 months and to pregnant and lactating women. The overall objective of the EOS program is to contribute to the reduction of under the age of five mortality and morbidity through a twice yearly delivery of key child survival interventions. The program seeks to reach coverage of at least 80% of children 6 to 59 months and lactating and pregnant women (UNICEF, 2006).

Initially the program was initiated in drought prone areas of the country. In order to enhance the child mortality reduction efforts the scope of this program was expanded to non-drought prone areas; thereby targeting all *Woredas* of the country. The EOS/TSF since November 2004 is implemented in 325 districts (51%) in all regions of Ethiopia except Addis Ababa.

The Enhanced Outreach Strategy (EOS) without screening and targeted supplementary food is delivered to children in the remaining districts of Ethiopia. This program is a result of collaborative efforts of the WFP, UNICEF, and the Government of Ethiopia. Currently due to the global increase in food price, the number of TSF *Woredas* reduced from 325 to 163 *Woredas*. The combined EOS/TSF program is an innovative approach and is believed to make significant contributions to improving the health and nutrition of children in Ethiopia (UNICEF, 2006).

The outcome of the EOS/TSF has been promising as an interim strategy to address the acute nutritional needs of children and pregnant and lactating women in chronically food-insecure areas. The nutrition-services package includes bi-annual vitamin A supplementation, de-worming and screening for malnutrition. Malnourished children, pregnant and lactating women are then referred to the TSF (to address moderate malnutrition) or to the Therapeutic Feeding Program (TFP) (to address severe malnutrition) if they meet the set admission criteria.

The MUAC measurement and bilateral edema are used for nutritional screening. The cut of point used to label acute malnutrition for the purpose of intervention are MUAC < 12 cm and /or edema, for children and MUAC < 21 cm, for pregnant and lactating women. All acutely malnourished children (MUAC < 12 cm and /or edema) and women (MUAC < 21 cm) are given a ration card that entitles them to collect two rations of food provided by the WFP through the Disaster Prevention and Preparedness Agency (DPPA). This TSF program is provided to each beneficiary on two occasions three months apart. A single ration consists 25 kg of flour and 3 liters of vegetable oil. Severely acutely malnourished children (bilateral edema or MUAC < 11 cm) are referred for therapeutic feeding program (TFP) in addition to receiving the rations (UNICEF, 2006).

According to FMOH Health Sector Development Program (HSDP III) term review report (2008), Seven million children and 1.5 million pregnant and lactating women were screened for malnutrition every six months and referred to TSFP and TFP accordingly. It was, however, reported that there was significant delays between referrals and actual provision of the supplementary food rations.

2.3.2 Community Based Nutrition

One of the interventions still high in terms of priority in the National Nutritional Strategy/Program(NNS/P) is the Community Based Nutrition, which addresses the high level of chronic malnutrition by empowering the community to access, analyze and take action to improve the children and women's nutritional status through community conversation for collective action, including age, appropriate individual counseling on breast feeding, quality and adequate complementary feeding, care of the sick child, immunization and others using Growth Monitoring and Promotion (GMP) as tool (EHNRI 2009).

The Volunteer Community Health Workers (VCHWs) supported by the Health Extension Workers (HEWs) are responsible for implementing the Community Based Nutrition (CBN) working with 30 to 50 households within their community. The CBN packages are monthly GMP activities for children under 2 years (individual counseling based on growth arc and Essential Nutrition Action (ENA) messages on infant and young child feeding) supported by community conversations, follow-up home visits, referral and follow up for children with severe acute malnutrition, promotion, implementation and follow-up of biannual vitamin A supplementation and de-worming through community health days, promotion of maternal and adolescent nutrition, follow-up of iron supplementation for pregnant women, and promotion of use of iodized salt.

The drivers of community actions are set to be the health extension workers supported by community volunteers and model households (one volunteer community health worker per 50 household). There is significant progress in training of health extension workers in Ethiopia since 2003. All the 30,000 HEWs were trained and deployed by

March 2009, covering all rural *Kebeles* with 2 health extension workers. One of the 16 training modules of HEW is on nutrition. Anecdotal evidence of the HSDP mid-term review suggested the need to upgrade the capacity of HEW to identify malnutrition before it reaches the acute stage, improve their nutrition counseling and promotion skills and to strengthen their collaboration with agricultural extension workers to promote consumption of locally available food. Upgrading training for HEW was carried out to correct such weaknesses. Accordingly, 1649 HEWs were trained on CBN over the last two years (Ethiopian National Nutrition Strategy 2009).

Table 2: Decision Chart for the Implementation of Selective Feeding Programs

Finding	Action required
Food availability at household level <2100kcal/person/day.	**Unsatisfactory situation:** Improve general rations until local food availability and access can be made adequate.
Malnutrition rate 15% or more or 10-14% with aggravating factor.	**Serious situation:** • General rations (unless situation is limited to vulnerable groups); plus • Supplementary feeding generalized for all members of vulnerable groups, especially children and pregnant & lactating women; • Therapeutic feeding for severely acutely malnourished individuals.
Malnutrition rate 10-14% or 5-9% with aggravating factors.	**Risky situation:** • No general rations; but • Supplementary feeding targeted to individuals identified as malnourished in vulnerable groups; • Therapeutic feeding for severely acutely malnourished individuals.
Malnutrition rate under 10% with no aggravating factors.	**Acceptable situation:** • No need for population interventions; • Attention to malnourished individuals through regular community services.

Source: *WHO (2000/a*)

2.4 Complementary Feeding

Children need foods other than breast milk for two reasons: firstly for nutrition to grow and develop healthily; secondly to accustom them to the eating habits of the family and community. These two goals do not always harmonize. Spoon-feeding a baby a nutritionally-programmed pre-packaged food whilst she sits alone in her high chair excludes her from the social and emotional interaction and the taste and texture experiences of sharing the family meal. However, in some societies, the shared family meal may not deliver appropriate nutrients to the young child and she may miss out nutritionally if parents and caregivers are unaware of the importance of active feeding and do not know which foods are the most appropriate (UNICEF/WHO 2003).

Food distribution within the family does not always favor children, even in richer societies. Almost 70 years ago, the British government ran an advertising campaign called 'Don't let Dad get all the meat'. Today, even well-educated families may deprive their children of a diverse diet because marketing and misinformation leads them to believe that children need special foods in jars and packets. How infants and young children are introduced to foods is crucial for child survival and lifelong health. The process also has emotional and psychological effects and is part of acculturation; that is one of several learning processes which help a child to become part of his group, whether family or community. Dietary practices not only influence the development of the older baby and young child but also lifelong eating practices. In the poor world many children who are beautifully breastfed beyond two years become malnourished or die for lack of nutritious complementary foods. In the rich world many children's early feeding experiences program them for lifelong harmful eating practices (IBFAN 2009).

Taste preferences are formed in early life and the content and manner of feeding may establish lifelong cravings for overly sweet, salty or energy-dense/nutrient-poor foods and drinks. Family and health worker pressures to eat too much may override innate appetite control and lead to overweight and obesity.

There is also a confusing overlap between what are termed 'complementary foods' and what are in reality breast milk substitutes. Even after six months, many foods do not

complement breastfeeding but replace it when it should ideally continue to be the principal food. For example a baby may be fed by a starchy staple, mashed fruits, juices, soups and gruels, which fill the baby's stomach, reduce appetite at the breast and therefore breast milk supply. Thus these products are de facto breast milk substitutes (IFBAN 2009).

If access to the breast is unrestricted, babies can stimulate the quantity of breast milk they need which can furnish sufficient energy and protein into the second year. The 'nutrient gap' of concern is that of micronutrients iron and zinc. Breast milk provides some but total supply depends on the individual baby's birth stores and as these run out, the baby needs exogenous sources. If the mother's diet is low in certain vitamins, levels of certain micronutrients in breast milk (vitamin A) might be lower. The safer solution would be to amend the mother's diet rather than feed the baby other foods. Many foods given to older infants and young children replace a nutritionally superior food, which has additional disease protection benefits, breast milk, with an inferior product. A true complementary food would add to the diet nutrients such as iron and zinc, which breast milk has not evolved to provide for older infants as the child gradually outgrows her birth stores. Many so-called complementary foods do not fulfill this function (WHO 2003).

Table 3: Important Aspects in Relation to Complementary Feeding

- Rich in energy and nutrients;
- Clean and safe;
- Easy to prepare from family foods;
- Locally available and affordable;
- Start with a few teaspoons and gradually increase the amount and variety;
- Actively encourage a child to eat at mealtimes and when having snacks;
- Make sure all utensils are clean;
- Spoon-feed complementary foods from a bowl or cup. Do not give from a feeding bottle;
- If complementary foods are not kept in a refrigerator, feed them within 2 hours of preparation;
- During and after illness, encourage a child to eat as much as possible at each meal. Continue this until the child regains any lost weight and is growing well again; and
- Keep a chart of a young child's weight. Monitoring growth is a useful way to know if the child is eating enough and is healthy.

Source: *www.who.int/nutrition/topics/complementry-feeding/en*

2.5 Supplementary Feeding Programs

"Supplementary feeding" is defined here, following WHO (1997), as the distribution of food to supplement energy and other nutrients missing from the diet of those who have special nutritional requirements. The most common purpose of supplementary feeding is to prevent or alleviate malnutrition through reducing the nutrient gap between an individual's actual consumption and his/her requirement. Regarding efficacy, many studies have shown that raising dietary intake through supplementary feeding can have beneficial nutritional consequences, including effects on outcomes such as growth, activity, cognitive development and compensation of energy lost during illness (World Bank 2006).

There are important interactions between dietary intake and health status, with implications for supplementary feeding programs. The so-called "malnutrition-infection complex" has been well documented (Tomkins and Watson 1989). Basically, both ill-health and poor dietary intake can result in malnutrition, but there is an important synergistic interaction whereby the combined effect is usually worse than the sum of the two individual effects. This means that, while it is important to deal with

both health and dietary factors, in order to address malnutrition, dealing with one alone (e.g. dietary intake) can effectively remove the interaction effect (World Bank 2009).

Supplementary feeding programs are relatively large programs in which a substantial number of beneficiaries are covered through the support of donors, international agencies and local governments. Such programs are primarily designed to distribute food among children between the ages of six months and 5 years in order to improve their nutritional status or to prevent deterioration in their health and nutrition, both under emergency conditions and in response to chronic food and nutrition insecurity and structural vulnerability.

Typically, moderately wasted children in Ethiopia are treated with corn/soy blended flour (CSB) through targeted supplementary feeding programs. CSB is a low-cost combination of a cereal and a legume fortified with micronutrients. A supply of CSB provides a child's daily energy requirement. There is limited evidence; however, to suggest that CSB is an effective choice for wasted children Although CSB is familiar and acceptable in the community, the inconsistency in outcomes in the treatment for moderate wasting raises questions about its effectiveness (WFP 2009).

Such programs normally target their interventions administratively by selecting the target groups according to geographic location, age or income level. The programs might select the most disadvantaged rural areas and/or the poorest urban slums. The most common criterion for selecting eligible children is the child's nutritional vulnerability, and anthropometric measurements such as weight-for-age or weight-for-height indices are often used to establish eligibility for program participation (WFP 2009).

In supplementary feeding programs it must be ensured that the ration provided is consumed personally by the intended beneficiary in order to derive a direct benefit from the program. Leakage may take place within the household. Foods provided by the program should be based on local food habits and cultural practices, to reduce program leakage. Intra-household leakage can also be reduced through food selection, if specific household members are targeted for supplementary feeding (UNHCR/WFP 1999).

Table 4: Types of Selective Feeding Programs

Program	Objectives	Criteria for selection and target group
Targeted supplementary feeding	• Correct moderate malnutrition. • Prevent moderately malnourished from becoming severely malnourished • Reduce mortality and morbidity risk in children under 5 years	• Children under 5 years moderately malnourished: • between 70% and 80% of the median weight-for height or: between -3 and -2 Z-scores weight-for-height • Malnourished children (based on weight-for-height, BMI, • MUAC or clinical signs): older children (between 5 and 10 years)
Blanket Supplementary feeding	• Prevent deterioration of nutritional situation. • Reduce prevalence of acute malnutrition in children under 5 years • Ensure safety net measures • Reduce mortality and morbidity risk	• Children under 3 or under 5 years • All pregnant women (from date of confirmed pregnancy) and nursing mothers (until maximum 6 months after delivery) Other at-risk groups
Therapeutic feeding program	• Reduce excess mortality and morbidity risk in children under 5 years • Provide medical/nutritional treatment for the severely malnourished	• Children under 5 years severely malnourished: <70% of the median weight-for-height and/or oedema or: <-3 Z-scores weight-for-height and/or oedema • Severely malnourished children older than 5 years, weight for height standards or presence of edema. • Low Birth Weight babies • Orphans < 1 year (only when traditional care practices are inadequate) • Mothers of children younger than one year with breast feeding failure (only in exceptional cases where relactation through counseling and traditional alternative feeding have failed)

Source: *UNHCR/WFP (1999)*

Table 5: Indicators for Monitoring Supplementary Feeding Programs

SFP indicators	Acceptable	Alarming
Recovery rate	>70%	<50%
Death rate	<3%	>10%
Defaulting rate	<15%	>30%

Source: *UNHCR/WFP (1999)*

2.5.1 Determinants of successful Supplementary Feeding Programs

The success of a feeding program depends on the amount of food that is delivered to the beneficiaries, the food quality and type, the duration of feeding, the timing of supplementation, the nutritional status of entrants and the degree of targeting of the food program. Related factors are whether health care is also provided and the degree of supervision.

2.5.1.1 Amount of Food and Sharing

Program has varied in the amount of food that has been distributed to participants. Typically, some baseline measure of dietary intake is used to determine the caloric and nutrient deficits in the population. Based on this information, the caloric and nutrient supplementation to be provided by the food ration is determined. However, since the ration size is based solely on average deficits, the amount of food that is distributed is too little for some and may be more than is needed for other recipients. The review of feeding program, found that only 62 to 83 percent of the energy gap was filled by the calories provided in the supplemental food (Andorson 1976).

In addition, most programs assume that only the existing calorie deficit needs to be filled by the ration; no allowance is made for any leakage in the food supplement. Some of the ration food will be substituted for food in the normal diet. Recipients also share the food with other household members. Project Poshak in India (Gopaldas et al 1975) found that sharing could decrease the amount of ration the child consumed by

50%. Clearly leakage due to sharing, substitution, and selling the ration, decrease the amount of food the recipient ultimately eats.

Alternatively, the type of nutrition delivery system can be used to curtail leakage. On-site feeding can reduce the leakage due to the sharing and selling of food. Anderson et al (1981), in an evaluation of supplementary feeding in five countries, reported that in-onsite feeding mothers reported that 79 to 86 %of the children ate the ration.

2.5.1.2 Food Quality and Type

Supplementary feeding programs are concerned not only with of food that is distributed but with the balance between calories, proteins and other nutrients in the ration. A FAO/WHO working group has recommended that 11% of the calories in the ration provided by protein (Anderson et al 1981). Diets that are deficient in calories and/ or proteins are typically also inadequate in micro nutrients.

While most programs advocated the use of culturally appropriate foods in supplemental feeding programs, in reality many projects continue to use imported foods. Many of the weaning foods that have been developed from imported foods have achieved limited acceptability in the target groups. The continued reliance of supplementary feeding programs on donated foods has increased country dependency on outside donors. Since the ultimate goal of most programs is to develop a self-sustaining intervention, use of donated foods should eventually be eliminated. The Indian government has recently taken the position that only locally produced products will be used as part of the supplementary feeding programs; this policy can potentially stimulate the demand for local products and strengthen the agricultural sector (Kielmann et al 1978).

2.5.1.3 Duration of Feeding

The length of time an individual must participate in a supplementary feeding program in order to improve nutritional status vary by type of program operation and the nutritional status of the participant. Nutritional rehabilitation centers (NRC) in which two-third or more of total nutrients need are provided in a closely provided in a closely

supervised setting have produced significant decrease in protein calorie malnutrition in a little two months (Anderson et al 1981). However, other types of operation take much longer time to produce similar results. Take home feeding programs tends to need one to two years of regular participation in order to produce sustained improvement in growth. On-site feeding program require a similar amount of time to produce a significant effect (Kielmann et al. 1978).

2.5.1.4 Timing of Supplementation

The time at which food is provided may influence the effectiveness of supplementation. For children the weaning period between 6 and 36 months is the time when they are most nutritionally vulnerable and in most need of supplemental feeding. It is during this period that the child is taken of breast milk and often given a less nutritional substitute. A study in Gutemala (freeman et al.1977) found the most positive impact was in child born to supplemented mothers and who received supplementation up to 36 months of age.

2.6 Micronutrient Malnutrition, Production of Local Blended Foods and Food Fortification

2.6.1 What is Micronutrient Malnutrition?

The overt effects of micronutrient malnutrition, such as blindness, anemia and goiter, have been known for many centuries. In more recent years, scientific research has revealed that the impact of Micro-Nutrient Deficiencies (MND) extends far beyond these effects, positioning their elimination as a global priority. Vast populations with MND in developing countries are unable to achieve their full mental and physical potential due to stunted growth, low physical work capacity, reduced IQ and lower resistance to infection. Elimination of these deficiencies is essential not only to improve health but also for sustained economic growth and national development (World Bank 2006).

2.6.2 Magnitude of Micronutrient Malnutrition

Thirty percent of the world's population is affected by vitamin A, iron or iodine deficiency. About 700 million persons suffer from clinical forms of these deficiencies and another two billion from sub-clinical forms. Apart from these three major public health problems, deficiencies of other micronutrients such as zinc, calcium, folic acid and other vitamins are widely prevalent in the developing world. Three quarters of the populations suffering from these deficiencies live in Asia. Over the last decade, the proportion of Asian households consuming iodized salt has increased significantly, resulting in lower goiter rates. Yet, nearly one billion people in the region remain uncovered by Universal Salt Iodization (USI). The prevalence of xeropthalmia and blindness is reduced to a great extent but one third of the preschoolers still have sub-clinical Vitamin A Deficiency (VAD), which increases the risk of disease and death. Iron Deficiency Anemia (IDA) affects 60 percent of women of reproductive age and is an important cause of maternal mortality. It reduces physical work capacity and productivity in adults and impairs learning ability and scholastic achievement in children. Both iron and iodine deficiencies have a negative impact on psychomotor development of children, which may be permanent if not corrected early in life. Thus micronutrient malnutrition poses a serious threat to national health and development (FAO/WHO 2004).

2.6.3 Production of Local Blended Foods

Blended foods are mixtures of cereals and other ingredients, including, pulses, dried skimmed milk and possibly sugar and/or some kind of vegetable oil. There are a number of processes for the commercial production of blended foods; example, dry blending of milled ingredients, toasting or roasting, extrusion cooking. The final product is usually milled min to powered form and fortified with vitamin and mineral pre-mix. Extruded and roasted blended foods are 'pre-cooked and therefore required minimal cooking which preserves level of micronutrients (Institute of Development Studies 2001).

A blended food tends to provide significantly higher and better quality levels and better quality protein than cereals. The Codex Alimentarius Commission of the Food and Agricultural Organization (FAO) recommend in the order of 15 gm protein per 100 gm blended food, together with increased levels of micronutrient and some time additional fat (FAO Codex Alimentarius Commission 1991). Blended foods were originally designed to provide protein supplements for weaning infants and young children or for low cost weaning foods in developing countries; for example *Faffa* in Ethiopia, *Likuni Phala* in Malawi and *Musalac* in Buredi. Some of the products are now used in the general ration for children and adults as a means of providing an additional source of micronutrients (Institute of Development Studies 2001).

According to Helen Young, in Nutrition and Intervention Strategies of Food Security in Sub-Saharan Africa; Blended foods have also been designed for use in nutritional rehabilitation programs. These products are more expensive than regular blended foods, partly because of their higher quality ingredients and higher specification package. They also contain a wider range of micronutrients suitable for the needs of malnourished children.

2.6.4 Fortification Strategy to reduce Micronutrient Deficiencies

Effective nutrition interventions are available to prevent MND and their consequences. Short-term strategies such as nutrient supplementation (giving a large dose of the micronutrient as a medicinal supplement) have been effective in providing immediate relief in several countries, but there is concern that this approach is not sustainable in the long term. Food fortification is a more cost-effective and sustainable solution. It plays a major role in improving the diet and meeting the micronutrient needs of the population. This must be viewed as part of an integrated food-based strategy; others include dietary diversification, homestead production and improved food processing and storage. Food fortification has several advantages over other interventions as it does not necessitate a change in dietary patterns of the population, can deliver a significant proportion of the recommended dietary allowances for a number of micronutrients on a continuous basis, and does not call for individual compliance. It

could often be dovetailed into the existing food production and distribution system, and therefore, can be sustained over a long period of time (FAO/WHO 2006).

The technical considerations in food fortification include selection of appropriate food vehicles that are consumed by a sizable proportion of the population and lend themselves to centralized processing on an economical scale. The product should be distributed through a wide network so that it reaches all parts of the country. Salt iodization is a good example of successful large-scale fortification in the developing world, the main reason for success being the simple and low-cost technology. Staple foods like rice, wheat and corn flour are some of the commonly consumed foods that can be fortified. However, these foods are often eaten where they are grown and processed at the community level. This limits fortification control and safety. When there is no single universally consumed vehicle in a country, fortification of a number of foods may be considered. The choice of food vehicle depends on local availability and consumption patterns (FAO/WHO 2004).

It is important to address micronutrient malnutrition in early life to reduce long-term effects on growth and development. In areas where iodine deficiency is endemic, an average child loses about 13 IQ points. IDA depresses psychomotor skills and intelligence but the effects are reversible if the intervention is early enough. Targeting fortified foods to infants and young children will improve their physical and mental development. The prevalence of iron deficiency in children was reduced from 30% to less than 5% through iron fortification of infant foods. While fortified complementary foods are now widely used in industrialized countries, they are beyond the reach of the poor in developing countries. The challenge is to increase the density of complementary foods with multiple fortifications of essential vitamins and minerals at an affordable price. The industry has an opportunity to create such nutritious foods and improve the growth potential of poor children (FAO/WHO 2006).

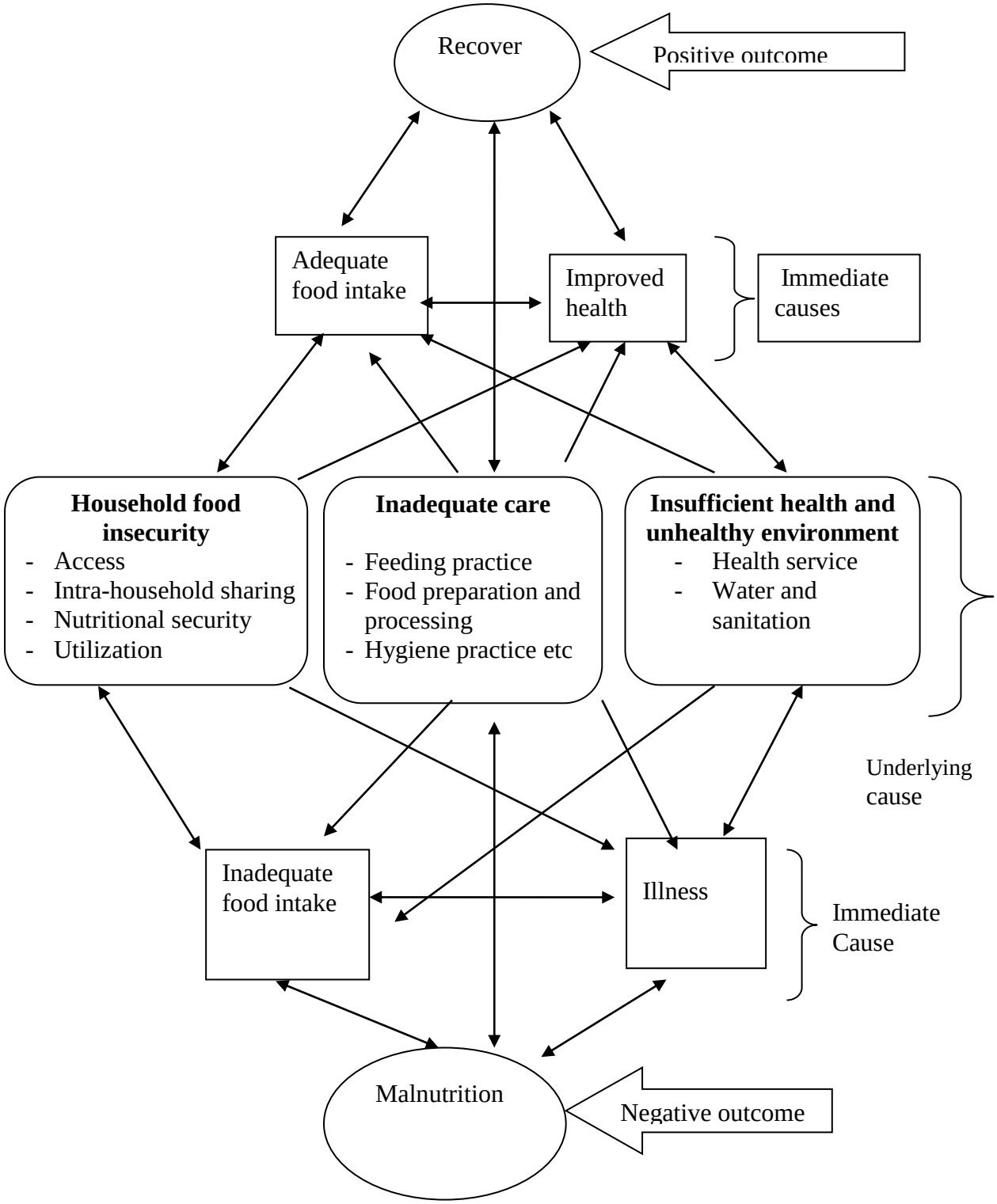
2.7 Causal Analysis

Once the problems have been assessed, and know something about who, what, where and when, then need to move on to ask the question “why?” In investigating causes, how do we know what to look for? It is helpful to have a simple conceptual framework to serve as an organizing principle or a common language that facilitates understanding and communication.

One widely used framework, developed by UNICEF but now used by many, positions a child’s nutritional status as an outcome of various causes which interact at different levels (see Figure 3).

This framework is comprehensive without being too complex and flexible without being too open-ended. It demonstrates the multidisciplinary nature of the nutrition problem, yet at the same time facilitates appropriate focused action.

Figure 3: Conceptual Framework which is modified by the researcher from UNICEF (1999)



2.7.1 Immediate Causes

At the immediate or individual level, the child needs to have an adequate dietary intake and to be free of disease and infection in order to be well nourished. If the child is either sick or not eating enough, his/her growth is likely to be impaired, which may over time lead to malnutrition. Poor diet and disease interact in a synergistic, vicious cycle with each factor exacerbating the other. Inadequate dietary intake in the young child compromises immune function and may lead to disease being more severe and/or more prolonged. Disease reduces appetite and hence intake, as well as reducing absorption and utilization of ingested nutrients and increasing catabolic losses. This has been referred to as the "malnutrition infection complex" (Tomkins and Watson 1989).

2.7.1.1 Dietary Intake

The adequacy of a young child's dietary intake relates to:

- The quantity of food consumed,
- The quality of the overall diet with respect to various macro and micronutrients,
- Its form, including palatability, energy density, bulk, and
- How frequently the food is actually consumed.

Child feeding (including breastfeeding and complementary feeding) is one of several caring practices. Energy density and dietary bulk are crucial concerns to the young growing child. Between 6 to 24 months in particular, the child has a relatively small stomach when compared to the quantity of food s/he needs. Frequent feeds are therefore required. But also the food must have a high caloric density for a given volume and thus not be too "bulky". The addition of some fat preferably, or even sugar, to staple cereals will greatly increase energy density in this way. Thus, for a given spoonful of food, more valuable calories are being consumed.

2.7.1.2 Disease and Infection

At an immediate level, a child thus becomes malnourished as result of an inadequate dietary intake often compounded by disease and infection. It will be necessary to gain some knowledge of the main types of disease suffered by young children and how common these are like, diarrhoeal disease, acute respiratory infections, parasitic infections, measles and malaria. Ideally data should be disaggregated by age, location, and season. Such a causal analysis will thus point to the main likely immediate causes of the malnutrition observed. We will now know the nature and magnitude of malnutrition and the types of diet and disease factors which are most proximally associated with it. But we will not yet know why dietary intake is inadequate, or why certain diseases are so common (World Bank 1999).

2.7.2 Underlying Causes

In order to ensure the immediate conditions of an adequate dietary intake and a disease-free, healthy child, there are three main underlying preconditions, summarized as: Food, care and health. These preconditions apply at the household level, referring to a household's access to resources (food, health) and how it uses them (care). "Food" refers to household food security, "care" to adequate care of women and children, and "health" refers to access to health services, water and sanitation. For a child to be adequately nourished throughout her or his life, all three of these preconditions need to exist simultaneously. In any problem analysis, there will be a need to investigate the relative roles of food, health and care factors in the causation of malnutrition; through focusing on the types of questions listed below. Again, this is intended to serve as a checklist which delineates the scope of each causal area. Obviously not all data are available or even required in any one situation (Institute of Development 2001).

2.7.2.1 Household Food Security

Does the child come from a household which has the ability to acquire adequate food for all its members throughout the year? How does household food security relate to individual nutritional status? Household food security can be seen in the framework to

be necessary but, of itself, not sufficient to ensure adequate individual nutrition. It clearly may be possible to be malnourished in a food-secure household through the effect of disease, inadequate care or inequitable food allocation. Moreover, while a household may be food-secure in terms of calories, dietary quality will determine the likelihood of micronutrient deficiencies occurring in individuals. It should also be pointed out that it may be possible for an individual to be well-nourished in a food-insecure household, although not all household members will be able to remain well-nourished in such a household over the long term. For example, young children who are well-nourished in food-insecure households are often referred to as examples of such 'positive deviance' which usually occurs as a result of the priority allocation of food, health and care resources to growing children in these households. Assuring food security at the household level is a fundamental first step in assuring adequate individual dietary intakes and ultimately adequate nutritional status. There is no single measure or indicator of household food security that can be applied universally in the way that anthropometry proxies for malnutrition. The following are some examples of indicators:

- Aggregated household energy consumption compared to aggregated household energy requirements
- Number of meals eaten each day
- Types and frequency of foods actually consumed (through food frequency assessments).
- Percentage of household expenditure that is allocated towards food purchases. The poor usually spend a high proportion of their income or expenditure on food, and thus income poverty and household food security tend often to be strongly related.
- Dependency ratio of the household i.e. proportion of young (dependent) children to wage-earning adults.

- Number of daily hours required for adult earners to work in order to acquire sufficient food for the entire family. Other resource-related indicators include household income, number of income sources, asset ownership etc, although these are less specific to household food security.

2.7.2.2 Care for children and Women

Do caregivers in the household and community have enough time, knowledge and appropriate skills to provide adequate care for children and women (particularly during pregnancy and lactation); Care essentially refers to behaviors and practices that is how resources (particularly food and health resources) are actually used within the household.

As mentioned, the fact that a young child needs to be actively fed by someone shows the importance of feeding practices, as distinct from food per se. Caring practices are conditioned by cultural factors, belief systems and capacity factors such as resources like time and knowledge (World Bank 1999). Indicators of such a capacity to care may include availability of maternal time for child care, the presence of alternate caregivers or community child care facilities, maternity benefits etc. There are six key types of caring practices with relevance to nutrition (Valid international 2006):

a) Feeding practices
b) Care for women
c) Food preparation and processing
d) Hygiene practices
e) Home health care, and
f) Psycho-social care.

a. Feeding practices

These are the most important caring practices with respect to nutrition. The fundamental means of preventing malnutrition among infants and young children is to ensure optimal home-based feeding. This simple fact should never be forgotten in

discussions of the role of supplementary feeding. Breastfeeding is the most important nutritional action that can be taken to ensure the adequate growth and development of the newborn child. Breastfeeding should be exclusive for about the first six months of a child's life, after which time semi-solids should be progressively introduced to the diet to complement the continued breastfeeding. If the child is less than six months old, it will be important to know if she/he is being exclusively breastfed, and if not, why not? What are the constraints? If the child is over six months of age, the following questions are important:

- Is the child receiving complementary foods?
- What age were such foods introduced?
- What type of foods?
- How are these foods prepared?
- Who feeds the child?
- Is the child fed adequately during illness?

b. Care for women

Maternal nutritional status (as measured for example by Body Mass Index (BMI)) is one proxy indicator of care for women, especially during pregnancy and lactation. At a more basic level, care for women encompasses her mental health, self-confidence and degree of power in household decision-making.

c. Food preparation and processing

- Is food stored, processed, prepared, and cooked adequately?
- Is food handled hygienically?
- Who prepares food for the household?
- How much time does this take?

It is important to know how households obtain food, who purchases it, who controls household resources (e.g. income) relating to food? What type of food beliefs, taboos exist? For example, do mothers believe the child can control his/her own intake or does

the mother take a more proactive child feeding role? This whole area of intra-household distribution of both food and health resources is a care issue, as it depends on socio-cultural practices and behaviors.

d. Hygiene practices

- Are personal hygiene practices adequate? Like, hand-washing, bathing and cleaning the child.
- Are household hygiene practices adequate? Like, cleaning house and immediate surroundings, disposing of child's waste, use of sanitary facilities, making water safe and choosing safe water.

e. Home health care

- Are measures taken to prevent illness?
- Are illnesses diagnosed?
- Is home treatment provided e.g. oral rehydration?
- Are preventive health services utilized e.g. immunization?
- Are curative health services utilized?

f. Psycho-social care

- Is the caregiver responsive to the child's developmental milestones and cues?
- Does the child interact positively with the family (touching, holding, and talking)?
- Is the child confident to play and explore her/his surroundings?

2.7.2.3 Health and Environment

Does the child have access to good quality health services, safe water supplies, and adequate sanitation?

a. Health services

- What kind of health infrastructure, and facilities exist (particularly MCH)
- What services are performed at these facilities?
- How accessible are facilities to vulnerable populations?
- What is immunization coverage (a proxy of outreach/access)?
- What is the quality of the facilities?
- What is the quality of trained staff at the facilities?
- Is staff always in attendance?
- Is an adequate supply and availability of essential drugs maintained?
- What types of services are in demand, what ailments trigger utilization?

b. Water and sanitation

- What type of water supply system exists?
- Is safe drinking water accessible?
- What amount is available per person?
- Is there access to an adequate sanitation system (e.g. latrine use)
- Is there adequate housing?

CHAPTER THREE

3. RESEARCH METHDOLOGY

3.1 Research Design

The study employed **case study.** This research deals on children who are under the age of five which were screened for supplementary feeding program or moderately malnourished children by 12th round TSF/EOS program.

3.2 Sample Size

To get representative data and to generalize the findings to all enrolled children in Mareko *Woreda*, the standard proportion sample size determination formula which is proposed by Mugenda (1999) was used.

$$\mathbf{n = \frac{Z^2 * p * q}{d^2}} \quad \text{……. (1)}$$

Where,

n = the desire sample size without considering non respondents

Z=level of standard confidence (1.96)

P = the proportion of children enrolled for TSF

q = 1-p

d = standard margin of error or the level of statistical significance (5% =0.05)

Total population of Mareko Woreda = 64,436

6-59 population = 10,052

6-59 month children enrolled in 2010 for TSF are 1200 which is 11 % so to know the n value $n = \frac{(1.96)2*0.11*0.89}{(0.05)2} = 132$

For the effective management interpretation of data I will use the sample of 100 households.

3.3 Sampling Procedures

The study employed systemic and purposive sampling techniques in order to select the required sample. First, the enrolled children were identified and the list of enrolled children was taken from *Woreda* Health Office that was screened during July 2010 EOS/TSF campaign of those who were moderately malnourished.

According to the data obtained from the health office 1143 children were enrolled (screened) for targeted supplementary feeding. From those, the totals of 100 children who have been already started feeding for 45 days were selected through systemic sampling. For the effectiveness and efficiency of data collection strategies four sample *kebeles* (Elalagebeba, Didahalbo, Hobe and Didamedore) were selected among 26 *kebeles* based on malnutrition prevalence, accessibility and food insecure areas. From these sample kebeles 100 Households/children were selected (Elalagebeba=20, Dida Halebo =25, Hobe =25 and Didamedore =30). Moreover, purposive sampling was used for selecting implementing offices (Ministry of Health, World Food Organization, *Woreda* Health Office, *Woreda* Disaster Risk Management and Food Security Agency) and responsible experts were undertaken for key informant interview.

3.4 Data Collection Methods

In order to elicit the required primary data:

Household survey was implemented: To understand the background information of the households, the knowledge attitude and practice of mothers/caregivers and the prevalence of infant and childhood diseases, structured questioners were used. Moreover to know the nutritional status of screened children, anthropometric measurements were used.

Key informant interview was applied: To identify the determinants/confounding factors for the effectiveness of TSFP and to cross check the household survey results, 5 responsible experts were interviewed from implementing Agencies/Offices.

Laboratory work was employed: To investigate the nutritional content of home-made complementary foods, six samples were taken from Didamedore *kebele* which mothers often feed under the age of two children. Sample containers were taken from food science laboratory and disinfected with Nitric acid and deionizer water for 24 hours to keep the micronutrient content of sample foods especially iron and zinc. And the sample also was transported to the laboratory in ice-box and kept at less than 4 ^{0}C prior to sample preparation especially for moisture determination.

Determination of crude protein:

Protein content was determined according to AOAC (2000) using the official method 979.09. A digestion flask containing about 0.5 g of sample, to which 3.5 ml of acid mixture and about 3g of catalyst mixture (K_2SO_4 and Selenium) were added and exposed to about 370 ℃ in order to allow digestion. Then, distillation took place in (Kjeltec 2300 Analyzer unit, FOSS, Sweden) by adding 25 ml of 40% NaOH and using 25 ml of boric acid with 10 drops of indicator solution. Finally, the distillate was titrated with standardized 0.1N sulphuric acid to a reddish color. The crude protein content was estimated using the formula:

$$Total\ nitrogen,\ percent\ by\ weight = \frac{(V_2 - V_1)\ x\ N\ x 14.007\ x 100}{W} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where, V_2=Volume in ml of the standard sulphuric acid solution used in the titration of the test material.

V_1= Volume in ml of the standard sulfuric acid used in the titration for the blank determination.

N= Normality of the standard sulphuric acid.

W= weight in grams of test material.

Crude protein content, percent per weight = total nitrogen $\times$ 6.25

Determination of crude fat:

A clean and dried thimble containing about 2 g of dried sample and covered with fat free cotton at the bottom and top was placed in the extraction chamber. Then, extraction took place using **(**2055 SOXTEC extraction unit, FOSS extractor, Sweden**)** for at least 4 hrs according to AOAC (2000) official method 4.5.01. The crude fat content was determined by the formula:-

$$\text{Crude fat (\%)} = \frac{M2-M1}{M} \times 100\% \quad \text{---------- (3)}$$

M_2=mass of flask and lipid extracted

M_1=mass of dried flask

M = weight of sample on dry basis

Determination of crude fiber:

Crude fiber analysis was conducted using the method of AOAC (2000) official method 962.09. About 1.6gm weighed sample was transferred into a 600 ml beaker and about 200 ml 1.25% sulfuric acid was added and boiled for 30 minutes. Recording took place by placing a watch glass over the mouth of the beaker. After 30 minutes heating by gently keeping the level constant with distilled water, 20 ml 28% KOH was added and boiled gently again for another 30 minutes. Subsequently, washing was conducted with 1% sulfuric acid and NaOH solution. After, filtering it was then dried in an electric oven (Memmert 854 Schwabach, West Germany) at 130 ^{o}C for 2hrs. Furthermore, it was cooled at room temperature for 30 minutes in a desiccators and weighed, then transferred the crucibles to muffle furnace (Carbolite Aston Lane, Hope,S20 England.) for 30 minute ashing at 550 ^{o}C . Finally, it was cooled again in desiccators and re-weighed. The crude fiber content was determined by using the formula:

$$\textit{Crude fiber content}\left(\frac{gm}{100}\right) = \frac{\left[\left(w_{1-}\, w_2\right)\left(100-m\right)\right]}{w_3} \quad \text{---------- (4)}$$

where, w_1= crucible weight after drying, w_2= crucible weight after ashing , w_3 = dry weight

m = % moisture of the sample

Determination of moisture content:

Moisture of the wet samples (homemade complementary foods) was determined according to AOAC (2000) using the official method 925.09. A clean dried and covered flat aluminum dishes were weighed and about 5gm of the sample were transferred to the dish. The dish then placed in the oven (Memmert 854 Schwabach, West Germany) at 102 ^{o}C for overnight and cooled in desiccators and re-weighed (Adane Thilahun 2009). Then, the moisture content was estimated by the formula:-

$$Moisture\,content\,(\%) = \left(\frac{weight\ of\ \ fresh\ sample - weight\ \ of\ dry\ sample}{weight\ \ of\ \ fresh\ sample} \right) x\,100 \quad \text{-------- (5)}$$

Determination of total ash:

The porcelain dish used for the analysis was washed by dilute hydrochloric acid on boiling. And it was washed with distilled and de-mineralized water respectively. Then dried at 120^{0}C in an oven and ignited at 550^{0}C in analytical balance (M_1). About 2.5 gm of sample powder was weighed in to the porcelain dish (M_2).The sample was charred at 120^{0}C on hot plate (Wagtech, UK, hot plate SH3), until the whole content becomes carbonized. Then the sample was placed in a (Carbolite, Aston Lane, Hope, Sheffield s30 2RR, England) furnace at 550^{0}C until whitish color appears. The sample was removed from the furnace and placed in desiccators. Finally the mass was weighed as (M_3) (AOAC 2000).

$$\text{Ash (\%)} = \frac{M3 - M1}{M2 - M1} \times 100\% \quad \text{---------- (6)}$$

M_1=mass of the dried dish

M_2=mass of the dish and the sample (on DB)

M_3=mass of the dish and the ash

Utilizable carbohydrate (CHO) determination:

The total utilizable carbohydrate was calculated by difference with the exclusion of crude fiber.

Total carbohydrate (%) = 100 - (fat + fiber + protein + ash) ---------- (7)

Total energy in kilo calories:

The gross energy (GE) content in each sample was determined mathematically using the following formulae:

Total energy (Kcal) = (9 × crude fat content + 4 × protein content + 4 × CHO Content) ---------- (8)

Laboratory results and food composition table were used: To propose the appropriate daily nutritional requirements of foods of children for complementary foods from locally available crop products; food composition table for use in Ethiopia part III was used based on complementary food laboratory analysis result which was carried out by the researcher.

To support the primary data, secondary data analysis and observation have been undertaken to acquire relevant information. Field visit was conducted as it is believed to provide better understanding of what was actually happened on in the ground. This particularly helped the researcher to observe the children's condition, the actual complementary foods that have been given by mother/caregiver and perception of households on targeted supplementary feeding.

3.5 Method of Data Analysis

Once data collection was completed, the quantitative data was stored out by theme and source. The household survey questionnaires were entered into SPSS evaluation version 17 for analysis. Frequency table and cross tabulations was done to articulate the results.

Anthropometric data was entered and analyzed using SPSS version 17software. The outcomes measured for nutritional status using base line MUAC measurement and after 45 day feeding MUAC measurement. For laboratory analysis mean +_ SD were used.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

In this chapter both the primary and secondary data collected through household survey, laboratory work, key informant interview, and direct observation from organizations and offices are presented, analyzed and discussed. It follows the explanations and analysis of the data incompliance with the analytical framework of the study.

4.1 Targeted Supplementary Feeding

Screening of children under the age of five using Mid-upper Arm Circumference (MUAC) and edema also takes place in conjunction with delivery of the health inputs. Those children who are found to have a MUAC below the cut-off point of 12.0cm are given a ration card and referred to the TSF program. Those who are below 11.0cm with MUAC and/or with edema are referred health services centers for treatment of severe malnutrition. The TSF beneficiaries receive 2 to 3 month food supplements that comprises 25 kg of micronutrient fortified Corn Soya Blended (CSB) and 3 liters of vegetable oil. These provide 1,690 kilocalories and 55gm of protein per day (http//www.wfp.org/eb/docs/2007/wfp137560).

The MUAC screening and TSF referral takes place every six months at designated EOS sites. The TSF distribution takes place every three months at TSF designated sites. The FMOH and UNICEF are responsible for the EOS component while the Disaster Risk Management and Food Security Section DRMFSS and WFP are responsible for the TSF component.

The overall aim of the combined components of the EOS/TSF is to reduce morbidity and mortality in children under five.

In Mareko *Woreda,* TSF has been undertaking in 25 rular *Kebeles* and in Koshe 01, among these *Kebeles* 1143 children were screened for supplementary feeding which accounts 11% of the total population of the age of under the age of five in 12th round EOS program. Among these 1053 children were MUAC measurements between 11-11.99 cm, 95 children were MUAC measurement 11cm; and 52 of them with bilateral edema (EOS 12th round from 14/11/2002-16/11/2002 EC WFP report).

4.2 Analysis and Discussion of Household Survey Data

These parts of the data analysis and discussion constitute the most imperative parts of the study: socio-demographic and economic data of the household, knowledge and practices of mothers/caregivers, health information and anthropometric measurement of children.

4.2.1 Background Characteristics of Respondents

The socio-demographic and economic backgrounds of the respondents are significant for various reasons. Therefore, this part of the study describes some of the important socio-demographic and economic profiles of the respondents which are directly and indirectly relate to the effectiveness and efficiency of supplementary feeding. In all, 78 women representing mothers/caregivers of children 6 to 59 months were interviewed.

4.2.1.1 Age Distribution of the respondents

According to the household survey the age range of all respondents (mothers/caregivers) was from 19 to 48 years old. As shown in table 6, though, different from *Kebele* to *Kebele*, the highest percentages (46.10%) of the respondents' age range were from 21 to 28 years old, the second percentage (39.42%) of the respondents' age range were from 29 to 35 years old. While the three least percentages 7.9%, 5.26% and 1.3% of respondents were the age range of 36 to 44, 15 to 20 and greater than 44 years old respectively.

Table 6: Age Distribution of the Respondents

Sr.No.	*Kebele*		Age rage					
			15-20	21-28	29-35	36-44	Above 44	Total
1	D/Halebo	No.	1	4	4	0	1	10
2	D/Medore	No.	1	10	11	5	0	27
3	E/Gebeba	No.	1	12	6	0	0	19
4	Hobe	No.	1	9	9	1	0	20
	Total	No.	4	35	30	6	1	76

Source: H*ousehold survey and computation (This paper researcher, 2011)*

4.2.1.2 Distribution of Educational Status Vs Age of Respondents

Table 7: Tabulation of Educational Status Vs Age of Respondents

Sr.No	Educational status		Age range					
			15-20	21-28	29-35	36-44	Above 44	Total
1	Illiterate	No.	2	24	24	5	1	56
2	Read and write	No.	0	1	1	1	0	3
3	1-4 grade	No.	0	9	2	0	0	11
4	5-8 grade	No.	2	0	1	0	0	3
5	9-10 grade	No	0	1	1	0	0	2
	Total	No	4	35	29	6	1	75

Source: H*ousehold survey and computation (This paper researcher, 2011)*

Table 7 unveils the educational status of the interviewed respondents, 74.7% of the respondents were illiterate, 4% of them were able to read and write without formal education, 14.7 % were some elementary school status 1 to 4 grade and 4% were 5 to 8 grade, and the rest 2.6% were secondary school status of 9 to 10 grade.

Table 7 also tells that the educational status of respondents in relation to the age category from 15 to 20 years old respondents, 50% of them were 5 to 8 grade, whereas age 21 to 28, 29 to 35, 36 to 44 and above 44 years old respondents 68.6%, 82.7%, 83.3% and 100% were illiterate respectively.

The results of table 6 and 7 indicate a very high level of illiteracy among mothers/caregivers. Even though the situation seems to have improved as we have seen age ranges. Levels of illiteracy among respondents still remain over 74.7%. High levels of illiteracy usually have negative impact on the earning capacity of women, hence their socio-economic status. Maternal literacy and level of education impact on the human and economic empowerment of women. (WHO, 2005). Income disparities have been known to translate into nutritional disparities of children. Children from the poorest 20% of the population have been known to be twice as likely to be underweight for their age (UNICEF, 2006). However, maternal education and maternal knowledge in nutrition are independently associated with nutritional outcomes (Webb and Lapping, 2002).

4.2.1.3 Family size Distribution of the Respondents

Table 8: Tabulation of Family Size on Age Greater than 5 Vs Less than 5

No. of family members greater than age of 5	Children Less than age of five			Total
	Family with one child	Family with two children	Family with three children	
2	7	9	2	18
3	2	6	3	11
4	8	5	2	15
5	4	12	1	17
6	4	4	0	8
7	1	4	0	5
8	3	0	0	3
9	1	0	0	1
Total	30	40	8	78

Source*: Household survey and computation (This paper researcher, 2011)*

Table 8 shows cross check: those of whose age greater than five households, who have only one child, are 7 respondents, as the number of household members' increases; the

numbers of children under the age of five are decrease, which means the fertility rate of aged partners, are very low. As we can see from the table, the number of households who have three under five children displayed at the top of the table that related with the fertility potential (age) of wife of the household.

Table 8 also reveals, among 78 respondents 30 of them which accounts 38.5% were those who have only one under five child, 40 of them which is 51.3% were those who have two under five children and the rest eight of them which accounts 10.3% were those who have three under five children. What is the amusing thing observed and realized during data collection and supervision; at whatever level two or three children were malnourished in one household; only one child was selected (screened) for Supplementary Feeding Program (SFP).

Table 9: Tabulation of Household Members more than three vs other Ration Beneficiaries

		Beneficiary of other rations		
Family members more than three		Yes	No	Total
	Yes	40	30	70
	No	7	0	7
	Total	47	30	77

Source*: Household survey and computation (This paper researcher, 2011)*

As table 9 shows, among 77 respondents 47 of them which accounts 61% were the beneficiaries of other rations rather than targeted supplementary feeding, like productive safety net program and relief. This implies that more than 61% of the residents of the area are under poverty level (food insecure). Therefore most of the beneficiaries in the program are coming from food insecure households according to socio-demographic/economic analysis of household survey.

In 2001 from 61,000 *Woreda* populations 24,419 of them were the beneficiaries of productive safety net program, and 7,800 of them were the beneficiary for relief program. The two programs beneficiaries were 58.82 % during good harvest year. In 2002 from 62,500 populations 24,419 of them were the beneficiaries of productive

safety net program and 22,798 of them were the beneficiaries of relief program (especially February, March and April) which accounts 75% during bad harvest year. According to *Woreda* report there was 85% production reduction because shortage of rain and resultant problems. In 2003 from 63,000 populations 24,419 of them have been the beneficiaries of productive safety net program which accounts almost 39% in the middle of the year which is good harvest season. What we have to understand from these *Woreda* data/report, in every year 22,419 *Woreda* populations were in need of food assistance which divulge, 39% of the populations in the *Woreda* are food insecure as well nutrition insecure in Gurage *zone* among 13 *Woredas (Marko Woreda* DRMFSS *2001 and 2002 and 2003* annual report*)*. From this fact, children of age under five who are living in Mareko *Woreda* are more vulnerable for nutrition insecurity or are more vulnerable for malnutrition.

In addition, among 78 respondents 26 of them which accounts 33.3% were polygamous households, from these 26 polygamous respondents 23 of them which accounts 88% whose family members were more than 3. Hence, the efficiency and effectiveness of targeted supplementary feeding program at whatever national, regional, community or household level are influenced by the Family size, beliefs and values. Besides, among 78 respondents, 71 of them which accounts 91% were their family size have more than 3, and the rest 7 of them which accounts 9% of their family size have 3 (nuclear family) which has also substantial influence on the effectiveness of the program and caring and feeding practices of mothers/caregivers (Care Ethiopia 2009). Other backgrounds characteristics of respondents like religion, ethnicity and marital status of the respondents/households are of the essence on caring and feeding habit of mothers/caregivers as well for the realization of the program.

4.2.2 Analysis and Discussion on Knowledge, Perception and Practice of Mothers/Caregivers data of the Household

The knowledge, perception and practice of mothers/caregivers who are caring and feeding of their screened malnourished children of the household play an important role for the rate of recovery and growth rate and for the improvement of physical and mental disabilities of malnourished children in the predetermined period of time.

Therefore, this part of the study describes some of the important knowledge, perception and practices which are directly related to the effectiveness and efficiency of supplementary feeding (Webb and Lapping, 2002).

4.2.2.1 The Distribution of Receiving the Right/Entitled Amount of Rations and Vegetable Oil

The knowledge and practices of mothers/caregivers on the right/entitled amount of rations and vegetable oil for the total for three months and also for daily requirements/preparation of malnourished children are paramount importance to the recovery and growth rate of children.

Table 10: the Distribution of receiving the Right Amount of Rations

Kebeles	Received the right amount of ration (25kg)		Total
	Yes	No	
Dida Halbo	8	2	10
Dida Medore	27	1	28
Elala Gebeba	19	0	19
Hobe	20	1	21
Total	74	4	78

Source: *Household survey and computation (This paper researcher, 2011)*

The data in table 10 shows that the knowledge of mothers/caregivers about entitled amount of Corn Soya-Bean Blended (CSB) of rations for three months were very good; though the level of knowledge differ from *Kebele* to *Kebele* when comparing to their educational status and the rural living environment. As we can see that among 78 respondents 74 of them which accounts 94.9% received the right amount (knows the right amount to serve that is 25kg), only 5.1% of the respondents did not know the entitled amount of ration. This implies that the awareness level of mothers/caregivers about supplementary feeding and the entitled amount is relatively good. So the knowledge, perceptions and practices of mothers/caregivers about nutrition and

supplementary feeding have paramount importance for the recovery and growth rate of malnourished children as well as future prospect of the country.

Table 11: The Distribution of receiving the Right Amount of Vegetable Oil

Kebeles	Received the right amount of vegetable oil (3 litter)		Total
	Yes	No	
Dida Halbo	8	2	10
Dida Medore	28	0	28
Elala Gebeba	16	3	19
Hobe	2	19	21
Total	54	24	78

Source: *Household survey and computation (This paper researcher, 2011)*

Table 11 reveals that among 78 respondents 54 of them which account 62.23% were receiving the right amount of vegetable oil whereas 30.77% of respondents were not. It was observed during data collection and supervision, and also realized during internship program; distributions of vegetable oil to the beneficiaries are one of problematic area of targeted supplementary feeding starting from the container despite the perception of mothers.

Besides, as table 11 reveals, the distribution of vegetable oils were particularly in Hobe *Kebele*, among 21 respondents 19 of them which accounts 90.5% were not receiving the right amount which accounts from total respondents 79.2%. Three liters of fortified vegetable oil is entitled for three month in proportion to 25 kg of CSB, so if not distributed, the right amount of vegetable oil, the daily nutritional requirement of malnourished children would not be fulfilled. Hence, the distribution of vegetable oil is the problem of the system rather than mothers/caregivers knowledge.

As analyzed from conceptual framework and from previous findings and discussions, the effectiveness and efficiency of targeting supplementary feeding programs are affected by different variables like educational status, age range, family size, socio-cultural system, knowledge, perceptions and practices of mothers/caregivers. Also the

knowledge, commitment, decision making ability of implementing organizations as well as responsible personnel has paramount importance for the attainment of program objectives. Moreover, access to improved health and education services, clean water and sanitation, and regular monitoring and evaluation play pivotal role for the program.

The knowledge, perception and practice part of household survey shows that the level of understanding of mothers/caregivers about the effects of malnutrition on their children and the significance of supplementary feeding; they answer the question "What would happen if the child could not get supplementary feeding?"; from all respondents 12 of them which accounts 15.4% responded "no problem I can feed my child", 43 of them which accounts 55.1% responded "could go down to sever malnutrition", 22 of them which accounts 28.2% responded "could die". What we can understand from this, the first one is about 83.33% of the respondents can't feed their children but know the consequences of malnutrition on their children, secondly, 15.4% of respondents have ability to fed their children according to the result; therefore, this makes known that malnutrition is not the only reason for household food insecurity, but also there are other factors for malnutrition. Moreover, the above analysis shows us targeting (inclusion unqualified children) is one of the determinant factors of the program.

On the other hand, among the respondents, 72 of them which account 92.3% of supplementary feeding rations were collected by mothers/caregivers and 3.8% of the rations were collected by husband of the household, and 3.8% of the rations collected by others, also among 78 respondents 71 of them which account 91% did not sold the rations, but only 7 of them which is 9% sold rations. This implies that mothers/caregivers give more emphasis/concern for the health of their children. As we know the overburden of caring patients of the household lay on shoulder of mothers/caregivers or female children. And also the rations which are collected by mothers used at least for the household consumption purpose (free from sale and not abuse). The percentage of sold ration on the consequences of health and future prospect of children are significant.

In addition to supplementary feeding, most mothers/caregivers provide their children for complementary feeding starting from six months old. According to the household survey, among respondents, 60.3%, 30.8%, 29.5%, 19.2% provide additional foods of cereals/grains with oil, cereals/grains with animal products, cereals/grains with vegetables and others (porridge and "muk" etc) respectively. 5.1% and 1.3% of respondents only provide supplementary feeding and breast feeding respectively. These figures show mothers/caregivers are well aware that additional foods are necessary for their children for proper growth and to maintain their children's health. As we know supplementary feeding is designed to maintain 50-60% of daily nutritional requirements of children, the rest 40-50% of daily nutritional requirement of children covered by homemade additional/complementary foods, so as to the knowledge and practice level of mothers on this area is good; according to the household survey result.

Practically and historically mothers are trying their best to feed during hard time (seasonal food shortage) by reducing the number of meals from adults and from themselves or borrowing grains and money from relatives or from money lenders. Despite of the care for their children/family, mothers should aware and know the availability of health services (family planning, antenatal and postnatal care etc) and utilize properly to limit the number of children.

4.2.1.2 Intra-Household Sharing Practices of Respondents

Intra-household sharing is one of major determining factors for the efficiency and effectiveness of Targeted Supplementary Feeding programs; as discussed in literature review section of "determinant factors of TSF".

Table 12: Tabulation showing sharing of ration vs educational status and age range

Age of Mothers				Given the rations for only screened (malnourished) children		Total
				Yes	No	
15-20	Education status	Illiterate	Count	1	1	2
			% within education	50.0%	50.0%	100.0%
		5-8 grade	Count	0	2	2
			% within education	.0%	100.0%	100.0%
	Total		Count	1	3	4
			% within age	25.0%	75.0%	100.0%
21-28	Education status	Illiterate	Count	4	20	24
			% within education	16.7%	83.3%	100.0%
		read & write	Count	0	1	1
			% within education	.0%	100.0%	100.0%
		1-4 grade	Count	3	6	9
			% within education	33.3%	66.7%	100.0%
		9-10 grade	Count	0	1	1
			% within education	.0%	100.0%	100.0%
	Total		Count	7	28	35
			% within age	20.0%	80.0%	100.0%
29-35	Education status	Illiterate	Count	7	17	24
			% within education	29.2%	70.8%	100.0%
		Read & write	Count	0	1	1
			% within education	.0%	100.0%	100.0%
		1-4 grade	Count	1	1	2
			% within education	50.0%	50.0%	100.0%
		5-8 grade	Count	0	1	1
			% within education	.0%	100.0%	100.0%
		9-10 grade	Count	0	1	1
			% within education	.0%	100.0%	100.0%

	Total		Count	8	21	29
			% within age	27.6%	72.4%	100.0%
36-40	Education status	Illiterate	Count	1	4	5
			% within education	20.0%	80.0%	100.0%
		Read & write	Count	0	1	1
			% within education	.0%	100.0%	100.0%
	Total		Count	1	5	6
			% within age	16.7%	83.3%	100.0%
Above 44	Education status	Illiterate	Count		1	1
			% within education		100.0%	100.0%
	Total		Count		1	1
			% within age		100.0%	100.0%

Source: *Household survey and computation (This paper researcher, 2011)*

Table 12 depicts the rate of recovery and growth of malnourished children (targeted moderately children) depends on proper feeding and utilization of rations regardless of other determining factors. It shows among 75 respondents 58 of them which account 77.3% were sharing the ration for their children and for other members of the households, but 17 of them which account 22.7% were feeding the entitled ration for screened malnourished children only. Moreover table 13 indulges, the age and educational status of mothers/caregivers did not have that much relation on sharing of rations to other households, means intra-household and inter-household sharing of supplementary feeding rations was common.

The household survey also reveals, who is "usually" and who is "sometimes" sharing the rations of malnourished children. According to the household survey, "usually" sharing were 58 respondents, 56 of them which accounts 96.6 % and 2 of them which accounts 3.4% answered for "other small children" and for "parents" respectively, whereas who "sometimes" share the ration for "parents" and other "relatives" as the table above shows. Among 58 respondents 37 of them which accounts 63.8%, were sharing for the "parents", 12 of them which accounts 20.7% were sharing for "old/sick person" and the rest 4 of them which accounts 6.8% were sharing for "relatives" outside the household. What can understand from this; whatever the education status,

age, knowledge and awareness of mothers/caregivers intra and inter-household sharing were common or used as a habit in Mareko *Woreda* communities. Food security is the necessary condition for nutrition security but not sufficient condition for nutrition security. The reason why this issue raised, to show intra-household sharing affects food security as well as nutritional security at individual level; that is food security at national and household level does not mean food is secured in an individual's level in the household. Food security is defined as "all people at all-time have physical and economic access for sufficient, safe and nutritious foods to meet dietary needs and food preference for active and healthy life". So by calculating the total food production, import, reserve from last production and subtracting export of food products, difficult to say the nation and households are food secured, because we do not have knowledge who consumed the available foods in the household. Though the responsibility of the head of the household and the culture are different from region to region and from household to household, different research reveal that there are varieties of distribution among households, between fathers and mothers, parents and children, healthy and sick persons and even the sex of children. So intra-household sharing is the major determinant factor of supplementary feeding of children as well as food and nutritional security of the household.

What researcher realized during supervision/observation and from data collectors; most of the rations (CSB and vegetable oils) that are distributed for three months of consumption of malnourished children for supplementary feeding were almost finished within 45 days. Therefore intra-household sharing highly affects the recovery and growth rate and nutritional improvement of malnourished children.

In addition to the above analysis to investigate the knowledge and practices of mothers/caregivers; the study tried to assess the practical application and preparation skills of mothers/caregivers in relation to TSF standards/amounts based on this household survey. Among the respondents, 77 of them which accounts 98.7% knew the amount CSB rations (two cups/day) and how to prepare, on the other hand the knowledge of mothers on the amount vegetable oil (half *sini*/ day) was different from the knowledge and practice of CSB, that is among 78 respondents 51 of them which account 65.4%, knew how much must be used per day, but the rest 27 of them which accounts 34.6% did not know the amount of vegetable must be used per day.

4.2.2.3 Age of Introduction and Type of Complementary Feeding

Age of introduction and types of complementary foods for children of 6 to 23 months are the two basic ideas on complementary feeding.

Table 13: Tabulation of type of Complementary Food vs Age of Introduction

Type of complementary foods			Age of complementary food introduction				Total
			4 months	6 months	8 months	others	
	Only cereals/grains	Count	0	3	1	0	4
		% within CF	.0%	75.0%	25.0%	.0%	100.0%
		% within age	.0%	5.5%	20.0%	.0%	5.8%
		% of Total	.0%	4.3%	1.4%	.0%	5.8%
	Cereal/grain With oil	Count	2	35	4	3	44
		% within CF	4.5%	79.5%	9.1%	6.8%	100.0%
		% within age	66.7%	63.6%	80.0%	50.0%	63.8%
		% of Total	2.9%	50.7%	5.8%	4.3%	63.8%
	Cereal/grain With animal product	Count	1	10	0	1	12
		% within CF	8.3%	83.3%	.0%	8.3%	100.0%
		% within age	33.3%	18.2%	.0%	16.7%	17.4%
		% of Total	1.4%	14.5%	.0%	1.4%	17.4%
	Cereal/grains With vegetables	Count	0	5	0	2	7
		% within CF	.0%	71.4%	.0%	28.6%	100.0%
		% within age	.0%	9.1%	.0%	33.3%	10.1%
		% of Total	.0%	7.2%	.0%	2.9%	10.1%
	others	Count	0	2	0	0	2
		% within CF	.0%	100.0%	.0%	.0%	100.0%
		% within age	.0%	3.6%	.0%	.0%	2.9%
		% of Total	.0%	2.9%	.0%	.0%	2.9%
Total		Count	3	55	5	6	69
		% within CF	4.3%	79.7%	7.2%	8.7%	100.0%
		% within age	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	4.3%	79.7%	7.2%	8.7%	100.0%

Source: *Household survey and computation (This paper researcher, 2011)*

As discussed in the literature review, complementary foods are introduced at the weaning stage of a child's development. At this stage, infants undergo a period of rapid growth and balanced diet is crucial. Nutrition in the early years of life is indeed a major determinant of growth and development and also influences adult in health.

According to the household survey, among 78 respondents, 68 of them which account 87.2% have been giving complementary foods to their children in addition to breast milk and supplementary feeding; but only 10 of them which account 12.8% were not giving complementary foods for their children. Moreover, age of introduction and type of complementary foods are the most determinant factors because the nutritional needs of infants and young children are significantly different from those of the rest of the population. In order to ensure growth, an infant must eat proportionally to its weight, three times more than an adult. Its capacities for digestion, absorption and elimination develop progressively. At 5 months of age; an infant has doubled its birth weight, at 1 year of age it has tripled and has grown 25 centimeters.

As shown in Table 13, among 69 respondents, those of them which accounts 4.3%, 79.7%, 7.2% and 8.7%, were introduced complementary feeds at the age of 4 months, 6 months, 8 months and other months respectively. On the other hand, among 69 respondents, 5.8%, 63.8, 17.4%, 10.1% and 2.9% frequently give only cereals/grains, cereals/grains with oil, cereals/grains with animal products, cereals/grains with vegetables and other foods respectively(own household survey(2011). Though, the knowledge and perception of mothers/caregivers about complementary food is relatively better however, the type and composition of food that mothers have been giving their children as additional food does not meet the specific nutritional needs of infants and young children.

According to (WHO 2003) guidelines: the amount and time of introduction of complementary foods Start at six months of age with small amounts of food and increase the quantity as the child gets older, while maintaining frequent breast feeding. The energy needs from complementary foods for infants with "average" breast milk intake in developing countries are approximately: - 200 kcal/day at 6-8, 300 kcal/day at 9-11, and 550 kcal/day at 12-23 month children.

Therefore, this analysis depicts the efforts of implementing agencies and other stakeholders need to increase the awareness of mothers/caregivers to demonstrate how to prepare complementary food from available products and also how to develop better fortified complementary food from local products with affordable price.

4.2.3 Analysis and Discussion of the Health Situation of Children and Anthropometric Measurements

The health condition and anthropometric measurements after 45 days of feeding were the most and prominent parts of this research to clearly understand the roles of targeted supplementary feeding on child nutrition under the age of five. Anthropometric measurements which include, MUAC, height and weight of children to measure the nutritional status of children who are in the middle of feeding, and also to know the stunting and wasting rate of children against the national and international standard measurement. Therefore, these parts of analysis and discussion can insight for the researcher and implementing agencies for their results as well as the strength and weakness of the program in particular *Woreda*.

4.2.3.1 Frequency distribution of Disease prevalence in *Marko Woreda.*

Table 14: Frequency Distribution of Disease Prevalence Rate

	Malaria	**Pneumonia**	**Diarrhoea**	**Intestinal parasite**
Frequency	40	17	51	12
%	33.3	14.2	42.5	10

Source: *Household survey and computation (This paper researcher, 2011)*

As shown Table 14, the incidence and prevalence rate of diseases in particular area, Diarrhoea was the 1st prevalent disease which accounts 42.5%, 2nd malaria which accounts 33.3%, 3rd pneumonia which accounts 14.2% and last 10% of the prevalence was intestinal parasite. These diseases are major causes to the morbidity and mortality of under the age of five children in this w*oreda*. Moreover, these diseases cause

secondary malnutrition; means affects the digestion and absorption process of food. According to the secondary data that collected from Mareko *Woreda* Health Office and Koshe Health Center, the major health problems (five top prevalent diseases) of children in the year 2000 were pneumonia, malaria, Chronic Diarrhoeal Disease (CDD), upper respiratory infection and tonsillitis respectively. In the year 2002 were Malaria, upper respiratory infection, CDD, pneumonia and tonsillitis respectively (2000 and 2002 annual *Woreda* Health Office and Health Center report). According to the report, the adult CDD morbidity rate for male and female were 4.25% and 4.6% in 2001 and 5.6% and 5.1% in 2002 respectively which is more or less similar in prevalence rate of household survey.

4.2.3.2 Effects of Targeted Supplementary Feeding Program on Nutritional status of children.

Table 15: MUAC Measurement Results of Children

MUAC Measurement			Kebeles				Total
			Deda Medore	Dida Hallebo	Elalla Gebeba	Hobe	
	MUAC measurement 12cm and above	Count	13	7	12	15	47
		% within row	27.7%	14.9%	25.5%	31.9%	100.0%
		% within column	52.0%	77.8%	66.7%	83.3%	67.1%
	MUAC measurement 11.99 cm and below	Count	12	2	6	3	23
		% within row	52.2%	8.7%	26.1%	13.0%	100.0%
		% within column	48.0%	22.2%	33.3%	16.7%	32.9%
Total		Count	25	9	18	18	70
		% within row	35.7%	12.9%	25.7%	25.7%	100.0%
		% within column	100.0%	100.0%	100.0%	100.0%	100.0%

Source: *Household survey and computation (This paper researcher, 2011)*

As can be seen from table 15, among 70 children whose Anthropometric Measurement (MUAC) 12cm and above were 47 which accounts 67.1% were recovered (their recovery and growth rate were improved) the rest 23 of them which accounts 32.9% were not recovered (they were nutritionally deteriorated during measurement/data collection). Also among 100 samples 4 of them which accounts 4% were died and also among two *kebeles* (Dida midore and Hobe) from 49 TSF beneficiaries 16 of them which accounts 32.7% were OTP users (they were becoming severely malnourished). As indicated in the literature review (table 6), the "recovery rate" >70% is acceptable, <50% is alarming and "death" <3% is acceptable, >10% is alarming (UNHCR/WFP 1999). But from the table 16 we can see the coverage of study area/MUAC measurement result is in between acceptance and alarming that is recovery rate 67.1% and death rate 4%.

4.3 Nutritional Profile Analysis and Discussions of Complementary Foods

The ideal time to introduce complementary foods in the diets of infants is difficult to pinpoint. Complementary food introduced too early is of little benefit to the infant and may even be harmful due to the possibility of choking, developing food allergies, or causing an infant to consume less than the appropriate amount of breast milk or infant formula. Introducing complementary foods too late may cause an infant to develop nutritional deficiencies.

As already analyzed, in the household survey parts of knowledge, perception and practices of mothers/caregivers on complementary foods, among 69 respondents, 3 of them which accounts 4.3%, 55 of them which accounts 79.7%, 5 of them which accounts 7.2% and 6 of them which accounts 8.7% introduced complementary feeding at the age of four months, six months, eight months and other months respectively. These figures show the knowledge and practices of most mothers on ideal time to introduce complementary foods in the diet of infants are very good. But what the major problems in homemade complementary foods in the area are as observed during data

collection and analysis of primary and secondary data were: feeding and caring habit of mothers/caregivers, quality and quantity foods, handling and sanitation of foods.

4.3.1 Nutritional Content of some Complementary Foods in *Gurage* Zone *Marko Woreda.*

Nutritional content of certain complementary foods (corn porridge, *injera* with vegetable and sorghum porridge) which are frequently given to infants were analyzed in Food Science and Nutrition laboratories to determined the energy, moisture, protein, CHO, fiber and ash stats homemade complementary foods.

Table 16: Nutritional Content of some Complementary Food in 100 gm Sample

Types of Complementary foods	Energy (Kcal)	Moisture %	Protein grams	CHO grams	Fat grams	Ash grams	Fiber grams
Corn porridge	255	67.9+_0.5	5.5+_0.4	57+_0.1	0.2+_0.1	0.1+_0.01	37.1+_0.3
Injera with vegetable	275	64+_1.5	1.8+_0.9	62.9+_1.4	0.8	0.08	35.2+_0.6
Sorghum Porridge	261	66.6+_0.5	3.8	61.2+_0.5	0.06	0.2+_0.05	34.9+_0.5

Source: *Household survey and computation (This paper researcher, 2011)*

As shown table 16, the results of laboratory analysis on homemade complementary foods for infants for the contents of moisture are different from foods to foods, the overall average percentage of moisture in three samples are more than 64% from "wet samples". As complementary foods that are frequently given to children in addition to breast milk contain more of water. The proportion of nutritional requirement composition/proportion from daily requirement allowance are 55% of carbohydrates,

15% of protein and about 30% of fat, but Table 16 shows us from hundred grams of corn porridge 89.8% is carbohydrate, 9.4% protein and 0.8% fat, *Injera* with vegetables (cabbage) is 93.5% carbohydrate, 4% protein and 2.5% fats, and from sorghum porridge 93.9% is carbohydrate, 5.7% protein and 0.4% were fats. Also, the above table reveals, from 100 gram of corn porridge, *injera* with vegetable and sorghum porridge 4.4%, 3.1% and 5.6% were ash respectively and also 9%, 3.1%, 6.1% were fiber respectively. The above table also shows all sample foods are relatively rich of carbohydrates (insignificant differences among samples) on the other hand; *injera* with vegetable has low protein content relative to corn porridge and sorghum porridge. Sorghum porridge and *injera* with vegetables are almost having no fat content. What we understand from this analysis and discussion, foods which are actually given by mothers/caregivers to their children as complementary foods lacks quality as well as quantity. And it is not balanced food also; i.e. Low in fat and protein contents.

Table 17: Nutritional Composition of Ingredients per 100 gram (flour) of locally produced Food Products

Food products	kcal	moisture	protein	fat	CHO	ash	fiber	iron	phosphorous	calcium
Maize white	387	10%	9.0	4.6	75.2	1.2	2.2	7.0	288	19
Sorghum red	377	8.6%	6.3	3.4	80.4	1.3	1.8	6.0	250	9
Barley white	368	9.10%	8.5	2.0	79.0	1.4	2.2	6.3	294	17
Wheat E.whi	379	6.6%	12.7	2.5	76.6	1.6	2.5	7.0	342	12
Wheat white	362	10.6%	10.9	2.1	75.10	1.3	3.0	5.7	245	31
Teff white	358	10.9%	9.3	2.4	75.0	2.4	2.0	23.4	354	130
Teff red	355	10.8%	9.0	2.3	73.10	3.8	2.7	150	2.9	2.7
Kidney bean	354	9.5	19.10	1.6	65.9	3.9	6.7	8.7	414	144
Field peas	352.2	10.7	20.10	1.4	64.8	3.0	4.3	13.9	309	79
Broad beans	349.8	11.7	23.10	1.4	61.2	2.6	1.3	6.10	338	49

Source: *Household survey and computation (This paper researcher, 2011)*

Table 17 reveals, all cereals and leguminous products which are produced by locally or easily access to nearby market within affordable price. But what mothers need is awareness, technical support (demonstration) and some financial assistance to save their children from malnutrition.

4.3.2 Product Development/Proposal from Locally produced Food Products

To propose/develop feasible and sustainable complementary foods from locally available food products, first I had collected cereal and leguminous grains from the household and nearby market and then tabulated the nutritional content in the form of powder; based on food composition table use in Ethiopia part III(EHNRI 1997).

Table 18: Proposed Locally Available Crop Products for Blended Complementary Foods from 100 gm

Types of fortified foods	Energy (kcal)	Protein (gram)	Iron (mg)	Calcium (mg)
Corn with broad bean blended (75% corn & 25% bean)	370.95	12.53	6.78	26.5
Sorghum with broad Bean Blended (65%of sorghum & 35% bean)	367.48	12.20	6.04	23
Wheat with Kidney Bean Blended(70% wheat & 30% kidney bean)	359.20	13.33	7.51	64.9

Source: *Household survey and computation (This paper researcher, 2011)*

As can be seen in Table 18, complementary foods are blended from two basic locally available food crops (cereals and leguminous crops). As UNICEF/WHO (2003) the nutritional requirements of complementary foods in addition to average breast feeding (500ml) per day for 6 to 8 month children are 200kcal, 9 to11 months children 300 kcal and 12 to 23 months children are 550 kcal. According to WHO (2000), 100 gram of vegetable oil provide 900kcal; based on this content the researcher added 25gm oil for 225 kcal. Moreover, the proposed fortified complementary foods are presented in dry form which moisture content almost 10%; whereas children are taking in wet form

(semi-solid or liquid forms) which moisture content is almost 65 to 70%. These shows, the proposed complementary foods can increase the volume when mothers/caregivers prepare in the form of wet foods. Therefore, the researcher considered and calculated this dry proposed complementary foods 100g can be increased from 700g; according to UNICEF/WHO(2003) recommendation for children 6 to 11 and 12 to 23 months should take 2 to3 and 3 to 4 times per day respectively. And also children can take 200ml at one time (children one time bowl capacity) UNICEF/WHO (2003). So that the proposed amount of dry complementary foods are proportionate to the holding/taking capacity of children per day.

4.4 Major Determinants of Targeted Supplementary Feeding Program

The success of supplementary feeding depends on the amount of food delivered to children, intra-household sharing, the food quality and type, the duration of feeding, timing of supplementation, the nutritional status of the entrants, the degree of targeting of the food programs and other factors like the health and sanitation, care and food security situation of the household (United Nations University1985).

According to Key informant interview, among 5 respondents (responsible experts), all of them were agreed that intra-household sharing, targeting, delay of distribution, low level of awareness of mothers/caregivers are the major determinants of the effectiveness of the program. Moreover, staff turnover, transportation and lack of commitment at all level are also the major bottlenecks of the program.

The information that obtained from key informant interview reveals, children from poor (food insecure), polygamous, landless households and twin children have been highly affected by malnutrition. Besides professional recommend that, cooperation among implementing offices/organizations, on time resources mobilization, mainstreaming of community based nutrition, action based monitoring and impact assessment, political commitment and decision are crucial to effectively implement the program as well as to save innocents. Also the interview data disclose, targeting supplementary feeding has imperative effect to improve the health of children, fulfilling the nutritional requirements of children and socio-economic value of the household. In addition, this

data crosscheck the information from household survey like, intra-household sharing, who is sharing at household level, the awareness level of mothers/caregivers as well as the practice of mothers during screening to make entitled for their children.

4.4.1 The Amount of Food and Sharing (Intra-household sharing)

As stated in the review parts of determinants of supplementary feeding program, programs have varied in the amount of food that has been distributed to the beneficiaries. Typically, some base line measures of dietary intake are used to determine the caloric and nutrient deficits in the population. Based on this information, the caloric and nutrient supplementation to be provided by the food ration is determined. However, since the ration size is based solely on average deficits, the amount of food that is distributed is too little for some and may be more than needed for other beneficiaries. But in this *Kebele* the amount of rations are (25 kg CSB) and vegetable oils (3 liters) for all ages and all levels of moderately malnourished children; so the amount of food distributed affects the recovery rate as well as the prevention strategy of moderately malnourished to severely malnourished.

In addition to the amount of food, intra-household sharing of rations are common, as the knowledge perception and practice parts of the household survey result shows, from 75 respondents 58 of them which account 77.2% were sharing the ration for their small children and other households. And also during key informant interview, all responsible experts from the *Woreda* Health Office and Disaster Risk Management and Food Security Office, region WFP office and Ministry of Health; all of them proved that intra-household sharing is the practice of all mothers/caregivers of TSF beneficiary children.

4.4.2 Food Quality and Type

Supplementary feeding programs are concerned not only with the quantity of food that is distributed but also the balance between calories, protein and other nutrients in the ration. Generally CSB and vegetable oils are micronutrient fortified internationally accepted standard foods for moderately malnourished children which is (25kg CSB and

3 liters of vegetable oil), to provide 1,690 kilo-calories, 55g of protein per day, but what the problem is the application/practices of mothers at household levels, the researcher realized from the *Woreda* TSF responsible experts and health extension workers is that mothers/caregivers are mixing CSB with other corn and sorghum powders, and also shared for all members of households. The researcher also proved this reality during supervision/observation in Dida Halebo *Kebele,* Dgeba Ersah households, mother name was Fantaye Basha, I asked her "show me CSB and oil?", unfortunately, 90 day ration was not available(I could not see it) within 45 days of distribution, but she told me that CSB is mixed with other corn powders; and about Oil, rat penetrated the container and made it out of use. You can imagine, resources are already invested for this purpose, but this child was not recovered as it has been observed and the child will become severely malnourished and even may die.

4.4.3 The Duration of Feeding

The length of time the child must participate in supplementary feeding program in order to improve nutritional status will depend on type of program operation and the nutritional status of children. Normally targeted supplementary feeding designed and operated for three month time (90 days), but what was disclose in this research, the study under taken after 45 days of the distribution of rations or at the middle of feeding time, during this time, most of the ration in most of households were finished and in some of households only small amounts were left (not more than five day feeding), this data was critically collected in Dida Medore *Kebele* by health extension workers and also proved by key informant interview of responsible experts.

4.4.4 Timing of Supplementation

The time at which food is provided substantially influence the effectiveness of the supplementation. For example, moderately malnourished children were screened/selected for supplementary feeding on 12^{Th} round EOS/TSF program on the end of July 2010, but the ration is distributed for the beneficiary on December 2010 after five months of screening as proved from the *Woreda* Health Office and Disaster Risk Management and Food Security Section of the *Woreda* Agriculture and Rural

Development, responsible experts in key informant interview. According to the memorandum agreement of World Food Program and Disaster Risk Management and Food Security Section of Federal Ministries of Agriculture and Rural Development the distribution of ration should undertake within two months of screening.

We can take one of the objectives of supplementary feeding program to compare with this finding: "to prevent those moderately malnourished becoming severely malnourished", but because of the delay of timing of distribution of 12th round screening causes in Dida Medore *Kebele* among 28 TSF beneficiaries children 10 of them which accounts 33.3% were also OTP beneficiaries, and in Halebo *Kebele* among 21 TSF beneficiaries 6 of them which accounts 28.6% were also OTP beneficiaries. This figure showed that it is difficult to measure the impact of TSF on the recovery rate of children. Therefore, timing of supplementation is one of crucial factors on the recovery and growth rate of children.

4.4.5 Nutritional Status of Entrants and Degree of Targeting

The nutritional status of entrants/beneficiaries at point of entry in to the program will influence how effective food supplementation will be. More of the effect of supplementation will be seen in the most malnourished people (Habichat and Yarbrough 1980). What targeting mean is that the inclusion of untargeted/non-malnourished children and exclusion of targeted/malnourished children by various reasons like, technical gap, negligence or nepotism. These types of practices are common in this particular *Kebele* according to key informant interview, some health extension workers practice such kind of mistakes to benefit their relatives, community and religious leaders to get acceptance on the *Kebele*. Moreover health extension workers commit such kind of mistakes because of fear, because the existence of them determined by community and religious leaders or to avoid criticism by community leaders.

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

In this chapter, on the basis of major findings of the study, conclusions are drawn and recommendations are forwarded as the way out.

5.1 Conclusions

The research shows that the socio-economic conditions of targeting supplementary feeding beneficiary household's under the study area; most of them are food insecure and their livelihoods are based on subsistence agriculture; that can be obtained from production of cereal crops and by acquiring food crops and get money from productive safety net programs.

Most household members are characterized by their considerable dependence on productive safety net programs which is undertaken by the *Woreda* Agriculture and Rural Development office. It became clear that crop products and money that are acquired from productive safety net programs are being undermined due to social, economic and political challenges which are directly related to charity resources.

Food security is defined as "all people at all time have physical and economic access for sufficient, safe and nutritious foods to meet dietary needs and food preference for active and healthy life"; as we see from the definition, the key words and phrases are, sufficient, safe, nutritious, meet dietary needs, food preference, and active and healthy life (world food summit 1996). Let us see some international standards of human rights; **The Universal Declaration on the Eradication of Hunger and Malnutrition (1974):** "Every man, woman, and child has the inalienable right to be free from hunger and malnutrition in order to develop fully and maintain their physical and mental faculties." and **Convention on the Right of Child (CRC), Article 24 (1990)**: "State parties recognize the right of the child to the enjoyment of the highest attainable standard of health… and shall take appropriate measures to combat disease and

malnutrition…through the provision of adequate nutritious food, clean drinking water, and health care." But it says nothing about who is responsible and accountable to enforce these definitions and declarations; millions of children have been died due to malnutrition. Despite food security is the necessary condition for nutrition security; it is not sufficient condition for nutrition security (World Bank 2006). Nutrition security is also affected by preference, socio-cultural situation, knowledge, perception, practice and other variable of mothers/caregivers according to analysis and discussion of the study.

In the study, it is also found that the educational status of mothers/caregivers are very low; 71.8% of them are illiterate and their ages are more than 25, the knowledge, perception and practices, caring of their children and feeding habit are substantially very poor. However, the knowledge of how many kilo of ration and liters of vegetable oils entitled for their malnourished children is relatively good. This shows that, educational status, family size, age, polygamist, knowledge and practices and other variables like religion, ethnicity etc of mother's/caregiver's have paramount impact on preparation, management of the rations and caring and feeding habit of children. Moreover, the socio-demographic conditions of mothers/caregivers have also significant value on recovery and growth rate of malnourished children and also maintain their health and sanitation.

The health and sanitation condition of mothers/caregivers and children are poor because they are living in slum house, (humans and animals are living together), shortage of clean water supply for food preparation and drinking, their personal and environmental hygiene is also very poor and the daily nutritional requirements were not maintained because of its food insecure households and lack of knowledge. As the result of these, most of children have frequently got ill and the incidence and prevalence rate of diseases like malaria, diarrhea, intestinal parasite and pneumonia are high in the area. Therefore, these infant and childhood diseases affect the digestion and absorption process of children and cause secondary malnutrition and the ineffectiveness of targeted supplementary program.

Some of the objectives of targeted supplementary feeding are " to prevent the nutritional deterioration of children under five", "to prevent those moderately malnourished becoming severely malnourished" and "rehabilitate moderately malnourished children", but the recovery and growth rate of beneficiary children are very low which is 67.1% in relation to the standard/indicators set by UNHCR/WFP 1999. Besides, some of the children who are being the beneficiaries of targeted supplementary feeding are also being the beneficiaries of outpatient treatment program (OTP). Therefore, the effectiveness and efficiency of the targeting supplementary feeding program is under questions because of various factors.

The laboratory analysis result revealed that the homemade complementary foods that have been given to children in addition to breast feeding have very low protein and fat contents. The proportion of daily nutritional requirements should be carbohydrates 55%, Fat 30% and 15% (Hellen KowtalALUK 1992) and (pauel M.Insel and Walton T.Roth 2006) but the laboratory result show from 100 grams of corn porridge carbohydrate is 89.8%, protein 9.4% and fat 0.8% and from *Injera* with vegetables (cabbage) carbohydrate is 93.5%, protein 4% and fats 2.5%, and from sorghum porridge carbohydrate is 93.9%, protein 5.7% and fats 0.4% from "dry" samples. Therefore, the complementary foods which were being given by mothers lack proteins and fats, because of this facts the level of protein energy malnutrition of under five children especially kwashiorkor are highly prevalent in Mareko *Woreda.*

In the contrary, cereals and leguminous products which are available in the household and accessible at local markets with affordable price are reaching in required energies, but what lacks knowledge and practice of mothers and other household members.

In regard to determinants of targeted supplementary feeding program, the findings of the study shows intra-household sharing, time of supplementation, targeting and duration of feeding are major determinants of the effectiveness and efficiency of the program. Whereas the amount of food, health and sanitation, food security and income level of the household also exacerbate the infectiveness of the program. As can be seen from the analysis and discussion, targeted supplementary feeding programs trapped by varies challenges which determines the overall objectives of the program.

The findings also show that, the efforts exerted by implementing institutions/offices play a pivotal role on the attainable efforts of national child survival strategies. However, this program activities implemented by the collaboration of World Food Program by providing foods, financial support and follow up and monitoring by the respective sub-offices, United Nations Children's Fund (UNICEF) with the collaboration of Ministry of Health undertaking screening and Disaster Risk Management and Food Security Section of Ministry of Agriculture and Rural Development , allocation, dispatch and distribution of rations and vegetable oils, this long process and fragmented integration among this offices contribute its share on lack of responsibilities and accountability and also on timing of supplementation. Furthermore, at *woreda* level no one is responsible and accountable for monitoring and evaluation and for the failures of the program.

As can be seen from knowledge and practice of household survey finding, ration redaction especially in vegetable oil are common phenomena because of the container's nature and distributors reduce their salary from this amount (observation during internship and data collection) and also some of the activities like distribution, storage, management, monitoring and evaluation activities by World Food Program (WFP) being undertaken by non professionals.

5.2 Recommendations

In light of the findings obtained from household survey; key informant interview, observation and secondary data analysis have been used. So, this study concluded that cons and prone of socio-demographic and economic conditions, knowledge and perception of mothers/caregivers, the health condition of children role of complementary feeding on the effectiveness of the program and factors that determine the effectiveness of the program. Thus, the researcher suggests the following recommendations for the improvement and effectiveness of the program.

i. Improve Family Planning Services and Creating Income Generating Mechanisms

The study reveals that food insecurity and family size of the household which are causes of malnutrition and intra-household sharing of supplementary feeding that hampers effective implementation of supplementary feeding program. Therefore, *Woreda* responsible officers and stakeholders should improve family planning services and creating income generating mechanisms at grass root level, by designing and implementing the following suggested strategies:

- Improving the capacity of health post services;
- Providing intensive training for health extension and agriculture extension workers;
- Creating commitment on NGO, Government officials and community leaders who are working at *kebele* ;
- Motivating and providing incentives for well accomplished workers; and mothers who properly utilize birth controls;
- Using productive safety net programs for pre-determine purpose;
- Establishing demonstration areas.

ii. Awareness raising and Capacity Building of Mothers/Caregivers

The findings disclose that, 71.8% of respondents were illiterate, and Knowledge and practice in preparation, management and utilization of rations and vegetable oil and caring and feeding habit of children are very poor. But the knowledge of mother's about complementary food is relatively good, the practice and feeding habit are so alarming according to laboratory analysis result. Then, concerned Government offices, partners and non-governmental organization should work closely with community leaders and with the community to save the life of innocents. Therefore, concerned bodies should implement the suggested strategies listed below:

- Improving rural education services;
- Enhancing informal education or adult education;
- Demonstrating mothers/caregivers;
- Improving personal and environmental hygiene services;
- Intensive health education; and
- Scaling up best practices.

iii. Close Supervision and Evaluation of the Impact of the program

The study shows that the recovery and growth rate of children is 67.1%; even most of them are on the cut point (12cm) which is less to the standard of UNCHR/WFP 1999 recovery and growth rate. Furthermore, intra-household sharing of supplementary feeding which accounts 74.4% is an alarming and amusing figure in regard to the objective of supplementary feeding. As the result 32.9% of children are deteriorating and then going down to severely malnourished and some of them are going to loss life because of lack of management and supervision; then, the situation is frightening. So, it is imperative that implementation agency/organization should take into consideration and practice the following suggested strategies:

- Develop and implement sustainable awareness creation program;
- Assign solely responsible and accountable personnel and Agency/organization;

- Close supervision of mothers/caregivers;
- Identify key influencers and decision makers and coordinate towards the program;
- Identify the gap of the program; and
- Continuous monitoring and evaluation of the impact of supplementary feeding on recovery and growth rate of under the age of five children.

iv. Creating Responsibility and Accountability

The finding also reveals that lack of clarity and confusion about responsibility and accountability among implementing organizations because of fragmentation of the system and activities; as the result, the effectiveness of the program constrained by unorganized system. Hence, implementing organizations and the government should create accountability and build the working capacity of responsible and accountable office/organization and experts by realizing the following suggested strategies.

- Creating well justified system;
- Creating one well organized (professionally, financially and logistically) office/organization;
- Intensive and continuous training of health extension workers and food distributor agents;
- Developing common understanding among implementation organizations about the objective of targeted supplementary feeding;
- Identifying knowledge and system gaps;
- Scaling up international and national best practices on the particular program; and

v. Creating Leadership and High Level Commitment

The finding disclose that various factors like targeting, intra-household sharing, time of supplementation, and others substantially affect the recovery and growth rate of children and effectiveness of the program. Therefore, concerned bodies and the government should create leadership and high commitment among implementation organization by implementing the following suggested strategies:

- Intensive and continuous capacity building;
- Motivating and providing incentives for well accomplished and committed experts/personnel;
- Establish responsible and accountable system;
- Set well defined objective, inspire and motivate towards the objective;
- Establish monitoring and evaluation system; and
- Assign professionals based on merit.

vi. Motivating mothers and make children to test/practice

The laboratory result also reveals the protein and fat content of complementary foods that mothers/caregivers often have been giving to their children are alarming for future prospect of children. Therefore, *Woreda* HO, DRMFSS and NGO should implement and demonstrate the proposed fortified complementary foods in table 19 to mothers as well as children. Moreover, to acquire the daily vitamins nutritional requirements mothers/caregivers should present fruits and vegetables in addition to the proposed foods.

Finally, the researcher proposes that children in different months old should take appropriate proposed proportional foods, oil and animal proteins (in addition to the proposed) to fulfill daily nutritional requirements. The result of the laboratory dealt only on macronutrients, so the researcher would like to suggest that interested groups or other students will do micronutrient laboratory analysis in this particular area to make this research comprehensive.

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Annex I

The Role of Supplementary Feeding on Child Nutrition under the age of five SNNP Region in case of Mareko *Woreda*

Household Questionnaire

Household Identification

Level	Name	Code
Region		
Zone		
Woreda		
Kebele		
Village		
Name the head's of the house hold		

Interview Identification

Name of interviewer	
Interviewer code	
Start time	Day: Time:
End time	Day : Time:
Checked by:	

Socio Demographic Data

1. What is the Sex of the head's of the house hold?

   (1) Male, (2) female

2. Name of the mother/caregiver _____

3. Age of the mother/caregiver _____

4. What is marital status of mothers/care givers?

   (1) Married, (2) separated/divorced, (3) widowed, (4) others

5. What is the ethnicity of mother /caregiver?

   (1) Oromo, (2) Amhara, (3) Somali, (4) Gurage, (5) Afar, (6) other

6. What is the religion of the mother /caregiver?

   (1) Muslim, (2) Orthodox, (3) protestant, (4) catholic, (5) other

7. What the educational status of the mother /caregiver?

   (1) Illiterate, (2) can read & write without formal education, (3) 1-4 grade,

   (4) 5-8 grade, (5) 8-10 grade, (6) 11-12, (7) vocational/technical certificate,

   (8) university degree, (9) other

8. What are the main products of the house hold? (1) maize, (2) corns, (3) wheat,

   (4) Barley, (5) Potato, (6) beans, peas, (7) others

9. What are major economic source of the household?

   (1) Crop products like cereals, (2) crop product like leguminous and root crops,

   (3) cash crops like coffee and spices, (4) Livestock products,

   (5) off farm diversification like labor and hand crafts, (6) others

10. Is this a polygamous household? (1) Yes, (2) No

11. Are members of the household more than three? (1) Yes, (2) No

No family members age >5 years in HH	Age of members	No of children <5 years in HH	Age of children	No of children beneficiaries of TSF program	Age of children

12. Does the household other forms food rations (like safety net, relief and others)

    (1) Yes (2) No

Knowledge and perception of mother/caregiver

13. Are you the beneficiaries of Targeted supplementary feeding?

(1) Yes (2) No

14. Do you know the entitled amount of food ration of your children?

(1) Yes (2) No

15. Do you and/or your child receive the entitled amount of blended food/25kg/beneficiary?)

(1) Yes (2) No

16. Do you and /or your child receive the entitled amount of vegetable oil (3liter/beneficiary)

(1) Yes (2) No

17. Who usually collects the food rations?

(1) Myself (2) husband (3) other

18. Did you sell any of the rations commodities? (1) Yes (2) No

19. Do you give the entitled amount of rations and vegetable oil only the screened child?

(1) Yes (2) No

20. What kind of food you give for your child/children in addition to supplementary feeding per day?

(1) Only supplementary feeding
(2) Only breast milk
(3) Only cereals/grains
(4) Cereal/grains with oil
(5) Cereals with animal product
(6) Cereals and vegetables
(7) Other

21. What would happen if the child could not get supplementary feeding?

(1) No problem I can feed my child
(2) He could go down to sever malnutrition
(3) He could die
(4) Other

22. Who usually share the entitled amount of rations and vegetable oil of screened child?
    (1) Children of the household
    (2) Parents/caregiver
    (3) Old/sick person of the household
    (4) Others
23. Who some time shares the entitled amount of rations and vegetable oil of screened child?
    (1) Children of the household
    (2) parents/caregivers
    (3) Old/sick person of the household
    (4) Relatives/flanking of the household especially the first day of receiving the ration
24. How do you prepare the blended food in your house?
    (1) Cooks alone water
    (2) Mixtures with oil and water
    (3) Added to other household food
    (4) Other
25. Who eats the blended food prepared in your house?
    (1) Only adult member of the family,
    (2) Mothers and children of the family,
    (3) All members of the family,
    (4) All children of the family,
    (5) Only the screened children, (6) others
26. How much blended food should you use in a day?
    (1) one cup, (2) two cups, (3) other
27. How much vegetable oil should you use in a day?
    (1) Half sine, (2) full sine, (3) other
28. Do you give complementary (weaning) food to your child in addition to breast milk?
    (1) Yes, (2) No
29. At what age should you start giving complementary foods to your child additional to breast milk?
    (1) four month, (2) Six month, (3) eight month, (4) other

30. What should the complementary food preferably consist of?

(1) Only cereals/grains, (2) cereal and oil, (3) cereal and animal product,

(4) Cereal and vegetables or fruit, (5) other

Health Information and Anthropometric Measurement of the Child

21. What is the general health condition of your child?

(1) not good, (2) good

32. What kind of diseases is prevalent in your area?

(1) Malaria (2) Pneumonia (3) Dieahoria (4) intestinal- parasite, (5) other

33. How many times your child has got sick in this year before started feeding?

(1) No, (2) 1, (3) 2, (4) 3, (5) more

34. How many times your child has got sick in this year after started feeding?

(1) No, (2) 1 (3), 2, (4) 3, (5) more

35. Did your children receive vitamin A supplementation during screening?

(1) yes, (2) No

36. Did your children receive measles vaccination during screening?

(1) yes (2) No

37. Did your children receive De-worming (Albendazone) during screening?

(1) yes (2) No

38. Ask and measure the child's Age----------weight----------Height----------

MUAC measurement----------

Annex II

The Role Supplementary Feeding on Child Nutrition under the age of five SNNP Regions the case of Mareko *Woreda*

Key Informant Interview Format

1. Interview Information
   1.1 Interviewer name----------
   1.2 Date of interview----------
   1.3 Duration of interview-from----------to----------
2. Respondents Information
   2.1 Name of respondent office/ institution----------
   2.2 Region----------
   2.3 Zone ----------
   2.4 Woreda----------
   2.5 Name of respondents----------
   2.6 Roles/title of respondents----------
   2.7 Location of interview----------
3. What is the role/responsibility of your office/institution on the intervention of Targeted supplementary feeding and child health protection?----------
   ---

   ---

4. How useful this targeted supplementary feeding?
    a. To improve children's health----------

    ---
    b. To fulfill nutritional requirements of screened children----------
    ---
    ---
    c. On socio-economic importance of the house hold----------
    ---
    ---
5. What are the factors of targeting problems during screening?
    1 ---
    2 ---
    3 ---
    4 ---
6. Do you think that mothers/caregivers giving the entitled food for only screened (malnourished) children? ----------
    ---
7. If question 6 is No, Who is usually sharing the prescribed amount of food?
    1 ---
    2 ---
    3 ---
    4 ---
    5 ---
8. What is the distribution trend of blended soybean and vegetable oils to the TSF beneficiaries?
    1 ---
    2 ---
    3 ---

9. What is the main reason for the delay of distribution?
   1. ----------
   2. ----------
   3. ----------

10. Could you tell me the past three distribution trend of blended soybean and vegetable oil to screened children?
   1. 10th round 2, Screened date---------- Received date----------
      Transportation date------ Distribution dates----------
   2. 11th round 1, Screened date ---------- Received date----------
      Transportation date---------- Distribution date----------
   3. 11th round 2, screened date ---------- Received date ----------
      Transportation date ---- Distribution date ----------

11. from the report or from your experience at what day/month children recovered from malnutrition after started to feed? ----------

12. From your knowledge and experience how many percent of children are recovered? And how many percent of children go down to chronic malnutrition (OTP and SC program)? ----------respectively

13. What mothers do when screening time approaches to get TSF rations (to make their children eligible for TSF beneficiary)?----------
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---

14. What types of malnutrition (protein energy, micro nutrient or 2ndry malnutrition) common in your zone/woreda? ----------
Could you tell me the last year number of, protein energy ----------Micronutrient----------and secondary ----------malnutrition cases?

15. what mothers/caregivers commonly do to treat their children from acute/chronic malnutrition before TSF started as a program?----------
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16. What kind of complementary food/diet (liquid, solid, semisolid) commonly mothers/caregivers give for their children in addition to breast milk? ----------
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---

17. At what month/age the child mothers/caregivers commonly start complementary feeding?

18. What kind food crops usually produce in your woreda/localities?

1. cereals----------

2. Leguminous----------

3. Root crops----------

4. Others----------

19. What kind of foods commonly parents give their children? ----------
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---

20. What kind of livestock products commonly consume at house hold level? ----------
----------and what kind of Livestock products consume occasionally? ----------
---------- Estimate how many times per year? ----------

21. What kind of interventions undertaking to improve the nutritional status of the community in your zone/woreda by government, Bilateral and multi Lateral organizations, NGO etc?----------
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---

22. What kind of interventions undertaking to improve the nutritional status of children under the age of five rather than targeted supplementary feeding, outpatient therapeutic, and stabilization center programs by concerned bodies?----------
---

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23. What are the main reasons of causing malnutrition in your locality especially under five children? ----------
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24. What kind action/intervention should undertake to improve the nutritional status of the community especially of those most vulnerable parts of the population like children, pregnant women, and lactating mothers and disable people?

1. By the government level----------
2. By multi and Bilateral organizations ----------
3. By NGOs----------
4. By community level----------
5. By the house hold level----------
6. By individual level----------

25. What they should do to attain Targeted supplementary program objectives?

1. Government ----------
   ----
2. World food program ---------- -
   ----
3. Parents ----------
   ----

26. What are major bottlenecks that affect the effectiveness of supplementary immunization and enhanced outreach strategy/activities in your zone/ woreda? ----------
---
---

27. What is your perception of the effectiveness of your office/ institution to implement targeted supplementary feeding program in this zone/woreda?

28. Can you describe the situation of last two year child malnutrition under the age of five?

1. Which children were affected most severely? ----------
   ----
2. Which part of the Kebele/locality children were affected most severely?
   ----
3. What were the reason this kebele/locality children most affected? ----------
   ----
