



**ADDIS ABABA UNIVERSITY
COLLEGE OF DEVELOPMENT STUDIES
CENTER FOR FOOD SECURITY STUDIES**

**NUTRITIONAL STATUS OF CHILDREN WITH DISABILITIES AGED
FROM SIX MONTHS TO 17 YEARS IN GULELE SUB-CITY,
ADDIS ABABA, ETHIOPIA**

BY

MUSSIE SEWNET MELESSE

**JUNE 2019
ADDIS ABABA, ETHIOPIA**

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A THESIS SUBMITTED TO THE COLLEGE OF DEVELOPMENT STUDIES CENTER FOR
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FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER
OF SCIENCE IN FOOD SECURITY AND DEVELOPMENT STUDIES

**JUNE 2019
ADDIS ABABA, ETHIOPIA**

DECLARATION

I, the undersigned, declare that this thesis is my original work and has not been presented for partial requirement of degree in any other university and that all sources and materials used for the thesis work have been fully acknowledged.

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This is to certify that the thesis prepared by Mussie Sewnet, entitled: “Nutritional Status of Children with Disabilities Aged from Six Months to 17 Years in Gulele Sub-City, Addis Ababa”, and submitted in partial fulfilment of the requirements for the Degree of Master in Food Security and Development Studies complies with the regulation of the University and meets the accepted standards with respect to originality and quality.

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Head, Center of Food Security and Development Studies

DEDICATION

This thesis is dedicated to my late father Sewnet Melesse Woldie. He gave me the foundation of education that he had never enjoyed. Incidentally, he met his demise when I was preparing for final exam on 30 January, 2017. You are no longer with us in flesh; '*Ababa*' I really, really miss your sound of your laughter. You did not only raise and nurture me but also taxed you extremely over the years for my education and intellectual development. It is my bottomless belief that your spirit will grace me at this successful instant of my life.

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ACRONYMS AND ABBREVIATIONS

ACPF	-	The African Child Policy Forum
BMASK	-	(<i>Bundes Ministerium für Arbeit, Soziales und Konsumentenschutz</i>) Federal Ministry of Labor, Social Affairs and Consumer Protection
CSA	-	Central Statistics Agency
CWD	-	Children With Disability
FANTA	-	Food and Nutrition Technical Assistance
FAO	-	Food and Agriculture Organization
FDRE	-	Federal Democratic Republic of Ethiopia
HIDDS	-	Household Dietary Diversity Score
IDDS	-	Individual Dietary Diversity Score
IDEIA	-	Individuals with Disabilities Education Improvement Act
IFAD	-	International Fund for Agricultural Development
IFPRI	-	International Food Policy Research Institute
IMNCI	-	Integrated Management of Newborn and Childhood Illness
MAM	-	Moderate Acute Malnutrition
MOLSA	-	Ministry of Labor and Social Affairs
MUAC	-	Mid Upper Arm Circumference
NACS	-	Nutrition Assessment, Counselling, and Support
NGO	-	Non-Governmental Organization
NICHCY	-	National Dissemination Center for Children with Disabilities
PWD	-	People with Disability
SAM	-	Severe Acute Malnutrition
SMD	-	Severe and Multiple Disability
TGE	-	Transitional Government of Ethiopia
UNCRC	-	United Nations Convention on the Rights of the Child
UNICEF	-	United Nations Children's Fund
WB	-	World Bank
WFP	-	World Food Program
WHO	-	World Health Organization

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ABSTRACT

Malnutrition and disability are interconnected especially in countries suffering from high levels of malnutrition including Ethiopia. Children with disability are prone to malnutrition due to different factors. The study was aimed to assess the nutritional status and its causes among children with disabilities aged from six months to seventeen years old, in Gulele Sub-City of Addis Ababa. This study used cross-sectional study design and the sample size was determined by using Cochran (1977) formula and adjusted by a formula for finite population to draw the final 272 households and children with disability. Anthropometric measurements: height/length, weight, and mid-upper arm circumference (MUAC) were used to study their nutritional status. Results were entered to SPSS 20 for further descriptive statistical analysis. Mid-Upper Arm Circumference (MUAC) and Body Mass Index (BMI) measurement indicates 55.1% and 58.1% respectively was grouped under normal nutritional status. However, the rest 44.9% and 37.5% respectively are under moderate and severe acute malnutrition. 35.3% of children with disability were not able to feed properly due to poor appetite, restlessness, pharyngeal atresia, and preference of food items. The type of disability the children have, family size, occupation and income of the household heads, and inability to take food were statistically significant relationship and considered as underlying causes for their nutritional status. Children with multiple disabilities, especially those children who are not able to take food should get the required nutrition and different types of care and support services. It is important to establish disability specific service points in health institutions and mothers/caregivers should get counselling regarding the needs of their children with disability.

Keywords: *Malnutrition, Disability, Micronutrient intake, Children, Anthropometric Measurements*

CHAPTER ONE

INTRODUCTION

1.1. Background of the Problem

Malnutrition is a global public health problem. One in three people are malnourished (IFPRI, 2016). Relationship of malnutrition and disability has different aspects. Malnutrition causes disability and increases vulnerability to other disabling diseases (Elwan, 1999). People with disabilities are more than one billion worldwide, which is about 15% of the total population or one in seven people. Among them, between 110 million and 190 million adults experience substantial problems in their activities for daily living. Moreover, 93 million children or one in 20 of those living with multiple disabilities are below 15 years of age (WHO, 2015). WHO and WB (2011) argue prevention of health problems due to disability and nutritional deficiency was considered as a development issue which should be given due attention.

In South-East Asia and Sub-Saharan Africa where high levels of malnutrition and nutrient deficiency are present, there are higher numbers of disability and developmental delay than others (Groce *et al.*, 2014; Pal *et al.*, 2016). Tompsett and his colleagues contend that children suffering from malnutrition become adults with different health problems (such as lower physical and intellectual abilities, lower levels of productivity, and higher levels of chronic illness and disability). In Africa, 83 million under five children are suffering from malnutrition which mostly affects on their health conditions leading to disability (Development Initiatives, 2017). Additionally, Elwan (1999) states children with disabilities (CWD) living in poverty may face problems of insufficient nutrition due to financial constraints or social beliefs.

In Ethiopia with high level of malnutrition and poverty, almost one-fourth of the Ethiopian population are malnourished with the greater ratio of suffering from severe malnutrition (Jemal & Kim, 2014). Thus, the number of children with disability aged from birth to 19 years was estimated to be 300,392 in 2017 (CSA, 2013). The assumed causes of disability were poverty, ignorance, war and drought. It was further aggravated by inadequate nutrition, limited access to health care, educational services, and the high prevalence of harmful traditional practices (ACPF,

2011). Therefore, the Ethiopian Government developed a National Plan of Action of Persons with Disability in 2012 to ensure full participation and equal opportunities for persons with disabilities thereby improving their situations in all spheres of life. But nutritional issues among these segments of the society were not addressed (MOLSA, 2012). Consequently, there was a National Nutrition Programme to end hunger by 2030 (FDRE, 2016). However, the link between malnutrition and disability was not considered in this document (Groce *et al.*, 2014). Thus, assessment of nutritional status and its causes in sample of children with disabilities and their caregivers will be done.

1.2. Statement of the Problem

Empirical studies in different parts of the world have revealed that an individual's health conditions, parents' socio-economic conditions, food deficiency, scarcity of economic resources, high level of poverty and unemployment, parent's or mother's educational status and/or knowledge of nutrition, income status of households, feeding difficulty, failure to perform daily activities required for daily living (e.g. self-feeding), recurrent infectious diseases, and other related factors contribute to one type of disability or other. Malnutrition contributes to the occurrence of an individual's health problem like disability and others (Groce *et al.*, 2014). A study done in Turkana, Kenya shows those children with disabilities are mainly susceptible to malnutrition in areas where it is extensive across all children (Kuper *et al.*, 2015). In addition, the study conducted in Nigeria depicts that all children with disability were in problems of malnutrition, especially in those who were less than ten years of age (Tompsett *et al.*, 1999). Moreover, Mallory and his colleagues (1993) stated in their study that economic situations affect the parent's responses to their children's conditions.

Poverty has a detrimental effect on household income. Particularly, it may have effect on parent's responses to their children with disability (Mallory, *et al.*, 1993). The study conducted in Hawassa by Fiseha and Degefa (2017) show that children with disability are exposed to food deficiency than their counterparts without disabilities. In the same study, people with disabilities are embarrassed by economic resources due to high level of poverty and unemployment compared to those without disabilities. Additionally, their problems and the scope of actual causes of nutritional problems that they face in their everyday lives have not been fully

investigated. The mother's education on child nutrition and knowledge of nutrition contributes for the children's health and nutrition (Alemu *et al.* 2005),

Moreover, feeding difficulty as a result of the disability they have aggravates the status of nutrition (Dannhauser & Walsh, 2007). According to the study conducted by Adamu and his colleagues (2018) in Nigeria, disability prevents children from performing day-to-day activities for daily living like self-feeding which results in poor nutritional status. Therefore, the incidence of malnutrition was higher in children with disability than those without the problem.

Furthermore, some studies recommended the need to focus on improving the household income status, particularly in poor countries like Ethiopia (Anware, Muhdin, & Kaushik, 2016). Support for disabled children remains minimal in Ethiopia: Parents often state that they have difficulty in getting meaningful information about the nature and prognosis of the disabilities affecting their children, as well as there was no access to counselling how to feed and take care of the child with disability (ACPF, 2011). Similarly, there were no official statistics regarding the link between poverty and disability; assumed to be strong. Feeding difficulty and malnutrition are common in children with disability and it may result in lowered growth and neurodevelopment, and impaired cardio-respiratory, gastrointestinal and immune systems (Arvedson, 2013).

On the other hand, Brothers of Good Works of the Ethiopian Catholic Church has been implementing community-based rehabilitation services, health care services and nutrition support to more than 400 children with disability in Gulele Sub-City. Those children included in the support have serious problems with regard to health and rehabilitation services. The services include: provision of physiotherapy, appliances and health care services, schooling, social integration and counselling. There is also provision of nutritious food items for identified malnourished CWD and child feeding at health centers.

According to the information gathered from the staff of the organization, those children with disability admitted to the support program were faced with different problems. They have poor personal hygiene and dipped with urine and faeces in some cases. In addition, they are emaciated and their age, height and the weight as well is not proportional as recorded in the health history

of the children with disability. Moreover, the direct observation at their socio-economic situation and physical condition of children with disabilities proves the incidence of the problem is higher in those children with disability.

However, the Organization faces difficulties how to intervene and in which problem to focus on and to set proper support planning since there was no data and evidence documented. The problem of nutritional status of children with disability in the study area is not studied and documented. During intervention, the Organization also noticed that there was a gap in identifying the nutritional status of those children with the relative importance of various factors affecting their nutrition. It was a challenge for the Organization how and what to do for the children with disabilities in the catchment area (Gulele Sub-City) since there are no studies to look at the underlying causes of nutritional status of the children with disability. The study tried to assess the nutritional status of children with disabilities and the underlining causes of malnutrition in children with disabilities. Therefore, nutritional status of sample children with disabilities aged from six months to 17 years and its causes assessed by using questionnaire, anthropometric measures, and Dietary Diversity Score (DDS).

1.3. Objectives of the Study

1.3.1. General Objective

The general objective of this study was to assess the nutritional status and its underlining causes among children with disabilities aged from six months to seventeen years old in Gulele Sub-City of Addis Ababa, Ethiopia.

1.3.2. Specific Objectives

The specific objectives of the study were to:

- assess nutritional status of children with disability aged from six months to seventeen years old in Gulele Sub-City of Addis Ababa, Ethiopia.
- identify the underlining causes which affect the nutritional status of children with disability aged from six months to 17 years in the study area.

1.4. Research Questions

The research questions were:

- i. What is the nutritional status of children with disabilities aged from six months to seventeen years old in the study area?
- ii. What are the underlining causes which affect the nutritional status of children with disability aged from six months to 17 years in the study area?

1.5. Significance of the Study

Information regarding nutritional status of children with disabilities is limited in the study area and most studies mainly focus on people with disability for inclusive education than their nutritional status. Currently, a number of different actors in Ethiopia are providing different types of care and support to CWD, however; little is known about their nutritional status. Therefore, assessing the nutritional status of children with disability helps to provide information to any interested stakeholders and have a paramount importance in identifying the causes and challenges they face. The results of the study reveal information which is useful to *Woreda* as well as Sub-City level planners, policy makers, researchers and development actors in both the governmental and non-governmental organizations working in the country with similar socio-economic, cultural and physical environment.

1.6. Scope of the Study

The study was conducted to assess the nutritional status of children with disability specific age groups from six months to 17 years old, because for those children less than 6 months it is difficult to identify the type of disability, such as intellectual disability, and even the family may not know the presence of disability. Additionally, those aged above 17 years are excluded since nutrition problem below these age groups is high worldwide. Moreover, due to constraints of budget and time, the study focused only in five *Woredas* of Gulele Sub-City, Addis Ababa.

1.7. Limitations of the Study

Presently, there was no data regarding persons with disability. The only data referred was the Ethiopian Population and Housing Census of 2007. This limits the ability to get the actual

sample for the study area. Children with profound intellectual and physical disabilities like amputated extremities (which prevent them from taking height/length and MUAC measurements) were not included in the study.

1.8. Organization of the Paper

The thesis has five chapters. The first chapter deals with the introduction, defining the problem, objectives of the study, scope, limitations, significance of the study and. The second chapter includes related literature reviews together with concepts, definitions and causes of malnutrition for children with disability and conceptual framework. The third chapter focuses on description of the study area, study design, study population, sources of population, data sources, sampling techniques and procedures, sample size determination, tools and techniques of data collection, quality of data management, data analysis techniques, and ethical considerations. The fourth chapter deals with results and discussions, and the fifth chapter focuses on conclusions and recommendations.

CHAPTER TWO

RELATED LITERATURE REVIEW

In this chapter, related literatures were reviewed in understanding and defining disability, nutrition, basic concepts, causes, and the challenges.

2.1. Basic Concepts of Disability

The definition of disability connotes different meanings in different cultures by different scholars. For instance, Stone (1999) stated that, in Britain there is a radically different way of thinking about disability and developed ‘Social Model of Disability’ to make a difference to the lives of disabled people. Disability was defined by the Australian Government National Action Plan on Disability 2012-2020, the effect lasting more than six months with physical, mental or psychological damage or an impairment of the sense organs for the normal participation in the society for day-to-day life events (BMASK, 2012; MOLSA, 2012). Based on the World Health Organization and International Labour Organization’s definitions on disability, Ethiopia has defined as follows:

“A disabled person is any person unable to ensure by himself or herself a normal life, as a result of deficiency in his or her physical or mental capabilities (FDRE, 2002)”.

In “*Negarit Gazeta*” the Transitional Government of Ethiopia (TGE) (1994) Proclamation No. 101 of 1994 referred to:

“A disabled person means a person with unable to see, hear, speak or is suffering from injuries to his limbs or from mental retardation, due to natural or manmade causes.”

In addition, according to CSA (2007a) a person who was unable to carry out activities for daily living that others can do due to different types of impairments was identified as a disabled person. Children with disabilities are one of the most disregarded groups of children, suffering from extensive deprivations of their rights (UNICEF, 2013). According to the UNCRC (1990), a child means every human being below the age of 18 years unless under the law applicable to the child (UNCRC, 2005).

2.1.1. Types of Disability

Disability in its nature is different according to the agent that caused it. In this regard, disability is divided into different categories. There are many people with different types of disabilities who are very much disabled, who cannot do day-to-day activities and with difficulty of communication called people with severe and profound intellectual disability. They often have more than one type of disability at a time (Inclusion Europe, 2003). Severe and multiple disabilities (SMD) have been defined as having one or more mental, emotional, and physical problems that require psycho-social, educational and medical services (Cetin & Safak, 2017). Inclusion Europe (2003) also stated that people with severe disability are the most susceptible for different violations than other disabled persons. They are mainly dependent on the capacity of their caregiver or contact person. In addition, they do not understand what to eat, drink, and other daily activities.

The classification of disability depends on the nature of the disability and physical difficulty in operating some activities. Severity and characteristics of disabilities have been classified into 13 major categories of disability under Individuals with Disabilities Education Act (IDEA) (NICHCY, 2012).

1. Multiple disabilities: It is the occurrence of functional problems of two or more types of disability in one person. It is associated impairments like, mental retardation-blindness or mental retardation, orthopaedic impairment, the combination of which causes difficulty in attending education. It does not include deaf and blindness (IDEIA, 2004).
2. Intellectual disability/Mental retardation: Sub-average general intellectual functioning existing simultaneously with difficulties in adaptive behaviour.
3. Autism: It is a developmental problem significantly affecting communication and social interaction, mostly apparent before age three.
4. Deafness: It is a hearing impairment that is so severe that the child is impaired in processing verbal communication, with or without amplification.
5. Deaf-blindness: A person with coinciding hearing and visual impairments.
6. Hearing impairment: Problems related to identifying parts of hearing and voice, rise and fall of position, and level and quality of voice are disabilities related to hearing.

7. Visual impairment: It is a visual difficulty (including blindness) that, even with correction, adversely affects a child's educational performance.
8. Orthopedic impairment: It refers to physical disabilities, including congenital impairments, impairments caused by disease, and impairments from other causes.
9. Learning disability: A disorder in one or more of the basic cognitive processes with memory, understanding and communication as a result of brain damage, minimal brain dysfunction, dyslexia, and developmental aphasia.
10. Emotional disturbance: It is a disability where a child of typical intelligence has difficulty, over time and to a marked degree, interpersonal relationships; responds inappropriately under normal circumstances; demonstrates a pervasive mood of unhappiness; or has a tendency to develop physical symptoms or fears.
11. Speech/language impairment: It is a communication disorder such as stuttering, impaired articulation, language impairment, or voice impairment.
12. Traumatic brain injury: It is an acquired injury to the brain caused by an external physical force, resulting in total or partial functional disability or psychosocial impairment, or both.
13. Other health impairments: having limited strength, vitality, or alertness due to chronic or acute health problems. For example, bipolar disorders, dysphasia, and other organic neurological disorders.

2.1.2. Disability in Ethiopia

There are no up-to-date national statistics available on disability in Ethiopia. The World Report on Disability jointly issued by the WB and WHO in 2011 estimated that 17.6% of the Ethiopian populations have a disability (WHO & WB, 2011). The Ethiopian Central Statistics Agency population projection document prepared in 2013 indicated that the Ethiopian population was projected to 94,352,139 in 2017 (CSA, 2013). Similarly, for the same period, the population of Addis Ababa and Gulele Sub-City was estimated 3,435,028 and 335,434 respectively. In this regard, the number of people with disability in Ethiopia was projected to be 1,037,874, merely; person with disability in Addis Ababa and Gulele Sub-City was projected to be 41,220 and 4,696 respectively at the end of 2017 (Table 3.1). In addition, among those persons with disability

living in Gulele Sub-City, 932 are children with disability aged from birth to 19 years respectively.

The Ethiopian National Plan of Action of Persons with Disabilities (2012-2021) estimates that 95% of persons with disabilities in Ethiopia are living below the poverty line. Like the overall population, 84% are assumed to live in rural areas and therefore have limited access to basic services. Physiotherapy/rehabilitation services in Ethiopia are also limited and accessible only in urban centres (MOLSA, 2012).

2.2. Nutrition and its Concepts

In 2016, the number of undernourished people in the world increased to an estimated 815 million, up from 777 million in 2015 but still down from about 900 million in the year 2000. Similarly, while the prevalence of undernourishment is projected to have increased to an estimated 11 percent in 2016, this is still well below the level of a decade ago. Nonetheless, the recent increase is cause for great concern and poses a significant challenge for international commitments to end hunger by 2030 (FAO *et al.*, 2017). Similarly, the food security situation has visibly worsened in parts of Sub-Saharan Africa and South-Eastern and Western Asia. Deteriorations have been observed most notably in situations of conflict, often compounded by droughts or floods (linked in part to the El Nino phenomenon).

2.2.1. The Nexus between Nutrition and Disability

Malnutrition and disability are both major global health problems. It is estimated that one billion people worldwide are living with moderate and severe disability. Of these, some 93 million are children aged below 15 years (WHO, 2015). According to Nora, Eleanor, & Marko, (2013) globally there are almost one billion people who are malnourished; they are closely interrelated, one resulting in to the other. Basically, this association is arising as a lack of appropriate nutrition in mothers and young children leading to disability. Children with disabilities have different health problems which affects their nutritional status. In this regard, fulfilling child's nutritional needs becomes crucial. There are issues that affect the nutritional status of the child with disability like, slower oral-motor development - larger tongues, smaller teeth, challenges

with chewing, food texture preferences, constipation, picky-eating or eating the same foods, and weight gain (Brinkman, 2010).

As a result of strong relationship between nutrition and disability, there is lack of enough food or a poor diet, insufficient intake of vitamins and minerals (iodine, vitamin A and vitamin D), increased vulnerability to health problems resulting in physical, sensory or intellectual disabilities (FAO & WHO, 2004). According to UNICEF (2013) Report, 250,000 to 500,000 children are still blinded each year by vitamin A deficiency; despite it can be easily prevented by cheap oral supplementation. Children with pre-existing disabilities are at risk of becoming malnourished. Children with some types of physical disabilities, cerebral palsy for example, may encounter significant difficulties in chewing and swallowing or feeding themselves resulting in severe nutritional implications. Once disabled, children often face significant food insecurity (UNICEF, 2013).

2.2.2. Disability and Poverty

Poverty and disability are intimately connected; it is a major contributory factor leading to disability while disability traps people into poverty. Children who are poor are more likely to become disabled through poor healthcare, malnutrition, lack of access to clean water and basic sanitation, dangerous living and working conditions (Elwan, 1999). Children living in poverty are exposed to developmental delays than children from higher socio-economic backgrounds because they are disproportionately exposed to a wide range of problems (AbdAllah, El-Sherbeny, & Khairy, 2007; WHO, 2012).

Likewise, an unequal number of all persons with disability are living in poverty especially in developing countries. Children with disabilities have no access to education, exclusion from job trainings, and excluded from employment, due to these factors they are more likely to be poor throughout their lifetimes (UNICEF, 2013). Disability and poverty have a vicious circle relationship that poverty can cause disability and disability can cause poverty as well (Schiemer, 2017).

2.3. Causes of Malnutrition in Children with Disability

In some children with disability, the type of disability encountered is a direct cause of malnutrition. They face anatomic or oral motor/mechanical difficulties, leading to lower nutrient intake. A child with a cleft palate faces difficulty of sucking, chewing and feeding. Children with cerebral palsy have problem of feeding, which causes malnutrition, illness and early death (Groce *et al.*, 2014; Yousafzai, Filteau, & Wirz, 2003). Similarly, constipation, dysphasia (gastro-esophageal atresia), poor health status, respiratory tract infections, behavioral problems like restlessness which results feeding difficulty and lack of knowledge among the mothers/caregivers of disabled children how to feed are factors which contribute the occurrence of malnutrition in children with disability (Dannhauser & Walsh, 2007).

Children with disability are exposed to different types of risks and causes of malnutrition, such as inadequate nutrition, poor sanitation and hygiene, exposure to infection and illness, lack of access to health care, inadequate child care, exposure to violence, neglect and abuse. Those risky factors might contribute to increased level of vulnerability to malnutrition (WHO, 2012). Parents/caregivers may also assume that a child with disability does not grow and become successful as a result of their impairment and there will be discouragement from breastfeeding being given less quantities of food, or purposefully not being fed at all (Groce *et al.*, 2014); these factors play great role for the occurrence of malnutrition in children with disability. Moreover, as a result of negative attitudes towards disability, mothers/caregivers might be isolated; lack needed socio-economic support, and limited access to information. These factors can have effect on the health and development of the child with disability (WHO, 2012).

Children with disability also face shortage of important nutrients for normal growth which helps to maintain development of body tissues. These nutrients from food: protein, carbohydrates, fat, fibre, vitamins and minerals and water are very important for normal growth. Micronutrient deficiencies are a result of reduced intake and/or absorption of the sources. The most common forms of micronutrient deficiencies are related to iron, vitamin A and iodine deficiency (NACS, 2016).

In general, according to Penagini *et al.* (2015) causes of malnutrition in children with disability are many including both nutritional and non-nutritional aspects. Among the nutritional factors, the major one is inadequate dietary intake as a result of gastrointestinal disorders including oral motor dysfunction, gastro-esophageal reflux and constipation. Non-nutritional factors are the type and severity of disability, difficulty of movement, and socio-economic problems are critical issues in determining nutritional status of children with disability.

2.4. Challenges Faced by Mothers/caregivers of a child with disability

Children with disabilities are supposed to be incompetent to become self-sufficient and unable to learn. There is a tendency to think they are weak, hopeless, dependent, and unable to learn and subjects of charity. In addition, there are negative parental attitudes to children with disabilities in the household, resulting in isolating, hiding, denying them access to education, social interaction, and food. Because of the existence of both religious and cultural beliefs, a family that gives birth to a child with a disability is subjected to social stigma and discrimination (ACPF, 2014).

Taderera and Hall (2017) state extreme poverty in household exacerbates the challenge among mothers/caregivers of the child with disability. In households with low economic status; especially those households where income relies on daily labour, worsens the situation. In addition, children with disabilities need higher expenditure than other family members and require more attention because they may have additional needs when compared to non-disabled children. However, extended family members may share efforts and time to provide care and support for the child with disability. Moreover, as stated by Girma Woldemariam and Timotiows Genebo (2002), women's malnutrition has association with marital status; unmarried and divorced/separated women have lower nutritional status when compared to married ones and if women are malnourished, it has a major effect on their own health and their children's health (Yimer Mihretie, 2018).

2.5. Methods of Nutritional Assessment

Nutritional assessment is the process of estimating the nutritional status of an individual or group, at a given point in time, by using different techniques. It provides an indication of the

adequacy of the balance between dietary intake and metabolic requirement (Suskind & Varma, 1984). Nutritional assessment helps to get information about the occurrence and geographic distribution of nutritional conditions within a specific community. Assessing the role of different epidemiological factors and identifying high-risk groups in nutritional insufficiencies is also its advantage (Shrivastava, S.R., Shrivastava, P.S., & Ramasamy, 2014). According to Suskind and Varma (1984), nutritional assessment has numerous advantages: helps in detection of malnutrition, assesses the state nutrition and subsequent interventions. It has special implication in children because nutritional problems occur frequently and affects their health.

Direct and indirect nutritional assessment methods are used in evaluating nutritional status. In assessing nutritional status, the direct method deals with individuals and measures the objective criteria and the indirect method also uses community health indices indicating nutritional influences (FAO, 2018). Nutritional assessment also involves the interpretation of methods like, dietary intake, anthropometry, biochemical, hematological variables, and clinical and physical assessment methods in a person or groups of people whether they are well nourished or malnourished (Gibney *et al.*, 2009). Using any one method or a combination of methods is recommended depending on the purpose of the nutritional assessment.

Anthropometry: A method used to assess either growth or change in the body. This method includes height/length, weight, skin-fold thickness, and head circumference etc., could detect the change of body composition to assess the nutritional status in specific population groups, including new-born, children under age of five and adults (NACS, 2016).

Dietary intake assessment: In this method, there are three approaches and the respondents are asked to record the foods and beverages and the amounts of each consumed over one or more days (usually 3-7 days); 24-hours dietary recall, food frequency, and three-day food diary. The food intake is compared with the Recommended Daily Dietary Allowances (Shrivastava, S.R., Shrivastava, P.S., & Ramasamy, 2014). As defined by FAO (2006 & 2010) Household/ Individual Dietary Diversity Score Tercile, if the individual takes at least 1-3 food groups is low IDDS tercile, if equivalent to 4-5 food groups it is said to be medium IDDS tercile and for 6 or more food groups it is said to be high IDDS. Micronutrient intake determines the nutritional

status of the individual who consume food groups that are good sources of micronutrients, such as vitamin A and iron.

Mid Upper Arm Circumference (MUAC): Is the circumference of the upper arm, measured at the midpoint between the shoulder and elbow, it is a quick and simple way and recommended to use in children and adults to indicate status of nutrition like, severe acute malnutrition (SAM), moderate acute malnutrition (MAM), and normal status of nutrition as shown in Table 2.1.

Table 2.1. Mid Upper Arm Circumference classification based on age

Age groups	MUAC level and nutritional status classification		
	SAM	MAM	Normal
Children 6 - 11 months old	< 11.0 cm	11.0 – 12.0 cm	> 12.0 cm
Children 12 - 59 months old	< 11.0 cm	11.0 – 13.0 cm	> 13.0 cm
Children 5 - 9 years old	< 13.5 cm	13.5 - 14.5 cm	> 14.5 cm
Children 10 - 14 years old	< 16.0 cm	16.0 – 18.5 cm	> 18.5 cm
Adults	< 18.5 cm	18.5 – 21.0 cm	> 21.0 cm

Source: Adapted from WHO, (2009); FANTA, (2016).

Body Mass Index (BMI): It is the most appropriate simple indicator by which weight for height can be related to health outcome. According to WHO (2010), BMI is a simple indicator of weight-to-height used to classify underweight, overweight and obesity in adults. If an individual BMI is <17.0 kg/m² indicates moderate and severe thinness, 18.5 kg/m² indicates underweight, 18.5 kg/m² and 24.9 kg/m² is considered normal. A BMI 25 kg/m² & 29.9 kg/m² are overweight and 30 kg/m² are obese (Makeda Sinaga *et al.*, 2018). Absence of acute protein-energy malnutrition, or normal nutritional status, is defined as having a weight-for-height z-score of -2.0 or greater. Moderate acute protein-energy malnutrition is defined as having a weight-for-height z-score of -3.0 to less than -2.0. Severe acute protein-energy malnutrition is defined as having a weight-for-height z-score less than -3.0 (WHO, 2006).

Table 2.2. Weight-for-height z-score (WHZ) cut-offs for classification of nutritional status

<-3	-3 to <-2	-2 to +2	>+2 to +3	>+3
Severe acute malnutrition (SAM)	Moderate acute malnutrition (MAM)	Normal nutritional status	Overweight	Obesity
Under nutrition			Over nutrition	

Source: NACS, 2016

2.6. Conceptual Framework

Employment and education of the mother or caregiver may be expected to have better income and enhance accessibility of health care services and better sanitation. These may, in turn, have a positive effect on the nutritional status of the child with disability. Inadequate access to nutritious food, inadequate maternal and child care practices, inadequate health services, poor sanitation and disease interacts with each other and affects the nutritional status of the individual. Unsafe sanitary facilities also facilitate the spread of waterborne diseases that may cause disabilities and malnutrition. Inadequate care for pregnant women and infants is a critical factor in disability prevention. In households where there is access to antenatal follow up and vaccination coverage they are less likely to develop disability and poor nutritional status.

The impact of the above-mentioned causes at the individual and household level happens through inadequate food intake and disease, which leads to disability. This results in poor appetite and increases nutrient requirements whilst inadequate intake of food of the right quantity and quality makes the body more susceptible to infection/disease. Child malnutrition may also lead to higher levels of chronic illness and disability in adult life which may have intergenerational effects as malnourished females are more likely to give birth to low-weight babies. When lack of food and infection are combined, a synergistic interaction can precipitate or worsen malnutrition which leads to disability and death. In this regard, this study focused on investigating the nutritional status and its causes of children with disabilities in the age group of six months to seventeen years old.

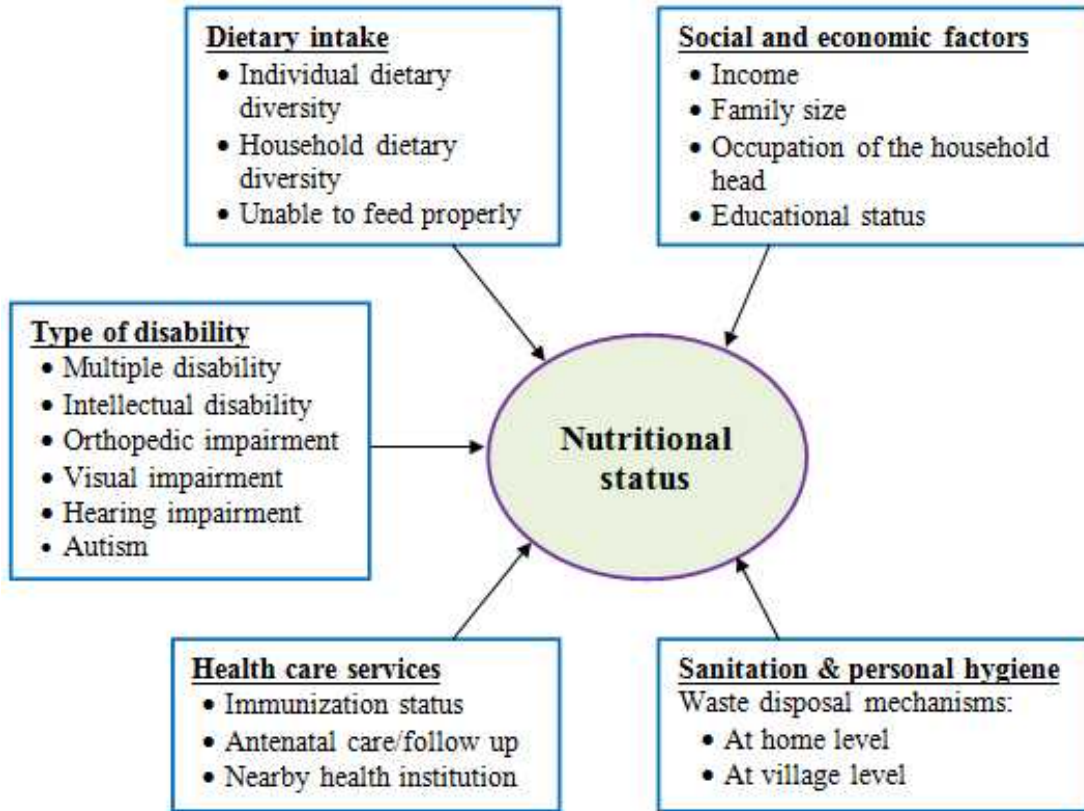


Figure 2.1. Conceptual framework of nutrition and disability

Source: constructed by the researcher

CHAPTER THREE

RESEARCH DESIGN AND METHODS

3.1. Description of the Study Area

This study was conducted in Addis Ababa, the capital city of the Government of Federal Democratic Republic of Ethiopia, specifically in Gulele Sub-City. Administratively, Addis Ababa City is a chartered city having three layers of government: city government, sub-city administrations, and district (*Woreda*) administrations. The total area of the City is about 527 km² and the total human population, as of 2017, was estimated to be 3,435,028 (CSA, 2013). The City serves as social, economic and political center for the country. It is a seat for African Union, United Nations Economic Commission for Africa, and other international organizations.

Gulele Sub-City is one of the Sub-Cities in Addis Ababa, located in northern suburb of the city, near the Mountain Entoto and Entoto Natural Park. Its geographical coordinates are 9° 14' 0" North and 38° 41' 0" East. It borders with the districts of Kolfe Keranio, Addis Ketema, Arada and Yeka Sub-Cities. It covers a total area of 30.18 km². The Sub-City is also divided into 10 *Woredas*. In Gulele Sub-City, among the total population of 267,624; 3,738 were persons with disability and 742 were children with disability aged from birth to 19 years old (CSA, 2007). However, the recent data by the year 2017 based on the population projection report of CSA (2013), total population of Gulele Sub-City is expected to be 335,434. In this regard, the number of people with disability is expected to be 4,696, from these persons with disability aged from birth to 19 years old was projected to be 932. In the Sub-City, there are currently 39 health institutions (3 hospitals, 7 health centres, and 29 different level clinics).

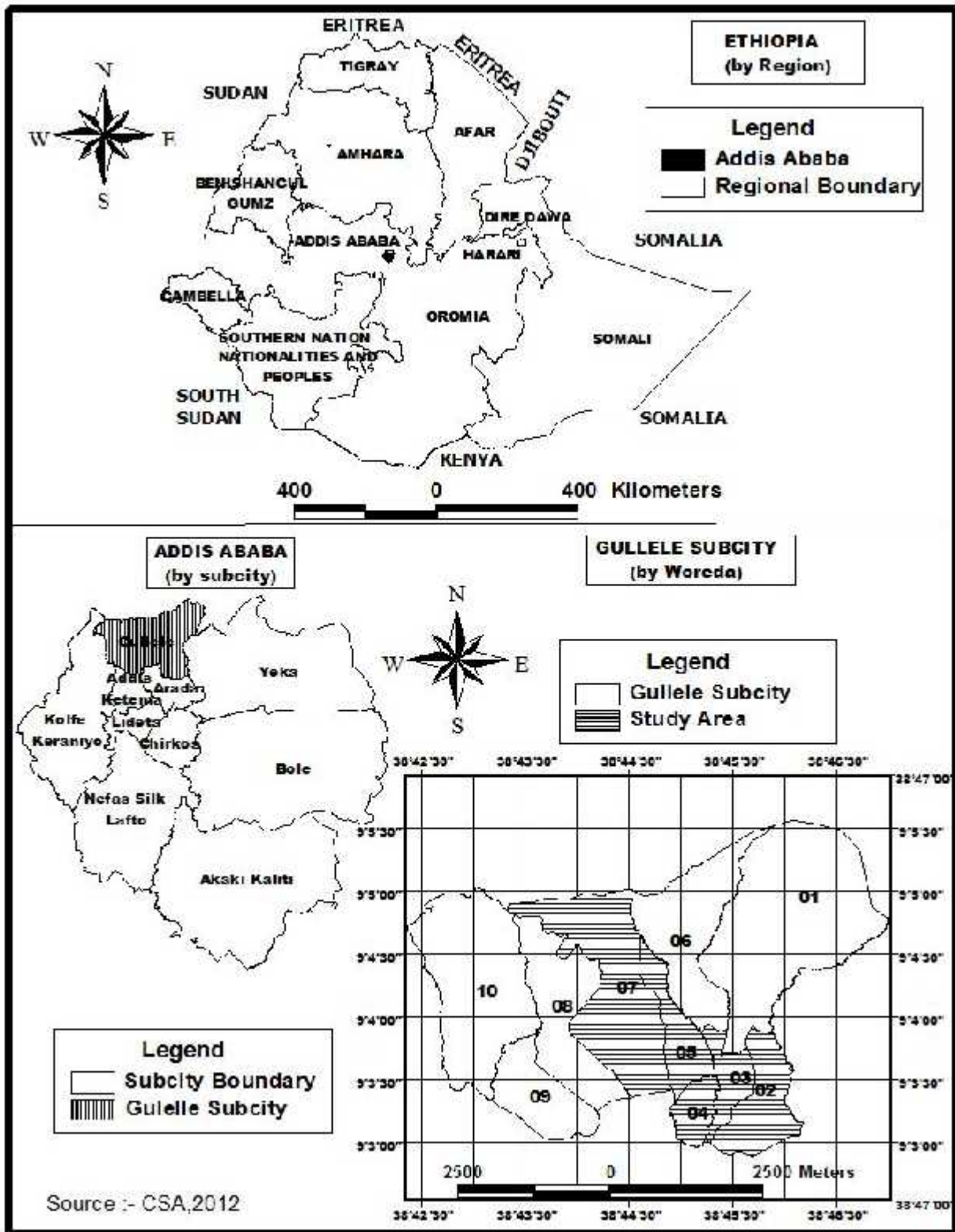


Figure 3.1. Map of the study area

Source: CSA, 2007a

3.2. Research Design

In an effort to address the stated objectives, cross-sectional study design was employed to assess nutritional status and to look at the causes among the study population, which involve capturing the best of both quantitative and qualitative aspects of the problem under investigation. This design helps in collecting, analysing, and mixing both quantitative and qualitative data in a series of studies and it provides a better understanding for the nutritional assessment of children with disabilities than either approach alone.

3.3. Study Population

The study was conducted in Gulele Sub-City specifically focusing in five *Woredas*. Among 10 *Woredas* of the Sub-City, *Woredas* 2, 3, 4, 5 and 7 were selected by using purposive sampling technique since it is the catchment area for Brothers of Good Works Counselling and Social Services Center - convenient to collect the data. In these selected *Woredas*, there are 458 children with disability aged from birth to 19 years. The population size of the study area was referred from the Ethiopian Central Statistics Agency population projection report (CSA, 2013). In addition, data on persons with disability were taken from the Ethiopian Census taken during 2007 and it was estimated based on the percent of the total population (Rate per 10,000) in relation to the 2017 population size.

3.3.1. Inclusion and Exclusion Criteria

3.3.1.1. Inclusion Criteria

In this study the demographic, social and economic characteristics of children with disability and their mothers/caregivers were considered. Children with disability aged from six months to 17 years were selected from five *Woredas* of Gulele Sub-City and included in the study.

3.3.1.2. Exclusion Criteria

Those children with disability with severe clinical/health problems leading to admission in Hospitals, bed-ridden, ages less than 6 months and above 18 years and those who are not at home during the sample collection were not included. In addition, those children with amputated and contracture extremities were excluded from the study.

3.4. Sources of Population

In the study, mothers/caregivers of children with disability and the children with disability ages from 6 months to 17 years are included.

3.5. Data Sources

In this study both primary and secondary data sources were used to gather the required information. Primary data was collected from mothers/caregivers of children with disability and by using anthropometric measurements like weight, height, and MUAC measurement. In addition, health professionals who were working in five health centres and field workers of Brothers of Good Works who were working for CWDs were used as a source of primary data. However, secondary data were collected from Addis Ababa Central Statistics Agency, Gulele Sub-City Health Office, respective Woredas of the Sub-City and from Brothers of Good Works Counselling and Social Services Centre.

3.6. Sampling Techniques and Procedures

In this study, mix of sampling techniques was employed. Selection of Gulele Sub-City and its five *Woredas* were purposive. In addition, systematic random sampling technique was used to identify the sample households with children with disability. Gulele Sub-City has ten *Woredas*, among them *Woredas* 2, 3, 4, 5 and 7 were selected. In these selected *Woredas*, sample households with children with disability aged from 6 months to 17 years old were identified based on the information (i.e. list of households with children with disability) gained from Brothers of Good Works Counselling and Social Services Centre and respective *Woreda* Health Offices. Finally, the first eligible household was selected by using systematic random sampling technique.

Table 3.1. Distribution of children with disability in studied area, 2019

Year	Ethiopia		Addis Ababa		Gulele	
	2007	2017	2007	2017	2007	2017
Total population	73,750,932	94,352,139	2,739,551	3,435,028	267,624	335,434
Number of PWD	805,535	1,037,874	32,630	41,220	3,738	4,696
% of total population (Rate per 10,000)	1.1		1.2		1.4	
Total population aged from 0-19 years	41,939,071	47,837,055	1,043,850	1,132,895	98,851	123,898
Number of CWD aged from 0-19 years	263,356	300,392	6,251	6,784	742	932

Source: CSA, 2007b; CSA, 2013 - Researcher computation (2019)

As shown in Table 3.1, the study areas *Woredas* 2, 3, 4, 5, and 7 have 77, 102, 53, 89, and 137 children with disability respectively. In this regard, 458 children with disability were part of the study.

3.7. Sample Size Determination

The sample size was determined by using a formula developed by Cochran (1977) to calculate a representative sample for the study.

$$n = \frac{z^2 pq}{d^2}$$

Where, n = required sample size,

z^2 = the selected critical value of desired confidence level (1.96)

p = the population proportion (assumed to be 0.50 since this would provide the maximum sample size).

q = 1-p

d = the desired level of precision (0.05).

Therefore;

$$n = \frac{3.84 * 0.5 * (1 - 0.5)}{0.0025}$$
$$n = \frac{3.84 * 0.25}{0.0025}$$
$$\underline{\underline{n = 384}}$$

Since the population size was less than 10,000; a correction formula was used to calculate the final sample size as shown below.

$$fn = \frac{n}{1 + \frac{(n-1)}{N}}$$

Where, fn = the final sample size,

n = the sample size derived from the above equation,

N = the population size,

$$fn = \frac{384}{1 + \frac{(384-1)}{932}}$$

$$\underline{\underline{fn = 272}}$$

Even if the final sample size was 272, considering 5% non-response rate 13 respondents were added, so the sample size for the study was $272+13=\underline{285}$. During data collection, 11 study participants were not willing to be part of the interview and the rest were not at home during the period of data collection. The distribution of sampled children with disability was calculated based on the population size of the *Woreda*. In this regard, in *Woreda* 2, 3, 4, 5, and 7 there were 46, 61, 31, 53 and 81 study participants, respectively, who were part of the study. Both children with disability and their respective caregivers (272 respondents) were involved in the study.

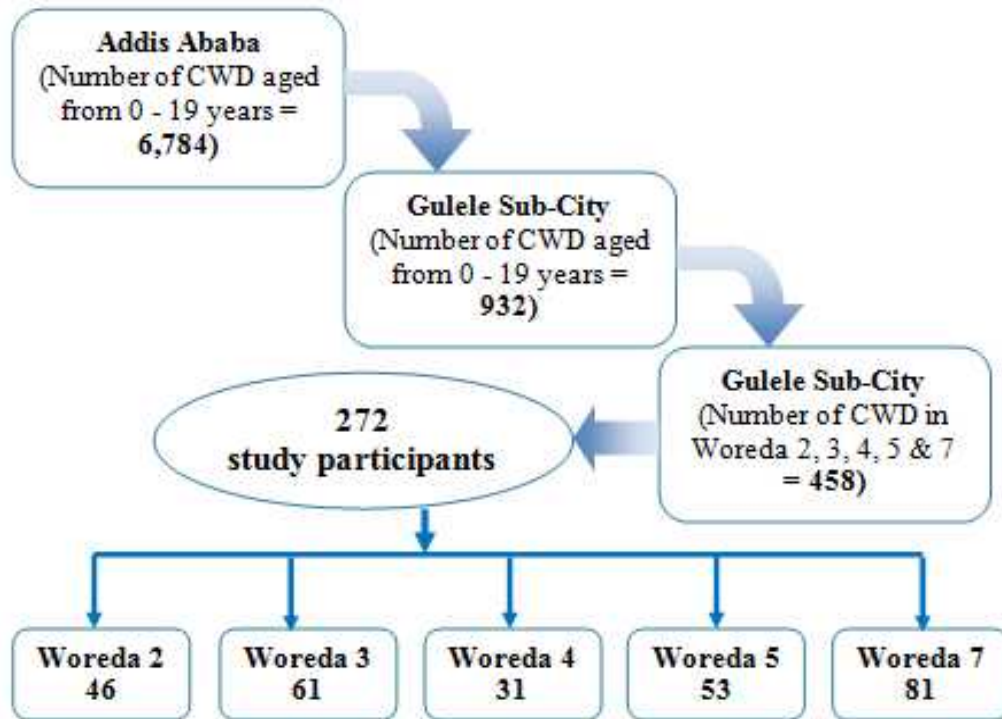


Figure 3.2. Proportional distribution of children with disability in each *Woreda*

Source: Sketched by the researcher, May 2019

3.8. Tools and Techniques of Data Collection

In this study, both qualitative and quantitative data was used to collect the relevant information of nutritional status and underlining causes of children with disability and their respective caregivers. In addition, qualitative data was collected from *Woreda* level health officers and staff working with children with disability as a key informant by using interview guide. During key informant interview from Brothers of Good Works – three field workers, five urban health extension workers from each *Woreda*, and health professionals (IMNCI nurses) from four health centres were participated. Moreover, observation and documentary analysis of published and unpublished was used with documentary analysis template.

3.8.1. Pretesting a Study Questionnaire

The final questionnaire was tested with 5-10 people who were more representative of the sample population. Finally, they were asked which questionnaire was not clear, difficult to understand,

uncomfortable and boring. After identifying the major problems improving and modifying the questionnaire was made.

3.8.2. Questionnaire

It was used to collect quantitative and qualitative data and there was carefully constructed questionnaire, often ranking or scoring options or using closed-ended and open-ended questions. In the questionnaire, Dietary Diversity Score standard questionnaire was used with a sort of modifications. Interview guide was formulated to guide the interview in order to collect qualitative data from *Woreda* level health officers and staffs working with children with disability.

3.8.3. Anthropometric Measurement

Height: The height of the children with disability was measured using measuring tape. The measurement was taken on recumbent length or standing height. The child with disability was informed to remove shoes and socks and wearing little clothing and to stand upright and looking straight ahead. When this was not possible, the child was informed to lie on flat surface. In this procedure, mothers/caregivers of the child with disability were involved and facilitated the measurement. The actual measure from the tape was taken in centimetre and recorded on the space provided in the questionnaire.

Weight: It was taken by using weight scale. The weight scale was calibrated each day by using the manufacturers' guidelines with regard to the transportation of the scales. For those who could stand, he/she stood over the centre of the weighing instrument with the body weight evenly distributed between both feet.

Mid Upper Arm Circumference (MUAC): It was taken from both sampled children with multiple disabilities in the study area by using MUAC measuring tape. The value was read from the window of the tape without pinching the arm or leaving the tape loose.

Body Mass Index (BMI): It was derived from the data entry of weight and height. Age and date of measurement was recorded, and then it was calculated by using the formula stated below and recorded.

$$\text{Body Mass Index} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

3.8.4. Dietary Diversity Score (DDS)

Dietary diversity score (DDS) was used to measure nutritional adequacy which refers to the number of food groups consumed in a given time, often in 24 hrs. Commonly, a diet of at least 4 DDS was valid as nutritionally adequate. To better reflect a quality diet, the number of different food groups consumed was calculated, for example, 12 food groups is used to calculate the HDDS (Cereals, Fish, and seafood, Root and tubers, Pulses/legumes/nuts, Vegetables, Milk and milk products, Fruits, Oil/fats, Meat, poultry, Sugar/honey, Eggs and Miscellaneous food items). In addition, for the IDDS eight food groups were used and it was calculated by using the type and number of food groups consumed by the household (FANTA, 2006; FAO, 2006 & 2010).

Observation also enabled the interviewer to observe visual clues and allowed the observation of body language which might indicate comfort or discomfort. Thus, these gave clues to the interviewer on how to proceed.

3.9. Quality of Data Management

In order to get quality data, urban health extension workers (HEWs) and staff of Brothers of Good Works, working in the study area, were used. Special orientation was given to the data collectors. Study subjects were also informed about the aim of the study and confidentiality was kept. The questionnaire format was tested before the main study for its reliability and finally, the data was checked for its completeness before analysis.

3.10. Techniques of Data Analysis

In the techniques of data analysis part, the captured qualitative and quantitative data were presented, analysed, described and interpreted in a systematic manner for the next step of the research process. Even though the two data were interconnected, the analysis of the qualitative data was followed by an analysis of the quantitative data.

First, the qualitative data obtained from respondents by using different data collection techniques, was analyzed. Data collected by using interviews was compiled for analysis and interpretation.

Secondly, quantitative data was presented in either table format. Biographical and demographical information about respondents as configured in the questionnaires was presented. In addition, the gathered data from the questionnaire was analysed and statistically converted by means of statistical tools. It was entered to Excel sheet, Window 10 and exported to SPSS version 20 for further analysis. Descriptive statistics such as frequency, percentage, mean, and standard deviation was used to organize the demographic and socio-economic characteristics.

The nutrition status of children was assessed by using Mid-Upper Arm Circumference (MUAC) WHO (2009) and FANTA (2016) cut off point was used to in order to categorize as severe and moderate acute malnourishment and normal nutritional status. In addition, Body Mass Index (BMI) measurement for children with disability was categorized based on WHO (2010) cut off point chart to represent severe and moderate acute malnutrition, normal, overweight, and obese. According to FANTA (2016) standard deviation (SD) scores (Z scores) were applied to determine the nutritional status. Children with weight-for-height/length of equal or greater -2SD scores were considered normal on the respective Z-score scales. Children scoring -3SD and below are categorized as severely malnourished under the three parameters.

In this study the child with disability's age, sex, and type of disability and the household's occupation, income, and family size were considered as independent variables. Statistically, Chi-square and Pearson Correlation were employed to identify the association between independent and outcome (dependent) variables and used to estimate the influence of independent variables to the nutritional status of children with disability.

3.11. Ethical Considerations

In this study, ethical considerations were taken in to account. Permission was sought from Addis Ababa University and ethical clearance was obtained from Addis Ababa Public Health Research and Emergency Management Core process and it was submitted to Gulele Sub-City Administration Health Office and the respective *Woredas*. A written consent was used with parents (mothers/caregivers) of children with disabilities. Information gathered by using different techniques was kept confidential, photos, recordings and names were not transferred to any second party.

3.12. Operational Definitions

Food security: “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” (UNICEF, 2013).

Children with disabilities: children aged from birth to 17 years (UNCRC, 2005) who born with a disabling health condition or impairment and who developed a type of disability as a result of illness, injury or poor nutrition.

Malnutrition: An abnormal physiological condition caused by inadequate, excessive or imbalanced intake in macronutrients, carbohydrates, protein, fats and micronutrients.

Severe Acute Malnutrition (SAM): A weight-for-height measurement of 70% or less below the median or 3 SD or more below the mean international reference values, the presence of bilateral pitting oedema, or a mid-upper arm circumference (MUAC) of less than 115 mm in children 6 – 60 months old.

Moderate acute malnutrition (MAM): defined as weight-for-height z-score (WHZ) between -2 and -3 or mid-upper arm circumference (MUAC) between 115 millimetres and <125 millimetres, in other words it is referred as wasting.

Under-nutrition: When the body does not have adequate amounts of one or more nutrients reflected in biochemical tests like, Haemoglobin (Hb) level for anaemia, in anthropometric indicators such as stunting (low height-for-age) or wasting (low weight-for-height) and/or weight-for-age (underweight).

Underweight: Measured by comparing the weight-for-age of a child with a reference population of well-nourished and healthy children.

Overweight: A body weighting above some level of acceptable weight that is usually defined in relation to height.

Obese: individuals with overweight with negative health effects.

Age: It is the length of time that a person has lived. Age was categorised to the nearest age, for example, in case of five years and four months of age was considered as five years old.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

This chapter presents data analysis, results, and discussions of data obtained from the study participants and information generated from anthropometric measurements and key informants. It is also organized into sections on household socio-demographic characteristics, dietary diversity score of the households, causes of disability, challenges faced by those households and summary of findings.

4.1. Households Socio-Economic and Demographic Characteristics

The study participants' socio-demographic characteristics such as sex, age, educational status, marital status and family size were summarized in Table 4.1. From 272 study participants, 268 (98.5%) were females and four were males. The average household size was 4.8 while the minimum household size was two and the maximum was nine. The study indicates that 181 (66.5%) of the participants age were found in the age range of 30-39 years. Regarding educational statuses of the mothers/caregivers of the children with disability, 154 (86.0%) were found to attend formal education (i.e. 40.1% were at elementary education level and 35.7% completed high school education level). Thus, the majority of the householders are formally educated. Here, it is possible to argue that the mothers/caregivers' education may contribute to their awareness of properly handling the children with disability.

Regarding the relationship between nutritional status of the woman householder and marital status of the women, the findings of the study indicated that 233 (85.7%) were married, but 39 (14.3%) were divorced. Married women had better nutritional status than the unmarried ones and mother's nutritional status also influenced the child's status and health (Nora, Eleanor, & Marko, 2013). Accordingly, it is believed that those households living in wedlock condition might feed their children better than female headed households. This finding concurred with that of the above-stated empirical evidence. Meanwhile, a significant proportion, 189 (69.5%), of these households were fathers as breadwinner whereas 73 (26.8%) of them earned monthly incomes from the mothers.

Table 4.1. Households socio-economic and demographic characteristics, Gulele Sub-city, N=272, 2019.

Sex of study participants						
Sex	Number		Percent			
Male	4		1.5			
Female	268		98.5			
Total	272		100.0			
Age category of study participants (mothers/caregivers of the CWD)						
Category	Frequency		Percent			
Below 19 years	0		-			
20 - 29 years	28		10.3			
30 - 39 years	181		66.5			
40 - 49 years	59		21.7			
50 - 59 years	4		1.5			
60 years and above	0		-			
Total	272		100.0			
Variable	Obs	Mean	SD	Minimum	Maximum	
Age category of study participants	272	36.2	18.6	24	33	
Level of education						
	Male	Female	Total	%		
No formal education	0	38	38	14.0		
Elementary	0	109	109	40.1		
Secondary/High school	0	97	97	35.7		
TVET	0	13	13	4.8		
Diploma	4	10	14	5.1		
Degree	0	1	1	0.4		
Total	4	268	272	100		
What is your marital status?						
	Frequency		Percent			
Married	233		85.7			
Divorced	39		14.3			
Total	272		100.0			

Occupation of the mothers/caregivers of the CWD

	Male	Female	Total	%
Weaving	0	21	21	7.7
Petty trade	0	24	24	8.8
Housewife	0	157	157	57.7
Job seeking	0	18	18	6.6
Civil servant/employed	4	25	29	10.7
Daily labourer	0	23	23	8.5
Total	4	268	272	100.0

Major source of household income

Category	Number*	Percent
Father only	189	69.5
Mother only	73	26.8
Father & Mother	36	13.2
Children	3	1.1

Household gross monthly income (Birr)

Category	Frequency	Percent
500 -1000	5	1.8
1001-1500	26	9.6
1501-2000	70	25.7
2001-2500	63	23.2
2501-3000	57	21.0
3001-3500	31	11.4
3501-4000	14	5.1
4001-4500	2	0.7
4501-5000	4	1.5
Total	272	100.0

Variable	Obs	Mean	SD	Minimum	Maximum
Income	272	2556.3	757.8	700	4500

Obs: Observations

*More than one response was possible

Employment and education of the mothers/caregivers contribute to have better incomes and then enhance accessibility of health care services which may, in turn, have a positive effect on the nutritional status of the child. With regard to occupation of the respondents, 157 (57.7%) were house wives, 10.7% were civil servants and 8.8% were petty traders. Majority of mothers/caregivers were house wives. There is also no generally dominant occupation as a major source income for those households in Gulele Sub-City. Thus, these house wives may run short of incomes to properly feed their children with disability. Even so, education and employment of the mothers or caregivers contribute to have better incomes and then enhance accessibility of health care services which may, in turn, have a positive effect on the nutritional status of the child.

A total of 82 (30.1%) of the households in the study had five family members, while 84 (30.9%) of them had four members in the households. The average family size for the study households was five. Therefore, these households were generally considered as overcrowded. It is possible to deduce that these might reduce care provisions and proper feeding for the children with disability. Concerning the respondent's major sources of household income, the findings were summarized in the Table 4.1. Ninety-eight (36%) of them generated their incomes from employment salary, 84 (30.9%) from petty trading, and 31 (11.4%) from handicrafts such as weaving and pottery. Data on monthly gross income of the households were also collected. These data showed that 70 (25.7%) and 63 (23.2%) of the participants gross monthly incomes were categorized in 1501-2000 birr and 2001-2500 birr, respectively. The mean monthly income was 2,556.30 birr with minimum 700 birr and a maximum 4,500 birr. It seems very difficult to buy all necessary food items (including nutritious foodstuffs) with such small amount of monthly income and then to properly feed the children in the households. Implicitly, this context could thus influence on a nutritional status of those children with disabilities in given households in the catchment areas of Gulele Sub-City in Addis Ababa.

Out of 272 sampled children with disability, 143 (52.6%) were males and 129 (47.4%) were females. Their age category further showed that 130 (47.8%), 79 (29%), and 59 (21.7%) were grouped under 5-9 years, 1-4 years, and 10-14 years, respectively. The minimum age was 1 year and the maximum was 16 years, while the average age was 6.9 years. Accordingly, almost half

of the children were considered to be in their childhood. From the sampled 272 children with disability, 104 (38.2%) were children with multiple disability, 66 (24.3%) were children with intellectual disability, 34 (12.5%) were with orthopaedic impairment, and 26 (9.6%) were with visual impairment (See Table 4.2). Additionally, the empirical evidence did not show variation between children's disability types and their sex. Thus, two-fifth of the children was with multiple disabilities. Implicitly, these children may face with difficulties in proper feeding and frequent occurrence of illnesses; contributed to the occurrence of malnutrition.

Table 4.2. Number and type of children with disability, Gulele Sub-city, 2019.

Age category of children with disability					
Age category*		Male	Female	Total	%
1 - 4years		41	38	79	29.0
5 - 9 years		66	64	130	47.8
10 - 14 years		34	25	59	21.7
15 - 17 years		2	2	4	1.5
Total		143	129	272	100.0
Variable	Obs	Mean	SD	Minimum	Maximum
Age of CWDs	272	6.9	3.3	1	16
Type of disability					
		Male	Female	Total	%
Multiple disability		48	56	104	38.2
Intellectual disability		31	35	66	24.3
Autism		4	5	9	3.3
Deafness/hearing impairment		19	4	23	8.5
Blindness/visual impairment		16	10	26	9.6
Orthopedic impairment		20	14	34	12.5
Emotional disturbance		4	3	7	2.6
Speech/language impairment		1	2	3	1.1
Total		143	129	272	100.0

*Age was categorised to the nearest age, for example, in case of five years and four months of age was considered as five years old.

4.2. Dietary Diversity Score of the Household and Children with Disability

The living standard of the household determines the amount and type of food consumed at household level; this increases the occurrence of malnutrition. In this study, mothers/care givers of children with disability were involved and they were asked about the actual intake/consumption of food groups at household level in the past 24 hours before the survey. Dietary Diversity Score (DDS) data was collected at individual and household level to measure the household and the individual to know food groups consumed. Inadequate intake of food of the right quantity and quality makes more susceptible to malnutrition.

In addition, scholars in the field of food and nutrition have agreed that amount and type of food items consumed at household level determine nutritional statuses of household members. Accordingly, based on Dietary Diversity Score (DDS), the findings of the study reveal that majority of the household members have consumed six and more items of food groups among 12 food groups. Moreover, these children with disabilities in the Sub-City mostly consume six and more items of the twelve and eight food groups. The data shows among the households with 12 food groups, 26 (9.6%) used 4-5 items of food groups and 246 (90.4%) also used six and more items of food groups. Here, it can be concluded that those households who consumed various types of food items might have relatively better nutritional status than their counter-part households. As to the type of food groups consumed by children with disabilities based on eight food groups, it also showed that 5.4% consumed 1-3 items of food groups, 93 (34.2%) used 4-5 items of food groups and 165 (60.7%) consumed six and more items of food groups. Therefore, those children with disability that have consumed different types of food items are assumed to be better off in their nutritional status (Table 4.3).

Reduced micronutrient intake and/or absorption results in micronutrient deficiencies especially, related to iron and vitamin A deficiency. Vitamin A deficiency results in blindness of children. The dietary diversity score data show that, on average, 166 (60.9%) of the children with disability consumed vitamin A rich plant sources and 169 (62.1%) of them consumed animal sources and 127 (46.7%) of the children ate iron source food groups. Here, it is not possible to argue these children are noticeably malnourished (Table 4.4).

Table 4.3. Dietary diversity score of the household and CWD*, Gulele Sub-city, 2019

Consumed food groups at household level		Frequency	%
Low HDDS (1 - 3 food groups consumed)		0	0.0
Medium HDDS (4 - 5 food groups consumed)		26	9.6
High HDDS (6 & more food groups consumed)		246	90.4
Total		272	100
Consumed food groups at individual (CWD) level		Frequency	%
Low IDDS (1 - 3 food groups consumed)		14	5.1
Medium IDDS (4 - 5 food groups consumed)		93	34.2
High IDDS (6 & more food groups consumed)		165	60.7
Total		272	100

*CWD-Children with Disability

Table 4.4. Micronutrient sources of food items consumed by children with disability, Gulele Sub-city, 2019.

	Food groups consumed	Frequency	%
Plant sources of Vitamin A	Vitamin A rich vegetables & tubers	91	33.5
	dark green leafy vegetables & fruits	240	88.2
	Average consumption	166	60.9
Animal sources of Vitamin A	Organ meat & fish	127	46.7
	Eggs	172	63.2
	Milk & milk products	208	76.5
	Average consumption	169	62.1
Iron sources	Organ meat & fish	127	46.7

As indicated in Table 4.5, based on the MUAC measurement, from those 272 children with disability, 50 (18.4%) were under severe malnutrition, and 72 (26.5%) were moderately malnourished. Also, 150 (55.1%) were categorized under normal range of malnutrition. It is not possible to argue these children are noticeably malnourished. This claim could be substantiated with the empirical data generated using Mid-Upper Arm Circumference (MUAC) measurement. More than half of the children are thus categorized under a normal range of malnourishment.

However, there are a proportion of (44.9%) children with disability with moderate and severe acute malnutrition.

Table 4.5. Mid-Upper Arm Circumference (MUAC) measurement of children with disability, Gulele Sub-city, 2019

MUAC for ages from 6 months to 17 years old								
Category/Status	Frequency						%	
Severe	50						18.4	
Moderate	72						26.5	
Normal	150						55.1	
Total	272						100.0	
MUAC measures based on age and sex category of children with disability								
Age category*	SAM		MAM		Normal		Total	%
	M	F	M	F	M	F		
1 year - 4years	6	8	5	14	24	22	79	29.0
5 - 9 years	9	12	19	22	35	33	130	47.8
10 - 14 years	7	8	7	5	21	11	59	21.7
15 - 17 years	0	0	0	0	2	2	4	1.5
Total	22	28	31	41	82	68	272	100.0

For those study participants of children with disability, weight in kilograms and height in meter was taken to calculate Body Mass Index (BMI). In this regard, Table 4.6 indicates that 61 (22.4%) were moderately malnourished, 156 (57.4%) were grouped at normal, 11 (4.0%) were overweight, and 3 (1.1%) were overweight. These measured values reasonably indicate that the significant proportion of the children with disabilities in Gulele Sub-City is grouped at normal level of malnutrition. However, there are a proportion of (37.5%) children with disability with moderate and severe acute malnutrition. The study findings showed that, in both BMI and MUAC measures, 229 (84.2%) children with disability were categorized with coinciding status, which was, 136 (50.0%) were at normal nutritional status, 52 (19.1%) and 41 (15.1%) were at moderate and severe acute malnutrition, respectively. While the rest, 43 (15.8%) were

mismatching status; categorized on different level of nutritional status which was difficult to compare based on the two measurements (Table 4.6).

Table 4.6. Body Mass Index (BMI) result of children with disability, Gulele Sub-city, 2019

BMI for ages from 6 months to 17 years old		
Category/Status	Frequency	Percent (%)
Severe	41	15.1
Moderate	61	22.4
Normal	156	57.4
Over weight	11	4.0
Obese	3	1.1
Total	272	100.0

BMI measures based on age and sex category of children with disability

	<-2		-3 to <-1		-2 to +1		>+2 to +2		>+2		Total	%
	SAM	MAM	Normal	Overweight	Obese							
Age category*	M	F	M	F	M	F	M	F	M	F	Total	%
1 year - 4years	6	8	12	11	18	16	0	0	0	0	71	26.1
5 - 9 years	4	9	15	16	40	45	0	0	0	0	129	47.4
10 - 14 years	6	8	5	2	22	15	8	2	0	0	68	25.0
15 - 17 years	0	0	0	0	0	0	1	0	2	1	4	1.5
Total	16	25	32	29	80	76	9	2	2	1	272	100.0

MUAC and BMI measures for ages from 6 months to 17 years old

Category/Status	BMI & MUAC	MUAC only	BMI only
Severe	41 (15.1%)	9	0
Moderate	52 (19.1%)	20	9
Normal	136 (50.0%)	14	20
Over weight	0 (0.0%)	0	11
Obese	0 (0.0%)	0	3
Total (N=272)	229 (84.2%)	43 (15.8%)	43

4.3. Access to Health Services

The study indicated that all (100%) respondents have access to health services at the nearby health institutions for antenatal care and immunization services. 264 (97.1%) of mothers/caregivers were attended antenatal care during their period of pregnancy. And 269 (98.9%) of children with disability were fully immunized (Table 4.7). Mothers/caregivers visited the nearby health institutions and non-governmental organizations which were working for children with disability. While, they complained that the services are not disability specific and friendly. There were no trained professionals for services such as counselling on feeding and how to take care of the child with the disability.

At this juncture, it is worth considering the availability, access and utilization of health services by the children under considerations in the Sub-City. The mothers/caregivers and children have access to health services at their nearby health institutions. Hence, they have visited the institutions for follow up antenatal care and immunization services. Consequently, most of the mothers/caregivers have attended antenatal care during their period of pregnancy, and the children are also fully immunized and visited health institutions to get pieces of advice, supports, and medical treatments. However, based on the key informant interview, they complained that the services provided are not disability specific and friendly. Even there are no trained professionals for providing proper services (such as counselling on feeding of the children and how to take care of them).

Table 4.7. Access and usage of health services, Gulele Sub-city, 2019

	N	Frequency	%
Availability of health institutions nearby		272	100.0
Attended antenatal follow up	272	264	97.1
Fully immunized children with disability		269	98.9

4.4. Causes of Malnutrition for Children with Disability

Children with disability face problems in relation to nutrition due to different direct and indirect causes such as anatomic difficulties (difficulty of feeding), lower nutrient intake, and behavioural problems. In order to identify the causes that affect the nutritional status of children with disability mothers/caregivers were asked about the feeding practice of the children. According to Table 4.8, among 272 children with disability 96 (35.3%) did not feed properly any type of food available at household level. The causes are poor appetite 27 (28.1%), restlessness 27 (28.1%), pharyngeal atresia 18 (18.8%), and preference of food items 16 (5.9). Children with disability's opportunity for breast feeding were summarized as follows, 16 (16.7%) children with disability didn't get breast feeding at all due to difficulty to suckle breast milk [5 (31.3%)], dislike breast milk because baby started with bottle feeding [5 (31.3%)], unproductive breast milk [4 (25.0%)], and long-time admission in hospital [2 (12.4%)].

Information gathered from key informant interviewees showed that causes of malnutrition among children with disability were multifaceted. Among the major causes, most children were not able to take the available food items at household level due to the disability they had; dysphasia (swallowing difficulties) dry and liquid food items, selection of food items that the household cannot afford, and some children were not stable during feeding time (restlessness). Some causes were directly interrelated to the family of the child with disability, such as lack of knowledge on how to feed and take care of the child, wrong belief of the family members that the child was not able to take food, lower attention to the child and ignorance, and excluding children from family life, from school, and their peers. In addition, low economic income of the household aggravated the situation like, inability to afford buying nutritious food items and shortage of time to take care of and to feed the child as required because most mothers/caregivers are worked as daily labourer for the subsistence of the household.

Table 4.8. Causes identified not to feed properly and not to get breast milk, Gulele Sub-city, 2019.

Causes not to feed properly	Frequency	%
Jaw muscle not working	8	8.3
Poor appetite	27	28.1
Pharyngeal atresia	18	18.8
Restlessness	27	28.1
Preference changes (food selection)	16	16.7
Total	96	100.0

Causes not to take breast milk	Frequency	%
long time admitted in hospital	2	12.4
Started with powder milk-dislike breast milk	5	31.3
Not producing breast milk	4	25.0
Cannot suckle breast milk	5	31.3
Total	16	100.0

Statistical analyses were carried out to identify the causes, relationship, and significance of independent variables for the nutritional status of the child with disability. Mean MUAC and BMI were calculated and Pearson Correlation were used to identify the association between independent and outcome (dependent) variables and used to estimate the influence of independent variables to the nutritional status of children with disability. A Pearson correlation was computed to assess the relationship between the child's inability to feed properly, types of disability, family size and occupation of the household with the nutritional status of the child with disability based on MUAC and BMI results.

Correlation analysis was run to see whether or not there was relationship between causes of inability to feed properly and BMI and MUAC measures taken from the children. Children with disability had problems to take the types of food available at household level due to different reasons. In this regard, the results revealed that there was a weak positive correlation between the two variables under consideration at ($r = 0.242$, $n = 96$, and $p = 0.018$ or $p < .05$).

Accordingly, there was a statistically significant correlation between causes of inability to take food properly and the MUAC measures taken from the children with disability.

Table 4.9. Causes for not feeding properly, MUAC & BMI measures, Gulele Sub-city, 2019

		Causes of inability to feed properly	Mean of MUAC measures
Causes of inability to feed properly	Pearson Correlation	1	.242
	Sig. (2-tailed)		.018
	N	96	96
Mean of MUAC measures	Pearson Correlation	.242	1
	Sig. (2-tailed)	.018	
	N	96	96
		Causes of inability to feed properly	Mean of BMI measures
Causes of inability to feed properly	Pearson Correlation	1	.271**
	Sig. (2-tailed)		.008
	N	96	96
Mean of BMI measures	Pearson Correlation	.271**	1
	Sig. (2-tailed)	.008	
	N	96	96

** . Correlation is significant at the 0.01 level (2-tailed).

In Table 4.8, there was a positive relationship between causes of inability to feed properly by the householders and the BMI measures at ($r = .271$, $n = 96$, and $p = .008$ which is $p < .01$). Thus, it can be deduced that these children with disability could not feed themselves properly which, in turn, affected their nutritional status.

4.5. Disability Types and Nutritional Status of the Children

A correlation between the children's types of disability and their nutritional statuses was checked using BMI and MUAC measures. The child's type of disability and the BMI measures was no correlation at $r = .076$, $n = 272$, $p = .212$. Here, it is possible to argue that the empirical evidence seems opposite to what have been documented by other studies. Contrarily, there was positive correlation between types of disability and nutritional status based on MUAC measures at $r = .420^{**}$, $n = 272$, $p = .000$. Both MUAC and BMI measurements have clearly showed that the types of disability create difficulties in properly feeding available food items at household level in Gulele Sub-City. Moreover, family size could be a cause for malnutrition as its size increases

nutritional status of the children is negatively affected. However, occupations of the householders have not had as such influence on the children’s nutritional status.

Table 4.10. Types of disability of CWD and BMI & MUAC measures, Gulele Sub-city, 2019

		BMI measures	Type of disability
BMI measures	Pearson Correlation	1	.076
	Sig. (2-tailed)		.212
	N	272	272
Type of disability	Pearson Correlation	.076	1
	Sig. (2-tailed)	.212	
	N	272	272
		Type of disability	MUAC measures
Type of disability	Pearson Correlation	1	.426**
	Sig. (2-tailed)		.000
	N	272	272
MUAC measures	Pearson Correlation	.426**	1
	Sig. (2-tailed)	.000	
	N	272	272

** . Correlation is significant at the 0.01 level (2-tailed).

4.6. Family Size, Occupation, Income, and Nutritional Status of the Children

Family size and occupation of the household determine the nutritional status of the child with disability. Pearson correlation coefficient results indicated that there was statistically significant negative correlation between family size and nutritional status of the children based on MUAC and BMI measures, respectively. Accordingly, the data analysis outputs were found to be $r = -.140^*$, $n = 272$, $p = .021$ for the MUAC measures, and $r = -.121^*$, $n = 272$, $p = .046$ for BMI measures. This indicated that as family size increases nutritional status of the children was negatively affected. Likewise, occupation of the household heads had no correlation with nutritional status of the children based on MUAC ($r = -.109$, $n = 272$, $p = .073$), and BMI measures ($r = -.037$, $n = 272$, $p = .540$), respectively.

Table 4.11. Family size and occupation with nutritional status, Gulele Sub-city, 2019

		Average family size in the household	Mean of MUAC measures
Average family size in the household	Pearson Correlation	1	-.140*
	Sig. (2-tailed)		.021
	N	272	272
Mean of MUAC measures	Pearson Correlation	-.140	1
	Sig. (2-tailed)	.021	
	N	272	272
		Average family size in the household	Mean of BMI measures
Average family size in the household	Pearson Correlation	1	-.121*
	Sig. (2-tailed)		.046
	N	272	272
Mean of BMI measures	Pearson Correlation	-.121*	1
	Sig. (2-tailed)	.046	
	N	272	272
. Correlation is significant at the 0.05 level (2-tailed).			
		Average BMI measure for CWD	Average household monthly income (ETB)
Average BMI measure for CWD	Pearson Correlation	1	.174**
	Sig. (2-tailed)		.004
	N	272	272
Average household monthly income (ETB)	Pearson Correlation	.174**	1
	Sig. (2-tailed)	.004	
	N	272	272
**. Correlation is significant at the 0.01 level (2-tailed).			
		Average household monthly income (ETB)	Average MUAC measure for CWD
Average household monthly income (ETB)	Pearson Correlation	1	.077
	Sig. (2-tailed)		.208
	N	272	272
Average MUAC measure for CWD	Pearson Correlation	.077	1
	Sig. (2-tailed)	.208	
	N	272	272

Table 4.11 indicated that there were relationships between household monthly incomes and children's nutritional statuses as measured by BMI and MUAC. There was a positive correlation between the households' monthly incomes and the BMI measures of children with disability at $r = .174^{**}$, $n = 272$, $p = .004$ which is less than .01. Moreover, there was no relationship between the monthly incomes of householders and the MUAC measures of the children at $r = .077$, $n = 272$, $p = .208$. Here, it is possible to conclude that those householders with better monthly incomes could feed their children with disability thereby improving the nutritional status than households with lower monthly incomes.

On the other hand, a multiple regression analysis was run using the SPSS software to identify nutritional status of children with disability as dependent variable based on MUAC measures, and causes of the child's inability to feed properly, types of disability, family size, occupation of the household head, and household monthly income as independent variables. Accordingly, there were positive statistically significant relationships between the five independent variables and the depended variable. Here, it is possible to deduce that types of disability, types of occupation, family size, causes of the child's inability to feed properly, and household monthly income, respectively predicted or indicated nutritional status of the children at, $F(5, 266) = 12.785$, $P < .001$, $R = .440$, $R^2 = .194$, Adjusted $R^2 = .179$) (See Appendix IV). In addition, the combination of those five factors together would explain 19.4% of change in the nutritional status of the children with disability based on MUAC measures. Possibly, types of disability, types of occupation, family size, causes of the child's inability to feed properly, and household monthly income, respectively may contribute to the nutritional status of those children with disability.

Next, to examine and explain the relationships between those independent variables and the nutritional status of the children with disability using BMI, multiple regression analysis method was employed. Thus, the analysis outputs revealed that there were positive relationships between family size, causes of the child's inability to feed properly, types of occupation, types of disability, and household monthly income, and the children's nutritional status in that given order at $F(5, 266) = 2.765$, $P < .05$, $R = .222$, $R^2 = .049$, Adjusted $R^2 = .032$) (See Appendix IV). These factors collectively may explain 4.9% of the variance in their nutritional status. On the

whole, MUAC measures may seem to better explain the nutritional status of those children with disability than those of BMI in Gulele Sub City of Addis Ababa.

It is possible to conclude that those householders with better monthly incomes could feed their children with disability thereby improving the nutritional status than households with lower monthly incomes. Possibly, types of disability, types of occupation, family size, causes of the child’s inability to feed properly, and household monthly income, respectively may contribute to the nutritional status of those children with disability. On the whole, MUAC measures may seem to better explain the nutritional status of those children with disability than those of BMI in Gulele Sub City of Addis Ababa.

4.7. Waste Disposal Mechanisms

Households of children with disability were furthermore asked about the waste disposal practices at household and village levels. The data showed that households were practiced to separate solid and liquid wastes and make ready for disposal. 258 (94.9%) of the households used proper waste disposal mechanisms, such as using dustbin for solid wastes and barrel for liquid wastes in their home until it was disposed to the communal disposal point. Moreover, 243 (89.3%) of the households at village level used to dispose solid wastes at the nearby garbage and the liquid waste were also disposed using the ditch in the village (Table 4.12). Consequently, such disposal mechanisms may keep the children from getting infected with water borne diseases that may cause one type of disability or other.

Table 4.12. Waste disposal mechanisms at household and village level, Gulele Sub-city, 2019

Responses	Waste disposal mechanisms			
	At village level		At household level	
	Frequency	%	Frequency	%
Yes	243	89.3	258	94.9
No	29	10.7	14	5.1
Total	272	100.0	272	100.0

4.8. Measures taken by the Mothers/caregivers

Study findings showed that the mothers/caregivers made a lot of efforts at feeding their children with disability. Amongst those efforts, 41 (42.7%) used small and frequent feeding, 31 (32.3%) prepared and fed semi-liquid food items, 19 (19.8%) used forced feedings, and 5 (5.2%) also prepared only liquid food. Therefore, the mothers/caregivers were trying their best to feed their children with disability by using different feeding mechanisms (Table 4.13). In addition, data collected from key informant interviews also supported that different mechanisms were employed by the mothers/caregivers to feed their children with the available food items at household level, prepared the types of food in liquid form and used small and frequent feeding approach.

Table 4.13. Efforts of mothers/caregivers to feed the child with disability, Gulele Sub-city, 2019

	Frequency	%
Semi-liquid food	31	32.3
Small and frequent feeding	41	42.7
Liquid food only	5	5.2
Forced feeding	19	19.8
Total	96	100.0

4.9. Challenges Faced by Mothers/caregivers

Key informant interviewees pointed out those family members of the child with disability have limitations in improving the nutritional status of children with disability. Low level of household income is the major challenge in order to fulfill the house hold basic needs like food; large family size shares the effort to provide care for the child with disability, and lack of knowledge and information how to feed and take care of the child with disability. A lack of proper health services and of appropriate professionals who could support the children with proper and friendly counseling and other related services which affect efforts at achieving their nutritional status.

4.10. Summary of Findings

The study assessed the nutritional status of children with disability and its causes in Gulele Sub-City, Addis Ababa. Based on the objectives, a research question was developed and the required data were collected and analyzed. In the study, 272 mothers/caregivers and the same proportion of children with disability were participated and the following summary of findings was generated.

Socio-demographic profile of the respondents was derived from selected variables and the findings indicated that, age of the mothers/caregiver's majority of the mothers/caregivers were married 233 (85.7%) and found in the age range of 30-39 years (66.5%). With regard to occupation of the respondents, 157 (57.7%) were house wives, 10.7% were civil servants and 8.8% were petty traders.

The largest educational attainment was elementary level 109 (40.1%). Majority, 157 (57.7%) of the study participants occupation were housewife, and 189 (69.5%) of the household income was generated by the father only with average monthly gross income of 2556.30 birr. The household diversity score data indicates 246 (90.4%) consumed six and more items of food groups.

Children with disability's mean age was seven years and 104 (38.2%) were children with multiple disabilities. From the individual diversity score data, 165 (60.7%) consumed six and more items of food groups and 166 (60.9%) also consumed vitamin A rich plant sources.

The child's MUAC level indicated that 150 (55.1%) were categorized under normal range of malnourishment. The rest, 72 (26.5%) and 50 (18.4%) were also grouped under moderate and severe level of malnutrition, respectively.

The BMI measures also indicated that 158 (58.1%) were at normal nutritional status. In addition, 61 (22.4%) and 41 (15.1%) were further grouped under moderate and severe level of nutritional status, respectively.

For both BMI and MUAC measures the matching/coinciding result indicated that 136 (50.0%) were at normal nutritional status, 52 (19.1%) and 41 (15.1%) were at moderate and severe acute malnutrition, respectively. While the rest, 43 (15.8%) have mismatching measures.

The study indicated that children with multiple disabilities, 104 (38.2%) were not able to feed properly the food available at household level 96 (35.3%) due to poor appetite, 27 (28.1%), restlessness 27 (28.1%), pharyngeal atresia 18 (18.8%), and preference of food items 16 (5.9). Consequently, mothers/caregivers used different mechanisms to feed their children with disability by using small and frequent feeding 41 (42.7%), preparing and feeding semi-liquid food items 31 (32.3%), and used forced feedings 19 (19.8%).

The study revealed that all mothers/caregivers have access to health services nearby, almost all (97.1%) have antenatal follow up, and 98.9% of children with disability were fully immunized. However, the mothers/caregivers have problems with the services of the health institutions due to lack of trained professionals for counselling on feeding and care of the child with disability and the services are not disability specific and friendly .

A relationship between causes of difficulty to feed properly, BMI and MUAC measures was positive correlation. The child's type of disability and the BMI measures were found to be a positive correlation. However; there was strong positive correlation between types of disability and nutritional status based on MUAC measures. In addition, there were statistically significant negative correlation between family size and nutritional status of the children based on MUAC and BMI measures, Moreover, there were weak positive relationships between the monthly incomes of householders and the MUAC and the BMI measures of the children with disability.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1. Conclusion

The aim of this study was to assess the nutritional status of children with disability and its causes. Based on the major findings derived from the study, the following conclusions were drawn. Most of the mothers/caregivers were married, majority of the householders are formally educated, and their occupation was housewives with average monthly income of 2,556.30 birr. Also, there was no generally dominant occupation as a major source income for those households in Gulele Sub-City. Thus, these house wives may run short of incomes to properly feed their children with disability. The study indicated that, the children have four dominant types of disability, but there is some what a prevalence of multiple disabilities. Thus, this implies that their disability conditions may put them into difficulty in proper feeding even available food items and frequent occurrence of illnesses.

The study shows nutritional status of children with disability based on Mid-Upper Arm Circumference (MUAC) measures was at normal level (55.1%). However, there were a proportion of (44.9%) children with disability with moderate and severe acute malnutrition. Likewise, the children's Body Mass Index (BMI) measure values reasonably indicate that the significant proportion (58.1%) of the children with disabilities in Gulele Sub-City is grouped at normal level of malnutrition. However, there were a proportion of (37.5%) children with disability with moderate and severe acute malnutrition.

At this juncture, mothers/caregivers and children have access to health services and most of them have attended antenatal care during their period of pregnancy, and the children were also fully immunized. Conversely, those mothers/caregivers who have visited the nearby health institutions complain that the services provided were not disability specific and friendly. Even there were no trained professionals for providing proper services (such as counselling on feeding of the children and how to take care of them).

In this study, causes of malnutrition identified were poor appetite, restlessness, pharyngeal atresia, family size, preference of food items, householder's income and occupation. The study further shows that children with disabilities were under problems of taking food properly. The types of disability create difficulties in properly feeding available food items at household level in Gulele Sub-City.

The study generally showed that mothers/caregivers who take care of children with disability were not getting disability specific services at the nearby health institutions. Finally, the study had been arguing that the type of disability the children have, the family size, and occupation of the household heads, difficulty to take food, and household monthly incomes were identified as causes for problems in the nutritional status of those children with disability in Gulele Sub City of Addis Ababa.

5.2. Recommendations

In this study, based on anthropometric variables, nutritional status was found with normal level among children with disability in the study area.

- As the mothers/caregivers of the children with disability are mostly stay at home, those concerned governmental offices in partnerships and collaboration with NGOs should design and implement income generating schema to augment their incomes which would help them to buy the necessary food groups and items to improve the children's nutritional status.
- Since most of the children in the study area have multiple disabilities, especially those children who are not able to take food as of their counterparts should get the required nutrition and different types of care and support services.
- For children with disabilities, there should be disability-specific services which address the needs of children with disabilities including professional specialty and training like, child nutrition counseling services in health institutions. Therefore, health institutions should establish disability specific service points with trained professionals to provide friendly, informative, and culturally-sensitive ways of services taking into consideration the children's existing contextual conditions.

- Mothers/caregivers of children with disability should get counselling services and trainings how to feed and take care of their children with disabilities in health institutions.
- As the study participants have expressed their multi-dimensional challenges encountered while handling their children with disabilities, all those concerned governmental officials and NGOs operating in those catchment areas in both Addis Ababa and in Gulele Sub-City should work should-to-shoulder in a consultative manner in identifying, documenting, sharing, intervening, monitoring, and evaluating their interventions on continuous and participatory basis.
- This study mainly focused on quantitative data due to shortage of resources in their various forms, it is recommended that further studies should be conducted using mixed sequential exploratory research design to understand the links between nutrition and disability with comparison between the disabled and their non-disabled counterparts in various socio-cultural, economic, and agro-ecological contexts at different levels in Addis Ababa.

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Appendix-I: Questionnaire - English

Code/ID: _____

**ADDIS ABABA UNIVERSITY
COLLEGE OF DEVELOPMENT STUDIES
CENTER FOR FOOD SECURITY STUDIES**

A questionnaire used to assess the nutritional status of children with disabilities in Gulele Sub-City, Addis Ababa, Ethiopia. My name is _____, I am in the research team of Addis Ababa University, center for food security studies in collaboration with Gulele Sub-City health office. I'm interviewing care givers of children with disabilities aged from six months to seventeen years old. I would like asking you a few questions in order to assess the nutritional status of children with disabilities living in the Sub-City. You don't have to answer any question that you don't want to answer and you may end this interview at any time you want to, however, your honest answer to these questions helps us to assess the nutritional status of children with disabilities to the better understanding of the underlining causes and how to improve their nutritional status in the future.

All information given by you will be strictly confidential. Your name will not be recorded in this form and will never be used in connection with any information you tell us. I greatly appreciate your cooperation in responding to this study. Would you be willing to participate? (If yes, proceed. If no, thank and stop here).

Please sign here to affirm your consent.

Code: _____

Name: _____ Sign: _____ Date: _____

Questionnaire for parents (mothers/caregivers) of children with disabilities

Part I: Socio-demographic characteristics of respondents

No	Questionnaires	Response category	
1	Sex of the respondent	1 = Male	2 = Female
2	Age of respondent	1 = Below 19 years old 2 = 20-29 years old 3 = 30-39 years old 4 = 40-49 years old	5 = 50-59 years old 6 = 60 and above 7 = Don't know
3	Have you ever attended school?	1 = Yes 2 = No (Skip to Qn. 5)	
4	If 'yes' to Q3, what is the highest level of school you attended?	1 = Elementary level 2 = Secondary/high school 3 = TVET	4 = Diploma 5 = Degree 6 = Masters & above
5	What is your occupation?	1 = Weaving 2 = Merchant/Petty trade 3 = Housewife 4 = Student 8 = Others(Specify) _____	5 = Job seeking 6 = Civil servant/employed 7 = Daily labourer
6	What is your marital status?	1 = Single 2 = Married 3 = Divorced 4 = Separated 5 = Widowed	
6a	How many family members are living in the household?	In number: _____	
6b	How much money do you earn on monthly bases (gross)?	In Birr: _____	
7	How many of the member/s is/are living with disability who is aged from 6 months to 17 years old?	In number: _____	
8	What is the type of disability does the child has?	1 = Multiple disability 2 = Intellectual disability 3 = Autism 4 = Deafness/Hearing impairment 5 = Blindness/Visual impairment 6 = Orthopaedic impairment 7 = Other health impairments 8 = Emotional disturbance 9 = Others, Specify: _____	

Part-II: Questions for caregivers/mothers

No	Questions	Response category
9	What is the source of the household income? (Multiple response is possible)	1= Income from petty trade 2= Income from pension 3= Monthly salary from employment 4= Support from relatives/children 5= Support from NGO's 6= Remittance 7=Income from daily labor 8= None 9= Others (specify) _____
10	Whose family member is mainly supporting the household income? (Multiple response is possible)	1= Father 2= Mother 3= Children 4= Others (specify) _____
11	Does your child with disability feed properly food that is available at home?	0 = No 1 = Yes (Skip to Q15)
11a	If 'No', why?	_____
11b	What efforts you did to feed the child?	_____
12	Is there any health institution for health care services nearby?	0 = No 1 = Yes
13	Do you have adequate antenatal care service during pregnancy?	0 = No 1 = Yes (Skip to Q17)
13 a	If 'No', why?	_____
14	Does the child got breast feeding during child hood?	0 = No (Skip to Q17b) 1 = Yes
14a	If 'Yes', for how long does the child got breast feeding (in months)?	_____
14b	If 'No', why?	_____
14c	Immunization status of the child with disability	0 = Not immunized at all 1 = Started but not completed 2 = Fully immunized
15	Is there any waste disposal mechanism in your village?	0 = No 1 = Yes
16	Do you use waste disposal mechanism at household level?	0 = No 1 = Yes

Part-III: Dietary diversity questionnaire

Please describe the foods (meals and snacks) that you ate or drank yesterday during the day and night, whether at home or outside the home. Start with the first food or drink of the morning. (Write down all foods and drinks mentioned. When composite dishes are mentioned, ask for the list of ingredients. When the respondent has finished, probe for meals and snacks not mentioned.)

N ^o	Food group with examples	Household members eaten	Child with disability eaten
17	Cereals (corn/maize, rice, wheat, sorghum, millet or any other grains or foods made from these (e.g. bread, noodles, porridge, <i>Enjera</i> , or other grain products)	Yes = 1 No = 0	Yes = 1 No = 0

18	Roots and tubers (potatoes & other foods made from roots)	Yes = 1 No = 0	Yes = 1 No = 0
19	Vitamin A rich vegetables and tubers (pumpkin, carrot, sweet potato)	Yes = 1 No = 0	Yes = 1 No = 0
20	Dark green leafy vegetables (Broccoli, salad, lettuce, etc.)	Yes = 1 No = 0	Yes = 1 No = 0
21	Other vegetables (e.g. tomato, onion)	Yes = 1 No = 0	Yes = 1 No = 0
22	Vitamin A rich fruits (mango, papaya, peach, and 100% fruit juice)	Yes = 1 No = 0	Yes = 1 No = 0
23	Other fruits (wild fruits and 100% fruit juice)	Yes = 1 No = 0	Yes = 1 No = 0
24	Flesh/Organ meat (liver, kidney, heart, beef, pork, goat, chicken)	Yes = 1 No = 0	Yes = 1 No = 0
25	Eggs	Yes = 1 No = 0	Yes = 1 No = 0
26	Fish and seafood (fresh or dried fish)	Yes = 1 No = 0	Yes = 1 No = 0
27	Legumes, nuts and seeds (beans, peas, lentils, nuts, or foods made from these)	Yes = 1 No = 0	Yes = 1 No = 0
28	Milk and milk products	Yes = 1 No = 0	Yes = 1 No = 0
29	Oils and fats (oil or butter added to food or used for cooking)	Yes = 1 No = 0	Yes = 1 No = 0
30	Sweets (sugar, honey, sweetened juice drinks, chocolates, candies, cookies and cakes)	Yes = 1 No = 0	Yes = 1 No = 0
31	Miscellaneous - Spices, beverages (spices salt, sauce, coffee, tea, alcoholic beverages)	Yes = 1 No = 0	Yes = 1 No = 0

Part-IV: Anthropometric measurements of a child with disabilities

No	Questions	Response category
32	Sex of the child	1 = Male 2 = Female
33	Age of the child	1 = _____
34	Height of the child (Cm)	1 = _____
35	Weight (Kg)	1 = _____
36	MUAC	1 = _____
37	BMI	1 = _____

Code: _____

Key Informant Interview Guide for Officers working with children with disabilities

Interview date: _____ Time: _____

Part-I: Socio-demographic information

Gender: [1] Female [2] Male

Level of education: _____

Organization which you are working: _____

Position: _____

Part –II: Interview questions

Did you notice malnourishment among those children with disabilities you are working with in Gulele Sub-City? 1 = Yes 2 = No

(If 'Yes', continue to the next question, if 'No', stop the interview with thanks).

How do you rate the severity of status of malnourishment among those children with disabilities you are working with in Gulele Sub-City?

0= No problem

1= Mild problem (can be ignored with effort)

2= Moderate problem (cannot be ignored but does not influence daily activities)

3= Severe problem (cannot be ignored, often limits daily activities and affects health)

4= Very severe problem (cannot be ignored and markedly limits daily activities and affects health)

What will be the causes of malnourishment for those children with disabilities you are working with in Gulele Sub-City?

What efforts family members did to solve the state of malnourishment of the child with disability? (mention the efforts done by them from your observation)

Did you notice limitations in order to improve the nutritional status of CWDs at household level?

1 = Yes

2 = No

If 'Yes' for Qn. 9, mention it.

What is the contribution of your organization in order to improve nutritional status of CWDs in Gulele Sub-City?

If you have any suggestion you are welcome.

Thank you for you cooperation.

Appendix-II: Questionnaire - Amharic

አዲስ አበባ ዩኒቨርሲቲ
የልማት ጥናት ኮሌጅ
የምግብ ዋስትና ጥናት ማእከል

ይህ መጠይቅ በጉለሌ ክ/ከተማ የሚገኙ ዕድሜያቸው ከስድስት ወር እስከ 17 ዓመት የሆኑ የአካል ጉዳት ያለባቸውን ህጻናት የስነ-ምግብ ችግርና መንስኤዎችን ለመለየትና ለመለካት የተዘጋጀ ነው። እኔ _____ እባላለሁ። የመጣሁት የአዲስ አበባ ዩኒቨርሲቲ፣ የሀገር ልማት ጥናት ኮሌጅ፣ የምግብ ዋስትና ጥናት ማእከል ከጉለሌ ክ/ከተማ ጤና ጽ/ቤት ጋር በመተባበር ጥናት ለማከናወን ነው። በዚህ ጥናት ዕድሜያቸው ከስድስት ወር እስከ 17 ዓመት የሆኑ የአካል ጉዳት ያለባቸውን ህጻናት ላይ የሚከሰት የምግብ እጥረት ምን ያህል ጉዳት እያደረሰ እንደሆነና መንስኤውን ለመረዳት አስበናል። ይህንንም መረጃ ለማግኘት ደግሞ ቤት ለቤት በመዘዋወር ቃለመጠይቅ በማድረግ ላይ እንገኛለን። በአካል ጉዳተኛ ልጆች የስነ-ምግብ ሁኔታ አስመልክቶ ጥቂት ጊዜያት የሚወስዱ የምንጠይቅዎት ጥያቄ ስላለን እንዲተባበሩን ይሁን። የሚሰጡን ትክክለኛ ምላሽ የአካል ጉዳት ያለባቸውን ህጻናት የስነ-ምግብ ችግርና መንስኤዎችን ለመለየት፣ ለመለካትና ለወደፊትም ችግሩን ተረድቶ መፍትሄ ለማፈላለግ ከፍተኛ አስተዋፅዖ አለው።

የሚሰጡት መረጃ ሚስጥራዊነቱ የተጠበቀ ነው፤ የሚሰጡኝ መረጃ በግለሰብ ደረጃ እንዲሁም ከጥናት ቡድኑ ውጪ ማንም አያውቀውም። በዚህ ቅፅ ውስጥ ስምዎ አይጠቀስም፤ ከሚሰጡን መረጃ ጋር ተያይዞ ስምዎ አይነሳም። ለጥናቱ ተባባሪ በመሆንዎ ላቅ ያለ ምስጋና አቀርባለሁ። በጥያቄዎቹ ደስተኛ ካልሆኑ በየትኛውም ሰዓት መረጃውን መስጠት ማቆም ይችላሉ። እንግዲህ አሁን ለቃለመጠይቁ ፈቃደኛ ነዎት? (ፈቃደኛ ከሆኑ መጠይቁን ቀጥል/ይ፣ ካልሆኑ ግን አመስግነህ/ሽ ተለያዩ)

መለያ ቁጥር: _____

ስም: _____ ፊርማ: _____ ቀን: _____

የአካል ጉዳት ያለባቸው ህጻናት ወላጆች/ተንከባካቢዎች የተዘጋጀ መጠይቅ

ክፍል አንድ: የመጠይቁ ተሳታፊዎች ማህበራዊና ሥነ-ሕዝብ ሁኔታ መረጃ

ተ.ቁ	መጠይቅ	የተሰጠ ምላሽ
1	ፆታ	1 = ወንድ 2 = ሴት
2	እድሜ	በዓመት: _____ 1 = አላውቀውም 2 = ፈቃደኛ አይደለሁም
3	መደበኛ ትምህርት ተምረው/ተከታትለው ያውቃሉ?	1 = አዎ 2 = የለም
4	ለጥያቄ 3፣ መላሽዎ አዎ ከሆነ የትምህርት ደረጃዎን ይግለጹ።	ክፍል: _____ 1 = ቴክኒክና ሙያ 2 = ዲፕሎማ 3 = ድግሪ 4 = ማስተርስ እና ከዚያ በላይ
5	መተዳደሪያ ስራዎ ምንድን ነው?	1 = ሽመና 2 = ንግድ/አነስተኛ ንግድ 3 = የቤት እመቤት 4 = ተማሪ 5 = ስራ ፈላጊ 6 = የመንግስት ሰራተኛ 7 = የቀን ሰራተኛ/ስራ 8 = ሌሎች: _____
6	የጋብቻ ሁኔታ	1 = ያላገባ 2 = ባለትዳር 3 = የተፋታ 4 = የተለያየ 5 = በሞት የተለየ
6ሀ	በቤት ውስጥ ስንት የቤተሰብ አባላት አሉ?	በቁጥር:
6ለ	አጠቃላይ የቤተሰቡ ወርሃዊ ገቢ ስንት ነው?	በብር:
7	ከቤተሰቡ አባላት ውስጥ አካል ጉዳተኛ የሆነ እድሜው ከ6 ወር እስከ 17 ዓመት እድሜ ያለው ስንት ናቸው?	በቁጥር:
8	የአካል ጉዳት ያለበት ህጻን ያለው የአካል ጉዳት አይነት ይጥቀሱ?	የአካል ጉዳት አይነት: 1 _____ 2 _____

ክፍል ሁለት: ለእናቶች/ተንከባካቢዎች የተዘጋጀ መጠይቅ

ተ.ቁ	መጠይቅ	የተሰጠ ምላሽ
9	የቤተሰቡ የገቢ ምንጭ ምንድን ነው? 1= አነስተኛ ንግድ 2= ጡረታ 3= ወርሃዊ ደመወዝ 4= ከልጅ/ከዘመድ ድጋፍ 5= መንግስታዊ ያ/ድ ድጋፍ	6= ከውጭ በሚላክ የገንዘብ ድጋፍ 7= ከቀን/ የጉልበት ስራ በሚገኝ 8= ምንም የለም 9= ሌሎች: _____
10	ከቤተሰቡ አባላት በዋናነት ገቢ የሚያመጣው/የሚደግፈው ማን ነው? 1= አባት 2= እናት 3= ልጆች 4= ሌሎች: _____	
11	የአካል ጉዳት ያለው ልጅዎ ቤት ያፈራውን የምግብ አይነት በአግባቡ ይመገባል? 0 = የለም 1 = አዎ	
11ሀ	የለም ከሆነ፣ ለምን? _____	
11ለ	ሕፃኑን ለመመገብ ምን ጥረት ጋደርጋሉ? _____	
12	በአቅራቢያችሁ የጤና አገልግሎት የሚሰጥ የጤና ተቋም አለ ወይ? 0 = የለም 1 = አዎ	
13	በእርግዝና ጊዜ በቂ የነፍሰጡር ክትትል ያደርጋሉ? 0 = የለም 1 = አዎ	
13ሀ	የለም ከሆነ፣ ለምን? _____	
14	ሕፃኑ በቂ የጡት ወተት ጠብቷል? _____	
14ሀ	አዎ ከሆነ ለምን ያህል ወራት ጠብቷል? _____	
14ለ	የለም ከሆነ፣ ለምን? _____	
14ሐ	የአካል ጉዳት ያለበት ሕፃን የክትባት ሁኔታ = ፈፅሞ አልተከተበም = ክትባቱን አላጠናቀቀም 2 = ሙሉ በሙሉ ክትባቱን አጠናቋል	
15	በመንደራችሁ በቂና አመቺ የቆሻሻ ማስወገጃ ዘዴ አለ ወይ? 0 = የለም 1 = አዎ	
16	በቤተሰባችሁ ውስጥ ተገቢ የሆነ የቆሻሻ ማስወገድ ዘዴ ትጠቀማላችሁ? 0 = የለም 1 = አዎ	

ክፍል አራት: የቤተሰብ አመጋገብ ሁኔታ መጠይቅ

በዚህ አንድ ቀን ውስጥ በማንኛውም የምግብ ሰዓት በቤት ውስጥም ሆነ ከቤት ውጭ የበሉትን ወይም የጠጡትን የምግብ አይነት ይጥቀሱ። (በጠዋት ከበሉት ወይም ከጠጡት የምግብ አይነት ቢጀምሩ ጥሩ ይሆናል። በመጠይቁ ቀን ልዩ በዓል ወይም ዝግጅት የነበረበት ወቅት መሆን የለበትም)።

ተ.ቁ	ጥያቄ	የተጠያቂው ቤተሰብ የበሉት	አካል ጉዳተኛው ልጅ የበላው
17	ጥራጥሬ (ሩዝ፣ ስንዴ፣ ዳቦ፣ እንጀራ፣ ፓስታ፣ ገንፎ)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
18	ነጭ ስራስር እና የድንች ዝርያ ወይንም የእስታርች ምግቦች (ድንች እና ከስራስር የተዘጋጁ ምግቦች)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
19	በቫይታሚን ኤ የበለፀጉ አትክልትና ድንች ዝርያ (ዱባ፣ ካሮት፣ ስኳርድንች)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0

20	ጥቁር አረንጓዴ የሆኑ ቅጠላማ አትክልቶች (አበባ ጎመን፣ ሰላጣ፣ ቆስጣ፣ ወዘተ.)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
21	ሌሎች አትክልቶች፣ (ምሳሌ፡- ቲማቲም፣ ሽንኩርት)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
22	በቫይታሚን ኤ የበለፀጉ ፍራፍሬዎች (ማንጎ፣ ፓፓያ፣ ኮክ፣ 100% የፍራፍሬ ጭማቂ)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
23	ሌሎች ፍራፍሬዎች? (ምሳሌ፡- ሙዝ፣ አፕል፣ ብርቱካን፣ አናናስ፣ 100% የፍራፍሬ ጭማቂ)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
24	ማንኛውም ስጋ ወይም የእንስሳት የውስጥ አካላት ስጋ (ጉብት፣ ኩላሊት፣ ልብ፣ የበሬ/የፍየል/የዶሮ ስጋ)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
25	እንቁላል	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
26	አሣ (ትኩስ ወይም ደረቅ አሣ)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
27	ማንኛውም ከባቂላ፣ አተር ወይም ምስር፣ አደንጓሬ፣ ከአህል የሚሰራ ምግብ	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
28	ወተትና የወተት ተዋዕያ	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
29	ዘይትና ቅባት (ስብ ወይም ቅቤ የተጨመረበት ምግብ ወይም ለምግብ የሚሆን የበሰለ ቅቤ)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
30	ጣፋጭ ነገሮች (ስኳር፣ ሞላሰስ፣ ማር፣ ለስላሳ መጠጦች፣ ቸኮሌት፣ ከረሜላ፣ ብስኩት)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
31	ቅመማ ቅመም እና የሚጠጡ ነገሮች (ቅመሞች፣ ጨው፣ ወጥ፣ ቡና፣ ሻይ፣ የአልኮል መጠጦች፣ ወዘተ)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0

ክፍል ሦስት፡ የአካል ጉዳት ያለባቸው ሕፃናት የስነ-ምግብ (አንት-ሮፖሜትሪክ) ልኬት መጠይቅ መሙያ ቅፅ

ተ.ቁ	መጠይቅ	የተሰጠ ምላሽ
32	የሕፃኑ ያታ	1 = ወንድ 2 = ሴት
33	የሕፃኑ እድሜ	1 = _____
34	የሕፃኑ ቁመት/አርዝመት (ሴ.ሜ)	1 = _____
35	ክብደት (ኪ.ግ)	1 = _____
36	ሚክ (የክንድ ላይ ልኬት)	1 = _____
37	ቢ.ኤም.አይ (የቁመትና ክብደት አማካኝ ልኬት)	1 = _____

9. የምግብ እጥረት ያለባቸው አካል ጉዳተኛ ሕፃናት ችግር ለማሻሻል በቤተሰብ ደረጃ የሚደረገው ጥረት ላይ ውስጥነት አለ?

- 1) አይደለም 2) የለም

10. አይደለም ከሆነ፣ ያብራሩ?

11. በጉለሌ ክ/ከተማ ያሉ አካል ጉዳተኛ ሕፃናት የምግብ እጥረት ችግር ለማሻሻል የእናንተ ተቋም ምን ምን ተግባራትን እያከናወነ ነው?

12. ተጨማሪ አስተያየት ካለዎት ንገሩኝ?

ለትብብርዎ በጣም አመሰግናለሁ።

Appendix-III: Weight-for-length/height cut-off points (NACS, 2016).

BOYS 0–23 months, weight-for-length

Length (cm) ↓	SAM <-3	MAM -3 to <-2	Normal -2 to +2	Overweight >+2 to +3	Obesity >+3
	Weight (kg) →				
45	0–1.8	1.9	2.0–3.0	3.1–3.3	> 3.3
46	0–1.9	2.0–2.1	2.2–3.1	3.2–3.5	> 3.5
47	0–2.0	2.1–2.2	2.3–3.3	3.4–3.7	> 3.7
48	0–2.2	2.3–2.4	2.5–3.6	3.7–3.9	> 3.9
49	0–2.3	2.4–2.5	2.6–3.8	3.9–4.2	> 4.2
50	0–2.5	2.6–2.7	2.8–4.0	4.1–4.4	> 4.4
51	0–2.6	2.7–2.9	3.0–4.2	4.3–4.7	> 4.7
52	0–2.8	2.9–3.1	3.2–4.5	4.6–5.0	> 5.0
53	0–3.0	3.1–3.3	3.4–4.8	4.9–5.3	> 5.3
54	0–3.2	3.3–3.5	3.6–5.1	5.2–5.6	> 5.6
55	0–3.5	3.6–3.7	3.8–5.4	5.5–6.0	> 6.0
56	0–3.7	3.8–4.0	4.1–5.8	5.9–6.3	> 6.3
57	0–3.9	4.0–4.2	4.3–6.1	6.2–6.7	> 6.7
58	0–4.2	4.3–4.5	4.6–6.4	6.5–7.1	> 7.1
59	0–4.4	4.5–4.7	4.8–6.8	6.9–7.4	> 7.4
60	0–4.6	4.7–5.0	5.1–7.1	7.2–7.8	> 7.8
61	0–4.8	4.9–5.2	5.3–7.4	7.5–8.1	> 8.1
62	0–5.0	5.1–5.5	5.6–7.7	7.8–8.5	> 8.5
63	0–5.2	5.3–5.7	5.8–8.0	8.1–8.8	> 8.8
64	0–5.4	5.5–5.9	6.0–8.3	8.4–9.1	> 9.1
65	0–5.6	5.7–6.1	6.2–8.6	8.7–9.4	> 9.4
66	0–5.8	5.9–6.3	6.4–8.9	9.0–9.7	> 9.7
67	0–6.0	6.1–6.5	6.6–9.2	9.3–10.0	> 10.0
68	0–6.2	6.3–6.7	6.8–9.4	9.5–10.3	> 10.3
69	0–6.4	6.5–6.9	7.0–9.7	9.8–10.6	> 10.6
70	0–6.5	6.6–7.1	7.2–10.0	10.1–10.9	> 10.9
71	0–6.7	6.8–7.3	7.4–10.2	10.3–11.2	> 11.2
72	0–6.9	7.0–7.5	7.6–10.5	10.6–11.5	> 11.5
73	0–7.1	7.2–7.6	7.7–10.8	10.9–11.8	> 11.8
74	0–7.2	7.3–7.8	7.9–11.0	11.1–12.1	> 12.1
75	0–7.4	7.5–8.0	8.1–11.3	11.4–12.3	> 12.3
76	0–7.5	7.6–8.2	8.3–11.5	11.6–12.6	> 12.6
77	0–7.7	7.8–8.3	8.4–11.7	11.8–12.8	> 12.8
78	0–7.8	7.9–8.5	8.6–12.0	12.1–13.1	> 13.1
79	0–8.0	8.1–8.6	8.7–12.2	12.3–13.3	> 13.3
80	0–8.1	8.2–8.8	8.9–12.4	12.5–13.6	> 13.6
81	0–8.3	8.4–9.0	9.1–12.6	12.7–13.8	> 13.8
82	0–8.4	8.5–9.1	9.2–12.8	12.9–14.0	> 14.0
83	0–8.6	8.7–9.3	9.4–13.1	13.2–14.3	> 14.3
84	0–8.8	8.9–9.5	9.6–13.3	13.4–14.6	> 14.6
85	0–9.0	9.1–9.7	9.8–13.6	13.7–14.9	> 14.9
86	0–9.2	9.3–9.9	10.0–13.9	14.0–15.2	> 15.2

GIRLS 0–23 months, weight-for-length

Length (cm) ↓	SAM <-3	MAM -3 to <-2	Normal -2 to +2	Overweight >+2 to +3	Obesity >+3
	Weight (kg) →				
45	0–1.8	1.9–2.0	2.1–3.0	3.1–3.3	> 3.3
46	0–1.9	2.0–2.1	2.2–3.2	3.3–3.5	> 3.5
47	0–2.1	2.2–2.3	2.4–3.4	3.5–3.7	> 3.7
48	0–2.2	2.3–2.4	2.5–3.6	3.7–4.0	> 4.0
49	0–2.3	2.4–2.5	2.6–3.8	3.9–4.2	> 4.2
50	0–2.5	2.6–2.7	2.8–4.0	4.1–4.5	> 4.5
51	0–2.7	2.8–2.9	3.0–4.3	4.4–4.8	> 4.8
52	0–2.8	2.9–3.1	3.2–4.6	4.7–5.1	> 5.1
53	0–3.0	3.1–3.3	3.4–4.9	5.0–5.4	> 5.4
54	0–3.2	3.3–3.5	3.6–5.2	5.3–5.7	> 5.7
55	0–3.4	3.5–3.7	3.8–5.5	5.6–6.1	> 6.1
56	0–3.6	3.7–3.9	4.0–5.8	5.9–6.4	> 6.4
57	0–3.8	3.9–4.2	4.3–6.1	6.2–6.8	> 6.8
58	0–4.0	4.1–4.4	4.5–6.5	6.6–7.1	> 7.1
59	0–4.2	4.3–4.6	4.7–6.8	6.9–7.5	> 7.5
60	0–4.4	4.5–4.8	4.9–7.1	7.2–7.8	> 7.8
61	0–4.6	4.7–5.0	5.1–7.4	7.5–8.2	> 8.2
62	0–4.8	4.9–5.2	5.3–7.7	7.8–8.5	> 8.5
63	0–5.0	5.1–5.4	5.5–8.0	8.1–8.8	> 8.8
64	0–5.2	5.3–5.6	5.7–8.3	8.4–9.1	> 9.1
65	0–5.4	5.5–5.8	5.9–8.6	8.7–9.5	> 9.5
66	0–5.5	5.6–6.0	6.1–8.8	8.9–9.8	> 9.8
67	0–5.7	5.8–6.2	6.3–9.1	9.2–10.0	> 10.0
68	0–5.9	6.0–6.4	6.5–9.4	9.5–10.3	> 10.3
69	0–6.0	6.1–6.6	6.7–9.6	9.7–10.6	> 10.6
70	0–6.2	6.3–6.8	6.9–9.9	10.0–10.9	> 10.9
71	0–6.4	6.5–6.9	7.0–10.1	10.2–11.1	> 11.1
72	0–6.5	6.6–7.1	7.2–10.3	10.4–11.4	> 11.4
73	0–6.7	6.8–7.3	7.4–10.6	10.7–11.7	> 11.7
74	0–6.8	6.9–7.4	7.5–10.8	10.9–11.9	> 11.9
75	0–7.0	7.1–7.6	7.7–11.0	11.1–12.2	> 12.2
76	0–7.1	7.2–7.7	7.8–11.2	11.3–12.4	> 12.4
77	0–7.3	7.4–7.9	8.0–11.5	11.6–12.6	> 12.6
78	0–7.4	7.5–8.1	8.2–11.7	11.8–12.9	> 12.9
79	0–7.6	7.7–8.2	8.3–11.9	12.0–13.1	> 13.1
80	0–7.7	7.8–8.4	8.5–12.1	12.2–13.4	> 13.4
81	0–7.9	8.0–8.6	8.7–12.4	12.5–13.7	> 13.7
82	0–8.0	8.1–8.7	8.8–12.6	12.7–13.9	> 13.9
83	0–8.2	8.3–8.9	9.0–12.9	13.0–14.2	> 14.2
84	0–8.4	8.5–9.1	9.2–13.2	13.3–14.5	> 14.5
85	0–8.6	8.7–9.3	9.4–13.5	13.6–14.9	> 14.9
86	0–8.8	8.9–9.6	9.7–13.8	13.9–15.2	> 15.2

BOYS 0–23 months, weight-for-length

Length (cm)	SAM < -3	MAM -3 to < -2	Normal -2 to +2	Overweight > +2 to +3	Obesity > +3
	Weight (kg)				
87	0–9.4	9.5–10.1	10.2–14.2	14.3–15.5	> 15.5
88	0–9.6	9.7–10.4	10.5–14.5	14.6–15.8	> 15.8
89	0–9.8	9.9–10.6	10.7–14.7	14.8–16.1	> 16.1
90	0–10.0	10.1–10.8	10.9–15.0	15.1–16.4	> 16.4
91	0–10.2	10.3–11.0	11.1–15.3	15.4–16.7	> 16.7
92	0–10.4	10.5–11.2	11.3–15.6	15.7–17.0	> 17.0
93	0–10.6	10.7–11.4	11.5–15.8	15.9–17.3	> 17.3
94	0–10.7	10.8–11.6	11.7–16.1	16.2–17.6	> 17.6
95	0–10.9	11.0–11.8	11.9–16.4	16.5–17.9	> 17.9
96	0–11.1	11.2–12.0	12.1–16.7	16.8–18.2	> 18.2
97	0–11.3	11.4–12.2	12.3–17.0	17.1–18.5	> 18.5
98	0–11.5	11.6–12.4	12.5–17.3	17.4–18.9	> 18.9
99	0–11.7	11.8–12.6	12.7–17.6	17.7–19.2	> 19.2
100	0–11.9	12.0–12.8	12.9–18.0	18.1–19.6	> 19.6

BOYS 24–59 months, weight-for-height

Height (cm)	SAM < -3	MAM -3 to < -2	Normal -2 to +2	Overweight > +2 to +3	Obesity > +3
	Weight (kg)				
65	0–5.8	5.9–6.2	6.3–8.8	8.9–9.6	> 9.6
66	0–6.0	6.1–6.4	6.5–9.1	9.2–9.9	> 9.9
67	0–6.1	6.2–6.6	6.7–9.4	9.5–10.2	> 10.2
68	0–6.3	6.4–6.8	6.9–9.6	9.7–10.5	> 10.5
69	0–6.5	6.6–7.0	7.1–9.9	10.0–10.8	> 10.8
70	0–6.7	6.8–7.2	7.3–10.2	10.3–11.1	> 11.1
71	0–6.8	6.9–7.4	7.5–10.4	10.5–11.4	> 11.4
72	0–7.0	7.1–7.6	7.7–10.7	10.8–11.7	> 11.7
73	0–7.2	7.3–7.8	7.9–11.0	11.1–12.0	> 12.0
74	0–7.3	7.4–7.9	8.0–11.2	11.3–12.2	> 12.2
75	0–7.5	7.6–8.1	8.2–11.4	11.5–12.5	> 12.5
76	0–7.6	7.7–8.3	8.4–11.7	11.8–12.8	> 12.8
77	0–7.8	7.9–8.4	8.5–11.9	12.0–13.0	> 13.0
78	0–7.9	8.0–8.6	8.7–12.1	12.2–13.3	> 13.3
79	0–8.1	8.2–8.7	8.8–12.3	12.4–13.5	> 13.5
80	0–8.2	8.3–8.9	9.0–12.6	12.7–13.7	> 13.7
81	0–8.4	8.5–9.1	9.2–12.8	12.9–14.0	> 14.0
82	0–8.6	8.7–9.2	9.3–13.0	13.1–14.2	> 14.2
83	0–8.7	8.8–9.4	9.5–13.3	13.4–14.5	> 14.5
84	0–8.9	9.0–9.6	9.7–13.5	13.6–14.8	> 14.8
85	0–9.1	9.2–9.9	10.0–13.8	13.9–15.1	> 15.1
86	0–9.3	9.4–10.1	10.2–14.1	14.2–15.4	> 15.4
87	0–9.5	9.6–10.3	10.4–14.4	14.5–15.7	> 15.7
88	0–9.7	9.8–10.5	10.6–14.7	14.8–16.0	> 16.0

GIRLS 0–23 months, weight-for-length

Length (cm)	SAM < -3	MAM -3 to < -2	Normal -2 to +2	Overweight > +2 to +3	Obesity > +3
	Weight (kg)				
87	0–9.0	9.1–9.8	9.9–14.1	14.2–15.5	> 15.5
88	0–9.2	9.3–10.0	10.1–14.4	14.5–15.9	> 15.9
89	0–9.4	9.5–10.2	10.3–14.7	14.8–16.2	> 16.2
90	0–9.6	9.7–10.4	10.5–15.0	15.1–16.5	> 16.5
91	0–9.8	9.9–10.6	10.7–15.3	15.4–16.9	> 16.9
92	0–10.0	10.1–10.8	10.9–15.6	15.7–17.2	> 17.2
93	0–10.1	10.2–11.0	11.1–15.9	16.0–17.5	> 17.5
94	0–10.3	10.4–11.2	11.3–16.2	16.3–17.9	> 17.9
95	0–10.5	10.6–11.4	11.5–16.5	16.6–18.2	> 18.2
96	0–10.7	10.8–11.6	11.7–16.8	16.9–18.6	> 18.6
97	0–10.9	11.0–11.9	12.0–17.1	17.2–18.9	> 18.9
98	0–11.1	11.2–12.1	12.2–17.5	17.6–19.3	> 19.3
99	0–11.3	11.4–12.3	12.4–17.8	17.9–19.6	> 19.6
100	0–11.5	11.6–12.5	12.6–18.1	18.2–20.0	> 20.0

GIRLS 24–59 months, weight-for-height

Height (cm)	SAM < -3	MAM -3 to < -2	Normal -2 to +2	Overweight > +2 to +3	Obesity > +3
	Weight (kg)				
65	0–5.5	5.6–6.0	6.1–8.7	8.8–9.7	> 9.7
66	0–5.7	5.8–6.2	6.3–9.0	9.1–10.0	> 10.0
67	0–5.8	5.9–6.3	6.4–9.3	9.4–10.2	> 10.2
68	0–6.0	6.1–6.5	6.6–9.5	9.6–10.5	> 10.5
69	0–6.2	6.3–6.7	6.8–9.8	9.9–10.8	> 10.8
70	0–6.3	6.4–6.9	7.0–10.0	10.1–11.1	> 11.1
71	0–6.5	6.6–7.0	7.1–10.3	10.4–11.3	> 11.3
72	0–6.6	6.7–7.2	7.3–10.5	10.6–11.6	> 11.6
73	0–6.8	6.9–7.4	7.5–10.7	10.8–11.8	> 11.8
74	0–6.9	7.0–7.5	7.6–11.0	11.1–12.1	> 12.1
75	0–7.1	7.2–7.7	7.8–11.2	11.3–12.3	> 12.3
76	0–7.2	7.3–7.9	8.0–11.4	11.5–12.6	> 12.6
77	0–7.4	7.5–8.0	8.1–11.6	11.7–12.8	> 12.8
78	0–7.5	7.6–8.2	8.3–11.8	11.9–13.1	> 13.1
79	0–7.7	7.8–8.3	8.4–12.1	12.2–13.3	> 13.3
80	0–7.8	7.9–8.5	8.6–12.3	12.4–13.6	> 13.6
81	0–8.0	8.1–8.7	8.8–12.6	12.7–13.9	> 13.9
82	0–8.2	8.3–8.9	9.0–12.8	12.9–14.1	> 14.1
83	0–8.4	8.5–9.1	9.2–13.1	13.2–14.5	> 14.5
84	0–8.5	8.6–9.3	9.4–13.4	13.5–14.8	> 14.8
85	0–8.7	8.8–9.5	9.6–13.7	13.8–15.1	> 15.1
86	0–8.9	9.0–9.7	9.8–14.0	14.1–15.4	> 15.4
87	0–9.1	9.2–9.9	10.0–14.3	14.4–15.8	> 15.8
88	0–9.3	9.4–10.1	10.2–14.6	14.7–16.1	> 16.1

BOYS 24–59 months, weight-for-height

Height (cm)	SAM < -3	MAM ≥ -3 to < -2	Normal ≥ -2 to ≤ +2	Overweight > +2 to ≤ +3	Obesity > +3
	Weight (kg) →				
89	0–9.9	10.0–10.7	10.8–14.9	15.0–16.3	> 16.3
90	0–10.1	10.2–10.9	11.0–15.2	15.3–16.6	> 16.6
91	0–10.3	10.4–11.1	11.2–15.5	15.6–16.9	> 16.9
92	0–10.5	10.6–11.3	11.4–15.8	15.9–17.2	> 17.2
93	0–10.7	10.8–11.5	11.6–16.0	16.1–17.5	> 17.5
94	0–10.9	11.0–11.7	11.8–16.3	16.4–17.8	> 17.8
95	0–11.0	11.1–11.9	12.0–16.6	16.7–18.1	> 18.1
96	0–11.2	11.3–12.1	12.2–16.9	17.0–18.4	> 18.4
97	0–11.4	11.5–12.3	12.4–17.2	17.3–18.8	> 18.8
98	0–11.6	11.7–12.5	12.6–17.5	17.6–19.1	> 19.1
99	0–11.8	11.9–12.8	12.9–17.9	18.0–19.5	> 19.5
100	0–12.0	12.1–13.0	13.1–18.2	18.3–19.9	> 19.9
101	0–12.2	12.3–13.2	13.3–18.5	18.6–20.3	> 20.3
102	0–12.4	12.5–13.5	13.6–18.9	19.0–20.7	> 20.7
103	0–12.7	12.8–13.7	13.8–19.3	19.4–21.1	> 21.1
104	0–12.9	13.0–13.9	14.0–19.7	19.8–21.6	> 21.6
105	0–13.1	13.2–14.2	14.3–20.1	20.2–22.0	> 22.0
106	0–13.3	13.4–14.4	14.5–20.5	20.6–22.5	> 22.5
107	0–13.6	13.7–14.7	14.8–20.9	21.0–22.9	> 22.9
108	0–13.8	13.9–15.0	15.1–21.3	21.4–23.4	> 23.4
109	0–14.0	14.1–15.2	15.3–21.8	21.9–23.9	> 23.9
110	0–14.3	14.4–15.5	15.6–22.2	22.3–24.4	> 24.4
111	0–14.5	14.6–15.8	15.9–22.7	22.8–25.0	> 25.0
112	0–14.8	14.9–16.1	16.2–23.1	23.2–25.5	> 25.5
113	0–15.1	15.2–16.4	16.5–23.6	23.7–26.0	> 26.0
114	0–15.3	15.4–16.7	16.8–24.1	24.2–26.6	> 26.6
115	0–15.6	15.7–17.0	17.1–24.6	24.7–27.2	> 27.2
116	0–15.9	16.0–17.3	17.4–25.1	25.2–27.8	> 27.8
117	0–16.1	16.2–17.6	17.7–25.6	25.7–28.3	> 28.3
118	0–16.4	16.5–17.9	18.0–26.1	26.2–28.9	> 28.9
119	0–16.7	16.8–18.2	18.3–26.6	26.7–29.5	> 29.5
120	0–17.0	17.1–18.5	18.6–27.2	27.3–30.1	> 30.1

GIRLS 24–59 months, weight-for-height

Height (cm)	SAM < -3	MAM ≥ -3 to < -2	Normal ≥ -2 to ≤ +2	Overweight > +2 to ≤ +3	Obesity > +3
	Weight (kg) →				
89	0–9.5	9.6–10.3	10.4–14.9	15.0–16.4	> 16.4
90	0–9.7	9.8–10.5	10.6–15.2	15.3–16.8	> 16.8
91	0–9.9	10.0–10.8	10.9–15.5	15.6–17.1	> 17.1
92	0–10.1	10.2–11.0	11.1–15.8	15.9–17.4	> 17.4
93	0–10.3	10.4–11.2	11.3–16.1	16.2–17.8	> 17.8
94	0–10.5	10.6–11.4	11.5–16.4	16.5–18.1	> 18.1
95	0–10.7	10.8–11.6	11.7–16.7	16.8–18.5	> 18.5
96	0–10.8	10.9–11.8	11.9–17.0	17.1–18.8	> 18.8
97	0–11.0	11.1–12.0	12.1–17.4	17.5–19.2	> 19.2
98	0–11.2	11.3–12.2	12.3–17.7	17.8–19.5	> 19.5
99	0–11.4	11.5–12.4	12.5–18.0	18.1–19.9	> 19.9
100	0–11.6	11.7–12.7	12.8–18.4	18.5–20.3	> 20.3
101	0–11.9	12.0–12.9	13.0–18.7	18.8–20.7	> 20.7
102	0–12.1	12.2–13.2	13.3–19.1	19.2–21.1	> 21.1
103	0–12.3	12.4–13.4	13.5–19.5	19.6–21.6	> 21.6
104	0–12.5	12.6–13.7	13.8–19.9	20.0–22.0	> 22.0
105	0–12.8	12.9–13.9	14.0–20.3	20.4–22.5	> 22.5
106	0–13.0	13.1–14.2	14.3–20.8	20.9–23.0	> 23.0
107	0–13.3	13.4–14.5	14.6–21.2	21.3–23.5	> 23.5
108	0–13.6	13.7–14.8	14.9–21.7	21.8–24.0	> 24.0
109	0–13.8	13.9–15.1	15.2–22.1	22.2–24.5	> 24.5
110	0–14.1	14.2–15.4	15.5–22.6	22.7–25.1	> 25.1
111	0–14.4	14.5–15.7	15.8–23.1	23.2–25.7	> 25.7
112	0–14.7	14.8–16.1	16.2–23.6	23.7–26.2	> 26.2
113	0–15.0	15.1–16.4	16.5–24.2	24.3–26.8	> 26.8
114	0–15.3	15.4–16.7	16.8–24.7	24.8–27.4	> 27.4
115	0–15.6	15.7–17.1	17.2–25.2	25.3–28.1	> 28.1
116	0–15.9	16.0–17.4	17.5–25.8	25.9–28.7	> 28.7
117	0–16.2	16.3–17.7	17.8–26.3	26.4–29.3	> 29.3
118	0–16.5	16.6–18.1	18.2–26.9	27.0–29.9	> 29.9
119	0–16.8	16.9–18.4	18.5–27.4	27.5–30.6	> 30.6
120	0–17.2	17.3–18.8	18.9–28.0	28.1–31.2	> 31.2

BMI-for-Age Table, BOYS 5–18 Years (WHO 2007)

Age (years:months)	Severe malnutrition < -3 SD (BMI)	Moderate malnutrition -3 to < -2 SD (BMI)	Normal -2 to +1 SD (BMI)	Overweight > +1 to +2 SD (BMI)	Obese > +2 SD (BMI)
5:1	less than 12.1	12.1–12.9	13.0–16.6	16.7–18.3	18.4 or higher
5:6	less than 12.1	12.1–12.9	13.0–16.7	16.8–18.4	18.5 or higher
6:0	less than 12.1	12.1–12.9	13.0–16.8	16.9–18.5	18.6 or higher
6:6	less than 12.2	12.2–13.0	13.1–16.9	17.0–18.7	18.8 or higher
7:0	less than 12.3	12.3–13.0	13.1–17.0	17.1–19.0	19.1 or higher
7:6	less than 12.3	12.3–13.1	13.2–17.2	17.3–19.3	19.4 or higher
8:0	less than 12.4	12.4–13.2	13.3–17.4	17.5–19.7	19.8 or higher
8:6	less than 12.5	12.5–13.3	13.4–17.7	17.8–20.1	20.2 or higher
9:0	less than 12.6	12.6–13.4	13.5–17.9	18.0–20.5	20.6 or higher
9:6	less than 12.7	12.7–13.5	13.6–18.2	18.3–20.9	21.0 or higher
10:0	less than 12.8	12.8–13.6	13.7–18.5	18.6–21.4	21.5 or higher
10:6	less than 12.9	12.9–13.8	13.9–18.8	18.9–21.9	22.0 or higher
11:0	less than 13.1	13.1–14.0	14.1–19.2	19.3–22.5	22.6 or higher
1:6	less than 13.2	13.2–14.1	14.2–19.5	19.6–23.0	23.1 or higher
12:0	less than 13.4	13.4–14.4	14.5–19.9	20.0–23.6	23.7 or higher
12:6	less than 13.6	13.6–14.6	14.7–20.4	20.5–24.2	24.3 or higher
13:0	less than 13.8	13.8–14.8	14.9–20.8	20.9–24.8	24.9 or higher
13:6	less than 14.0	14.0–15.1	15.2–21.3	21.4–25.3	25.4 or higher
14:0	less than 14.3	14.3–15.4	15.5–21.8	21.9–25.9	26.0 or higher
14:6	less than 14.5	14.5–15.6	15.7–22.2	22.3–26.5	26.6 or higher
15:0	less than 14.7	14.7–15.9	16.0–22.7	22.8–27.0	27.1 or higher
15:6	less than 14.9	14.9–16.2	16.3–23.1	23.2–27.4	27.5 or higher
16:0	less than 15.1	15.1–16.4	16.5–23.5	23.6–27.9	28.0 or higher
16:6	less than 15.3	15.3–16.6	16.7–23.9	24.0–28.3	28.4 or higher
17:0	less than 15.4	15.4–16.8	16.9–24.3	24.4–28.6	28.7 or higher
17:6	less than 15.6	15.6–17.0	17.1–24.6	24.7–29.0	29.1 or higher
18:0	less than 15.7	15.7–17.2	17.3–24.9	25.0–29.2	29.3 or higher

BMI-for-Age Table, GIRLS 5–18 Years (WHO 2007)

Age (years:months)	Severe malnutrition < -3 SD (BMI)	Moderate malnutrition -3 to < -2 SD (BMI)	Normal -2 to +1 SD (BMI)	Overweight > +1 to +2 SD	Obese > +2 SD (BMI)
5:1	less than 11.8	11.8–12.6	12.7–16.9	17.0–18.9	19.0 or higher
5:6	less than 11.7	11.7–12.6	12.7–16.9	17.0–19.0	19.1 or higher
6:0	less than 11.7	11.7–12.6	12.7–17.0	17.1–19.2	19.3 or higher
6:6	less than 11.7	11.7–12.6	12.7–17.1	17.2–19.5	19.6 or higher
7:0	less than 11.8	11.8–12.6	12.7–17.3	17.4–19.8	19.9 or higher
7:6	less than 11.8	11.8–12.7	12.8–17.5	17.6–20.1	20.2 or higher
8:0	less than 11.9	11.9–12.8	12.9–17.7	17.8–20.6	20.7 or higher
8:6	less than 12.0	12.0–12.9	13.0–18.0	18.1–21.0	21.1 or higher
9:0	less than 12.1	12.1–13.0	13.1–18.3	18.4–21.5	21.6 or higher
9:6	less than 12.2	12.2–13.2	13.3–18.7	18.8–22.0	22.1 or higher
10:0	less than 12.4	12.4–13.4	13.5–19.0	19.1–22.6	22.7 or higher
10:6	less than 12.5	12.5–13.6	13.7–19.4	19.5–23.1	23.2 or higher
11:0	less than 12.7	12.7–13.8	13.9–19.9	20.0–23.7	23.8 or higher
11:6	less than 12.9	12.9–14.0	14.1–20.3	20.4–24.3	24.4 or higher
12:0	less than 13.2	13.2–14.3	14.4–20.8	20.9–25.0	25.1 or higher
12:6	less than 13.4	13.4–14.6	14.7–21.3	21.4–25.6	25.7 or higher
13:0	less than 13.6	13.6–14.8	14.9–21.8	21.9–26.2	26.3 or higher
13:6	less than 13.8	13.8–15.1	15.2–22.3	22.4–26.8	26.9 or higher
14:0	less than 14.0	14.0–15.3	15.4–22.7	22.8–27.3	27.4 or higher
14:6	less than 14.2	14.2–15.6	15.7–23.1	23.2–27.8	27.9 or higher
15:0	less than 14.4	14.4–15.8	15.9–23.5	23.6–28.2	28.3 or higher
15:6	less than 14.5	14.5–15.9	16.0–23.8	23.9–28.6	28.7 or higher
16:0	less than 14.6	14.6–16.1	16.2–24.1	24.2–28.9	29.0 or higher
16:6	less than 14.7	14.7–16.2	16.3–24.3	24.4–29.1	29.2 or higher
17:0	less than 14.7	14.7–16.3	16.4–24.5	24.6–29.3	29.4 or higher
17:6	less than 14.7	14.7–16.3	16.4–24.6	24.7–29.4	29.5 or higher
18:0	less than 14.7	14.7–16.3	16.4–24.8	24.9–29.5	29.6 or higher

Appendix-IV: Multiple regression analysis outputs

1. Analysis based on MUAC measures

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.440 ^a	.194	.179	2.14719	.194	12.785	5	266	.000	1.457

a. Predictors: (Constant), Average household monthly income (ETB), If 'No', why?, Your occupation, Family size 13, Type of disability

b. Dependent Variable: MUAC measures mean

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
Causes not to feed properly	-.030	.080	-.021	-.369	.712	-.187	.128	-.122	-.023	-.020	.931	1.074
Type of disability	.458	.066	.405	6.985	.000	.329	.587	.426	.394	.385	.901	1.110
Family size	-.086	.099	-.050	-.873	.384	-.280	.108	-.140	-.053	-.048	.911	1.098
Your occupation	-.185	.106	-.098	-1.751	.081	-.393	.023	-.109	-.107	-.096	.970	1.031
Average household monthly income (ETB)	4.999E-005	.000	.016	.288	.774	.000	.000	.055	.018	.016	.981	1.019

a. Dependent Variable: MUAC measures mean

2. Analysis based on BMI measures

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.222 ^a	0.049	0.032	9.43726	0.049	2.765	5	266	0.019	1.937

a. Predictors: (Constant), Average household monthly income (ETB), Causes not to feed properly, Your occupation, Family size, Type of disability

b. Dependent Variable: BMI measures mean

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
(Constant)	15.096	3.631		4.158	0	7.947	22.244					
Causes not to feed properly	-0.282	0.352	-0.05	-0.8	0.424	-0.976	0.412	-0.071	-0.049	-0.048	0.931	1.074
Types of disability	0.094	0.288	0.021	0.327	0.744	-0.473	0.661	0.076	0.02	0.02	0.901	1.11
Family size 13	-0.833	0.433	-0.12	-1.921	0.056	-1.686	0.021	-0.121	-0.117	-0.115	0.911	1.098
Your occupation	-0.253	0.464	-0.033	-0.545	0.586	-1.167	0.661	-0.037	-0.033	-0.033	0.97	1.031
Average household monthly income (ETB)	0.002	0.001	0.171	2.827	0.005	0.001	0.004	0.167	0.171	0.169	0.981	1.019

