SCHOOL OF GRADUATE STUDIES

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CENTER FOR FOOD SECURITY STUDIES

HOUSEHOLD FOOD SECURITY, NUTRITION AND WASH PRACTICES AMONG VEGETABLE PRODUCERS IN DUGDA WOREDA OROMIA REGION, ETHIOPIA: A COMPARATIVE STUDY

BY

ABAYA ALEMU GADISSA

November: 2021

Addis Ababa, Ethiopia

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Addis Ababa, Ethiopia

DECLARATION

I, Abaya Alemu, would like to declare that the study conducted on Household Food Security, Nutrition and Wash Practices among Vegetable Producers in Dugda Woreda Oromia Region, Ethiopia: A Comparative Study is my original work and that all sources of the materials in the research paper have been duly acknowledged. The study also complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

Abaya Alemu _____ _____

Name of student Signature Date

As research advisors, I hereby certify that I have read and evaluated the thesis prepared by Abaya Alemu Gadissa under my guidance, which is titled "Household Food Security, Nutrition And Wash Practices Among Vegetable Producers In Dugda Woreda Oromia Region, Ethiopia: A Comparative Study.

". I recommend that the thesis be submitted as it fulfills the requirements for the degree of Masters of Science in Food security and Development Studies.

Mogessie Ashenafi (Professor) , **09 July, 2021**

Advisor Signature/Date

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BOARD OF EXAMINERS

This is to certify that the senior essay prepared by Abaya Alemu, entitled" Household Food Security, Nutrition And Wash Practices Among Vegetable Producers In Dugda Woreda Oromia Region, Ethiopia: A Comparative Study and submitted in partial fulfillment of the requirements for MSc Degree in Food security complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

Signed by the examining committee:

Name, External examiner	Signature	Date
Name, Internal examiner	Signature	Date
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Advisor	Signature/Date	

Department head

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ACRONMYS AND ABBREVETIONS

CSA	Central Statistics Agency
FAO	Food and Agriculture Organization
KAP	Knowledge, Attitude and Practice
PSNP	Productive Safety Net Program
SDGs	Sustainable Development Goals
SSA	Sub-Saharan Africa
STH	Soil-Transmitted Helminthes
UNICEF	United Nations Children's Fund (previously, United Nations International Children's Emergency Fund
USAID	United State Agency for International Development
WASH	Water, Hygiene and Sanitation
WFP	World Food Program
WHO	World Health Organization

ABSTRACT

The main objective of this research was to assess the household food security, nutritional KAP and WASH practices in Dugda woreda, East Showa zone, Oromia Region, Ethiopia. Both qualitative and quantitative research methods were employed. Data was gathered from both primary and secondary sources. The survey questions were collected from 147 vegetable producers and an equal proportion of non-producers to evaluate the positive impacts of vegetable production on household food security status, nutritional and WASH practices. The result showed that the majority (61.2%) of vegetable producing households were food secure. Among the vegetable non-producers, only 15.6% of the households were food secure. The rest were either mildly (42.2%), moderately (25.2%) or severely (7%) food insecure. Fruit and vegetable crops generated more income to farmers than did traditional staple crops. About 49% of vegetable producing households get a monthly income of ETB 3000 or higher, whereas only 2.7% of vegetable non-producers get ETB 2001- 3000 per month. Less income leads to less purchasing power. Both vegetable producers (69.2%) and non-producers (76.7%) had good knowledge concerning appropriate household nutritional issues, though additional education on nutrition was needed. They understood the importance of feeding complementary foods to their children at six months of age in addition to breastfeeding. But they had poor practice and knowledge on feeding children with diversified diet. Appropriate nutritional practice was noted in 71.6% and 38.9% of vegetable producers and non-producers, respectively. Almost all respondents (86.4%) in both groups supposed that feeding children several times each day was difficult. Caregivers and mothers, thus, fed their children with less frequency and diet diversity. About 96% and 37% of vegetable producer and non-producer respondents, respectively, used piped water and appropriate practice on water sanitation was observed in 60.2% and 43.6% of vegetable producer and non-producer respondents, respectively. About 74.8% of vegetable producers and 50% of non-producers had good knowledge on critical time to wash hands. However, there were inappropriate practices in hand washing.

CHAPTER ONE

INTRODUCTION

1.1 Background

Food and nutrition protection was described at the World Food Summit in 1996 as the situation where "all people at all times have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life" (FAO, 1998). This concept of food security represents two main dimensions: The status of food and its stability.

Child malnutrition is one of the most severe public health and developmental issues in the developing world, affecting the vulnerable and underprivileged in particular (Poel, 2008). In developing nations, children are most vulnerable to malnutrition due to low dietary consumption, lack of proper feeding habits, and inequitable distribution of food within households (Yalew, 2014). Almost one in four children under five years of age, 165 million or 26% were stunted worldwide in 2011; 101 million or 16% were underweight and 52 million were mildly or seriously wasted (UNICEF, 2013). Food is also seen as one of the most relevant markers of the living condition of a family and also an important determinant of infant survival (Ronald,2014). In developing countries around the world, eliminating hunger among children under the age of five remains an immense challenge. An estimated 230 million under-five children are believed to be chronically malnourished in developing countries (Alem-Meta, 2018).

Water, hygiene and sanitations (WASH) issues are important in food safety and, consequently, nutrition. Overall, 6% of Ethiopian households use improved toilet facilities (16% in urban areas and 4% in rural areas). More than half (56%) of rural households use unimproved toilet facilities. More than one-third (35%) of toilet facilities are shared in urban household whereas only 2% of rural households share their toilet facilities with other households One in three households in Ethiopia has no toilet facility (39% in rural areas and 7% in urban areas) (EMWDHS, 2019).

This study focused on Meki, Dugda Woreda, Oromia region. The key economic stay of the people in Dugda woreda is the mixed farming scheme at subsistence level, and vegetables are an

important cash crop. This study evaluated the household food security, nutrition knowledge and practices, the importance of vegetables in household diet diversity and WASH status in households and the surrounding in two kebeles (Shubi Gemo and Weyo Gebriel) found around Meki town, Dugda woreda.

1.2Statement of the Problem

There are millions of people who have been facing food insecurity that can be explained as either chronic or transitory in nature in Ethiopia. According to FSIN (2017) estimation of food-insecure population by country data, for instance, there were about 17.7 million food-insecure peoples in 2016 in Ethiopia. Of this figure, about 9.7 million were population in crises, emergency and famine; while about 8 million were population in stressed situation.

Malnutrition persists in many areas of developing countries, such as Latin America, the Middle East, South and South East Asia and African countries, but the extent and severity differ (Degefa, 2005). In Sub-Saharan Africa, the risk of stunting is 33% higher among first-born girls under 18 years of age, and as such, early maternity is a primary driver of malnutrition (Fink et al. 2014). Ethiopia is one of the countries affected by malnutrition. Diet diversity in Ethiopia is, in general, extremely low, the consumption of fruits and vegetables is particularly low as they are not widely available and where available they are unaffordable to most target communities. Ethiopia's per capita consumption of fresh fruit is one of the lowest in the East Africa region. For instance, while the world Health Organization recommends that one person should eat at least 146 Kg of fruits and vegetables per year ,our country's citizens eat only 7 kgs per year which is much less consumption per year than the recommended amount. This is because of food rich in nutrients such as fruits and vegetables are in limited supply associated with high postharvest loss and waste along their supply chain, unaffordable to many as a result of low-income status and weak dietary habits resulting from inadequate awareness on nutritional benefits (GAIN, 2020). Adequate nutrition during infancy and early childhood is essential to the development of each child's full human potential. World Health Organization recommends introducing additional foods when an infant reaches 6 months of age. After sixth month of age, breast milk alone is no longer sufficient to meet the nutritional requirements of 6- 23 months of age children (WHO, 2003). Inappropriate complementary feeding practices remain as major public health problem in many developing countries where many children are victim of the malpractice (Chessa et al.,

2011). In Ethiopia, 59% of infants under 6 months are exclusively breastfed (EPHI, 2019). Results from the 2019 EMDHS show that 37% of children under 5 are short for their age or stunted (below -2 SD), and 12% are severely stunted (below -3 SD). The prevalence of stunting generally increases steadily with age, from 22% among children 6-8 months up to 44% of children 48-59 months. Notably, the highest proportion of stunting of children (45%) was observed at age 24-35 months, and it is also slightly higher among male than female children (40% versus 33%). Moreover, the use of sanitation facilities in Ethiopia is very poor, with just 7% of public services being used nationwide. The use of basic drinking water facilities is also poor, especially in rural areas, where only 30% of the rural population uses them (UNICEF 2017). This study, therefore, assessed household food security status, nutrition KAP, and WASH practices among vegetable producers and non-producers in two kebeles (Shubi Gemo and Weyo Gebriel) of, Dugda woreda.

1.3Objectives of the Study

1.3.1 General Objectives

The general objective of the study was to explore household food security status, nutrition KAP and Water, hygiene and sanitation practice status among vegetable producers in Dugda woreda of east Showa zone, Oromia, Ethiopia, 2021.

1.3.2 Specific Objectives

The specific objectives of this study were to:

- ✓ Assess the food security status of vegetable producing households in the study area.
- ✓ Examine WASH practices among vegetable producer's households in the study area.
- ✓ Assess household nutritional KAP among vegetable producers in the study area.

1.4Research Questions

- ✓ Does the practice of vegetable production affect the status of food security at household levels?
- ✓ What are the WASH status of households and the surrounding among both groups?
- ✓ What is the households' nutrition KAP and role of vegetable production on diet diversity?

1.5 Significance of the Study

The result of the findings of the study is believed to add some insight related to the contribution of vegetable production to improve food security status, WASH, food diversity, and nutrition KAP. The finding of the study may contribute to create awareness on food security status, WASH and nutrition KAP and provide additional information and understanding to local conditions through providing some awareness related to the subject of study in the study area. The study would also benefit other researchers and organizations who may intend to conduct further study on related issues.

1.6 Scope and Limitations of the Study

Basically, the research study was undertaken for academic purpose. It was limited to one woreda. The researcher faced obstacles during data collection period. One of the main problems was inaccessibility to contact few enumerators. This made the data collection period longer than planned.

1.7 Organization of the thesis

This thesis contains introduction in chapter one, literature review under chapter two, research methods in chapter three, results and discussion under chapter four and finally conclusion and recommendation under chapter five.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Definitions of basic concepts and Review of Related Literature

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. The four pillars of food security are availability, access, utilization and stability. The nutritional dimension is integral to the concept of food security (CFS, 2009). Water, sanitation services and good hygiene are three closely connected preconditions for public health. Inappropriate WASH conditions cause 1.7 million deaths annually. The UN's Office for the Coordination of Humanitarian Affairs (OCHA) foresees that the number of people without access to safe water will increase from just over 1 billion to 2 billion by 2025 (Churruca, 2018). The In developing countries, monotonous staple-based diets are closely associated with low consumption of micronutrients (IFPRI, 2016). Concurrently, rapid eating shifts in poor countries are characterized by detrimental dietary changes toward increased consumption of refined foods and decreased intakes of dietary fiber and fruits and vegetables (Popkin, 2014). Ethiopia provides an interesting case. Like other low-income countries, it has lately witnessed transitions in its food value chains and retail landscape. Noticeably, the traditional food basket is bit by bit changing with more preference for high-value foods, such as animal and processed foods, and snowballing willingness-to-pay for convenience foods (Worku et al., 2017). While the nutrition transition is in its early stage and mostly affects urban areas, its malicious health effects are already observed: urban overweight/obesity rates have reached 21% for women, as compared to 4% in rural areas (ICF, 2016). Like in many African countries, Ethiopia has multiple food taboos, some of which limit possibilities for consuming healthy diets.

Based on FAO (2013), when a household achieves access to safe and nutritious food coupled with a sanitary surrounding, a household is said to be nutritionally secure. Health protection itself is the adequacy of calorie consumption plus food content in terms of nutritional proportions. But food security appears to correlate with adequate calorie intake in the early stages of the growth of these principles, according to Maxwell and Smith (1992), since it is inferred that other requirements are generally fulfilled while calorie intake is satisfied. At this point, food quality

was not given much emphasis. Nutritional safety is then adequate calorie intake and other forms of treatment and wellbeing by implication.

The word vegetable is used as a supplement to starchy foods and meats, to describe the loving edible shoot, leaves, fruit and root of plants and spices that are eaten whole or partially, raw or fried Vegetables are often classified as those plants that are eaten with the staple food in relatively limited amounts as a side dish. Vegetables are essential food types within the human diet, though, because they provide nutrients such as vitamins and minerals and also the bulk of roughage that the body requires and that most typical staple foods typically lack (Haile, 2014).

2.1.1. Operational Definitions

Knowledge

Knowledge is the understanding of any given topic (Kaliyaperumal, 2004). In this research, it refers to an individual's understanding of nutrition, water and sanitation and personal hygiene including the intellectual ability to remember and recall food- and nutrition-related terminology, specific pieces of information and facts.

Attitudes

Attitudes are emotional, motivational, perceptive and cognitive beliefs that positively or negatively influence the behavior or practice of an individual (FAO. 1994). An individual's feeding or eating manners is influenced by his/her feelings, motivations, perceptions and beliefs (Carruth and Anderson,1977). Attitudes influence future behavior no matter the person's knowledge and help explain why an individual adopts one practice and no other alternatives (Médecins du Monde. 2011). The terms attitude, beliefs and perceptions are interchangeable.

Practices

In this research, the term "practices" is defined as the observable actions of an individual that could affect his/her or others' nutrition, such as eating, feeding, washing hands, cooking and selecting foods. Practice and behavior are substitutable terms, although practice has a meaning of long-standing or commonly practiced behavior (Contento, 2011).

Timely introduction of complementary feeding: The proportion of children 6–23 months that were introduced to solid and semisolid foods at 6 months of age (FAO,2014).

Minimum dietary diversity: is the variety of meals taken by children 6–23 months of age who receive foods from 4 or more food groups with the food groups consisting; (I) grains, roots and tubers; (II) legumes and nuts; (III) dairy products; (IV) flesh foods; (V) eggs; (VI) vitamin A rich fruits and vegetables; and (vii) other fruits and vegetables during the previous day of study (WHO,2007).

Minimum meal frequency: is the frequency of child feeding to breastfed and non-breastfed children 6–23 months of age, who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more during the previous day. Minimum is defined as 2 times for breastfed infants 6–8 months, 3 times for breastfed children 9–23 months, 4 times for non-breastfed children 6–23 months (WHO,2007).

Good practice

Those respondents who scored at least 60% and above in practice questions.

Poor practice

Those respondents who answer less than 60% of practice questions.

Good Knowledge

Those respondents who scored at least 60% and above in knowledge questions.

Poor knowledge

Those s respondents who fail to answer 60% of the knowledge questions.

Positive attitude

Those s respondents who could answer/score at least sixty percent and above from the questions that measure attitude.

Negative attitude

Those respondents who could not answer at least 60% of attitude questions. (FAO,2014).

2.2. Empirical Literature

2.2.1. Water, Sanitation and Hygiene

The U.S. Agency for International Development's (USAID's) Water and Development Strategy (2013–2018) was released in May 2013 with the goal of saving lives and advancing development through improvements in water, sanitation and hygiene (WASH) programs and thru sound management and use of water for food security. The Multi-Sectoral Nutrition Strategy was released a year later in May 2014, with the goal of improving nutrition to save lots of lives, build resilience, increase economic productivity and advance development. This implementation brief was initially released in complement to the existing Water and Development Strategy Implementation guide, to USAID staff in January 2015 to facilitate and support programming decisions on WASH and Nutrition, a key theme within the Water and Development Strategy. The brief is being re-released to support similar programming within the context of the Multi-Sectoral Nutrition Strategy. Other briefs within the Water and Development Strategy Implementation Briefs series currently available or in development will provide additional information to facilitate and support programming decisions on the subsequent key themes associated with the USAID Strategies: Agriculture Management, Sanitation, Water Quality, and Sustainability of WASH Services. The Water and Development Strategy necessitate increased integration of WASH and food security programs. USAID's water programs are amplifying the goals of the U.S. Government's Feed the long run Initiative by ensuring improved agricultural water management and WASH components are integrated into food security programs whenever possible and appropriate for the local context. An oversized fraction of the world's illness and death is because of communicable diseases (WHO,2009). Sixty-two percent and 31% of all deaths in Africa and Southeast Asia, respectively, are caused by communicable disease (Curtis etal.,2009). This trend is very notable in developing countries where acute respiratory and intestinal infections are the first causes of morbidity and mortality among young children (WHO,2009). Inadequate sanitary conditions and poor hygiene practices play major roles within the increased burden of disease within these developing countries. Lack of resources, namely

soap and water, also as inadequate sanitation facilities is also two of the most reasons why children don't wash their hands (Oswald etal,2008). Additionally to having proper resources and facilities, hygiene practices are heavily influenced by students' knowledge and attitudes towards hygiene. Despite these negative attitudes towards hand washing, many children practice good hand washing behavior (Water and sanitation program,2009). A study conducted by the UN Children's Fund (UNICEF) and also the Ethiopian Ministry of Health found that study participants in rural Ethiopia had poor status regarding knowledge, attitudes, and practices (KAP) of hygiene (Kumie and Ali,2005). Approximately 60% of youngsters surveyed failed to realize the possible transmission of diseases through excretion (Kumie and Ali,2005). Simple hygienic measures like washing hands with soap were poorly practiced, especially in rural areas (Kumie and Ali,2005). Another study conducted by the Research-inspired Policy and Practice Learning in Ethiopia (RiPPLE), a program surveying rural households within the southwest region of Ethiopia, found that hand washing practices were also poor(RiPPLE,2009). New hand washing facilities, additionally to awareness and knowledge about proper hygiene, have led to some changes in behavior and attitude, yet the prevalence of hand washing remains low during this region (RiPPLE,2009). WASH practices are proven to scale back diarrheal rates by 30–40 percent (Cairncross et al., 2010). This level of reduction is achieved through a comprehensive approach promoting improvements in key WASH practices (e.g., handwashing, treatment and safe storage of beverage, safe disposal of feces, and food hygiene); improving access to safe water and sanitation technologies and products; and facilitating or supporting an enabling environment (e.g., improved policies, community organization institutional strengthening, and public- private partnerships). Furthermore, a clean environment for kids is additionally important to cut back exposure to the pathogenic surroundings. Use of safe water, sanitation facilities, and good hygiene can improve nutritional outcomes by addressing both immediate and underlying causes of malnutrition. Lack of sanitation, specifically, is strongly correlated with acute malnutrition and stunting. Even within the absence of diarrhea, a fecal-contaminated environment is linked to chronic under nutrition, which reduces utilization of essential nutrients. Diarrheal disease reduces the absorption of nutrients by the gut. However, poor absorption of nutrients and under nutrition don't seem to be entirely attributed to diarrheal disease (USAID,2015).

2.2.2. Nutritional Knowledge, Attitude and Practice

Globally, severe acute malnutrition is that the leading explanation for death in under-five children. The best risk of under nutrition occurs during intrauterine life, infancy and babyhood which makes the primary 1000 days a window of opportunity to deal with malnutrition (Sawaya, 2006). The most predisposing factors of malnutrition among under five years old children include household food insecurity, inadequate health and sanitation services, limited knowledge of the mothers/caregivers on proper feeding practices like exclusive breastfeeding, complimentary feeding, appropriate food type, and mix, and also limited time for mothers available for his or her care during pregnancy, care or feeding for infants, and kids. Henceforth, good knowledge, and positive attitude of the mothers on appropriate infant, and young child feeding practice is extremely crucial to keep up, promote the health and nutritional status of the youngsters (Kliegman et al., 2011; UNICEF, 2010; WHO, 2014). knowledge, attitude and practice (KAP) of mothers/caregivers on infant and young child feeding during this curtail time are vital for the kid health, growth and development (Kliegman et al., 2011; global organization Children's Fund, 2010; World Food Program, 2009; World Health Organization, 2014; WHO & UNICEF, 2003). WHO/UNICEF recommended exclusive breastfeeding for the primary six months, complementary feeding at six months onwards and continuation of breastfeeding minimum of up to 2 years; to boost the health and nutritional status of the kids (Dachew & Bifftu, 2014). In developing countries, including geographical area, knowledge of mothers/caregivers on the importance of colostrums for the newborns was reported in between 48.6% to 90% (Engebretsen et al., 2014). In Ethiopia, 66.3% of the mothers/caregivers knew that they ought to breastfeed for a minimum of two or more years (UNICEF, 2014). The planet health organization (WHO) has developed eight core and 7 optional indicators to watch and guide infant and young child feeding practices (WHO, 2008). Ethiopia is one in every of the sub-Saharan African countries with high level of malnutrition and has launched the national strategy for infant and young child feeding in 2004 to boost the nutritional status of kids (Disha et al.,2012). WHO recommends combinations of indicators to live the amount of appropriate complementary feeding, however, most studies conducted up to now on complementary practices has used single indicator with narrow age range and thus not adequately quantify the extent and determinants of appropriate complementary feeding practices (Arimond &Ruel,2002).

World Health Organization (WHO,2006) recommends exclusive breastfeeding for the primary 6 months, introduction of complementary feeding with continued breastfeeding for a minimum of 2 years. Similarly, (WHO,2005) recommended infant and young child feeding practices for kids aged 6-23 months include: continued breastfeeding; feeding semisolid/solid food per the age of the child; and feeding a spread of foods like cereals, fruits, vegetables. Breastfeeding of up to 2 years old and beyond is a very important source of nutrients, fluids and immunological protection, while appropriate complementary food promotes physiological state, nutritional status and growth of young children (WHO,2006).

2.2.3. Relationships between vegetable production, WASH and Food borne illness affecting households

Low water supply, hygiene and sanitation standards prevail in Ethiopia. Therefore, primarily due to open defecation, farmland is likely to be polluted with contagious Identified patient s. In addition, natural fertilizer (human and animal excreta) is extensively used in the country by farmers and water used for irrigation is typically polluted (Bekele etal, 2017). In addition, the raw eating of fruits and vegetables such as pineapple, mango, cabbage, salad, and green pepper is frequent. Both of these make fruits and vegetables vehicles of disease transmission. According to Tefera etal. (2014) in Ethiopia have shown that 25.1% to 57.8% of the fruit and vegetable samples, respectively, obtained during the selling process have been infected with parasite.

During pre-harvest (cultivation, irrigation, livestock manure etc.), post-harvest handling, storage, transportation) or while processing for consumption, fruits and vegetables may be subjected to microbial contaminants. The high levels of infection of pathogenic organisms in many developed countries have been blamed for the use of insufficiently processed waster. Soil contamination of agricultural waste and increased application of poorly composted manures to soil where vegetables are cultivated also play a role in fruit and vegetable contamination (Beuchat, 1995)

2.2.4. The Roles of vegetables in enhancing diet diversity and nutrition

Vegetables are horticultural crops, annual or perennial, with certain parts (roots, stalks, bulbs, berries, leaves, etc.) that can be eaten in whole or in part, fried or raw (Welbaum,2015). In terms of bioactive nutrient molecules such as dietary fibers, vitamins and minerals, and non-nutritious

phytochemicals, vegetables are essential for human nutrition (phenolic compounds, flavonoids, bioactive peptides, etc.).

These molecules of nutrients and non-nutrients decrease the risk of chronic illnesses such as heart disease, diabetes, some cancers and obesity (Septembre etal., 2018). Fresh vegetables can play an important role in human nutrition due to the high nutritional content of vitamins such as vitamins B, C, K, and minerals such as calcium, potassium and magnesium, as well as dietary fiber (Yahia et al., 2019).Vegetables are abundant in pro-vitamin A and vitamin C, several mineral micronutrients, antioxidant and anti-cancer phytochemicals that promote wellbeing (Yang et al., 2013).

2.2.5. Vegetable production in Ethiopia

Under rain-fed and/or irrigation systems, different forms of vegetable crops are grown in Ethiopia (Emana, 2015). Many have also recently emerged as important vegetables for export, according to the Ethiopian Investment Agency (2012). In recent years, public health advocacy on the role of vegetables in human nutrition and health has increased awareness of the nutritional and health benefits of vegetables in Ethiopia. As such, increasing vegetable consumption helps combat hidden hunger and malnutrition (Yesuf, 2012) Vegetables are also used by the local processing industry as a source of raw materials. Processed products such as tomato paste, tomato juice, oleoresin and hot pepper/chili ground spice (Capsicumspp.) are manufactured for export, making a major contribution to the national economy (BAREDO, 2013). Diverse abiotic and biotic factors such as lack or limited access to improved seeds, diseases and insect pests, high post-harvest losses, poor marketing system, lack of market information systems, poor market linkages, low institutional support, and lack of value chain development constrain production.

WASH and food-borne Foodborne diseases which lead to serious health and economic problems are mainly caused by protozoan and helminthes parasites (Fitsum etal, 2017). Vegetables are means of transportation for the transmission of parasites if soiled as a result of different associated factors related to planting, collecting, transportation, showcase chain, and inappropriate treatment at domestic (Omowaye and Audu, 2012). Improved hygiene can help to curtail the spread of soil-transmitted helminth diseases by decreasing the prevalence of faeces in

people's habitats. Untreated wastewater irrigation, the use of raw manure as fertilizer, improper on-harvest handling and hygienic conditions during preparation are factors that determine the level of contamination. Poor water, sanitation and hygiene (WASH) affects all facets of health and sustainability, hinders economic and social development, and is a significant obstacle to poverty alleviation (Boschi,etal, 2008).

2.4. Conceptual framework

Vegetable crops generate more income for farmers compared to traditional staple crops. In addition they generate employment for the rural workers, and therefore improve access to food (Weinberger and Lumpkin, 2007). This positive correlation between vegetable commercialization and household income is confirmed by various researchers' Global fruit and vegetable cultivation has experienced a remarkable increase in production. And the availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports(including food aid)(FAO,2006). Fresh vegetables can play an important role in human nutrition due to the high nutritional content of vitamins such as vitamins B, C, K, and minerals such as calcium, potassium and magnesium, as well as dietary fiber (Yahia et al., 2019).Vegetables are abundant in pro-vitamin A and vitamin C, several mineral micronutrients, antioxidant and anti-cancer phytochemicals that promote wellbeing (Yang et al., 2013).WASH is related to food security because according to FAO,(2006) Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs in food security.

Output has been growing at an annual rate of about 3% over the last decade (Achterbosch et al., 2014). Improving access to vegetables and fruits in their diets reduces mortality and morbidity of infants and children under five years old, particularly in rural areas (Braun et al., 2004) WASH remains one of the big public health issues in sub-Saharan Africa, with very poor coverage (Bain etal, 2014). Poor knowledge, attitude and practice of peoples toward nutrition make the nutrition status of households and household members to consume poorly nutritious food. In addition to these this less KAP will lead mothers to feed their children nutrient poor foods.

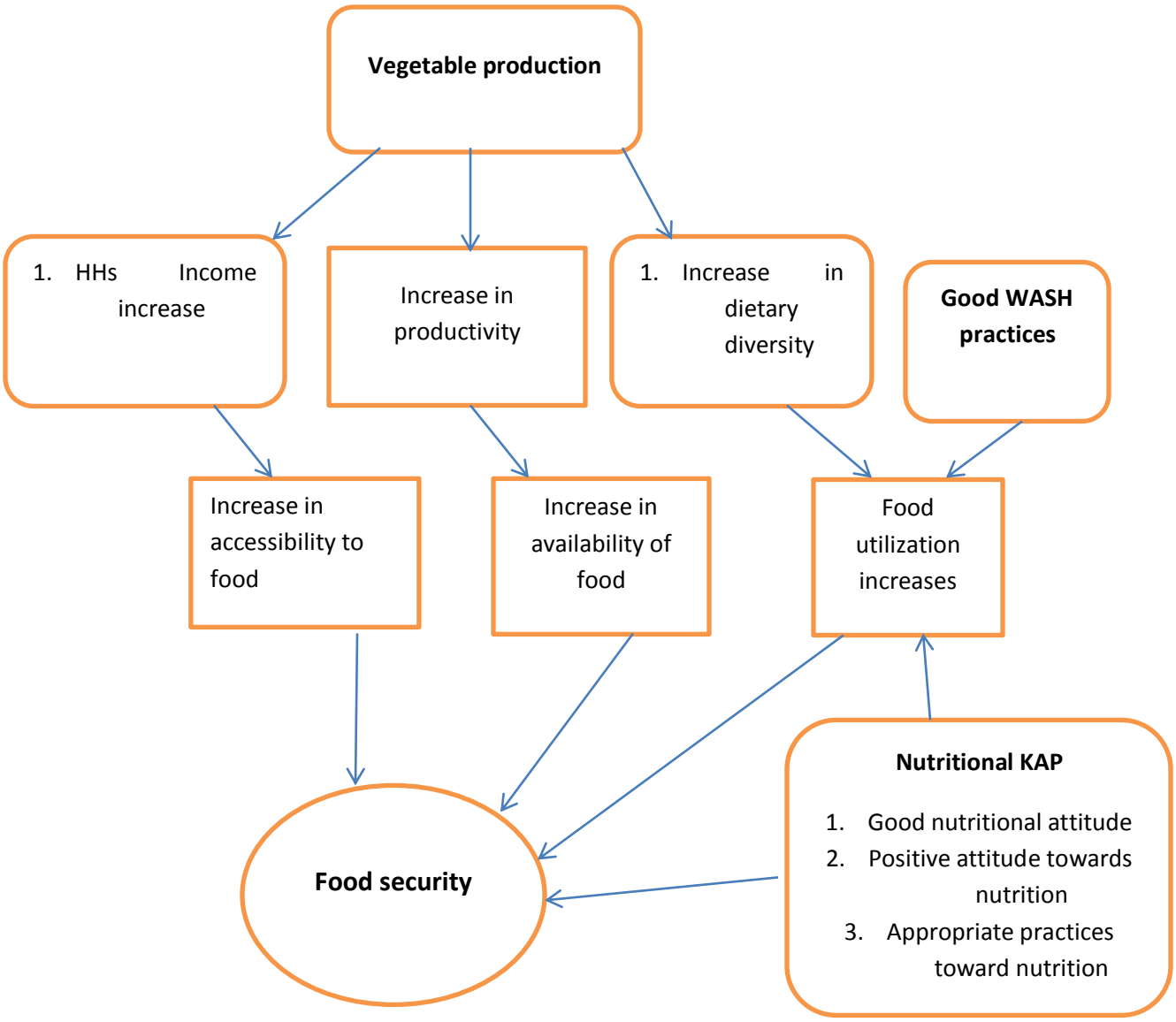

Figure.1. conceptual framework of food and nutrition insecurity

CHAPTER: THREE

3.1 RESEARCH METHOD

3.2. Description of the Study Area

Dugda is one of the woredas in the Oromia Region of Ethiopia and 141 Km far from Addis Ababa to southern direction. Dugda Woreda was part of the former woreda of Dugda Bora. Dugda is part of the East Shewa Zone in the Great Rift Valley and borders Lake Zway to the southeast, Adami Tullu and Jido Kombolcha to the South, and the Southern Nations, Nationalities and Peoples Region to the west, the Southwest Shewa Zone to the Northwest, the Awash River to the north, the Koka Reservoir to the northeast, and the Arsi Zone to the east. Dugda's administrative center is Meki. The land size of the district is 95945 ha, from this such as cultivated land is 62,262ha, forest land 7987 ha, water body 12032 ha, grazing land 3411 ha, and mountainous land 298 ha. The total population of the area is 192,806, of whom 101,030 male, 91,776 females. The rural population (118,362) consisted of 60,655 female and 57,707male. The town population, however, was 55570 consisting of 29,784 male, and 25786 female. The topography of the study area is 1600-2220 masl with an annual rain fall of 750mm and an average annual temperature of 26^0C. The agro-ecology of the area is 55% Kola, 45% Dega. 97.1% flat land and 2.9% sloppy. The soil type of the area is 59% sandy loam and 41%. clay loam (CSA,2013).

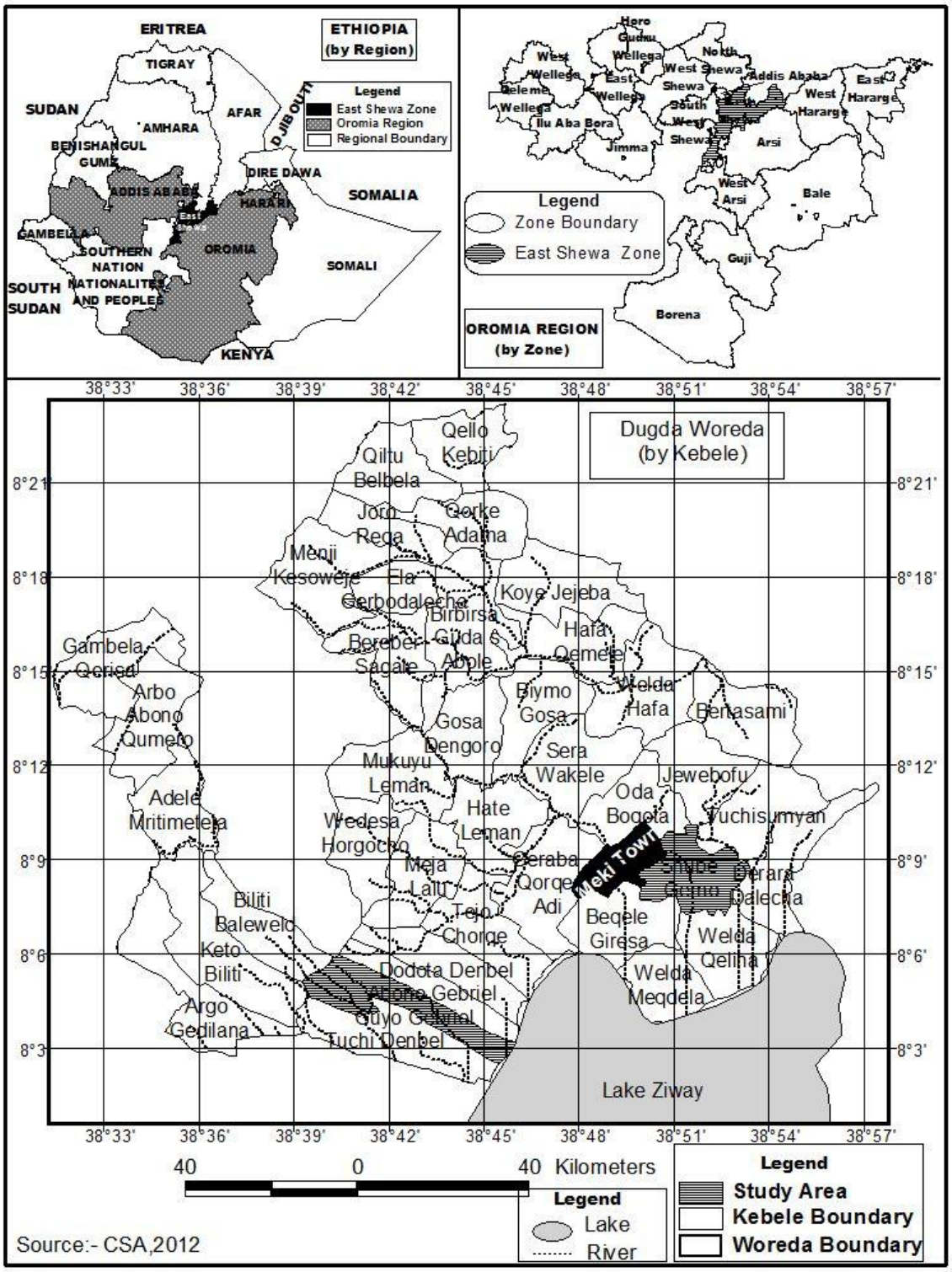

Figure: Study area Map

3.3. Study Design

Both quantitative and qualitative methods were followed in this study. All vegetable producers in the study kebeles (n=147) and an equal number of non-vegetable producers were randomly every second individuals were selected from both kebeles, thus making the total number of 294. The sample households were used to compare the positive impact of vegetables on diet diversity and food security status of households.

3.4. Study period

The study was conducted from the beginning from March to May 2021.

3.5. Sampling Technique

Rural farmers who have been growing vegetables using irrigation or rain-fed agriculture in Dugda were the sample frame for this specific analysis. The study kebeles were chosen purposively and carefully based on number of vegetable producers, closeness to the main road and familiarity of the researcher with the study area. This study mainly focused on vegetable growing farmers and those who were not engaged in vegetable production for comparison purposes. The purposive sampling technique, also called judgment sampling, is the deliberate choice of an informant due to the qualities the informant possesses from vegetable producers. Systematic random sampling was applied to choose proportional numbers of vegetable non-producer households and every 2^{nd} individuals were chosen.

It is a non-random technique that does not need underlying theories or a set number of informants. The researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience (Bernard, 2002).

3.6. Inclusion and Exclusion criteria

3.6.1. Inclusion criteria

The study included all farmers engaged in vegetable production and those not engaged in vegetable production.

3.6.2. Exclusion criteria

This study did not include farmers who did participate in farming activity of animal rearing, and poultry only.

3.7. Methods of Data Collection

Data were generated from both primary and secondary sources to achieve the objective of the study.

Primary Sources of Data

The primary data were collected through various data collection methods such as field observation, surveys, focus group discussion and key informants.

Field Observation

Before and during the research time, observation of the study kebeles was carried out. Different sites were visited before data collection to understand the status of waste disposal system, vegetable production system.

Survey

A survey was conducted through the development of structured questionnaires to generate quantitative and qualitative information on nutrition KAP and WASH. For the convenience of data collection during the survey, the established standardized questionnaire was translated into the local languages, Afan Oromo and Amharic. To achieve the objective of the study, enumerators were employed based on their ability to communicate with local language, educational background and experiences in similar works. A survey design provides a plan for a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population (Creswell, 2014).

Focus Group Discussion

Focus groups discussions was undertaken to get detailed information from small scale farmers. There were two FGDs selected from vegetable producers, and non-producers.

Key Informant Interview

Key informant interview was conducted with selected extension experts, and woreda agricultural extension officers.

Sources of secondary data

Various documents available at wereda and kebele were reviewed and used to generate secondary source of information. Moreover, books, journal, articles, different GOs and NGOs documents and publications, and academic research papers were reviewed to understand WASH, nutrition KAP and household food security.

3.8. Methods of Data Analysis

Data for this study were generated through qualitative and quantitative method. Hence, qualitative and quantitative techniques were used to analyze data. Information that wewre generated from key informant interview, focus group discussion and personal observation were analyzed qualitatively. The quantitative data generated from household survey were coded and entered into computer for analysis. Hence, quantitative data were analyzed using computer software, Statistical Package for Social Sciences (SPSS). The data that was entered into the program was analyzed using descriptive statistics such as frequencies, descriptive, and cross tabulation. Data obtained by guidelines for assessing nutrition-related Knowledge, Attitudes and Practices and the information generated by the HFIAS was used to assess the prevalence of household food insecurity (access component) and to detect changes in the food insecurity situation of a population over time for the study area analyzed quantitatively.

Household Food Insecurity Access Scale (HFIAS)

HFIAS was used in this study to distinguish households who were food secure and food insecure based on access (Coates et al, 2007). It has nine generic questions and every questions is asked with a recall period of four weeks (30 days). Each question is followed by a frequency-of-occurrence question as “rarely” (once or twice), “sometimes” (three to 10 times) or “often” (more than ten times) within the past four weeks (Coates et. al, 2007).

Knowledge, attitude or practices were calculated as:

$$\frac{\text{Number of correct/positive/appropriate answers given by all respondents}}{\text{Number of all questions asked to respondents}} \times 100 \quad \text{--equ}^{n}\text{. 1}$$

3.9. Data Quality Assurance

Data quality was ensured during collection, coding, entry and analysis. Orientation was given to the data collectors and supervisors to prevent any confusion and have a common understanding about the study. Prior to the starting of data collection Pretest was conducted on 10% of our sample size to ensure the validity of the questionnaire. Each questionnaire was checked for its consistency, provision of full information and completeness. Supervision of data collectors included observation of how the data collectors were collecting the data and was done by supervisors. The filled questionnaires were checked for completeness by data collectors, supervisors and Principal Investigator (PI) on a daily basis. Consequently, any problem encountered was discussed and solved immediately. Incomplete questionnaire were discorded and counted with non-respondent.

3.10. Ethical considerations

Informed consent to participate in the study was obtained from respondents. The confidentiality of information obtained from respondents and the anonymity of respondents were protected. Local administrators were communicated to enter the study area, and local cultural aspects were respected.

CHAPTER FOUR

4. RESULTS AND DISCUSSIONS

This chapter presents the results and discussion of the study. It is divided into two subsections; the first sub section summarizes results by using descriptive statistics such as, percentages and frequencies to describe the characteristics of sampled households by using explanatory variables. Finally, the second sub section discusses food insecurity and Nutrition KAP status, water sanitation KAP, water sanitation and hygiene KAP, personal hygiene and food handling status of households.

4.1. Characteristic of Study Population

This survey was conducted on a total of 294 households consisting of 50% each of vegetable producers and non-producers. The socio-demographic character of respondents is presented in Table 4.1. Age distributions of the household members varied highly. The age of respondents ranged from 20-50 years and the age group 31-40 consisted of 39.19 % of the respondents. 100 % respondents were married. Number of children per sample households ranged from two to over six. About 55% of vegetable producing households had five or more children whereas this figure was observed in 46% of non-producer households. Majority of responds in both groups (around 90%) were followers of Christianity of various denominations and the rest were Muslim. Of the respondents, 18% and 12% of vegetable producing and non-producing households, respectively, could not read or write. About 57% and 24.5% of vegetable producing respondents had elementary and secondary level education, respectively. About 86% of vegetable non-producing respondent had elementary level education. Almost all respondents in both groups were farmers and a few vegetable non-producers (10%) were daily laborers. All vegetable non-producers had monthly income ranging from ETB 500 to 2000. On the other hand, about 52% of vegetable producing households had a monthly income ranging from ETB 2000 to >4000.

Table 4.1: Socio-economic and demographic status of the study population

Variables	Category	Vegetable producers	Vegetable non-producers
		No. (%)	No. (%)
Age group	20-30	6.7	20.4
	31-40	39.58	38.8
	41-50	53.72	40.8
	Total	100	100
Marital status	Married	100	100
Number of <2 years children per household	Two	27.2	20.4
	Three	8.2	15.6
	Four	8.2	18.4
	Five	5.4	42.2
	Six	29.9	3.4
	>Six	21.1	0
Age of infant (months)	0-6	31.3	15.6
	7-23 Months	59.9	88.4
Religion	Muslim	10.9	13.6
	Orthodox	75.5	67.3
	Protestant	13.6	19.1
	Total	100	100
Education	not read and write	18.4	11.6
	Read and write	0	11.6
	Grades 1-5	29.9	74.8
	Grades 6-8	27.2	0
	Grades 9-12	21.8	2
	College	2.7	0
Occupation	House wife	19	15.6
	Farmer	81	73.5
	Daily laborer	0	10.9
Monthly household income (ETB)	500-1000	37.4	76.9
	1001-2000	10.9	23.1
	2001-3000	2.7	0
	3001-4000	21.8	0
	>4000	27.2	0

4.2. Vegetable production status in the study area

On how vegetable production became so popular in the Woreda, a key informant had the following to say:

> "*Vegetable producers have formed a union called 'Meki-Batu Union' in 2002 which now has 527 members. The Union helps farmers to solve market problems. It collects and sells vegetables produced by members in local and foreign markets, and provides then with technical and advisory support*."

Although they admitted that vegetable production had put them in a better financial position, vegetable producers said the following in a focus group discussion:

> "*The most important constraints we face are credit inaccessibility, unavailability of inputs such as seeds of improved varieties, pesticides and fertilizers. The cost of pesticides and seeds of improved varieties is unaffordable*".

Respondents who did not produce vegetables said the following in a focus group discussion:

> "*Underground water and lakes are available for vegetable production. The major constraint we face to start vegetable production is the money to buy inputs. Moreover, we fear of market failure even if we could get credit from other individuals. To start a vegetable production venture on land size of a quarter of hectare, it requires more than ETB 20,000 as an initial investment. Generally we need accessibility of credit, input and advice to begin vegetable production*"

A key informant also supported the opinion of vegetable non-producers by stating the following:

> "*The main constraints to engage non-producers in vegetable production are credit inaccessibility, lack of awareness and willingness to produce vegetables, practice of renting their lands for vegetable production and increment in costs of* inputs".

4.3. Food security status of households

HFIAS was utilized in this study to distinguish between vegetable producer and non-producer respondents' in terms of their status of food insecurity. As can be observed in Table 4.2, 61.2% of vegetable producing and only 15.6% of non-vegetable producing households were food secure. Moreover, from among the vegetable producing and non-producing households, 25.2% and 42.5%, respectively, were mildly food insecure. About 7.5% of vegetable producing and 25.2% of non-producing households were moderately food insecure. Similarly, less (6.1%) vegetable producing households were severely food insecure when compared to vegetable non-producing households.

The food insecurity status of vegetable non-producers in current study was in line with but greater than to study conducted in Bona-Zuria Woreda, Sidama Zone, and Southern Ethiopia in which only 15% of irrigation non-users were severely food insecure; 61.22% of vegetable

producers were food secure (Tizita,2017). Fruit and vegetable crops generate more income for farmers compared to staple crops. Additionally they generate employment for the agricultural workers, so improve access to food (Weinberger and Lumpkin, 2007). From the result, vegetable producers were more food secures than vegetable non-producers, which may be due to the better purchasing power of vegetable. Data obtained in this study also showed that a large proportion (76.9%) of vegetable non-producers had only ETB 500-1000 income per month. In contrast, monthly income of about half of the vegetable producers was over three times higher than the non-producers. Low purchasing power affects one of the pillars of food security, namely accessibility. Food which is out there should be made accessible to consumers in times (Yeshewas, 2019). This also implies that the food within the country should be affordable and economically accessible to the community. This idea supports the definition which says food access is the way different people can obtain the available food. Normally we access food through a combination of home production, stocks, purchase, barter, gifts, borrowing or food aid. Food access is ensured when communities and households and all individuals within them have adequate resources, such as money, to obtain appropriate foods for a nutritious diet. Access depends on income available to the household, on the distribution of income within the household and on the price of food. It also depends on market, social and institutional entitlement/rights to which individuals have access (International Federation of Red Cross and Red Crescent societies, 2006).

Table 4.2a: HFIAS in the past four weeks in Dugda Woreda East Showa zone Oromia Region 2021.

HFIAS		Occurrence		Frequency		
		Yes	No	Rarely (1)	Sometimes (2)	Often (3)
1. In the past four weeks, did you worry that your household would not have enough food?	A[1]	93	54	36	37	20
	B[2]	119	23	23	62	34
2. In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	A	38	109	22	16	0
	B	86	61	34	27	25
3. In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	A	37	110	28	9	0
	B	99	48	62	37	0
4. In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	A	38	109	27	11	0
	B	99	48	63	36	0
5. In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	A	37	110	27	9	1
	B	63	84	38	25	0
6. In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	A	38	109	27	11	0
	B	64	83	37	27	0
7. In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	A	11	136	11	0	0
	B	25	132	14	11	0
8. In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	A	0	147	0	0	0
	B	25	132	25	0	0
9. In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	A	0	147	0	0	0
	B	0	147	0	0	0

[1] A, vegetable producers; [2] B, vegetable non-producers

Table 4.2b. *HFIA prevalence* in Dugda Woreda East Showa zone Oromia Region 2021

Category	vegetable producers	vegetable non-producers	Total
Food secure	90 (61.2%)	23 (15.6%)	113 (38.4%)
Mildly food insecure	37 (25.2%)	62 (42.2%)	99 (33.7%)
Moderately food insecure	11 (7.5%)	37 (25.2%)	48 (16.3%)
Severely food insecure	9 (6.1%)	25 (17%)	34 (11.6%)

A, vegetable producers[2] B, vegetable non-producers

From this table showed that monthly income, education status, age of respondents had associations with food security status of households, because the significance values were less than 0.005.

Table 4.2 C: Association of Food security status and monthly income, education status, age of respondents

Variables		Food security status of vegetable producer hhs		Total	Chi square test value	Significance value
		Food insecure	Food secure			
Monthly income of vegetable producer respondents	500-1000	55	0	55	139.629[a]	0.000
	1001-2000	2	14	16		
	2001-3000	0	4	4		
	3001-4000	0	32	32		
	>4000	0	40	40		
Total		57	90	147		
Education status of producers	Illiterate	27	0	27	101.249[a]	.000
	grade 1-5	29	15	44		
	grade 6-8	1	39	40		
	grade 9-12	0	32	32		
	College	0	4	4		
Total		57	90	147		
Age of vegetable producer respondents	20-30	0	10	10	74.184[a]	.000
	31-40	1	57	58		
	41-50	56	23	79		
Total		57	90	147		

4.4. Nutritional assessment of Households

Studies that assess people's nutrition-related knowledge, attitudes and practices (KAP) are a useful method for gaining such an insight into peoples' personal determinants of their dietary habits. They provide valuable inputs for effective programing and project planning. Additionally, KAP studies are indispensable for evaluating nutrition-education and communication interventions. KAP studies emerged within the 1950s from the requirement to measure opposition to planning services (Cleland, 1973). Nutrition-related KAP studies assess and explore peoples' KAP regarding nutrition, diet, foods and closely related hygiene and health issues (FAO, 2014). In this study KAP assessment were applied to determine children nutrition, food handling, water sanitation, personal hygiene status of households in the study area.

4.4.1. Households Nutritional KAP

4.4.1.1. Household Nutritional Knowledge

With respect to the overall nutritional knowledge of vegetable producer households, result showed that 69.2% and 76.8% for vegetable producer and non-producer households respectively had satisfactory knowledge.

All children should exclusively breastfeed for the primary six months and continue for as long as the mother and child wish. After six months of life, both appropriate and sufficient complementary food should be added to the breast milk (UNICEF, 2009). Breast milk is that the natural first food for babies, which provides all the energy and nutrients that the infant needs for the primary six months of life (WHO, 2003).

The total appropriate nutritional knowledge of respondents was 73% (69.22% for vegetable producer respondents and 76.77% for non-producer respondents). The result shows that 70.7% of respondents have appropriate exclusive breast feeding but 29.3% of respondents have less knowledge regarding exclusive breast feeding. This result is less than the finding conducted in Ginjo Guduru kebele, Jimma town,Oromia region,Ethiopia in 2020 (Habtamu, 2020) which was 92.1% and less higher than study conducted at Dabat health center ,northwest, Ethiopia (Mulugeta etal, 2017). Exclusive breastfeeding among children under age six months has consistently increased from 49% in 2005 to 59% in EMDHS (2019). The World Health Organization (WHO) and world organization Children's Fund (UNICEF) recommends that each

infant should be exclusively breastfed for the primary six months of life, with breastfeeding continuing for up to 2 years old or longer (WHO, 2003). Exclusive breastfeeding (EBF) is defined as feeding the infant only breast milk, with no supplemental liquids or solids apart from liquid medicine and vitamin/mineral supplements (WHO, 2003). For the primary six months of life, infants should be exclusively breast fed to attain optimal growth, development and health. Breastfeeding is related to a reduced risk of otitis, gastroen-teritis, disease, sudden SIDS syndrome, necrotizing enter colitis, obesity, and hypertension (James and Lessen,2009). Nutritional deficiencies and infectious diseases are the leading causes of kid mortality in developing countries. Breastfed infants have a reduced risk of malnutrition and customary childhood infectious diseases (UNICEF, 2011).Thereafter, infants should receive nutritionally adequate and safe complementary foods, while continuing to breast feed for up to 2 years or more.

4.4.1.2. Households Nutritional Attitudes

Regarding nutritional attitudes of households result has shown that the total positive attitude of vegetable producer households towards nutrition was 59.16% and 47.31% for vegetable non-producer households. In addition to this most of vegetable producer respondents (97.2%) and 88.4% of non-producer respondents perceived that it is difficult to feed their children different types of foods each day.

Regarding nutritional attitude 53.2%% of respondents had relevant attitudes toward nutrition. From the result most of respondents (87.85%) of respondents were not confident in preparing foods for their children. In addition only 7.2%% of respondents think that to give different types of food is not difficult and the rest 92.8% of respondents think giving different types of food to their children is difficult. The result shows that all respondents think that feeding their children several times each day is good and most of respondents (87.4%) think feeding their children several times each day is difficult. 94.2% of respondents think that continuing feeding breast milk beyond six month is good and 82.6% of respondents think that it is not difficult to continue breast milk feeding beyond six months.

4.4.1.3. Households Nutritional Practice

Concerning nutritional practice of respondents the result has showed that 71. 66%vegetable producer respondents have appropriate practice and 38.93% of respondents have appropriate practice. Vegetable producer respondents mostly feed their children from grains, legumes and nuts or, from beans, peas, from lentil nuts or seeds, milk, oil and fats and fishes

The single best Intervention to scale back child mortality in developed and developing countries is promotion of infant feeding practices. Despite this recommendation of worldwide only 39 you look after infants 6 months old are exclusive breast feed. In 2008 over million children under the age of 5 die annually, 41 you look after this death occur in geographical region and another 34% in south Asia and also the major contributors to their death is poor nursing practice (FAO,2017).

Globally, 60% of infant and young child deaths occur because of in appropriate alimentation practices and communicable disease from which two third of those deaths are because of sub optimal infant feeding practices. Inappropriate alimentation practice could have negative effect on child growth and development, especially in developing countries, where accessibility of basic health serves isn't sufficient (UNICEF, 2003). In Ethiopia 57% of all under-five deaths is extremely related to abrupt cessation of breastfeeding and infectious diseases, but it's closely linked to gap of data the way to feed appropriately and food insecurity. Concerning feeding additional foods to breast milk for children 64.62% showed that they have appropriate knowledge on the time when children should have to start additional food, this finding is much lesser than study conducted in Wolayita zone, Ethiopia (Motuma etal.,2016) which indicates 97.1% know the time children should start complementary foods. And 35.37% of respondents have less knowledge regarding the time to start additional food for children. Regarding the importance of complementary food 62.93% of respondents only replied correctly, this result is much lesser than study conducted in Wolayita zone, Ethiopia (Motuma etal.,2016) which shows 92.6% of respondents correctly known the benefits of complementary feeding and this finding is much higher than study conducted in Shabelle zone,Somali region,Ethiopia (Rashid etal.,2016) which says only 25% of the participants knew the correct time of complementary feeding to be at six months. And the rest needs nutritional education regarding complementary food for children. In addition to this respondents were little knowledgeable regarding diet diversity only 42.16% of respondents have appropriate knowledge. While research conducted by Motuma et al. (2016) in

Wolayita zone, Ethiopia showed, (85.3%) of respondents have knowledge on how to prepare foods for their children. is not difficult to continue breast milk feeding beyond six months.

The result shows 76.87% of all respondents have appropriate practice toward nutrition. From these respondents 88.4% vegetable producer respondents and 65.3% of non-producer respondents were included. This result is much higher than national prevalence which is 59% (EMDHS, 2019) and most respondents (81.58%) consumed breast milk and regarding diet diversity 56% of respondents used six groups of foods and all are vegetable producers. The lack of dietary diversity may be a particularly severe problem among poor populations of developing countries because their diets are predominantly supported starchy staples and infrequently include little or no animal products and few fresh fruits and vegetables. These plant-based diets tend to be low during a number of micronutrients, and also the micronutrients they contain are often in an exceedingly form that's not easily absorbed. Other aspects of dietary quality problems like high intakes of fat, salt, and sweetening in developed countries is becoming a priority for developing countries (WHO,1996). Good Dietary Diversity. Children 6–23 months old who received foods from four or more food groups of the seven food groups [(1) grain, root, and tubers, (2) legumes and nuts, (3) dairy products, (4) flesh food, (5) egg, (6) vitamin A-rich fruit and vegetables, and (7) other fruit and vegetables] are wont to have minimum dietary diversity (WHO,2007).Vegetable producers were used different types of diets to prepare foods for their children but vegetable non producers were less in using different groups of food groups to prepare food for their children.

The nutritional KAP was calculated as indicated in chapter three equation one.

Table 4.3: Nutritional KAP status of households

	Respondents category		Average
	Producers	Non-producers	
Knowledge	69.2%	76.8%	73%
Attitude	59.16%	47.31%	53.2%
Practice	71.66%	38.93%	55.2%
Total	66.67%	54.34%	60.5%

4.4.2. Food Handling Knowledge, Attitude and Practice

Food handler is a person who handles food, or contact with any utensils or equipment that are likely to be up-to-date with food, as an example cutlery, bowls, plates or chopping boar (Tessema et al., 2014). The role of food handlers, normally mothers in guaranteeing food safety at the household level is incredibly much acknowledged and an understanding of the interaction on prevailing safe food handling knowledge, beliefs and practices of food handlers so as to attenuate food borne outbreaks required (Medeiros et al.,2004).

4.4.2.1. Food Handling Knowledge Status of Respondents

To assess the food handling status of respondents there were five knowledge questions, two for practice and nine for attitude used.

Thus concerning food handling result showed that 89.278% for vegetable producers and vegetable non-producers their knowledge status on food handling was calculated in similar manner as follows:

This result indicated us the vegetable non-producer's knowledge status was 76.6% regarding food handling. In this study the overall knowledge of respondents on food handling was 82.9% (89.278% for vegetable producer respondents and 76.6% vegetable non-producers). This indicates knowledge of respondents in this study were more knowledgeable than study conducted in Jigjiga town on food safety KAP in abattoir and retail meat shops (Tegegne & Phyo,2017) which indicates 78% of respondents have unsatisfactory knowledge level. Current study is again more greater than study conducted on College Students, Ethiopia (Jember etal.,2019).

4.4.2.2. Food Handling Attitude of Households

To assess the household's food handling attitude seven questions were asked and the overall status of their attitude was calculated according to equation one in chapter three.

This result indicated that vis-à-vis food handling attitude of vegetable non-producers have shown 80.02 %(Table 4.4)

Thus the overall positive attitudes of respondents were 83.9%, this result was in agreement with study conducted in Zimbabwe (Ncube et al., 2020) which revealed that over 80% of the food handlers had positive attitudes toward food safety.

4.4.2.3. Households Food Handling Practice

Relating to household**d**s food handling practice there were two generic questions asked for respondents and their positive attitude status

Food contamination mainly occurs through poor food handling practice which results in numerous food borne diseases. These diseases are the major causes of morbidity and mortality. Globally, more than 50% of the total food poisoning cases were attributed to improper food handling procedure (Lee et al., 2017). Good personal hygiene and food handling practices are important for preventing the transmission of pathogens from food handlers to the consumers (Wambui et al., 2017). Close to 75% of food-borne illness outbreaks are attributed to lack of safe food handling practices by food handlers in food service establishments (Gizaw et al., 2014). Food handlers play a key role in ensuring strict adherence to food safety principles throughout the whole process (Asmaw etal., 2018). Regarding food handling practice 38.1% of all respondents have appropriate practice which is less than study conducted in North West Ethiopia (Fasika etal.,2019). But vegetable producer respondents have 40.8% appropriate practice, this value align with research undergone by Fasika et al,(2019) in North West Ethiopia which revealed good food handling practice of those respondents were 40.1%, while vegetable non-producers have 35.5% relevant practices on food handling. This result generally indicates there were low or inappropriate practices concerning food handling.

Table 4.4: Food handling KAP

	Respondents category		Average
	Producers	Non-producers	
Knowledge	89.27%	76.6%	82.935%
Attitude	87.6%	80.02%	83.81%
Practice	40.8	35.5%	38.1%
Total	72.55%	64.04%	68.28%

4.4.3. Households Water Sanitation KAP

Water supply, sanitation and hygiene have direct impact on diseases especially diarrhea and therefore are important for preventing malnutrition. When people are showed to high levels of infection due to unsafe and insufficient water supply and inadequate sanitation, their nutrition status is compromised (WHO, 2001).

4.4.3.1. Households Water sanitation Knowledge.

The results shows that 38.8%% respondents have total appropriate knowledge toward uses of water they use and how to treat the water if they know the water they use for cooking or drinking is not safe.

4.4.3.2. Households Water Sanitation Attitude

Result from table 4.10 shown that the positive attitude of vegetable producers on water sanitation were 76.32% and 74.12% for vegetable non-producer respondents.

The survey result shows 75.22% of respondents have positive attitude toward treatment of water they use for cooking and drinking but this result implies there were gaps; therefore it needs additional community education on treatment of water.24.78% of respondents believe it is difficult to boil water. This finding is higher than study conducted in Tigray by Abera etal (2020).Which indicated that 48.5% of respondents in rural Tigray were observed positive attitude on WASH.

4.4.3.3. Water Sanitation Practice

Concerning water sanitation practice, the result has shown that the appropriate practices of vegetable producer households was 60.22% and those of vegetable non-producers was 43.66% (table 4.5).Result shows that practice toward the use of water and sanitation was 51.9% which was less appropriate practices. This finding is higher in some extent than study conducted in Rural Residents in Tigray Region, Northern Ethiopia (Abera etal.,2020) whish says among rural residents in Tigray region indicated good knowledge ,positive attitude and good practice on wash were observed 42.2%. Safe treatment and storage of drinking water can reduce the prevalence waterborne diseases by 30-50% (UNICEF, 2016).Concerning treatment of items they used 55.44% of respondents treat the items with water and soap. This will help to protect contamination during collection. 18.52% of respondents store water in clean and covered

container. This is less practice and needs education regarding storage of water and treatment of items used for storage. This result is less than the study conducted in Gogrial West County, Warrap state South Sudan with title Knowledge, Attitude and Practice Survey report(WASH-Alek base,2012),which indicated 40% of respondents use plastic buckets and pots. It was observed during the survey that these are often without lids. The use of open buckets and pots without a lid is a poor practice simply because water can easily get contaminated. 66.3% of all vegetable producer and non-producer respondents used piped water for cooking, hand washing and for drinking. This result higher than the study conducted by EDHS in 2016 which indicated bout 56% of households had access to improved drinking water sources, while 9.94% had access to improved sanitation and 52.85% had access to a hand washing facility with water and soap. But only 36.7% non-producer respondents used piped water for purpose explained above and 95.9% of producers use piped water for the above activities. According to information obtained from key informant interview those who are not get piped water availability they purchase from the Meki town. 31.6% of the total respondents use surface water for cooking, hand washing and drinking. 59.2% of non-producers use surface water; when only 4.1% of producers use the water for the specified use. Only 2% of the total respondents use piped into dwelling water.

Table 4.5: households water sanitation KAP

	Respondents category		Average
	Producers	Non-producers	
Knowledge	89.27%	76.6%	82.935%
Attitude	87.6%	80.02%	83.81%
Practice	40.8	35.5%	38.1%
Total	72.55%	64.04%	68.28%

4.4.4. Water Sanitation and Hygiene KAP

Unless people have adequate knowledge, attitudes and practices in relation to drinking water, sanitation and hygiene, mere access to the services is not sufficient mitigate health problems related to unsafe water and poor sanitation and hygiene. Three key hygiene practices safe disposal of feces, hand washing with soap at critical times, and the treatment and storage of drinking water are the most effective ways of reducing diarrheal disease (Luby et al.,2006).

4.4.4.1. Water sanitation and hygiene knowledge

Results from table 4.12 shows that the water and hygiene knowledge of vegetable producer households were 70.42% and that of vegetable non-producer households were 65.99%.

Current study showed that about 68.1% from all respondents have appropriate knowledge, which was less than study conducted in Northern Ethiopia (Bayeh etal., 2016) which says overall assessments of knowledge showed that the majority of respondents (75.7%) were knowledgeable about water safety, sanitation and hygiene.

4.4.4.2. Water Sanitation and Hygiene Attitude

Results revealed that the attitude of vegetable producers towards sanitation and hygiene was 77.56% and for vegetable non-producer respondents it was 69.54%.

4.4.4.3. Households Water and Sanitation Practice

The result showed that the appropriate practices of vegetable producer respondents were 62.1%and 53.5% for those vegetable non-producer households. The values were obtained from the following calculations:

Concerning water and sanitation practices 57.8% from all respondents have appropriate practice. Regarding 15 days prevalence of diarrhea among children less than five years was found to be around 10%. This was in line but less with research conducted in Northern Ethiopia (Bayeh et al., 2016) which was 13.6%. 21. 75% from all respondents indicated presences of open defecation, this result was much less than study conducted in Gogrial West country, Warrap state south sudan (WASH-Alek base,2012) and bring into line study conducted in Wundwin Township, Mynamar (United Nations Human Settlements Programme) which indicated 15.6% (78 households) who usually defecated openly, 15.4% (77 households) did it in the field and 0.2% (only 1 household) defecated in the house compound.

Table 4.6: Water sanitation and hygiene KAP

	Respondents category		Average
	Producers	Non-producers	
Knowledge	70.42%	65.99%	68.2%
Attitude	77.56%	69.54%	73.55%
Practice	62.1%	53.5%	57.8%
Total	70.02%	63.01%	66.51%

4.4.5. Households Personal Hygiene KAP4.

4.5.1. Households Personal Hygiene Knowledge

The results have shown that the knowledge of vegetable producer households on personal hygiene was 74.75% and 50% for vegetable non-producers. According to result from table 4.15 only 58.5% vegetable producer respondents wash their hands after going to toilet or cleaning baby's bottom but 72.1% of vegetable no-producer respondents wash their hands after performing similar activities. The overall personal hygiene knowledge of households was 62.3%, but vegetable producers were more knowledgeable than vegetable non-producer households.

All respondents have 62.37% overall knowledge on personal hygiene and this result is align with study conducted Kotebe Metropolitan university(Getachew Dagnew &Dessalegn Berihun,2018) which indicated that only 44% of respondents were knowledgeable regarding personal hygiene but vegetable producer respondents showed higher knowledge (74.75%) regarding personal hygiene and 82.38% of respondents showed positive attitude toward personal hygiene. Concerning Status of respondents on personal hygiene knowledge result shows that 62.37% of respondents wash hands (after going to the toi0let and cleaning the baby's bottom) and34.69% of them remove faeces from the home and surroundings. This result align but greater with a study conducted Gogrial West country, Warrap state South Sudan by WASH-Alek(2012) Base indicated about half of the respondents do not have a good hand washing practice during key times, current research showed that more than half of the respondents did not have appropriate practices. 55% said they wash their hands during one of the three (3) critical times; 5% after defecation, 24% before preparing food and 26% before eating food. It is important to note that

most of the respondents do not have a good hand washing practice after defecation, arguably the most important time to wash ones hands to prevent spread of diarrhea.

Result shows that 1.36% after cleaning the baby's bottom/changing a baby's nappy, and 2.04 %before preparing/handling food

wash their hands the rest 96.59% wash their hands after going to the toilet/latrine, after cleaning the baby's bottom/changing a baby's nappy, before preparing/handling food, before feeding a child/eating, after handling raw food and after handling garbage. This result is in align with the result done in Nigeria which shows 70.6% of respondents had good knowledge of hand washing (Aigbiremolen et al.,2015).

4.5.2. Households Personal Hygiene Attitude

Concerning household's personal hygiene the result has shown that the positive attitudes of vegetable producers were 81.36 % and 83.4% for non-producers.

Result shown regarding attitudes of respondents that 65.30% respondents they think they are not likely to become sick from not washing their hands. 34.69% think they were likely to become sick from not washing their hands. The result shows that 70.408% of respondents think that how serious they think it is not serious that they or their child gets sick from not washing their hands and 28.23% think it is serious that they or their children gets sick from not washing their hands and 1.360% think it is neutral or unsure. Result shown regarding attitudes of respondents that 65.30% respondents they think they are not likely to become sick from not washing their hands. 34.69% think they were likely to become sick from not washing their hands.

The result showed that 70.408% of respondents think that how serious they think it is not serious that they or their child gets sick from not washing their hands and 28.23% think it is serious that they or their children gets sick from not washing their hands and 1.360% think it is neutral or unsure. 96.59% of respondents think that to wash hands before feeding a child or eating is good and 3.401% think that they are not sure. This positive attitude finding much higher than the study conducted in Hossana town, Southern Ethiopia (Alula et al,2018) Which shown only (59.4%) of respondents had positive attitude and all respondents think that it is not difficult to wash their hands before preparing food. Result shows 8.503 % feel not confident in washing their hands properly and 3.401% think they are not sure for washing their hands properly. 88.095% think

they are confident that they wash their hands properly. This shows that the respondents who feel not confident did not know the materials and procedures to wash their hands. The overall Positive attitude of respondents was 82.38%; this result is higher than study conducted in Kotebe metropolitan university of Ethiopia (Getachew Dagnew & Dessalegn Berihun,2018) which showed that 56.2% of respondents have positive attitude.

4.4.5.3. Household's Personal hygiene Practice

The status of vegetable producer's household's personal hygiene practice was 36.4% and those of vegetable non-producers households were' 44.25%.Vis-à-vis personal hygiene practice around 40% of respondents showed appropriate practice. Concerning this practice or method of hand washing 19.38 % respondents Washes hands in a bowl of water (sharing with other) which is poor practice and 39.11% or respondents wash their hands with someone pouring a little clean water from a jug onto one's hands. The rest 41.496% washes their hands with soap or ashes, this result is much higher than study conducted in Warrap state South Sudan, which indicated 24% they wash their hands with clean water and soap (WASH-Alek base, 2012).

Table 4.7: households' personal hygiene KAP

	Respondents category		Average
	Producers	Non-producers	
Knowledge	74.75%	50%	62.3%
Attitude	81.36%	83.4 %	82.38%
Practice	36.4%	44.25%	40 %
Total	64.17%	59.2%	61.69%

4.5. Relationship between household food security, nutrition KAP and WASH practices

Improving access to vegetables and fruits in their diets reduces mortality and morbidity of infants and children under five years old, particularly in rural areas (Braun et al., 2004). WASH remains one of the big public health issues in sub-Saharan Africa, with very poor coverage (Bain etal, 2014). Poor knowledge, attitude and practice of peoples toward nutrition make the nutrition

status of households and household members to consume poorly nutritious food. In addition to these this less KAP will lead mothers to feed their children nutrient poor foods. WASH practices are proven to scale back diarrheal rates by 30–40 percent (Cairncross et al., 2010). This level of reduction is achieved through a comprehensive approach promoting improvements in key WASH practices (e.g., hand washing, treatment and safe storage of beverage, safe disposal of feces, and food hygiene); improving access to safe water and sanitation technologies and products; and facilitating or supporting an enabling environment (e.g., improved policies, community organization institutional strengthening, and public- private partnerships). Furthermore, a clean environment for kids is additionally important to cut back exposure to the pathogenic surroundings. Use of safe water, sanitation facilities, and good hygiene can improve nutritional outcomes by addressing both immediate and underlying causes of malnutrition. Lack of sanitation, specifically, is strongly correlated with acute malnutrition and stunting. Even within the absence of diarrhea, a fecal-contaminated environment is linked to chronic under nutrition, which reduces utilization of essential nutrients.

Table 4.8 indicates that there is association between food security and Nutritional KAP, WASH practices because the significant values were less or equal to 0.005, but religion of respondents were have no association with food security status of households. Poor knowledge, attitude and practice of peoples toward nutrition make the nutrition status of households and household members to consume poorly nutritious food. In addition to these this less KAP will lead mothers to feed their children nutrient poor foods. WASH practices are proven to scale back diarrheal rates by 30–40 percent (Cairncross et al., 2010).This indicated us nutritional KAP is related to household food security status.

Table 4.8: Association of nutritional KAP, WASH practices and Food security

Variable	Category	Freq.	Food security status		Chi-square test	Sig. value
			Secure	insecure		
Continue breastfeeding	Six month and less	4	0	4	14.32	0.005
	12-23 months	112	24	88	12.50	0.003
	23 months and more	152	70	82	16.34	0.000
Dietary diversity and ways of enriching porridge by adding from different food groups	Animal source foods	124	56	68	67.51	0.004
	Pulses and nuts	56	56	19	12.36	0.000
	Vitamin-A-rich fruits and vegetables	50	56	6	16.23	0.000
	Energy rich foods(oil and fat)	58	50	8	12.53	0.003
Likelihood of getting sick from eating contaminated food?	Likely	86	27	59	14.43	0.000
	Not likely	108	53	55	17.23	0.002
Seriousness of getting sick from eating contaminated food.	Serious	42	26	16	69.34	0.004
	Not serious	252	64	188	54.32	0.003
Goodness of keeping meat, poultry, fish, or cooked food in a cool place.	Good	241	86	175	107.23	0.000
	Not good	53	34	19	12.45	0.000
Goodness of re-heating left-overs before eating or serving them	Good	264	88	176	15.32	0.003
	Not Good	30	2	28	12.25	0.000
Goodness of washing fruits and vegetables with clean water	Good	182	90	182	16.42	0.003
	Not good	12	0	12	14.67	0.000
Treating unsafe water	Boil	74	32	42	162.3	0.000
	Adding Chlorine	220	58	162	59.32	0.000
Using toilet	Good	290	90	200	19.34	0.000
	Not good/not know	4	0	4	12.53	0.000
Religion	Muslim	36	14	22	16.82	0.574
	Orthodox	210	57	153	11.3	0.632
	Protestant	48	19	29	18.43	0.532

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

This research believed to have a contribution in advancing the existing understanding and practice in Ethiopia regarding the food security status of vegetable producers and non-producers, nutritional KAP, and WASH practices. Food and nutrition protection was described at the World Food Summit in 1996 as the situation where "all people at all times have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. This concept of food security represents two main dimensions: The status of food and its stability. The researcher attempted to review one of the less studied subject which is Food security, diet diversity and wash practices of vegetable producers. It is believed that the study contributes in the existing knowledge and fills the research gap by lighting the challenges and strategies of the study group in the study area. Concerning household food security status of vegetable producers and non-producers was done to determine the positive effects of vegetable production on food security of households. This finding revealed that vegetable producers were more food secure than vegetable non-producers. Regarding nutrition KAP, most respondents had good knowledge concerning appropriate nutritional knowledge, but it needs additional education on nutrition. This study revealed that more than half of respondents had good knowledge concerning feeding additional foods to breast milk for their children. Most of respondents understood the importance of feeding complementary foods their children, but they had poor practice and knowledge on feeding children with diversified diet. Almost all of the respondents supposed that feeding children several times each day is difficult. This poor attitude leads caregivers and mothers to feed their children with less frequency and diet diversity.

Concerning water and sanitation more than average of respondents had use piped water for cooking, hand washing and drinking, but their practices on water treatment were poor.

Vis-à-vis personal hygiene more than half of respondents had good knowledge on critical time to wash their hands, but there were malpractices on hand washing.

5.2. Recommendations

This study had revealed the status of household food security, diet diversity status and WASH practices of vegetable producers and non-producers in Dugda Woreda East Showa zone, Oromia region, Ethiopia in 2021.The following recommendations are set based on findings:

1. To enhance household food security and diet diversity vegetable production have great role; but there were gaps observed between vegetable producers and no-producers. Thus to increase vegetable production engagers, it is mandatory to solve the issues of credit accessibilities. Respondents raised that to buy inputs to produce vegetables they lack credit accessibilities therefore these issues needs action from ministry of agriculture and finance institutions to resolve the problem.
2. Concerning nutritional KAP, even more than half of respondents shown us good knowledge, but it needs additional education to minimize the malpractices and negative attitudes on nutritional issues.
3. On personal hygiene there were good knowledge shown but there were inappropriate practices on hand washing. These issues need continuous education to be given in formal and informal ways.
4. Additional training and education is needed for the societies concerning child feeding and water sanitation by health extension workers.

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Annex 1: Questionnaire

Household Food Security, Nutrition and Wash Practices among Vegetable Producers in Dugda Woreda Oromia Region, Ethiopia

Part 1; Demographic and socio-economic data

No	Question (variable	Response option	Response
	Age	----------	
1.2	Marital status	01. Single 04. Widowed 02. Married 05. Widower 03. Divorced	
1.3	Religion	01. Muslim 03 .Catholic 02. Orthodox 04. protestant	
1.4	Level of Education	01. can't read &write 02. can read &write 03. Grade 1-5/ħ1-5 04. Grade 6-8/ħ 6-8 05. Grade 9-12/ħ 9-12 06. College /university	
1.5	Occupation	01. Housewife 04. Merchant 02. Farmer 05. Daily labor 03 .Govt. employee	
1.6	Monthly income (Birr)	----------	
1.7	Number of children/households	----------	
1.8	Age of infant /	----------	

Part 2. Household Food Insecurity Access Scale (HFIAS) Measurement Tool

No	Question	Response options	Code
1	. In the past four weeks, did you worry that your household would not have enough food?	0 = No (skip to Q2) 1=Yes	.|___|
1a	How often did this happen?	1 = Rarely (once or twice in the past four weeks 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks	.|___|
2	In the past four weeks, were you or any	0 = No (skip to Q3)	.|___|

	household member not able to eat the kinds of foods you preferred because of a lack of resources?	1=Yes	
2a	How often did this happen?	1 = Rarely (once or twice in the past four weeks 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks	.|___|
3	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0 = No (skip to Q4) 1 = Yes	.|___|
3a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	.|___|
4	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0 = No (skip to Q5) 1 = Yes	.|___|
4a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	.|___|
5	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	0 = No (skip to Q6) 1 = Yes	|___|
5a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	.|___|
6	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	0 = No (skip to Q7) 1 = Yes	.|___|

6a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks	.|___|
7	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	0 = No (skip to Q8) 1 = Yes	.|___|
7a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	.|___|
8	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0 = No (skip to Q9) 1 = Yes	.|___|
8a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	.|___|
9	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	0 = No (questionnaire is finished) 1 = Yes /	.|___|
9a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	.___|

Part 3:Food handling

I am going to ask you some questions about food handling. Please let me know if you need me to clarify any of my questions. Feel free to ask any question you may have.

3.1 Food handling attitude

No	Questions	Response option	Answer
1	How likely do you think you are to get sick from eating contaminated food?	1=. Not likely - 2= You're not sure – 3= Likely - *If Not likely:* Can you tell me the reason why it is not likely?	
2	How serious do you think it is to be sick from eating contaminated food? ¨	1=. Not serious – 2=. You're not sure - 3= Serious - If Not Serious *Can* you tell me the reason why it is not serious?	
3	How good do you think it is to keep meat, poultry, fish, seafood or cooked food in a cool place, for example in a cool box or in the refrigerator?	1=. Not good – 2=. You're not sure – 3=. Good - *If Not good:* Can you tell me the reasons why it is not good? _____	
4	How good do you think it is to reheat leftovers before eating or serving them?	1=. Not good - 2=. You're not sure - 3=. Good - *If Not good:* Can you tell me the reasons why it is not good?_____	
5	How difficult is it for you to reheat leftovers before eating or serving them?	1= Not difficult - 2=. So-so - 3= Difficult - *If Difficult:* Can you tell me the reasons why it is difficult?_____	
6	How good do you think it is to wash fruits and vegetables with clean water?	1=. Not good - 2=. You're not sure - 3= Good - *If Not good:* Can you tell me the reasons why it is not good?_____	
7	How difficult is it for you to wash fruits and vegetables with clean water? ¨	1=. Not difficult 2=. So-so - 3=. Difficult - *If Difficult:* Can you tell me the reasons why it is difficult?_____	

3.2 Food handling Knowledge

No	Questions	Response option	Answer
1	Why should you prevent raw meat, offal, poultry and seafood from touching other foods such as those that are cooked or ready to eat?	1=Raw animal foods often contain germs (which may be transferred to cooked and ready-to-eat foods) - 2=Other - 3=Don't know	
2	When cooking soups and stews, what sign shows that these are ready and safe to be served?	1=They are boiling/ well cooked - 2=Other - 3=Don't know -	
3	What kinds of food should be placed in the refrigerator or in a cool place, such as an icebox or cool box?	Perishable foods 1=Meat, offal - ¨2=Poultry - 3=Fish - 4=Milk/dairy products - 5= Cooked foods - 6=Other - 7=Don't know -	
4	Why should someone avoid eating leftovers that were not kept in a cool place?	1=Because food is not safe anymore - 2=Foods get spoiled (germs multiply very quickly and can cause illness) - 3= Higher temperatures make germs grow faster - 4=Other - 5=Don't know 6=(Any of the three first response options is correct)	
5	What should you do before eating raw fruits and vegetables?	1=Wash them with clean water - 2= Other - 3= Don't know -	

3.3 Food handling Practices

No	Questions	Response option	Answer
1	After you have prepared dinner, kitchen surfaces, pots, pans, plates and utensils are dirty. Can you describe how you clean them usually?	1=Scrape excess food into rubbish bin 2=Wash with hot water - 3=Wash with detergent - 4=Don't know/no answer -	
2	How do you store perishable fresh foods such as raw meat, poultry and seafood?	1= In the refrigerator (below 5 °C)/cool box 2=Covered (protected from insects, rodents, pests and dust) 3=Separated from cooked or ready-to-eat foods 4=Other 5=Don't know/no answer -	

Part 4:Personal hygiene Attitudes

No	Questions	Response option	Answer
1	How likely do you think you are to become sick, such as having stomach ache or diarrhoea, from not washing your hands? *OR* How likely do you think it is that your child will become sick, such as having stomach ache or diarrhea, from you not washing your hands?	1=. Not likely - 2=. You're not sure - 3= Likely - If Not likely: Can you tell me the reason why it is not likely? _____	
2	How serious do you think it is if you or your child gets sick from you not washing your hands? *OR* How serious do you think diarrhea is for your health? *OR* How serious do you think is diarrhea for a baby's health?	1=.Not really serious 2=. Neutral/unsure ¨3=. Serious If Not Serious: Can you tell me the reason why it is not serious?_____	
3	How good do you think it is to wash your hands before preparing food? *OR* How good do you think it is to wash your hands before feeding a child/eating?	1=Not good - ¨2=. You're not sure - 3=Good - *If Not good:* Can you tell me the reasons why it is not good?_____	

4	How difficult is it for you to wash your hands before preparing food? *OR* How difficult is it for you to wash your hands before feeding a child/eating?	1=. Not difficult - ¨2=. So-so - 3= Difficult - *If Difficult:* Can you tell me the reasons why it is difficult?_____	
5	How confident do you feel in washing your hands properly?	1=. Not confident - 2= Ok/so-so - 3=. Confident - *If Not confident:* Can you tell me the reasons why you do not feel confident?	

4.2 Personal hygiene Knowledge

No	Questions	Response option	Answer
1	Food poisoning often results from contact with germs from faeces. What can you do to avoid sickness from germs from human or animal faeces?	1=Wash hands (after going to the toilet and cleaning the baby's bottom) 2=Remove faeces from the home and surroundings (use a latrine, teach small children to use a potty and put hildren's faeces in the latrine, and clean up faeces from animals) 3= Other 4=Don't know	
2	There are key moments when you need to wash your hands to prevent germs from reaching food. What are these key moments?	1=After going to the toilet/latrine - 2=After cleaning the baby's bottom/changing a baby's nappy - 3=Before preparing/handling food - 4= Before feeding a child/eating - 5=After handling raw food 6= After handling garbage - 7= Other - 8=Don't know -	

4.3 Personal hygiene Practices

No	Questions	Response option	Answer
1	Could you please describe step by step how you wash your hands?	1= Washes hands in a bowl of water (sharing with other people) — poor practice 2=. With someone pouring a little clean water from a jug onto one's hands — appropriate practice 3= Under running water — appropriate practice 4= Washes hands with soap or ashes 5= Other 6=Don't know/no answer	

Part 5: Water and sanitation Attitudes

No	Questions	Response option	Answer
1	How likely do you think you are to get diarrhoea from using unsafe water? *OR* -How likely do you think your child is to get diarrhoea from using unsafe water?	1= Not likely - 2= You're not sure 3= Likely *If Not likely:* Can you tell me the reason why it is not likely? -	
2	How serious do you think it is to get sick from using unsafe water?	1=. Not really serious - 2=. Neutral/serious 3=. Serious - If Not serious: Can you tell me the reason why it is not serious? -	
3	How good do you think it is to boil water before drinking or using it?	1=. Not good - 2=. You're not sure - 3=. Good - If Not good: Can you tell me the reasons why it is not good?	
4	How difficult is it for you to boil water before drinking or using it?	1=. Not difficult - 2= So-so – 3= Difficult - If Difficult: - Why it is difficult? _____	
5	How confident do you feel in boiling water before drinking or using it?	1= Not confident 2=. Ok/so-so 3= Confident - *If Not confident:* Can you tell me the reasons why you do not feel confident?	

5.2 Water and sanitation Knowledge

No	Questions	Response option	Answer
1	If you know that the water you are going to use for cooking or drinking is not safe or does not come from a safe source, what should you do?	1=, Boil it - 2=Add bleach/chlorine 3=Strain it through a cloth - 4=Use a water filter (ceramic, sand, composite, etc.) – 5=Use solar disinfection 6=Let it stand and settle - 7=Discard it and get water from a safe source - 8=Other - 9= Don't know -	

5.2 Water and sanitation Practices

No/	Questions	Response option	Answer
1	What is the main source of water used by your household for drinking, cooking and hand washing?	1=Piped water 2=Piped into dwelling 3= Piped into yard or plot - 4= Public tap/standpipe 5= Tube well/borehole 6=Dug well 7= Protected well 8= Unprotected well 9=Water from spring - 10= Protected spring 11= Unprotected spring 13=Tanker-truck 14=Cart with small tank/drum - 15=Surface water (river, stream, dam, lake, pond, canal, irrigation channel) 16=Bottled water 17= Other (specify) _____ 18=Don't know	
2 A	Do you collect water for domestic use?	1=Yes.....Go to *question* P.2B. 2= No..... Go to *question* P.3.	
2.B	B. What item do you use to collect water?		
2.C	To know if the item is clean probe: Did you treat this item in any way to make it clean?	1=Yes 2= No 3= Don't know If Yes: How? 4=Use of water and soap (clean container) - 5=Other - 6= Don't know/no answer	
3	Could you describe how you store water?	1=Clean container or jar 2= Covered container or jar 3=Clean and covered container or jar 4=Other 5= Don't know/no answer	
4.A	Do you treat your water in any way to make it safe to drink?	1=Yes 2=No 3= Don't know/no answer go to 4.B *If Yes:*	
4.B	What do you usually do to the water to make it safer to drink?	1=*Boil it* 2=*Add bleach/chlorine* 3=*Strain it through a cloth* 4=*Use a water filter (ceramic, sand, composite,*	

		etc.) 5= *Use solar disinfection* 6=*Let it stand and settle* 7=*Other -* 8= *Don't know/no answer*	

Part 6. Feeding young children (6–23 months

6.1 Households child feeding Practice

6. 1. 1 Was (name of the baby) breastfed or did he or she consume breastmilk yesterday during the day or at night? 0 .No 1. Yes

6.2: Dietary diversity

Now I would like to ask you about (other) liquids or foods that (*name of the baby*) ate yesterday during the day or at night. I am interested in whether your child had the item even if it was combined with other foods. For example, if (*name of the baby*) ate a millet porridge made with a mixed vegetable sauce, you should reply yes to any food I ask about that was an ingredient in the porridge or sauce. Please do not include any food used in a small amount for seasoning or condiments (like chillies, spices, herbs or fish powder); I will ask you about those foods separately. Yesterday during the day or at night, did (*name of the baby*) eat:

6.2Food categories	Food lists	No	yes
6.2.1 Group 1: Grains, roots and tubers	Porridge, bread, rice, pasta/noodles or other foods made from grains		
6.2.2 Group 2: Legumes and nuts	Any foods made from beans, peas, lentils, nuts or seeds		
6.2.3 Group 3: Dairy products	Infant formula, such as [insert local examples]		
	Milk, such as tinned, powdered or fresh animal milk		
	Yogurt or drinking yogurt		
	Cheese or other dairy products		
6.2.4 Group 4:Flesh foods	Any meat, such as beef, lamb, goat, chicken or other meat		
	Fresh or dried fish, shellfish or seafood		
6.2.5 Group 5:Eggs	Eggs from poultry		
6.2.6 Group 6: Vitamin A fruits and vegetables	Pumpkin, carrots, squash or sweet potatoes that are yellow or orange inside		
	Any dark green vegetables [insert local examples]		

	Ripe mangoes (fresh or dried [not green]), ripe papayas (fresh or dried), musk melon [insert other local vitamin-A-rich fruits]		
6.2.7 Group 7: Other fruits and vegetables	Any other vegetables and fruits		
Other oils and fats	Any oil, fats, or butter or foods made with any of these		
	Any sugary foods, such as chocolates, sweets, candies, pastries, cakes or biscuits		
	Condiments for flavour, such as chillies, spices, herbs or fish powder		

6.3. How many times did (name of the baby) eat foods, that is meals and snacks other than liquids yesterday during the day or at night?

----------times

6.4 Households nutritional knowledge

No	Question	Response option	Code
6.4. 1	Continued breastfeeding How long is it recommended that a woman breastfeeds her child? Until what age is it recommended that a mother continues breastfeeding?	1. Six months or less 2. 6–11 months 3. 12–23 months 4. 24 months and more (correct response) 5. Other 6. Don't know	|___|
6.4.2	Age of start of complementary foods .At what age should babies start eating foods in addition to breastmilk?	1. At six months 2. Other 3. . Don't know	|___|
6.4.3	Reason for giving complementary foods at six monthsWhy is it important to give foods in addition to breastmilk to babies from the age ofsix months?	1. Breastmilk alone is not sufficient (enough)/cannot supply all the nutrients needed for growth/from six months, baby needs more food in addition to breastmilk 2. Other 3. Don't know	|___|
6.4.4	Consistency of meals how much thick and watery/thin porridges given to a young child?	1. It must be thick porridge 2. It must be watery/thin porridges 3. ¨Does not know	|___|
6.4.5	Reason for consistency of meals?	1 .Because the thick porridge is more	|___|

		nutritious/because it is prepared with different types of foods or ingredients (food diversity) 2. Other 3. Don't know	
6.4.6	Please tell me some ways to make rice porridge more nutritious or better for your baby's health. Which foods or types of food can be added to rice porridge make it more nutritious?	1. Animal-source foods (meat,poultry, fish, liver/organ meat, eggs, etc.) 2.Pulses and nuts: flours of groundnut and other legumes (peas, beans, lentils, etc.), sunflower seed, peanuts, soybeans 3 Vitamin-A-rich fruits and vegetables (carrot, orange-fleshed sweet potato, yellow pumpkin, mango, papaya, etc.) 4 .Green leafy vegetables (e.g. spinach) 5 Energy-rich foods (e.g. oil, butter/ghee) 6. Other 7. Don't know	|___|
6.4.7	Responsive feeding Do you know any ways to encourage young children to eat?	1.=Giving them attention during meals, talk to them, make meal times happy times 2.=clap hands 3=make funny faces/play/laugh 4.=demonstrate opening your own mouth very wide/modelling how to eat 5.=say encouraging words 6.=draw the child's attention 7. Other 8.Don't know	|___|

6.5 Households nutritional attitude

6.5.1	Self-confidence How confident do you feel in preparing food for your child?	1.=Not confident 2.=Ok/so-so 3.=Confident	….|___|
6.5.2	Giving a diversity of food (foods from many food groups) Perceived benefits How good do you think it is to give different types of food to your child each day?	1.=Not good 2.= You're not sure 3=. Good	….|___|
6.5. 2a	Perceived barriers How difficult is it for you to give different types of food to your child each day?	1=.Not difficult 2.= So-so 3. =Difficult	
6.5.3	Feeding frequently, Perceived benefits. How good do you think it is to feed your child several times each day?	1.=Not good 2.=You're not sure 3.=Good	….|___|
6.5.3a	Perceived barriers How difficult is it for you to feed your child several times each day?	1.=Not difficult 2=.So-so 3.=Difficult	….|___|
6.5.4	Continuing breastfeeding beyond six months Perceived benefits; How good do you think it is to continue breastfeeding beyond six months?	1.=Not goo 2.=You're not sure 3. =Good	….|___|
6.5.4a	Perceived barriers; How difficult is it for you to continue breastfeeding beyond six months?	1.=Not difficult 2.=So-so 3. =Difficult	….|___|