Nutritional Status and Associated Factors among Children Aged 6 months to 17 years with Disabilities in Gulele Sub-city, Addis Ababa

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Abstract

Malnutrition and disability are interconnected especially in countries suffering from high levels of malnutrition including Ethiopia. Thus, this study aimed to assess the nutritional status and its associated factors among children with disabilities aged six months to seventeen years old, in Gulele Sub-city of Addis Ababa, Ethiopia. The study used cross-sectional study design. Two hundred seventy-two disabled children were studied. Anthropometric measurements including height, weight, and mid-upper arm circumference (MUAC) and Body Mass Index (BMI) were taken. Based on the individual dietary diversity score of 12 food groups (FANTA), 165 children (60.7%) with disabilities consumed ≥ 6 food groups. MUAC and BMI measurements also indicate 55.1% and 58.1%, respectively, had normal nutritional status. However, the remaining proportion of children with disabilities were found to have moderate and severe acute malnutrition. There were 35.3% children with disabilities who did not feed properly due to poor appetite, restlessness, pharyngeal artesia, and preference of food items. More than average children with disabilities had normal nutritional status while, the rest of them had moderate and severe acute malnutrition. This was associated with difficulty of feeding, types of disabilities such as multiple disabilities , occupation of the household head, family size and income level. It is recommended that counselling regarding the needs of the children with disability for mothers/caregivers should be established as disability specific service points.

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1. Introduction

Malnutrition is a global public health problem. Over 828 million people worldwide are malnourished, with 349 million affected by food insecurity as a result of the combined effects of conflict, COVID, the climate crisis, and rising costs of food (WFP, 2022). Relationship of malnutrition with disability has different aspects. Malnutrition causes disability and increases vulnerability to other disabling diseases (WHO, 2020). 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).

People with disabilities are more than one billion worldwide, which is about 15% of the total population or one in seven people (Brennan, 2020). 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, 2022). WHO and World Bank argue prevention of health problems due to disability and nutritional deficiency was considered as a development issue which should be given due attention. 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, recurrent infectious diseases, and other related factors contribute to one type of disability or other (WHO,2022).

Malnutrition contributes to the occurrence of an individual's health problem like disability and others (Wabwire-Mangen et al., 20 23). A study done in Turkana, Kenya, shows that those children with disabilities (CWD) were more susceptible to malnutrition (Kuper et al., 2015). In addition, a study conducted in Nigeria depicts that all CWD experienced malnutrition, especially those aged less than ten years (Brennan, 2020). 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 (Pal et al., 2016). In Africa, 83 million under five children were suffering from malnutrition which mostly affects their health conditions leading to disability (Development Initiatives, 2017). Additionally, WHO (2021) states that CWD living in poverty may lead to insufficient nutrition due to financial constraints or social beliefs. Poverty has a detrimental effect on household income; children suffering from malnutrition become adults with different health problems it may have effect on parent's responses to their children with disability (Groce et al., 2014). It is because of this reason that some studies recommended the need to focus on improving the household income status, particularly in poor countries like Ethiopia (Anware et al., 2016). According to the study conducted by Aisha et al., (2003) in Indian slum, disability prevents children from performing day-to-day activities for daily living like self-feeding which results in poor nutritional status.

In Ethiopia, with high level of poverty, almost one-fourth of the Ethiopian population are malnourished with the greater ratio of suffering from severe malnutrition (Jemal and Kim, 2014). Thus, the assumed underlying 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 (Brennan, 2020). Given this, 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). There was a National Nutrition Program to end hunger by 2030 (FDRE, 2016). However, the link between malnutrition and disability was not considered in this document (Groce et al., 2014).

There are very few studies conducted to examine the association between malnutrition and disability in Ethiopia. A study conducted in Hawassa showed that children with disability are exposed to food deficiency than their counterparts without disabilities (Fiseha and Degefa, 2017). 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 challenges 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). Further. 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 (Boudokhane et al., 2021).

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 intervention of provision of food items for identified malnourished CWD and child feeding at health centers. Those children with disability admitted to the support program were faced with different nutritional and health 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 on 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 adequately studied and documented.

Thus, this study is meant to assess the nutritional status of children with disabilities and the factors associated with malnutrition in children with disabilities aged from six months to seventeen years old in Gulele Sub-City of Addis Ababa, Ethiopia.

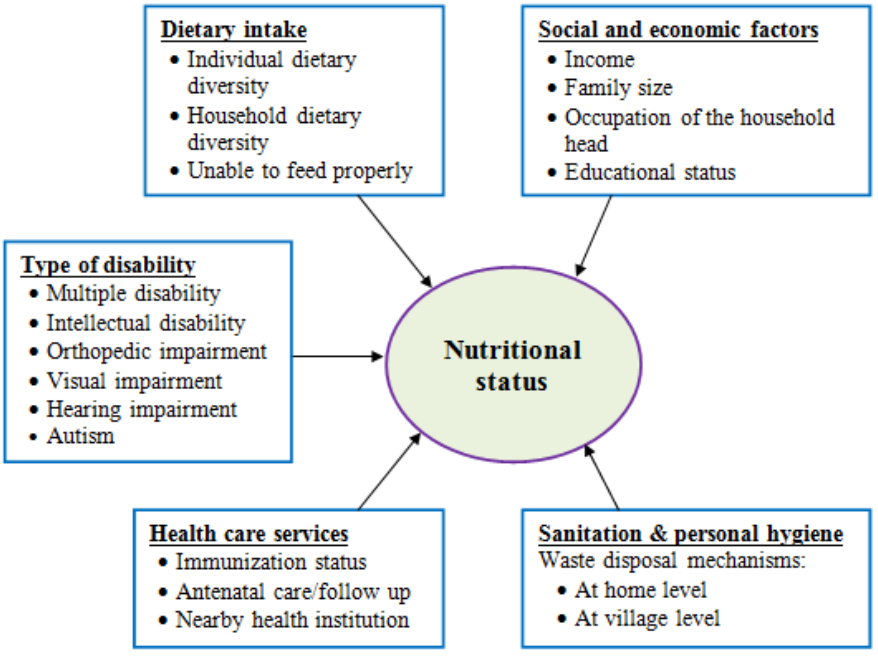

Figure 1: Conceptual framework of nutritional status and disability

Source: constructed by the researcher

2. Methods

2.1 Description of the Study Area

This study was conducted in Addis Ababa, the capital city of Ethiopia, specifically in Gulele Sub-City. Gulele Sub-City is one of the Sub-Cities in Addis Ababa, located in northern suburb of the city, near the Entoto mountain and Entoto Natural Park. Its geographical coordinates are 9° 14' 0" North and 38° 41' 0" East. It covers a total area of 30.18 km^2. The Sub-City is also divided into 10 *Woredas*. Among the total population of 267,624 residing in the sub-city, 3,738 were reported to be persons with disability and 742 were children aged under 19 with disability (CSA, 2007). However, the data for the year 2017 based on the population projection report of CSA (2007) total population of Gulele Sub-City is expected to be 3445,434. In this regard, the number of people with disability is expected to be 4,873, from these persons with disability aged from birth to nineteen years old was projected.

2.2. Study Design and Period

Community based cross-sectional study design was employed to assess the levels and determinants of nutritional status among the study population. The employed both quantitative and qualitative data. The study was conducted from January to March, 2019.

2.3. The Study Population

In this study, mothers/caregivers of children with disability and children with disability aged 6 months to 17 years residing in five *woredas* (districts) of Gulele Sub-city were used as target population. In these selected *woredas*, there were 458 children with disability aged from birth to seventeen years.

2.4. Inclusion and Exclusion Criteria

Children with disability aged 6 months to 17 years were selected from five *woredas* of Gulele Sub-City and included in the study. Those children with disability with severe clinical/health problems leading to admission to Hospitals, bed-ridden, ages less than 6 months and above

18 years, and those with amputated and contracture extremities were excluded from the study.

2.5. Data Sources

Both primary and secondary data sources were used to gather the required information. Primary data were collected from mothers/caregivers of children with disability. Anthropometric measurements like weight, height, and Mid Upper Arm Circumference (MUAC) were used to measure nutritional status. In addition, health professionals who were working in five health centres and field workers of Brothers of Good Works who were working for CWD were used as a source of primary data. 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.

2.6. Sampling design

The sample size was determined by using a formula developed by Cochran (1963) to calculate a representative sample for the study.

$$\mathbf{n} = \frac{Z^2 pq}{d^2}$$

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) n = 384.

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

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

Where, fn = the final sample size, n = the sample size derived from the above equation,

N = the population size, fn = 272

A 5% non-response rate (13 respondents) were added for possible dropouts/nonresponse, making the final sample size of 285. 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 proportionally calculated as 46, 61, 31, 53 and 81 study participants, respectively. Both children with disability and their respective caregivers were involved in the study.

The study employed a combination of sampling techniques to draw the estimated sample size. Selection of Gulele Sub-City and its five Woredas were purposive. Systematic random sampling technique was used to identify the sample households with children with disability. In the selected Woredas, sample households with CWD aged 6 months to 17 years old were identified based on the information gained from Brothers of Good Works Counselling and Social Services Centre and respective Woreda Health Offices. Finally, eligible household was selected by using systematic random sampling technique. The number households of selected the study Woredas 2, 3, 4, 5, and 7 computed as 77, 102, 53, 89, and 137 for children with disability, respectively.

2.7. Data Collection tools and field procedures

In this study, both qualitative and quantitative data were collected. The qualitative data were collected from Woreda level health officers and staff working with children with disability as key informants 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 participated. Questionnaires were used to collect quantitative data containing both closed-ended and open-ended questions. In the questionnaire, Dietary Diversity Score (DDS) standard

questionnaire was used with some modifications. Interview guide was formulated to guide the interview. Dietary diversity score 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 food groups was valid as nutritionally adequate (WHO, 2012). To better reflect a quality diet, the number of different food groups consumed was calculated. Twelve food groups were used to calculate the Household Dietary Diversity Score (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). For the Individual Dietary Diversity Score (IDDS), eight food groups were used (FAO, 2006 & 2010).

Anthropometric Measurement: The height of the children with disability was measured using measuring tape. The measurement was taken on recumbent length or standing height (Black *et al.*, 2013), Children with disability were 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. 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, they were told to stand 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 (FANTA, 2016).

$$BMI = \frac{Weight\ (kg)}{Height\ (m^2)}$$

2.8. Data Analysis

The collected data were entered into Excel sheet and exported to SPSS version 26 for further analysis. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to portray the demographic and socio-economic characteristics of the study participants. The nutritional status of children was assessed using MUAC and based on WHO (2009) cut off point to categorize them as acute, severe, moderate and normal levels. In addition, BMI measurement for children with disability was categorized based on WHO (2010) cut off point chart to represent acute, severe and moderate malnutrition, normal, overweight, and obese. According to FANTA (2016) standard deviation (SD) and 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 were categorized as severely malnourished under the three parameters. Pearson Chi-square and Correlation were employed to identify simple association between the independent and outcome variables.

2.9. Ethical Considerations

Ethical clearance was obtained from Addis Ababa University, College of Development Studies ethical review committee. A written consent was used with parents of children with disabilities. Information gathered by using different techniques was kept confidential and names were not transferred to any second party.

3. Results and Discussion

3.1.Households Socio-economic and Demographic Characteristics

The results of socio-economic demographic characteristics showed that out of 272 study participants, 268 (98.5%) were females and 4 (1.5%) were males. The average household size was 4.8 while the minimum household size was 2 and the maximum was 9. Moreover, the result indicates that 181 (66.5%) of the participants' ages were found in the age range of 30-39 years. Regarding educational status of the mothers/caregivers of the children with disability, 154 (86.0%) attended formal education (i.e. 40.1% were at elementary and 45.9 % above and completed high school education level). Thus, the majority of the householders are formally educated. Here, it is possible to assume that the mothers/caregivers' education may contribute to their awareness on proper handling of the children with disability. With regards to marital status of the care givers, 233 (85.7%) were married, and 39 (14.3%) were divorced. Married women had better nutritional status than the unmarried ones and mother's nutritional status also influence the child's nutritional status and health (Nora et al., 2013). The study revealed that those households living in wedlock condition might feed their children better than female headed households. Meanwhile, a significant proportion, 189 (69.5%), of these households had fathers as breadwinner whereas 73 (26.8%) of them earned monthly incomes from the mothers. 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 housewives, 10.7% were civil servants and 8.8% were petty traders. Those who had no work (house wives) may run short of incomes to properly feed their children with disability.

A total of 82 (30.1%) of the households had five members, while 84 (30.9%) of them had four members. The average household size for the

sampled households was five, suggesting that these households were generally considered as overcrowded.

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 in the range between 1501-2000 birr and 2001-2500 birr, respectively. The mean monthly income for the sampled households was 2,556.30 birr with minimum of 700 birr and maximum of 4,500 Birr. The overall average income suggests that significant proportion of them may struggle to cover their basic necessities, which in turn impacts the proper feeding of the children in the households.

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. The type of disability the child had may contribute to the occurrence of malnutrition. 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 4.1). Additionally, the empirical evidence did not show variation between children's disability types and their sex. Thus, two-fifth of the children were with multiple disabilities. Implicitly, these children may face with difficulties in proper feeding and frequent occurrence of illnesses.

Table 1: Number of children with disability by type, Gulele Sub-city, Addis Ababa, 2019. (N = 272)

Age category of children with disability					
Age category*		**Male**	**Female**	**Total**	**%**
1 – 4 years		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
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
Orthopaedic impairment		20	14	34	12.3
Emotional disturbance		4	3	7	2.6
Speech/language impairment		1	2	3	1.1

*Age was categorized to the nearest age. For example, 5 years and 4 months of age was considered as 5 years old. Obs - observations, CWD - children with disability

3.2. 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 likelihood of malnutrition. In this study, mothers/caregivers 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 prior to the survey. The DDS data was collected to measure the

quality of diet at individual and household levels. Inadequate intake of food of the right quantity and quality makes children more susceptible to malnutrition. The data shows that among the households with 12 food groups, 26 (9.6%) consumed 4-5 items of food groups and 246 (90.4%) consumed six and more items of the food groups. Here, it can be said 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 was seen 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 4.2).

Table 2: Dietary diversity score of the household and CWD*, Gulele Sub-city, Addis Ababa 2019. (N = 272)

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
Consumed food groups at individual (CWD) level		
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

*CWD - children with disability, H - household & IDDS - individual dietary diversity score

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 (Tabe 4.3).

Table 3: Micronutrient sources of food items consumed by children with disability, Gulele Sub-city, Addis Ababa, 2019. (N = 272)

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

Based on the MUAC measurement, from those 272 children with disability, 50 (18.4%) were under severe malnourishment, and 72 (26.5%) were moderately malnourished. Also, 150 (55.1%) were categorized under normal range of malnourishment (Table 4.4).

For those children with disability, weight in kilograms and height in meter was taken to calculate Body Mass Index (BMI). The study result indicates that 61 (22.4%) were moderately malnourished, 156 (57.4%) were grouped as normal, 11 (4.0%) were overweight, and 3 (1.1%) were obese. 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.

Table 4: MUAC measurement of children with disability, Gulele Sub-city, Addis Ababa, 2019. (N = 272)

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	
MUAC measures based on age and sex category of children with disability						
	SAM		**MAM**		**Normal**	
Age category	**M**	**F**	**M**	**F**	**M**	**F**
1 – 4 years	6	8	5	14	24	22
5 - 9 years	9	12	19	22	35	33
10 - 14 years	7	8	7	5	21	11
15 - 17 years	0	0	0	0	2	2
Total	**22**	**28**	**31**	**41**	**82**	**68**
Percentage	**8.0**	**10.3**	**11.4**	**15.1**	**30.1**	**25**

F - Female, M - male, SAM - severe acute malnutrition, MAM - moderate acute malnutrition

Access to Health Services

The study indicated that all (100%) respondents had access to health services at the nearby health institutions for Antenatal Care (ANC) and immunization services. Two hundred sixty-four (97.1%) of mothers/care givers attended ANC during their most recent pregnancy. And 269 (98.9%) of children with disability were fully immunized. However, based on the key informant interviews, mothers/caregivers visited the nearby health institutions and non-governmental organizations which were working for children with disability to get pieces of advice, supports, and for medical treatments. However, 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 a child with disability.

3.4. Factors associated with Malnutrition Children with Disability

Children with disability face problems related to nutrition due to different direct and indirect factors such as anatomic difficulties (difficulty of feeding), lower nutrient intake, and behavioural problems. In order to identify the major factors that affect the nutritional status of children with disability, mothers/caregivers were asked about the feeding practice of their children. The study result showed that among 272 children with disability 96 (35.3%) did not feed properly any type of food available at household level. The factors include poor appetite (28.1%), restlessness (28.1%), pharyngeal Artesia (18.8%), and preference of food items (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 factors, most children were not able to take the available food items at household level due to the disability they had; dysphasia dry and liquid food items, selection of food items that the household cannot afford, and some children were not stable during feeding time. 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, excluding children from family life, from school, and their peers. In addition, low economic status of the household aggravated the situation leading to 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 were working as daily labourer for fulfilling the subsistence of the household.

Statistical analyses were carried out to identify the determinants of nutritional status of children with disability. Mean MUAC and BMI were calculated and Pearson Correlation were used to identify the association between independent and outcome variables (nutritional status of children with disability). Pearson correlation was computed to assess the relationship between the child's inability to feed properly, types of disability, household size and occupation of the household with the nutritional status of children 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. The result 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.

The study result showed that there was a positive relationship between 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.

3.5. 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 $r = .420^{**}$, $n = 272$, $p = .000$.

3.6. Determinate of Nutritional Status of the Children

Household 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 4.5 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.

Table 5: Family size and occupation with nutritional status, Gulele Sub-city, Addis Ababa 2019.

		Average family size in the household	**Mean of MUAC measures**
Average family size in the household	Pearson Correlation	1	-0.140*
	Sig. (2-tailed)		0.021
Mean of MUAC measures	Pearson Correlation	-0.140	1
	Sig. (2-tailed)	0.021	
	N	272	272
Average family size in the household	Pearson Correlation	1	-0.121*
	Sig. (2-tailed)		0.046
Mean of BMI measures	Pearson Correlation	-0.121*	1
	Sig. (2-tailed)	0.046	
	N	272	272
* Correlation is significant at the 0.05 level (2-tailed).*			

		Average BMI measure for CWD	**Average hh monthly income (ETB)**
Average BMI measure for CWD	Pearson Correlation	1	0.174**
	Sig. (2-tailed)		0.004
Average household monthly income (ETB)	Pearson Correlation	0.174**	1
	Sig. (2-tailed)	0.004	
	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	0.077
	Sig. (2-tailed)		0.208
Average MUAC measure for CWD	Pearson Correlation	0.077	1
	Sig. (2-tailed)	0.208	
	N	272	272

ETB – Ethiopian Birr, MUAC - Mid upper arm circumference, hh – household

4. Conclusion

The study has shown that households living in wedlock conditions might feed their children better than single female-headed households. Even though, education and employment of the 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. 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 type of disability the children have, the family size, and occupation of the household heads, difficulty to take food, and household monthly incomes are identified as causes for problems in the nutritional status of those children with disability in studied Sub City. 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.

References

ACPF. 2011. Children with disabilities in Ethiopia: The hidden reality, Addis Ababa: The African Child Policy Forum.

Aisha, K.Y., Filteau, S. & Wirz, S. 2003. Feeding difficulties in disabled children leads to malnutrition: experience in an Indian slum. *British Journal of Nutrition, 90: 1097 - 1106.*

Alemu Mekonnen, et al., 2005. Child nutritional status in poor Ethiopian households: the Role of Gender, Assets and Location, Young lives, London.

Anware, M., Muhdins, M. & Kaushik, K. 2016. Socio-economic determinants of nutritional status of children in Ethiopia. *International Journal of Scientific& Research*, 6: 166 - 76.

Arvedson, J. 2013. Feeding children with cerebral-palsy and swallowing difficulties. *European Journal of Clinical Nutrition, 7:* 9 -12.

Black, et al., 2013. *Maternal and child undernutrition and overweight in low-income and middle-income countries*, *Lancet*, 382(98): 427 - 451.

Boudokhane,P., Migaou, H., Kalai, A., Dhahri, A., Jellad, A. & Sahra Frih, Z. 2021. Feeding problems and malnutrition associated factors in a North African sample of multidisabled children with cerebral palsy. Research in Developmental Disabilities, 118: 104 - 08.

Brennan, C.S. 2020. Disability rights during the pandemic: A Global Report on Findings of the COVID-19 Disability Rights Monitor. COVID-19 Disability Rights Monitor.

Cochran, W.G. 1963. Sampling techniques, 2nd Ed., New York: John Wiley and Sons, Inc.

CSA. 2013. Population projection of Ethiopia for all regions at *Woreda* level from 2014 – 2017, Addis Ababa, Ethiopia.

CSA. 2007. Population and housing census of Ethiopia, Ethiopian Population Census Commission, Addis Ababa, Ethiopia.

Dannhauser, A. & Walsh, C. 2007. Nutritional status of disabled school children in Bloemfontein. South African Journal of Clinical Nutrition, 20(1): 6-14.

Development Initiatives. 2017. Global nutrition report 2017: Nourishing the SDGs. Bristol, UK: Development Initiatives.

FANTA. 2006. Household dietary diversity score (HDDS) for measurement of household food access: Indicator Guide, Version 2, Washington DC.

FANTA. 2016. Nutrition assessment, counselling, and support (NACS): A user's guide-Module 2: Nutrition assessment and classification, Version 2. Washington, DC: FHI 360/FANTA. https://www.fantaproject.org/WHZ.NACS-Users-Guide-pdf. (Accessed on April, 2019).

FAO & WHO. 2004. Vitamin and mineral requirements in human nutrition: Report of a joint FAO/WHO expert consultation, Bangkok, Thailand.

FAO. 2006. Base line survey report protecting and improving household food security and nutrition in HIV/AIDS affected are as in Manica and Sofala province, Maputo, Mozambique. http://www.fao.org/fileadmin/user/eufao-fsi4dm.pdf. (Accessed on April 5, 2019).

FAO. 2010. Guidelines for measuring household and individual dietary diversity, Nutrition and consumer protection division. http://www.fao.org/3/1983e.pdf. (Accessed on April 5, 2019).

FDRE. 2016. National nutrition program, 2016-2020, Ethiopia. https://eeas.europa.eu/sites/eeas/files/nnp2_pdf.pdf. (Accessed on May 28, 2019).

Fiseha Endale & Degefa Tolossa. 2017. Food security status of people with disabilities in Selassie Kebele, Hawassa Town, Southern Ethiopia. *Ethiopian Journal of the Social Sciences and Humanities,* 3: 105-134.

Groce, et al., 2014. Malnutrition and disability: Unexplored opportunities for collaboration. *Paediatrics and International Child Health, 34:* 308-314.

Jemal Abafita & Kim, K. 2014. Determinants of household food security in rural Ethiopia: An Empirical Analysis. *Journal of Rural Development, 37:* 129-157.

Kuper, et al., 2015. Malnutrition and childhood disability in Turkana, Kenya: Results from a Case-Control Study. PLoS ONE 10(12): e0144926.

Maulik, P.K. & Darmstadt, G.L. 2007. Childhood disability in low- and middle-income countries: overview of screening, prevention, services, legislation, and epidemiology. Paediatrics. 120 (Suppl 1): 51–55.

MOLSA. 2012. National plan of action of persons with disabilities (2012-2021), Addis Ababa, Ethiopia.

Nora, G., Eleanor, C. & Marko, K. 2013. Stronger together: Nutrition-disability links and synergies, briefing note; Cheshire disability and inclusive development centre, London, UK.

http://www.asksource.info/resources/stronger-together. (Accessed on November 10, 2018).

Pal, A., Pari, K., Sinha, A. & Dhara, C. 2016. Prevalence of under nutrition and associated factors: A cross-sectional study among rural adolescents in West Bengal, India. *International Journal of Paediatrics and Adolescent Medicine*, 4: 9-18.

WHO. (2021). Disability and health.: https://www.who.int/news-room/fact-sheets/detail/disability-and-health. (Accessed on March, 2024).

WFP, UNICEF. 2022. The state of food security and nutrition in the world.

Holden J (2019). Disability and nutrition programming: *evidence and learning*. UKAID: London.

Wabwire-Mangen F, Peterson S. & Forssberg H. 2023. Nutritional status and growth of children and adolescents with and without cerebral palsy in eastern Uganda: A longitudinal comparative analysis. PLOS Glob Public Health. 3(6): e0001241.

UNICEF, WHO & World Bank. 2021. Technical Notes from the background document for country consultations on the 2021 edition of the UNICEF-WHO-World Bank New York, USA, UNICEF. https://data.unicef.org/resources/jme.

Siddiqui, F, Salam RA, Lassi ZS & Jai K. 2020. The intertwined relationship between malnutrition and poverty. Front Public Health. 8: 453. doi: 10.3389/fpubh.2020.00453.

WHO. 2012. WHO Global Database on Child Growth and Malnutrition.

WHO. 2009. Guidelines for an integrated approach to the nutritional care of HIV-infected children (6 months-14 years). https://www.who.nutrition/publications. (Accessed on April 10, 2019).

WHO. 2010. Nutrition landscape information system (NLIS) country profile indicators: interpretation guide, Geneva. https://www.who.int/nutrition/en. (Accessed on April 5, 2019).

WHO. 2020. The World Bank group joint child malnutrition estimates: levels and trends in child malnutrition: key findings of the 2020 edition.