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I hereby proclaim that I am the sole author of the thesis. I**, Muhammad Zahirul Islam**, declare that this thesis is submitted in fulfillment of the requirements for the Degree of Master of Science (MS) in Applied Human Nutrition and Dietetics, Department of Applied Food Science and Nutrition, Faculty of Food Science & Technology, Chattogram Veterinary and Animal Sciences University. I also authorized the Chattogram Veterinary and Animal Sciences University (CVASU) to grant this thesis to other institutions or individuals for the purpose of scholarly research. It was further authorizing the CVASU to reproduce the thesis by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

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Muhammad Zahirul Islam

June 2020

Nutritional Status and Associated Risk Factors of Malnutrition Among Disabled Rohingya Refugee Children in Cox's Bazar Bangladesh

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This is to certify that we have examined the above Master's thesis and have found that is complete and satisfactory in all respects, and that all revisions required by the thesis examination committee have been made

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Author
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DEDICATED TO MY SIBLINGS BABU AND SANTU WHO PASSED AWAY FROM US ON 2018

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Abbreviations

ACF	Action Against Hunger
BMI	Body Mass Index
BMD	Bone Mineral Density
CRC	Convention on the Rights of the Child
CDC	Centers for Disease Control and Prevention
CRPD	Convention on the Rights of Persons with Disabilities
FAO	Food and Agricultural Organization
ISCG	Inter sector coordination group
PWD	Person with Disability
UNCRPD	United Nations Convention on the Rights of Persons with Disabilities
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
USAID	United States Agency for International Development
VAD	Vitamin A deficiency
WASH	Water, Sanitation and Hygiene
WDDF	Women with Disabilities Development Foundation
WHO	World Health Organization
WFP	World Food Program

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Abstract

The prime aim of the study was to assess the nutritional status and associated factors for children with disability at Rohingya refugee camps in Ukhiya under Cox'sBazar district, Bangladesh . A community based cross sectional study was carried out in the study. A total of 115 person with disability children comprising 61 boys and 54 girls from Kutupalong and Balukhali camps participated in this study. A pre-prepared questionnaire was used to find out the association among various factors with nutritional status. The nutritional status of children with disability are presented through the two segments according to the age range. Nutritional status of under 5 years children are determined by Z-score of weight for age (undernutrition), height for age (stunting) and weight for height (wasting) and age range 6 to 15 years are determined by BMI. In this survey, 44.6% children were underweight, 64.3% children were stunted, and 31.4% children were wasted according to the age range 1-5 years. Based on BMI, according to the age group 6 to 12 years children, the prevalence of underweight found 5.7% and overweight found 5.7%. Age rage between 13 to 15 years children, the prevalence of underweight found 12.5% and overweight found 4.1% and also informed that undernutrition was significantly associated with child's age group, sex, caregiver's nutritional status, caregiver's education, caregiver's relation , type of disability , diarrhea, asthma, worm infestation and health status of children. Washington questionnaires was used to identified children with disability. A total of 11 types of disability were found out according to the person with disabilities right and protection Act 2013.

Keywords: PWD Children, Z-score, Stunting, Undernutrition, Wasting.

Chapter-1: Introduction

A person's physiological condition, which results from the relationship between nutrient intake and requirements and from the capacity of the body to digest, absorb and usage of these nutrients, is known as nutritional status (FAO, 2007). Host factors such as biological and non-biological influence the nutritional needs of children and nutrition intake, socio-economic status is the most significant. Poverty is one of the main socio-economic causes of food intake variation, and it also affects nutrient needs. Hookworms, schistosomes, malaria, etc. are parasites that cause loss of blood, raising the need for nutrients. Socio-cultural variables, such as religion, diet and social status, also affect nutritional status (Jackson *et al.*, 2004). In Bangladesh, Rohingya Refugee children constitute a rising vulnerable population at high risk of health and nutritional inequalities. With an estimated 14.4 million people meeting the United Nations High Commission for Refugees (UNHCR) concept, which marks the largest number of refugees registered since 1995, the number of refugees in the world began to rise in 2014. A figure was estimated that since August 2017, Rohingya people have crossed the border for the catastrophic humanitarian crisis caused by brutality, persecution and mass atrocities in their home state of Rakhine, Myanmar, the Rohingya people had no choice but to flee to Cox's Bazar, Bangladesh. A total of 52 percent belonged to the age group of 0-17 years (UNHCR, 2020). The level of malnutrition among Rohingya children was already above the Emergency Thresholds of the World Health Organization. In Bangladesh, Rohingya refugee camps host approximately 836 000 refugees, of whom 33956 are children under five who are most vulnerable to their health conditions (Pdes, 2011; Islam & Nujhat, 2018). Therefore, children under five are more vulnerable and appear to fall into high-risk death categories during the first five years of life (Parks, K. 2015). Children under nutrition are indeed a big and urgent deal for us and it will affect both health and development if we ignore children under nutrition (Islam; *et al.*, 2014).

The nutritional status of disabled Rohingya children, however, is more miserable. The condition of diminished functioning associated with sickness, accident, disease or other health states encountered as an impairment, limitation of movement, or restriction of involvement in the sense of one's environment is known as disability. It is therefore important to use a systematic evaluation method to evaluate all factors that may impair

the ability of an individual to conduct normal daily activities, whether daily life, social engagement or environmental contributions may be instrumental (Leonardi *et al,.* 2006). Vision impairment, deaf or hard of hearing, mental health conditions, intellectual disabilities, acquired brain injury, autism spectrum disorders, physical disability etc. are some examples of common disabilities we may find. But intellectual disability (where a child is less able to think and develop new skills), down syndrome (a usual genetic condition that causes intellectual disability) and cerebral palsy (a physical disability that makes it harder for a child to control how their body moves) are rough congenital disorders in children. Some factors significantly affect the nutritional status of disabled children in the Rohingya refugee camp, such as environmental effects (including air pollution, water pollution, sound pollution, danger, etc.), education (illiteracy), quack (traditional healer), family socio-economic status, caregiver, trauma (physical condition), food taboo, discrimination (discrimination treatment), accessibility, etc.

Major related factors such as overcrowding, inadequate clean drinking water, lake of sanitation and unhygienic conditions etc. play a very important role in the nutritional status of Rohingya refugees camp; for these reasons, refugees are at high risk of communicable diseases (Phillips *et al.* 2015). Many infectious diseases, such as diarrhea, cholera, chickenpox, and diphtheria, have been facilitated by unsanitary living conditions followed by inadequate water, sanitation, and hygiene (WASH) activities (Ahmed *et al.* 2018; Cousins 2018; Hasan & Siddique 2019).

Different surveys and methods are used to complete the nutrition status and related factors project in disabled Rohingya refugee children aged 0-17 years, with the goal of resolving disabilities, fulfilling the need for treatment for children and improving nutritional status. This project is based on evidence from an illustrative random sampling evaluation followed by Action Against Hunger (AAH), together with the Government of Bangladesh, the United Nations Children's Fund (UNICEF), UNHCR, the World Food Program (WFP), Save the Children, and the Centers for Disease Control and Prevention (CDC) of the United States, to collect confirmation to inform the ongoing humanitarian program. As a one-off event responding to the data needs of the humanitarian response, each survey was organized. The comparison and pattern analysis presented was planned after the third round of data collection had been completed. No data-driven research improvements have taken place.

1.1 Aim and Objectives of the study

Aim:

This thesis is aimed to evaluate the nutritional status and associated risk factors of malnutrition among disabled Rohingya children

Objectives:

1. To survey of the applicability and feasibility of nutritional counselling steps to improve the nutritional condition of refugee camps in Rohingya
2. To compare the nutritional status of disabled children with that of their siblings and neighbors who are not disabled.
3. To investigate anthropometric techniques suitable for children with disabilities in this situation.

1.2 Significance of the study

Evaluating prevalence of bad nutritional status and disabilities in Rohingya Camp aged 0-15 years. Moreover, community-based interventions provide useful entry points to strength and support families to meet children special requirements for care. Consequently, accumulating proof to notify ongoing humanitarian programs and collaborating between the health and disabilities. Obviously, educating the disabilities community at all the levels link between nutrition and disabilities.

Chapter 2: Review of Literature

Bangladesh has one of the highest malnutrition rates in the world such as stunted, underweight and wasted. Although all administrative divisions were affected by infant malnutrition, there were substantial disparities in the prevalence of underweight, stunting and wasting of the three anthropometric indicators. Stunting rates have been slowly decreasing over the last 10 years, regardless of the high levels. Children in Bangladesh also suffer from high levels of micronutrient deficiencies and should be commended for making substantial progress over the past 15 years in reducing vitamin A deficiency (VAD) among pre-school children. Anemia, also very common among children in Bangladesh, has been initiated with several programs to improve their iron status (FAO,2010).

As specified in the Convention on the Rights (CRC) of the Child, all children, including children with disabilities, have the right to adequate nutrition. In particular, the Convention on the Rights of Persons with Disabilities (CRPD) underlines the responsibility of States Parties to avoid unequal denial of food and fluids or health care on the basis of disability. Nutrition and disability are closely linked: both are targets for sustainable growth, and both can only be resolved by addressing hunger problems, ensuring equality and human rights.

As a non-disabled community, children and adults with disabilities also do not benefit from the same level of services (UNICEF, 2012). This is for a number of reasons, including inaccessible premises and professionals that are unable to interact effectively with people with disabilities (Ahmed *et al.*,2018). The exclusion of children with disabilities in cases with insufficient resources could be based on the erroneous assumption that maintaining the health and safety (and even life) of children with disabilities is a lower priority than preserving the health and welfare of children with disabilities (WHO, 2012).

Access to enough nutritious food is also a problem for families with members with disabilities due to poverty and unequal distribution of household resources. In both the nutrition and disability industries, access to healthy food for women with disabilities

and their children is consistently neglected, putting women and children at increased risk.

2.1 Background

Myanmar's Rohingya people were subjected to government-sponsored persecution, imprisonment, abuse and torture, prompting many waves of huge influx to Bangladesh and took place in Cox's Bazar refugee camps, where basic needs such as education, health care, employment and freedom of travel are deprived. (Bhatia *et al*., 2018). The prevalence of Rohingya Refugee malnutrition among five years children was above the emergency threshold level of the World Health Organization (Bhatia *et al.*,2018;Haroon *et al.*,2020 Therefore, under nutrition, the risk of morbidity and mortality associated with infectious disease and poor cognitive and developmental results of a child is increased (Black *et al.*,2013). Poor nutrition, on the other hand, is the leading cause of infectious diseases. Consequently, disease prevention or early malnutrition diagnosis can ultimately boost the nutritional health of children under the age of five (V. One, 2018).

2.2 Disability

Disability, at some point in everyone has life, a part of human condition will be temporarily or permanently shown and those who survive to old age will experience increasing difficulties in functioning. Most extended families have members with disabilities, and many non-disabled people are responsible for supporting and caring for their disabled relatives and friends.

Due to quantitative and qualitative inadequacy of diet and physical inactivity, one to three disabled people are frequently affected by impairment of nutritional status, resulting in a significant reduction of fat-free mass and bone mineral density (BMD) and over-expression of fat mass and an increased number of biochemical risk factors for chronic degenerative diseases. In order to improve dietary intake and nutritional status in disabled people, the aim of this study was to analyse the applicability and efficacy of a nutritional counselling intervention.

The most frequent pathologies among people with a severe reduction in physical activity are obesity, cardiovascular diseases, diabetes and osteoporosis. One of the first steps in the development of co-morbidities in disabled subjects could be the impairment

in nutritional status as a result of quantitative and qualitative dietary inadequacy. We investigated the nutritional status and food intake of patients with physical or mental disabilities in order to evaluate this hypothesis.

2.3 Nutritional Status

Nutritional status is an individual's physiological state, which results from the relationship between the intake of nutrients and the requirements and the capacity of the body to digest, absorb and use these nutrients. The word malnutrition implies low nutritional status (FAO,2007). Malnutrition, a low nutritional status, is very prevalent in children, creating a significant public health concern in the developing countries. It is stuck in a vicious loop that can raise the rate of morbidity and mortality and poor health in children. Malnutrition can affect the development of physical psychology, contributing to poorer performance and productivity as children grow up (Moench-Pfanner *et al.*, 2016) Stunting, which has affected 156 million children worldwide, including Bangladesh, is the most common form of malnutrition (Campisi *et al.*, 2017).

2.3.1 Nutritional status in Bangladesh

Bangladesh's malnutrition rate are among the highest in the world. Over 54% of pre-school children, or more than 9.5 million children, are stunted, 56% are underweight, and over 17% are wasted. There were significant variations in the prevalence of the three anthropometric measures, as all the administrative divisions were affected by child malnutrition. The underweight prevalence ranged from 49.8% in Khulna to 64.0% in Sylhet, which also recorded the highest prevalence of stunting (61.4%) and wasting (20.9 percent). Stunting rates have gradually decreased over the past 10 years, despite the high levels (FAO, 2010).

Children in Bangladesh also suffer from high levels of micronutrient deficiencies, especially deficiencies in vitamin A, iron, iodine and zinc. Bangladesh should be commended for making significant progress in reducing pre-school children's vitamin A deficiency (VAD) in the past 15 years; however, consumption of vitamin A rich foods is still poor, indicating that further attention and support are needed for the underlying causes of VAD. Anaemia is also very common in Bangladesh among children and few programs have been launched to improve their iron status. (FAO, 2010).

In Bangladesh, malnutrition among women is also extremely prevalent. More than 50% of women suffer from chronic energy deficiency, and reports show that there has been no change in the nutritional status of women over the past 20 years. There were

substantial differences in the prevalence of female malnutrition among the administrative divisions, as observed for girls. Women with a BMI<18.5 kg/m2 ranged in prevalence from 47.6 percent in Khulna to 59.6 percent in Sylhet. Among women of reproductive age and during pregnancy, clinical VAD is normal. There is also a high prevalence of sub-clinical VAD and anemia among pregnant and lactating women. In Bangladesh, programs also need to start integrating components for adolescents and school-age children who will also benefit from nutrition improvements. (FAO, 2010).

2.3.2 Nutritional Status in Rohingya Refugees camp

The Rohingya people are the world's most persecuted Muslim minority. The Citizenship Act was introduced in 1982, although the Rohingya community has been living in that country since 1799, Rohingyas were not given full and associated citizenship (Mahmood *et al.*,2017). Basic needs such as schooling, health care, employment and freedom of movement were devoid of them. The level of malnutrition among Rohingya children was already above the Emergency Thresholds of the World Health Organization. However, due to the long journey to Bangladesh and the living situation in camps, the nutritional condition of Rohingya children has greatly deteriorated. (UNICEF, 2009). Poor nutrition is the main cause of infectious diseases and inevitably contributes to a greater economic burden on the nation (Jesmin *et al.,* 2011).

2.3.3. Associated Factors for Nutritional status

There are a number of variables that effect children's dietary needs and nutrient intake. It is possible to categorize these variables as both biological and nonbiological. Age, gender, growth, disease states, and genetic makeup are biological factors. Socio-economic status is the most critical among the nonbiological factors. Poverty is one of the main socio-economic causes of food intake variation, and it also affects nutrient needs. Poverty puts restrictions on living in conditions that are less food-safe and have higher potential health hazards, including pollutants such as lead and other heavy metals that are environmentally sound. Blood loss is caused by parasites, particularly hookworms, schistosomes and malaria, which increases nutrient needs. In poor conditions, these parasites are usually more prevalent. Socio-cultural factors also affect dietary consumption and needs, such as religion, food, and social status. Religion and culture affect what people consider to be edible foods, what they consume, and as such have an effect on the intake of nutrients and the need for nutrients in higher quantities (Jackson *et al.,* 2004).

2.3.4. Associated factors for nutritional status in Rohingya refugees camp

One of the most ill-treated and abused refugee communities in the world, the Rohingya refugees from Myanmar are (Milton *et al.* 2017). In their home country of Myanmar, they have faced government-sponsored discrimination, detention, abuse, and torture, and have fled to neighbouring countries, especially Bangladesh (Bhatia *et al.* 2018). This entails the displacement from Myanmar's Rakhine State to Bangladesh's Cox's Bazar district of three-quarters of a million people, bringing the total number of Rohingya refugees residing in Bangladesh to around 910,000 (UNHCR, 2021).

This mass migration has placed extensive pressure on refugee camp facilities and improvised settlements (Iacucci *et al.* 2017). Basic facilities, including food, water, access to health services, and mostly shelter and sanitation, are inadequate to meet the needs of refugees properly (Iacucci *et al.* 2017). Poor water, sanitation and hygiene (WASH) activities followed by unsanitary living conditions have enabled the emergence of many infectious diseases, such as diarrhea, cholera, chickenpox, and diphtheria (Ahmed *et al.* 2018; Cousins 2017). As a consequence, the present study was conducted to create baseline information on WASH practices and to investigate factors among Rohingya refugees associated with WASH practices.

2.3.4.1 Socio-economic status

People with disabilities are often believed to have less nutrition than their peers without disabilities, and studies in developing countries have shown that children and adolescents with disabilities are vulnerable to inadequate nutritional treatment. (Bax, 1993; Thomas *et al.*, 1989). In contrast, far less information is available on the nutritional status of children with disabilities in developing countries, where widespread malnutrition among the general population further complicates the situation. There is a near connection between disability and poverty. (Coleridge, 1993). Owing to financial limitations or social values, children with disabilities living in poverty may be placed at increased risk of insufficient nutrition. Economic conditions can influence the responses of the parent to the condition of his child (Mallory, 1993). It is easy for parents with children with disabilities to send them out on the streets to ask for alms because of the power that parents have over children and the cultural importance put on respect for such authority. (Omiegbe 1995). The idea that the sight of such children is more likely to elicit a sense of compassion from members of society,

especially from those who take alms-giving as an obligation, is part of the appeal of using children with disabilities in this way.

Parents or guardians of disabled children who send their kids out for alms-begging compare what they do to parents or guardians who send their kids out as street traders. Children with disabilities who refuse to beg are usually threatened with beating or denied food for economic reasons, sending their children with disabilities to beg for alms.

a) Education

Among the different determinants of nutritional status, after socio-economic status, parent education is probably the next most significant factor. A literate mother uses scarce resources for the child's needs in 2 better ways than an illiterate mother with higher resources. (Bairagi, 1980). The influence of women's education on their children's nutritional status is achieved through their position as providers of household health and nutrition. (D'souza and Bhuiya, 1982). The Rohingya have restricted access to education in Myanmar. Among Rohingya refugees who arrived in Bangladesh in 2017, 76 percent of those over 15 years of age have not received nutrition education for children is a huge and urgent deal for all and if we neglect children under nutrition, it will affect both health and development. As seen by the majority of caregivers being unemployed and dependent on child support grants for income, high levels of poverty were evident in the participants, which may have had a negative impact on the children's nutritional status.

b) Environmental factor

The consistency of the social interactions of children with disabilities is low relative to those without disabilities: (i) have few, if any, friends without disability; (ii) socialize less with peers without disability; (iii) are more rejected, more victimized and less popular than peers without disability and (iv) have more unstable, conflictual, uncooperative and non-emotional relationships (Alper & Ryndak,1992). The physical environment of the school was influenced by friendships between children with and without disabilities. Wide gaps between schools enrolling children with disabilities meant that a disabled child's home was often far from their school mates' homes. Those with functional disabilities have been reported to attend learning centres at a lower rate than their peers without functional difficulties for children between the 3-5 and 5-14

age groups. For children aged 3-5, this pattern was more pronounced for enrolment rates, underscoring inequalities in inclusion starting during early childhood growth.

Children with an impairment in the map below apply to people who have been identified to have non-emotional functional issues, including seeing, hearing, walking, self-care, (or fine motor control for children aged 3-5), communication, learning, remembering, and concentrating(REACH Bangladesh,2019)

c) Discrimination

In every area of society, in the home, the community and the workplace, abuses of the rights of children with disabilities to equity and non-discrimination play out and are witnessed by most people with disabilities. Beliefs continue that disability is a curse and a punishment by a family member, most often the mother, for sinful conduct. This ideology permeates all levels of society and affects access to appropriate services, health care, education and involvement. (Islam; *et al.*, 2018).

The social stigma contributes to the propensity of the family to conceal, out of guilt or for their safety, children with disabilities and to avoid finding adequate treatment. This could also be a factor that may lead some families to be hesitant to report the birth of a child with a disability, a problem that needs to be addressed by conventional security systems. Supportive parents often face the need to shield their child from harmful community perceptions and struggle to gain access to adequate resources in health and education. With a poor knowledge of disability and little support for parenting, parents often see the child as a burden, with little opportunity to contribute through employment or marriage to the family income. (Islam; *et al.*, 2018).

Such convictions are reinforced by prejudice in the group. Discriminatory attitudes, particularly in urban slums and remote areas, often lead to low public investment and slow progress towards inclusion. Adolescents with disabilities say that health professionals and educators often steer them away from clinics and schools during focus group discussions. They also report being turned away from public transit and prevented from engaging in group events, despite new legislative orders. When it contrasts with other social values, there is also no regard for the rule of law Disability is not the disease itself, but the behaviours and obstacles to the world that contribute to disability. Children with disabilities are often 'invisible' to service providers, and than their non-disabled peers, they are at greater risk of abuse Instead of living with their

families, children with disabilities are frequently disproportionately put in alternative care. Based on both their disability and their gender, girls with disabilities face discrimination. The terms buddi hom/kom (less intelligent), demagikhomzari and demag horaf or demag halka ('the brain is not working') or ada mata or ada fol ('half head') or mata chout (absent minded) are often used interchangeably to describe individuals with intellectual disabilities. These terms are often stigmatizing and pejorative. They are less likely to be enrolled at school and more prone to domestic sexual abuse and exploitation. Owing to prevalent beliefs that they are not able to perform a reproductive function or contribute to family well-being, they are discouraged from getting married and becoming mothers. They also suffer from the superstition that misfortune and poor luck are brought to the entire family by a person with a disability.

Discrimination against children with disabilities is witnessed at multiple levels, both reinforcing one another. Institutional discrimination builds and strengthens attitudinal discrimination and condones environmental discrimination, as stated by ADD Foreign. In certain cases, people are aware that the law allows them, with the exception of their children with disabilities, to send their primary aged children to kindergarten. (UNICEF, 2014).

d) Caregiver

While vulnerable groups, such as elderly people and people with disabilities, are in need of greater assistance, their involvement in camp activities and their access to in-camp services is very limited. In addition, the physical layout of the camp sites does not meet the needs of the elderly or disabled, who struggle to get about and access facilities inside the sites. The general lack of awareness about their rights as immigrants, disabled, or elderly people exacerbates these problems.

Within Myanmar, the state of Rakhine has less modern healthcare than the other states. Rohingya find it difficult to access and use health facilities because of their statelessness and extreme limitations on their movements. (Mahmood *et al.*, 2017 They have limited access to university education in Myanmar and, subsequently, in Rakhine State, government and NGO health facilities are staffed by national medical personnel of other ethnicities, mostly from other parts of the region, performing one-year assignments at the beginning of their medical careers in Rakhine State. As a result of long-standing

discrimination and travel restrictions, restricted access to formal health services, including public hospitals and government clinics, may account for poor health outcomes among Rohingya refugees. (Park, 2015). Alternative traditional practices such as homemade medicinal remedies are often pursued by Rohingya or by traditional healers, herbalists, shopkeepers (who offer medicine and medical advice), and religious or religious healers (Ripoli, 2017).

Over 100 different organisations, including the Government of Bangladesh, United Nations agencies and national and foreign NGOs, provide health services for Rohingya refugees and the local host community. The most widely reported health conditions were acute respiratory infections, fever of unexplained origin, and acute watery diarrhea (Health Sector Bulletin, 2018). Diarrhoea, acute respiratory infections and measles pose a high burden of illness in children under 5 years of age, with low coverage of vaccination. (for measles) (Guzek *et al.,* 2017In contrast to Bangladeshi children, Rohingya children are stated to be at greater risk of diarrheal diseases (UNICEF , 2014)

In addition to overcrowded living conditions, malnutrition and insufficient water and sanitation, low vaccination coverage can precipitate outbreaks of disease. (Chan *et al.*, 2017). During the rainy season (approximately June to October), these threats are exacerbated by a massive preparedness and response plan set up by the various humanitarian agencies in Cox's Bazar. (UNOCHA, 2018). While the provision of reproductive and sexual health services in Bangladesh's refugee settlements is improving, access to these services remains a problem. (Hossain *et al.;* 2018). In addition to the lack of adequate quantity and consistency of health services for the community as a whole, special needs groups, such as people with disabilities and older people, face difficulties of access resulting from prejudice and exclusion, and inaccessibility in terrain with steep hills (Hassan *et al.,* 2015).

e) Trauma

Different general evaluations and observations on registered Rohingya refugees in official camps in Bangladesh have over the years attested to the high degree of psychological distress among this community. High levels of anxiety were reported, with refugees constantly alerted to risk, poor sleep, depressed mood, lack of appetite, suicidal thoughts, and high levels of unexplained medical symptoms. (Refugee Consultations Bangladesh, 2007). High levels of emotional distress are due both to

exposure to traumatic incidents in Myanmar and to the prolonged existence of the refugee situation, the lack of permanent alternatives and everyday living conditions, including restricted living arrangements, reliance on food assistance, barriers to livelihoods and high levels of domestic violence. (Hinic, 2016). The stressors were very high in this population and were largely connected to the restrictive humanitarian background of lack of space, lack of freedom of movement and lack of access to basic services. Although the study was not intended to include mental illness prevalence statistics, it was clear that emotional distress levels were very high, both among children and adults. Sadness, low mood, lack of interest in everyday activities, anxiety, and persistent rage and frustration are frequently reported symptoms (Action against hunger, 2017). Disabled people experience irritation, loneliness, strange behaviour, no employment, anxiety, sadness, unable to interact effectively with family members, crying.

f) Superstition and Quack

Possession by a demon (jinn in Arabic and fawri in Rohingya) or ghost is a prevalent folk diagnosis (saysee). This includes the temporary occupation by spirits or ghosts of the mind and body of a person. Jinn are supernatural (made of fire) beings capable of transforming into human, ghost, or animal appearances. There are good and poor Jinns, according to the popular theory. In popular mythology, jinn-possessed people are often seen as behaving erratically, having optical hallucinations and delusional delusions (e.g. suspicious of homicidal ideation of an unknown person). Jinn possession is commonly identified among Muslim patients in clinical observations (Hassan *et al.*, 2015). It is often claimed that supernatural possession contributes to anti-social behaviour. It is assumed that both benevolent and malignant spirits are present at night and reside in various locations. In Islamic holy religious sites, such as mosques, benevolent spirits are believed to be found. In remote territories, ponds, latrines, or Hindu/Buddhist cemeteries, malignant spirits are believed to manifest themselves in particular. Malignant spirits are drawn to dirt and since menstrual blood is considered filthy, during menstruation, during childbirth and the forty days after delivery, a woman is considered especially susceptible to attacks by Jinns. It may become insane or handicapped if a jinn hits the newborn child. (Hassan et al, 2015).

The actions of the possessed person can offer hints of what the spirit wants. People abducted by a spirit who wants to 'marry' them, for instance, appear to exhibit anti-social behaviour, disregard of social and cultural norms, delusional thinking, hallucinations, talking to themselves, theatrical and agitated behaviour, sudden rise in appetite, but also anhedonia, loss of interest in daily routine/ sex. In general, Rohingya individuals do not seek medical or psychological care if they assume that a person has a spirit, but approach traditional healers who follow traditional rituals, religious practices and prayers.

A culturally informed evaluation with a basic understanding of the explanatory models of disease and relevant cultural practices is necessary in a clinical context to allow clinicians to differentiate possession of jinn from psychotic presentation or epileptic seizures, particularly in the Rohingya people. There are common experiences of being possessed. In the case of supernatural possession (by jinn/fawri or ghosts), seeking aid from traditional healers is a common practice for Rohingya. Some people who are considered possessed may suffer from mental problems or dissociative disorders, whereas others may have epilepsy or psychosis. In providing culturally appropriate psychiatric care and psychosocial support, understanding Rohingya's traditional help-seeking behaviour and involving traditional healers in interventions is critical.

For several purposes, conventional methods of healing play an important role in the treatment of mental health issues in the Rohingya community. The lack of understanding of Western definitions of mental health and methods of care, such as counselling or psychotherapy, is an important reason. Another reason is that severe mental health conditions are viewed as socially abnormal behaviour (such as psychosis, epilepsy, mania). It is also assumed that people with significant mental health problems have been cursed by Allah for their own wrongdoing. Lastly, traditional healing methods also encourage problems between the healer and the patient to be handled privately or even secretively, thus minimizing the risk of group ostracism and stigma. For several different issues, including malnutrition, mental health disorders, epilepsy, as well as developmental disabilities and autism, healers are consulted. Such issues are sometimes linked to the 'evil eye' or malevolent spirits-jinn. When any human with malevolent intent or 'ill will' looks at them, the evil eye may be inflicted upon an individual. It is often assumed that it simply results, for instance, from compliments said about a child. Symptoms like lack of enthusiasm, loss of appetite, and sleep

disorders may be caused by the evil eye. It is believed that pregnant women are more vulnerable to the evil eye. Rohingya differentiate between two malnutrition-related cultural syndromes: léça biaram ('thin disease') and tom zu biaram (illness that causes loss of strength), both of which are attributed to jinn possession (Boutry *et al.*, 2015).

Chapater-3: Materials and Methods

3.1 Study area and Period

A Cross-sectional community based study was carried out from June 2019 to December 2019 at Rohingya Refugee camp, Ukhiya ,Cox's Bazar. Camps are in Ukhiya Upazila under Cox's Bazar district of Bangladesh. It has a total population of about 8,71,924 including 48% male and 52% female. There are 35 camps in both Ukhiya and Teknaf Upazila (UNHCR,2021)

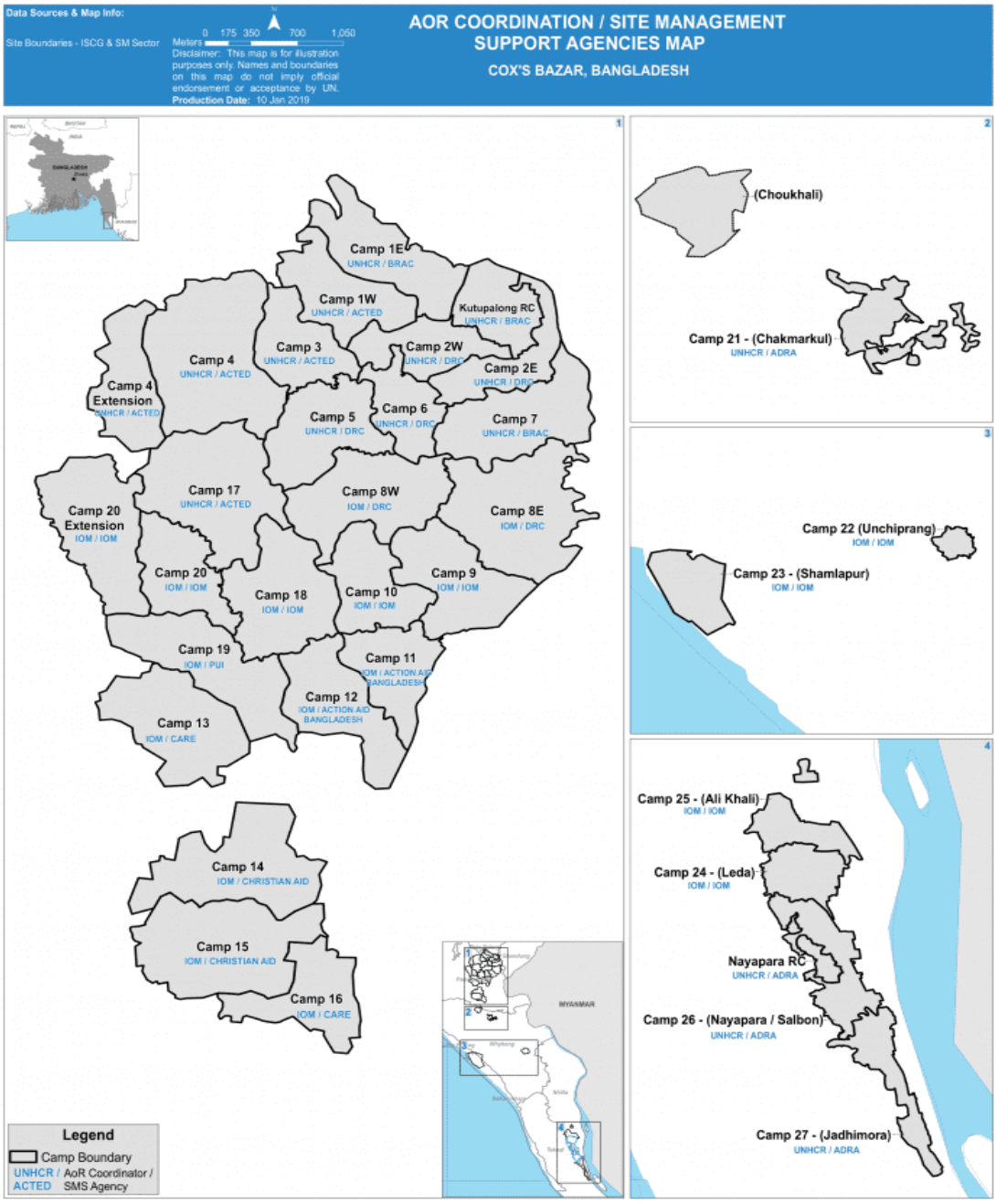

Fig 3.1 Geographical location of Rohingya refugee camps

3.2 Apparatus

a) A structured questionnaire (CDC,2020) was used in the study to collect information on socio demographic and socio-economic characteristics of the households.

b) An analog weight machine (Model: HA 650) of Tanita brand was used to measure the weight of children.

c) MUAC tape was used to measure reading of Mid upper arm circumference of children.

d) A 3-meter measuring tape was used to measure the height of care giver and children.

3.3 Sample Size

The sample size was estimated by using the formula, which is give below (Figure-3.2). In the formula the sample size (n) is for finite populations (f < 0.05), taking into account a 95% confidence level (z), the population size (N), maximum population variability (p = q = 0.5), and assuming 5% sampling error (E).

Confidence level, z= 95%

Population Size, N = 20000

Sampling error, E = 5%

Maximum population variability, p = q =0.5

Sample Size, n=?

Putting all the value in equation Fig-3.2 finally we get the sample size is 90.

$$n = \frac{z^2.N.p.q}{N.E^2 + z^2.p.q}$$

Source: Bryman Simple Random Sampling, 2016.

3.4 Study design

A community based cross sectional study was carried out. Simple random sampling technique was used to select 115 under- fifteen-year-old children from different camps of Kutupalong Balukhali camps in Ukhiya. Simple random sampling was also used to select an individual for the study among eligible family.

3.5 Ethical consideration

This study was conducted in accordance with ethical principle of Helsinki declaration 1964. Written consent was obtained from each respondent after explaining the purpose

of the study. Only interested PWD children were interviewed to collect the necessary information.

3.6 Study variables

Two questionnaires are used in the study. Pre-structure questionnaires (Annex-1) and Washington questionnaires (Annex-2); (CDC,2020). Washington questionnaires are used to identified disability children and their type of disability. Six major question is used to find out impairments of the children. Pre-structure questionnaire was divided into socio-demographic variable, socio-economic variable, anthropometric measurements and other factors. 1) Socio-demographic characteristics includes age, family size and gender; 2) Socio-economic variables includes education of caregiver, relation with caregiver and caregiver nutritional status; 3) Anthropometric measurements were height, weight, mid-upper arm circumference (MUAC), and body mass index (BMI); and, 4) Other variables were health status including worm, diarrhea ,asthma and types of disability.

3.6.1. Assessment of anthropometric measurements

There are several ways to measure anthropometric measurements. These describe in the below section.

3.6.1.1. Mid-upper arm circumference (MUAC)

MUAC was measured by marking midway between acromion (shoulder) and the olecranon (elbow) on the vertical axis of the upper arm with the arm bent at right angle and between the lateral and medial surface of the arm. MUAC was assessed according to age. According to (WHO 2008) MUAC distribution was as follows:

Category	**MUAC according to age**		
	Under 5 years	**6-12 years**	**13 to 15 years**
Severe acute malnutrition (SAM)	**<11.5cm**	**<13cm**	< 16cm
Moderate acute malnutrition (MAM)	**<12.5cm**	**13-14 cm**	16-18cm
Normal	**>12.5cm**	**>14 cm**	> 18cm

3.6.1.2. Body mass index (BMI)

a) Height measurement: A measuring tape was used to measure height in cm. The PWD children were measured against the wall without wearing shoe and their heads positioned with their eyes looking straight ahead (frankfert plane) so that the line of vision was parallel to the body and the wood scale was brought down to the top of the head. The height at the nearest 0.1 cm was registered. For a given anthropometric measurement, the same measurer was used to prevent variance. (Wolde *et al.*, 2014).

b) Weight measurement: A digital balance operated by battery was used to record the weight of the girls. The balance was calibrated each of the time before use. During the procedure the subjects have worn light clothes and were in bare foot.

Body mass index (BMI) was calculated by the following formula.

$$\text{BMI} = (\text{weight in kilograms})/(\text{height in meters})^2$$

According to CDC guideline BMI was categorized as:

BMI Category	Underweight	Normal	Overweight
	<18.5	18.5-24.9	25-29

3.7 Statistical analysis

Descriptive analysis of mean, median, percentage, range, standard deviation was used. Chi-square test was done to see the association between response and co-variants. All analysis was done using the statistical packages SAS9.3, SPSS 16.0 and 5% level of significance was considered

Chapter-4. Results

At first the frequency table with demographic characteristics including age range, family size, gender, type of disability. Then the nutritional status of children with disability are presented through the two segments according to the age range. Nutritional status of under 5 years children are determined by Z score (including underweight, wasting and stunting) and age range 6 to 15 years are determined by BMI. Finally, the associations between different variables and nutritional status were described using Chi square test. BMI, wasting, stunting, under weight with their associate factors are describing their significant

4.1 Demographic characteristics of PWD Children in Rohingya refugee camp

Table- 4.1: Frequency Table including demographic characteristic

		Frequency	Percentage
Age Range	1-5 years	56	49.0
	6-12 years	35	30.0
	12-15 years	24	21.0
	Total	115	100.0
Family Size	1-4 members	40	34.8
	5-8 members	60	52.2
	9-12 members	15	13.0
	Total	115	100.0
Gender	Male	61	53.0
	Female	54	47.0
	Total	115	100.0
Type of disability	Autism	11	9.6
	Physical Disability	23	20.0
	Mental Disability	24	20.9
	Visual Disability	11	9.6
	Speech Disability	14	12.2
	Intellectual Disability	7	6.1
	Hearing Disability	13	11.3
	Deaf-Blindness	6	5.2
	Cerebral palsy	2	1.7
	Drown Syndrome	2	1.7
	Multiple Disability	2	1.7
	Total	115	100.0

Source: WDDF,2013 (Type of disability)

4.1.1 Age Distribution

Nutritional status of children is related to child's age. This study had ages ranging from 1 year to 15 years old and it was distributed into 3 different categories: 1-5 years (48.7%), 6-12 years (30.4%), 13-15 years (20.9%).

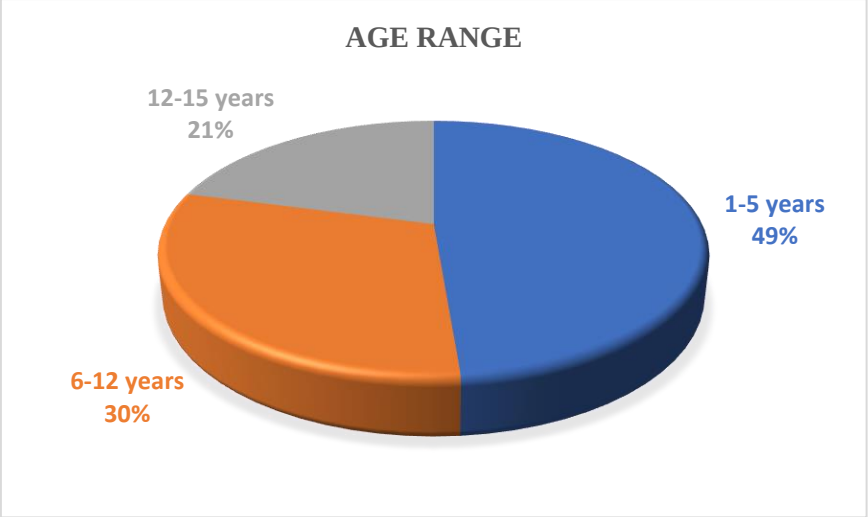

Figure 4.1: Age distribution (%) of children

4.1.2. Family Size

In my survey, there have been found 52.8 % families have 5-8 members, 34.8% families are 1-4 members and 13% families are 9-12 family members.

4.1.3. Gender Distribution

In this study among 115 PWD children, about 61(53%) of children were boys and 54(47%) were girls.

4.1.4. Type of disability:

There are 11 types of disability are classified in this study. About 9.56% children are suffering from Autism,20% in physical disability, 20.86% in mental disability, 9.56% in visual disability, 12.17% in speech disability, 6.08% in intellectual disability, 11.3% in hearing disability, 5.21% in deaf-blindness, 1.73% in cerebral palsy, 1.73% in drown syndrome and 1.73% in multiple disability.

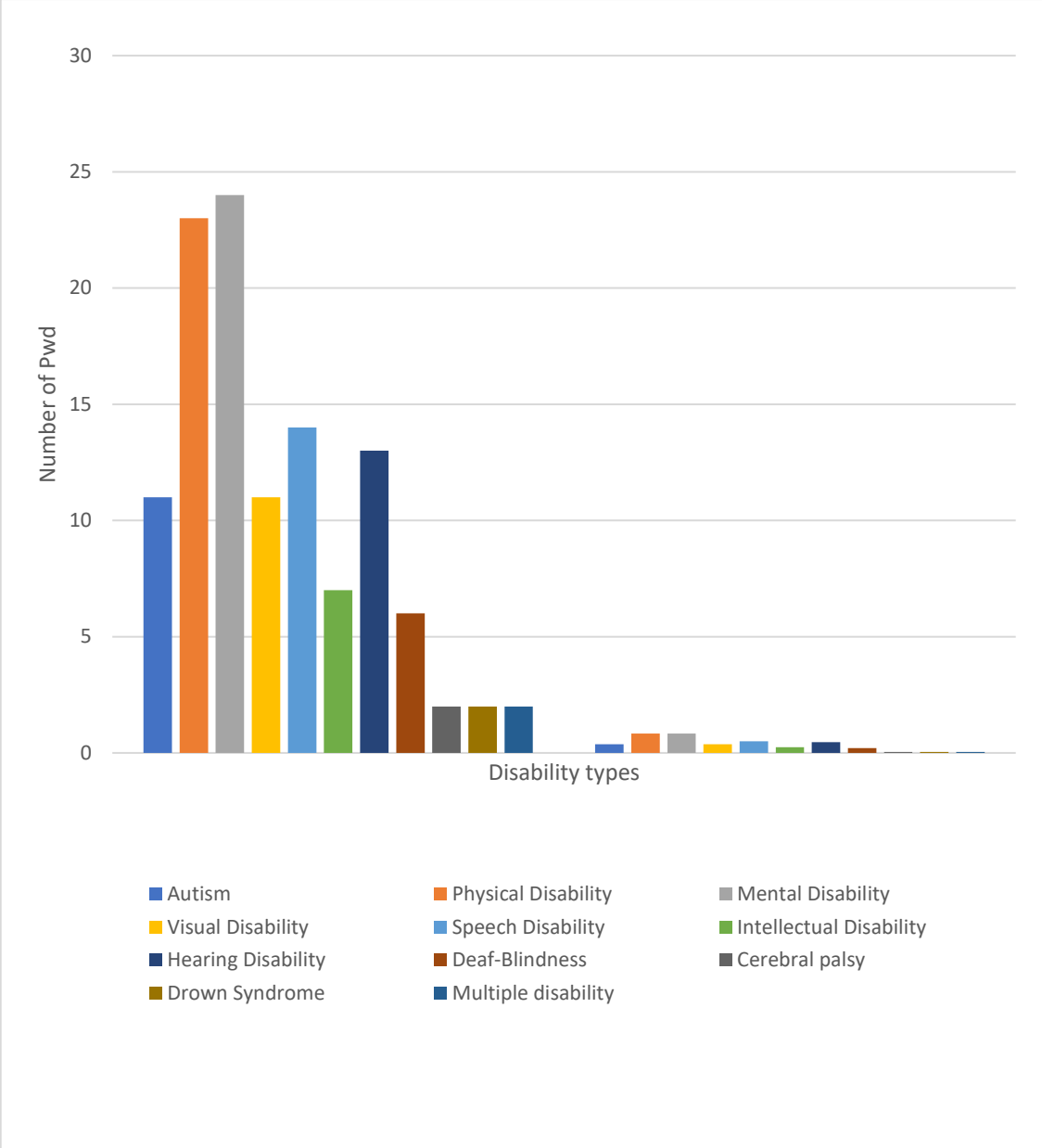

Figure 4.2: Types of disability of children

4.2 Nutritional Status of PWD Children in Rohingya refugee camp

Nutritional status is identified in two segmented according to the age rage. Age 1 to 5 have been determined by Z-score and age range 6 to 15 are determined by BMI. According to the age range 1 to 5 years, this study showed that about 44.6% children were underweight, 64.3% children were stunted, and 31.4% children were wasted. Based on BMI to the age group 6 to 12 years children, each of 5.7% are underweighted and overweighed. And rage between 13 to 15 years children are 12.5 % underweighted and 4.1% overweighed. These are shown in fig. **4.3 and 4.4.**

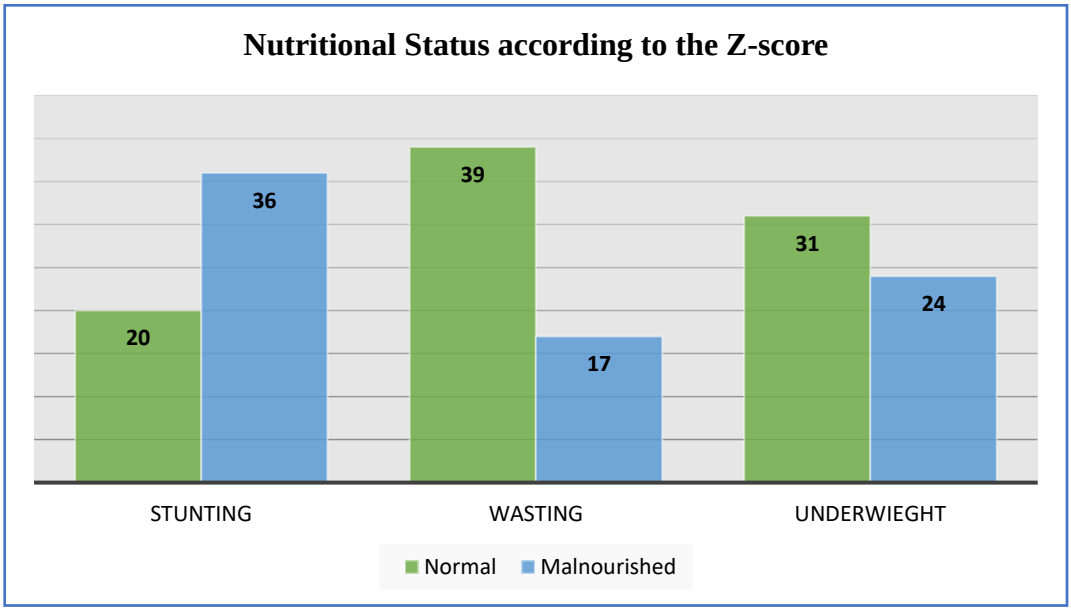

Figure 4.3: Nutritional Status of PWD Children (1 to 5 Years) in Rohingya refugee camp

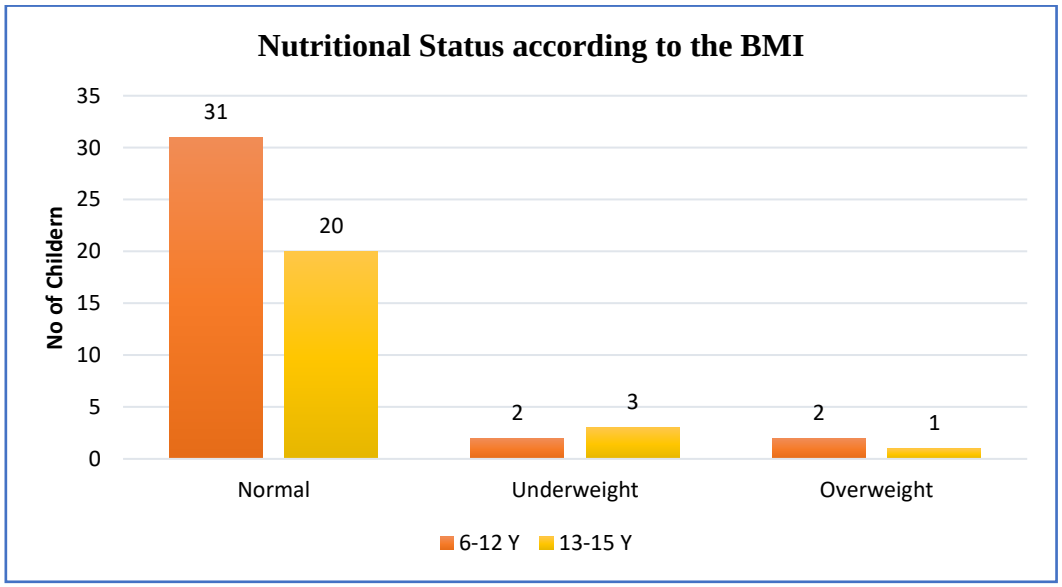

Figure 4.: Nutritional Status of PWD Children (6 to 15 Years)

4.3 BMI and Associate factors

Table 2 illustrates BMI among various factors and nutritional status of the PWD children. No significant association was found the family size, gender, relation with caregiver, with nutritional status. Statistical positive significance was found between the nutritional status and age, caregiver BMI, caregiver's education and type of

disability. In this study, person with disability child nutritional status are related to the caregiver nutrition status and types of disability. Around 11.4% caregiver are in undernutrition. Different types of disability also have great significant on the nutritional status of the PWD child. About 9.6% children are suffering from Autism, 20% children in physical disability, 20% in mental disability, 9.6% in visual disability, 12.1% in speech disability, 6% in intellectual disability, 11.3% in hearing disability, 5.2% in deaf blindness, 1.7% in cerebral palsy, 1.7% in drown syndrome and 1.7% in multiple disability

Table 2: Association between BMI and other variables among the PWD children of Rohingya Camp.

Variable	Group by variable	BMI			Total	P value
		Normal N (%)	Underweight N (%)	Overweight N (%)		
Age Range	1-5 years	29 (51.8)	25 (44.6)	2 (3.6)	56 (48.7)	<0.001*
	6-12 years	31 (88.6)	2 (5.7)	2 (5.7)	35 (30.4)	
	13-15 years	20 (83.4)	3 (12.5)	1 (4.1)	24 (20.9)	
Family Size	1-4 members	30 (75)	8 (20)	2 (5)	40 (34.8)	0.628
	5-8 members	44 (73.3)	15 (25)	1 (1.7)	60 (52.2)	
	9-12 members	13 (86.7)	2 (13.3)	0 (0)	15 (13.0)	
Gender	Male	46 (75.4)	14 (23)	1 (1.6)	61 (53.0)	0.757
	Female	41 (75.9)	11(20.4)	2 (3.7)	54 (47.0)	
Caregiver BMI	Normal	76 (78.4)	18 (18.6)	3 (3.1)	97 (84.3)	0.037*
	Underweight	5 (100)	0 (0)	0 (0)	5 (4.3)	
	Overweight	6 (46.2)	7 (53.8)	0 (0)	13 (11.4)	
Caregiver relation	Mother	31 (81.6)	6 (15.8)	1 (2.6)	38 (33.0)	0.321
	Father	23 (85.2)	3 (11.1)	1 (3.7)	27 (23.5)	
	Sibling	17 (60.7)	10 (35.7)	1 (3.6)	28 (24.3)	
	Relatives	16 (72.7)	6 (27.3)	0 (0)	22 (19.2)	
Care giver education	No Education	68 (85)	10 (12.5)	2 (2.5)	80 (69.6)	0.003*
	Primary	14 (56)	11 (44)	0 (0)	25 (21.7)	
	Secondary	5 (50)	4 (40)	1 (10)	10 (8.7)	
Type of disability	Autism	7 (63.6)	4 (36.4)	0 (0)	11 (9.6)	0.001*
	Physical Disability	13 (56.5)	10 (43.5)	0 (0)	23 (20.0)	

Variable	**Group By variable**	**BMI**			**Total**	**P Value**
		Normal N (%)	**Underweight N (%)**	**Overweight N (%)**		
Types of disability	Mental Disability	19 (79.2)	5 (20.8)	0 (0)	24 (20.7)	0.001*
	Visual Disability	8 (72.7)	1 (9.1)	2 (18.2)	11 (9.6)	
	Speech Disability	13 (92.9)	1 (7.1)	0 (0)	14 (12.1)	
	Intellectual Disability	7 (100)	0 (0)	0 (0)	7 (6.0)	
	Hearing Disability	11 (84.6)	2 (15.4)	0 (0)	13 (11.3)	
	Deaf-Blindness	5 (83.3)	1 (16.7)	0 (0)	6 (5.2)	
	Cerebral palsy	1 (50)	0 (0)	1 (50)	2 (1.7)	
	Drown Syndrome	2 (100)	0 (0)	0 (0)	2 (1.7)	
	Multiple disability	1 (50)	1 (50)	0 (0)	2 (1.7)	
Worm	No	54 (73)	17 (23)	3 (4.1)	74 (64.3)	0.367
	Yes	33 (80.5)	8 (19.5)	0 (0)	41 (35.7)	
Diarrhea	No	45 (70.3)	16 (25)	3 (4.7)	64 (55.7)	0.162
	Yes	42 (82.4)	9 (17.6)	0 (0)	51 (44.3)	
Asthma	Yes	13 (76.5)	3 (17.6)	1(5.9)	17 (14.8)	0.614
	No	74 (75.5)	22 (22.4)	2 (2)	98 (85.2)	

* Data frequency percentage of each group & $P < 0.050$ was considered statistically significant

4.4 Wasting and Associate factors

Table 3 illustrates wasting among various factors and nutritional status of the PWD children. No significant association was found the family size, gender, relation with caregiver, caregiver's education and type of disability, diarrhea with wasting. Statistical positive significance was found between the wasting and age, caregiver BMI, worm and Asthma. Care giver BMI has significantly affected with person with disability children. Around 17.89% PWD children are suffering from Asthma which has a great effect with wasting of a child. Wasting can be found only between age range of 1-5 years (31.4%) children. This is because care giver BMI also great impact on to the

wasting of PWD child. Around 4.3% of the caregivers are underweighted & 11.3% are overweighed.

Table 3: Association between Wasting and other variables among the PWD children of Rohingya Camp.

Variable	Group by variable	Wasting				Total N (%)	P value
		Normal N (%)	Marginal Wasted N (%)	Moderate Wasted N (%)	Severely Stunted N (%)		
Age Range	1-5years	39 (69.6)	10 (17.9)	6 (10.7)	1 (1.8)	56 (48.7)	0.002*
	6-12 years	35 (100)	0 (0)	0 (0)	0 (0)	35 (30.4)	
	13-15 years	24 (100)	0 (0)	0 (0)	0 (0)	24 (20.9)	
Family Size	1-4 members	34 (85)	4 (10)	1 (2.5)	1 (2.5)	40 (34.8)	0.821
	5-8 members	51 (85)	5 (8.3)	4 (6.7)	0 (0)	60 (52.2)	
	9-12 members	13 (86.7)	1 (6.7)	1 (6.7)	0 (0)	15 (13.0)	
Gender	Male	52 (85.2)	4 (6.6)	5 (8.2)	0 (0)	61 (53.0)	0.259
	Female	46 (85.2)	6 (11.1)	1 (1.9)	1 (1.9)	54 (47.0)	
Caregiver BMI	Normal	86 (88.7)	6 (6.2)	4 (4.1)	1 (1.0)	97 (84.3)	0.037*
	Underweight	5 (100)	0 (0)	0 (0)	0 (0)	5 (4.3)	
	Overweight	7 (53.8)	4 (30.8)	2 (15.4)	0 (0)	13 (11.3)	
Caregiver relation	Mother	35 (92.1)	1 (2.6)	1 (2.6)	1 (2.6)	38 (33.0)	0.346
	Father	25 (92.6)	1 (3.7)	1 (3.7)	0 (0)	27 (23.4)	
	Sibling	21 (75)	5 (17.9)	2 (7.1)	0 (0)	28 (24.3)	
	Relatives	17 (77.3)	3 (13.6)	2 (9.1)	0 (0)	22 (19.1)	
Care giver education	No Education	71 (88.8)	5 (6.3)	3 (3.8)	1 (1.3)	80 (69.6)	0.132
	Primary	17 (68)	5 (20)	3 (12)	0 (0)	25 (21.7)	
	Secondary	10 (10)	0 (0)	0 (0)	0 (0)	10 (8.7)	
Type of disability	Autism	11 (100)	0 (0)	0 (0)	0 (0)	11 (9.6)	0.898
	Physical Disability	17 (73.9)	4 (17.4)	2 (8.7)	0 (0)	23 (20.0)	
	Mental Disability	19 (79.2)	4 (16.7)	1 (4.2)	0 (0)	24 (20.9)	
	Visual Disability	10 (90.9)	1 (9.1)	0 (0)	0 (0)	11 (9.7)	
	Speech Disability	12 (85.7)	1 (7.1)	1 (7.1)	0 (0)	14 (12.2)	

Variable	**Group By variable**	**Wasting**				**Total N (%)**	**P Value**
		Normal N (%)	Marginal Wasted N (%)	Moderate Wasted N (%)	Severely Stunted N (%)		
Types of disability	Intellectual Disability	7(100)	0 (0)	0 (0)	0 (0)	7 (6.1)	0.898
	Hearing Disability	11 (84.6)	0 (0)	1 (7.7)	1 (7.7)	13 (11.3)	
	Deaf-Blindness	5 (83.3)	0 (0)	1 (16.7)	0 (0)	6 (5.2)	
	Cerebral palsy	2 (100)	0 (0)	0 (0)	0 (0)	2 (1.7)	
	Drown Syndrome	2 (100)	0 (0)	0 (0)	0 (0)	2 (1.7)	
	Multiple disability	2 (100)	0 (0)	0 (0)	0 (0)	2 (1.7)	
Worm	No	63 (85.1)	4 (5.4)	6 (8.1)	1 (1.4)	74 (64.3)	0.021*
	Yes	35 (85.4)	6 (14.6)	0 (0)	0 (0)	41 (35.7)	
Diarrhea	No	53(82.8)	7 (10.9)	4 (6.3)	0 (0)	64 (55.7)	0.479
	Yes	45(85.2)	3 (8.7)	2 (5.2)	1 (0.9)	51 (44.3)	
Asthma	Yes	12(70.6)	1 (5.9)	3 (17.6)	1 (5.9)	17(17.9)	0.006*
	No	86(87.8)	9 (9.2)	3 (3.1)	0 (0)	98(82.1)	

* Data frequency percentage of each group & $P < 0.050$ was considered statistically significant

4.5 Stunting and Associate factors

Table 4 illustrates BMI among various factors and nutritional status of the PWD children. No significant association was found the family size, relation with caregiver, caregiver's education and caregiver BMI, health status with stunting. Statistical positive significance was found between the stunting and age, gender and type of disability. Around 64.2% under 5 years children are stunted that has positive significant with stunting and age level. Around 4.3% of caregiver were underweighted and 11.4% caregiver are over-weighted. This is shown that physically disable people are suffering from stunting around 20% in comparative with other disability.

Table 4: Association between stunting and other variables among the PWD children of Rohingya Camp.

Variable	Group by variable	Stunting				Total N%	P value
		Normal N%	Marginal Stunted N%	Moderate Stunted N%	Severely Stunted N%		
Age Range	1-5 years	20(35.7)	12(21.4)	12(21.4)	12(21.4)	56(48.5)	<0.001*
	6-12 years	35 (100)	0 (0)	0 (0)	0 (0)	35 (30.4)	
	13-15 years	24 (100)	0 (0)	0 (0)	0 (0)	24 (20.7)	
Family Size	1-4 members	28 (70)	3 (7.5)	5 (12.5)	4 (10)	40(34.9)	0.971
	5-8 members	40 (66.7)	7 (11.7)	6 (10)	7 (11.7)	60 (52.2)	
	9-12 members	11 (73.3)	2 (13.2)	1 (6.7)	1 (6.7)	15 (13.0)	
Gender	Male	39 (63.9)	8 (13.1)	5 (8.2)	9 (14.8)	61 (53.0)	0.234
	Female	40 (74.1)	4 (7.4)	7 (13)	3 (5.6)	54 (47.0)	
Caregiver BMI	Normal	71 (73.2)	10(10.3)	8 (8.2)	8 (8.2)	97 (82.3)	0.002*
	Underweight	2 (40)	0 (0)	0 (0)	3 (60)	5 (4.3)	
	Overweight	6 (46.2)	2 (15.4)	4 (30.8)	1 (7.7)	13 (11.4)	
Caregiver relation	Mother	27 (71.1)	1(2.6)	5 (13.2)	5 (13.2)	38 (33.0)	.428
	Father	18 (66.7)	4 (14.8)	1 (3.7)	4 (14.8)	27 (23.5)	
	Sibling	18 (64.3)	3 (10.7)	4(14.3)	3 (10.7)	28 (24.3)	
	Relatives	16 (72.7)	4 (18.2)	2 (9.1)	0 (0)	22 (19.1)	
Care giver education	No Education	62 (77.5)	6 (7.5)	4 (5)	8 (10)	80 (69.6)	
	Primary	13 (52)	5 (20)	6 (24)	1 (4)	25 (21.7)	0.0067
	Secondary	4 (40)	1 (10)	2 (20)	3 (30)	10 (8.7)	
Type of disability	Autism	7 (63.6)	0 (0)	1 (9.1)	3 (27.3)	11 (9.7)	
	Physical Disability	10 (43.5)	7 (30.4)	5 (21.7)	1 (4.3)	23 (20.0)	
	Mental Disability	18 (75)	1 (4.2)	2 (8.3)	3 (12.5)	24 (20.9)	
	Visual Disability	8 (72.7)	1 (9.1)	1 (9.1)	1 (9.1)	11 (9.7)	
	Speech Disability	11 (78.6)	3 (21.4)	0 (0)	0 (0)	14 (12.2)	
	Intellectual Disability	7 (100)	0 (0)	0 (0)	0 (0)	7(6.1)	
	Hearing Disability	12 (92.3)	0 (0)	1 (7.7)	0 (0)	13 (11.3)	
	Deaf-Blindness	4 (66.7)	0 (0)	1 (16.7)	1(16.7)	6 (5.2)	
	Cerebral palsy	0 (0)	0 (0)	0 (0)	2 (100)	2 (1.7)	0.002*
	Drown Syndrome	1 (50)	0 (0)	0 (0)	1 (50)	2 (1.7)	
	Multiple disability	1 (50)	0 (0)	1 (50)	0 (0)	2 (1.7)	
Worm	No	48 (64.9)	9 (12.2)	9 (12.2)	8 (10.8)	74 (64.3)	0.646
	Yes	31 (75.6)	3 (7.3)	3 (7.3)	4 (9.8)	41 (35.7)	
Diarrhea	No	42 (65.6)	6 (9.4)	8 (12.5)	8 (12.5)	64 (55.7)	0.675
	Yes	37 (72.5)	6 (11.8)	4 (7.8)	4 (7.4)	51 (44.3)	
Asthma	Yes	12 (70.6)	2 (11.8)	0 (0)	3 (17.6)	17 (14.8)	0.373
	No	67(68.4)	10(10.2)	12(12.2)	9 (9.2)	98 (85.2)	

* Data frequency percentage of each group & P < 0.050 was considered statistically significant

4.6 Underweight and Associate factors

Table 5 illustrates underweight among various factors and nutritional status of the PWD children. No significant association was found the family size, gender, relation with caregiver, and type of disability and health status with underweight. Statistical positive significance was found between the underweight and age, caregiver's education and, caregiver BMI.

Table 5: Association between underweight and other variables among the PWD children of Rohingya Camp.

Variable	Group by variable	Underweight (N%)			Total (N%)	P value
		Normal	Mild	Moderate		
Age Range	1-5 years	31(55.4)	16 (28.6)	9 (16.1)	56 (48.7)	<0.001*
	6-12 years	35(100)	0 (0)	0 (0)	35 (30.4)	
	13-15 years	24 (100)	0 (0)	0 (0)	24 (20.9)	
Family Size	1-4 members	32 (80)	6 (15)	2 (5)	40 (34.8)	0.450
	5-8 members	45 (75)	10 (16.7)	5 (8.3)	60 (52.2)	
	9-12 members	13 (86.7)	0 (0)	2 (13.3)	15 (13.0)	
Gender	Male	47 (77)	8 (13.1)	6 (9.8)	61(57.0)	0.686
	Female	43 (79.6)	8 (14.8)	3 (5.6)	65 (47.0)	
Caregiver BMI	Normal	79 (81.4)	16 (16.5)	2 (2.1)	97 (84.3)	<0.001*
	Underweight	5 (100)	0(0)	0(0)	5 (4.3)	
	Overweight	6 (46.2)	0(0)	7 (53.8)	13 (11.3)	
Caregiver relation	Mother	32 (84.2)	3 (7.9)	3 (7.9)	38 (33.0)	0.058
	Father	24 (88.9)	2 (7.4)	1 (3.7)	27 (23.4)	
	Sibling	18 (64.3)	59(17.9)	5 (17.9)	28 (24.3)	
	Relatives	16 (72.7)	6 (17.3)	0(0)	22 (19.1)	
Care giver education	No Education	70 (87.5)	6 (7.5)	4 (5)	80 (69.6)	0.008*
	Primary	14 (56)	7 (28)	4 (16)	25 (21.7)	
	Secondary	6 (60)	3 (30)	1 (10)	10 (8.7)	
Type of disability	Autism	7 (63.6)	2 (18.2)	2 (18.2)	11 (9.6)	0.422
	Physical Disability	13 (56.5)	6 (26.1)	4 (17.4)	23 (20.0)	
	Mental Disability	19 (79.2)	4 (16.7)	1 (4.2)	24 (20.9)	
	Visual Disability	10 (90.9)	0 (0)	1 (9.1)	11 (9.7)	
	Speech Disability	13 (92.9)	1 (7.1)	0 (0)	14 (12.2)	

Variable	**Group By variable**	**Underweight**			**Total N (%)**	**P Value**
		Normal **N (%)**	Mild **N (%)**	Moderate **N (%)**		
Types of disability	Intellectual Disability	7 (100)	0 (0)	0 (0)	7 (6.1)	0.422
	Hearing Disability	11 (84.6)	2 (15.4)	0 (0)	13 (11.3)	
	Deaf-Blindness	5 (83.3)	0 (0)	1 (16.7)	6 (5,2)	
	Cerebral palsy	2 (100)	0 (0)	0 (0)	2 (1.7)	
	Drown Syndrome	2(100)	0 (0)	0 (0)	2 (1.7)	
	Multiple disability	1 (50)	1 (50)	0 (0)	2 (1.7)	
Worm	No	57 (77)	11 (14.9)	6 (8.1)	74 (64.3)	0.906
	Yes	33 (80.5)	5 (12.2)	3 (7.3)	41 (35.7)	
Diarrhea	No	48 (75)	9 (14.1)	7 (10.9)	64 (55.7)	0.371
	Yes	42 (82.4)	7 (13.7)	2 (3.9)	51 (44.3)	
Asthma	No	14 (62.4)	1 (5.9)	2 (11.8)	17 (14.9)	0.506
	Yes	76 (77.6)	15 (15.3)	7 (7.1)	98(85.2)	

* Data frequency percentage of each group & $P < 0.050$ was considered statistically significant

Chapter-5. Discussion

In this study focusing on nutritional status of disabled children in Rohingya refugee camp at Cox's Bazar in Bangladesh. After mass deracination from Rakhine state of Myanmar, Nutritional status specially the bad one such as malnutrition among the sample of Rohingya in makeshift settlements of Cox's Bazar district, Bangladesh exceeded global emergency thresholds in October-November 2017 (WHO,2018) This study was done to assess and performed to find out the nutritional status of the children with disability based on anthropometric parameters, their general food habit and caregiver status, disability types and predominant factors that contribute to malnutrition among the PWD children.

In this survey, two segments were used according to the age range such as Z score and BMI where Z score was used for 1 to 5years and BMI was used for 6 to 15 years PWD children . Based on the Z-score to the age range under 5 years children with disability, in this study found that 44.6% children were underweight, 64.3% children were stunted, and 31.4% children were wasted. But the prevalence of the stunting among children under 5years were 31.6% in Tanzania (Mshida, H. A. e*t al.*, 2018) and 20.1% in overseas refugee children (Dawson-Hahn. *et al*., 2016) ; prevalence of the underweight among children under 5years were 19.4% in Nigeria (Umeokonkwo, *et al*.,2020). Prevalence of the wasting among children under 5years were 17.3% in overseas refugee children (Dawson-Hahn. *et al*., 2016); 4.5% in Tanzania (Mshida, H. A. e*t al.*, 2018). In all the parameters are lower than my study. Under five years children with disability in Rohingya refugee camp are more vulnerable compare with the non-disable children living in the camp and overseas refugee. Because of, Irregular feeding practice and unhygienic living condition drive towards them malnutrition. Children with disability need more care and support from the caregiver and proper hygiene practice required.

Based on BMI, according to the age group 6 to 12 years children, the prevalence of underweight found 5.7% and overweight found 5.7%. Age rage between 13 to 15 years children, the prevalence of underweight found 12.5% and overweight found 4.1% . This finding is lower with the study of Shrestha, *et al*. (2020) who found 31.9% underweight prevalence rate between age range 6-10-year-old children in selected earthquake-affected areas of Gorkha district, Nepal. 10.6% overweight of Pernitez-Agan, *et al* (2019) and 5.2% overweight of Ahmed, *et al* (2018) found that the prevalence of

malnutrition among the adolescent boys and girls in Bangladesh was 16%. In our study we found the lower rate of underweight and similar rate overweight than these. Because of regular getting of monthly ration and food could be one of the main reasons of lowering the underweight. Without the assistance of caregiver, most of the disable children cannot move anywhere and stuck in home though the access also difficult in the camp level could be causes of overweight.

The World Report on Disability – published in 2011 by the World Bank and WHO - estimates that there are more than one billion people globally living with disabilities (WHO,2011). This includes approximately 93 million children aged 0–14 years living with "moderate or severe disability" (5·1%) of whom 13 million (0·7%) experience severe difficulties. Others have put this figure even higher – with UNICEF estimating that there were 150 million children with disabilities globally in 2009 (UNICEF,2009).

In this study, children with disability nutritional status are related to the caregiver nutrition status and types of disability. Around 11.4% caregiver are in undernutrition. Different types of disability also have great significant on the nutritional status of the PWD child. About 9.6% children are suffering from Autism, 20% children in physical disability, 20% in mental disability, 9.6% in visual disability, 12.1% in speech disability, 6% in intellectual disability, 11.3% in hearing disability, 5.2% in deaf blindness, 1.7% in cerebral palsy, 1.7% in drown syndrome and 1.7% in multiple disability.

The prevalence of disability was 0·98% (0·96–1·00%) overall, ranging from a low of 0·4% in Benin, Kenya and Tanzania, to a high of 3·3% in Rwanda. There was evidence that the prevalence of disability was higher in boys than girls in 22 of the 30 countries assessed – generally in the range of 1·3–1·4 fold higher. The dominant types of impairment were physical, vision and communication impairment . Hearing impairment was relatively rare, while learning impairment was more common in Latin American countries than in African or Asian countries (Kuper *et al*., 2014)

In our survey, the percentages of male are more than female, specially based on BMI. Age range of children, caregiver BMI, caregiver education and types of disabilities have significant p value on BMI. Also, there were some factors which are related to wasting and nutritional status of disabled children such as age, gender and type of disability.

But statistical positive significance was found between the underweight and age, caregiver's education and, caregiver BMI.

In this study worm infestation was significantly associated with undernutrition. Because, in Rohingya refugee camps most of the PWD children live without access to proper sanitation facilities and are unaware of the importance of fundamental hygiene practices like hand washing after visiting toilet. Worm infestation is related to poor sanitation and lack of clean drinking water. Worm infestation is one of the main causes of childhood malnutrition, anaemia, and stunted physical and mental growth, psychosocial problems. It also causes recurrent gastrointestinal and upper respiratory tract infection leading to high morbidity and mortality in children (Kappus *et al.*, 2015).

This study also showed that asthma was higher among malnourished children compare with normal, because children usually avoid food intakes or take less amount of foods during asthma.

Chapter-6: Conclusions

Malnutrition as revealed by anthropometric variables and associate factors occurs with a high manifestation among disabled children and almost increased with age and low socio-economic level. Attention towards the nutritional status of disabled children individuals is needed, and ample nutritional support is requested to restore linear growth, normalize weight, and elevate health and quality of life. The golden rule of fending off and preventing the ability and actual detrimental effects of malnutrition by providing an optimal diet must be one of the major considerations in their care .The results of this study confirm that there are quiet rooms to perk up the PwD child nutritional status at Rohingya refugee camp of Bangladesh. To reduce the burden of malnutrition among PwD children, a joint effort by the government and ISCG are necessary in an equitable manner to improve the nutritional status of PwD children. In addition to the ongoing programs to improve PwD child health, Government and ISCG may wish to design targeted nutrition intervention strategies with better understanding of target group to reduce childhood malnutrition. Additional to the program to confirm the easier access to health information and health education to caregiver, surveillance and assessment need to be regularly reviewed with special attention to be given to extremely vulnerable person with disability. For implementation of nutritional programme there is a need for strengthening of existing human resource working at different levels. Increase budget allocation for PwD children and continual international financial support for nutritional programme are also crucial for the reduction of undernutrition among PwD children. Proper coordination are required with different sectors such as health, nutrition, protection , site management, site development and WASH in Rohingya refugee camp to improve their living condition with supportive access and proper nutrition. We remain established but, on further research on this field and a country wide policy as a way to assist enhance their usual care and management.

Chapter 7: Recommendation

Community health extension work should be strengthening with nutritional health educators to minimize the rates of malnutrition among the disabled children in the study areas. Inter sector coordination group (ISCG) for the Cox's bazar humanitarian response can collaborate with protection sector with nutrition sector and other stockholders for better coordination service provision for the child with disability. Promote a multi-sectoral approach: The ministry of health should involve relevant stakeholders and other ministries like agriculture, water and sanitation and education ministry including community in the planning and implementation of nutrition programme for supporting child with disability in Rohingya camp. Establish person with disabilities rights and protection act 2013 in line with the principles of the United Nations Convention on the Rights of Persons with Disabilities (CRPD) for the better of displaced children with disability. Complaint and feedback mechanism should be strengthened through door to door for getting information of children with disability and their health and nutritional status. This study included only three camps of the Rohingya refugee among 35 camps and small size data. It is suggested that future work should include a greater camp area for more authentication of findings.

Limitations of the study

This study had some limitations. Findings of this small sample may lower its generalizations. For having a meaningful conclusion, the sample size needs to be large. It was a cross sectional study which deal with only one-time nutritional status. Follow up data could be given a clear image of context. This study only looked at the children with disability under 15 years, which may not translate to person with disability at all age in the Rohingya refugee camps. Finally, self-reporting of some variable might contribute some information bias. However, proper sampling method and statistically justified sample size may validate the findings of the study.

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Annex 1: Pre structured Questionnaires

Assalamuwalikum, my name is Muhammad Zahirul Islam, and I am a student at Chattogram Veterinary and Animal Sciences University. I am conducting a qualitative research study on "Nutritional status and associate factors – person with disabilities of Rohingya refugee camp, Bangladesh." The purposes of this study are to determine the nutritional status of person with disabilities at Ukhiya refugee camp of Bangladesh and the driving factors of nutritional status. You and your caregiver participation in the study will involve an interview with an estimated length of 15 minutes to 20 minutes. This study poses little to no risk to its participants. I will do my best to ensure that confidentiality is maintained by not citing your actual name within the actual study. You may choose to leave the study at any time.

By signing below, you agree that you have read and understood the above information and would be interested in participating in this study.

Date- Signature/Thumb

Date:	
Address:	
Participant	Name:
	Age:
	Sex:
	Religious:
Father's Name:	
Name of the Caregiver (if applicable):	
Demographic Questions:	
Mother's Age:	
Father's Age:	
How many year living in this area:	
Number of the family member:	
Socioeconomical information:	
1. Last Educational Status: (Mark with ✔ properly).	

Academic level					
	No academic background	Primary	Secondary	Higher Secondary	Others
Participant					
Father					
Mother					

2. Who is the main earner of your family?	
3. What is the total monthly (Tk.) income of your family?	

Marital Information:	
1. What is your marital status?	Married/ Non married/ Divorced / Widow
2. How many children do you have?	
3. Are you pregnant?	Yes/No/Not applicable
4. Did you ever get abortion?	Yes/No/Not applicable
5. When and How?	

Nutritional Information:	
1. How many times did you take your meal?	2 time- 3 time/ 3 time-4 time/ others
2. What types of food had been taken last 24 hours?	
3. Do you know about classification of food?	Yes/No
4. What types of classification you know?	Carbohydrate/Protein/Fat/Water/Minerals/Vitamin
5. Are you vegetarians?	Yes/No
6. Which type of protein have you taken most?	Egg/Meat/Fish/Legume/Dal/Milk
7. Do you take Calcium supplement?	Yes/No
8. Do you take Iron supplement?	Yes/No
9. Do you eat raw salt during your meal?	Yes/No

10. Do you take iodized salt in your food?	Yes/No
11. Do you like seasonal fruits/vegetables	Yes/No
12. What is your favorite food or fruit?	
13. Do you like fast food?	Yes/No
14. How often you take fast food?	

Skipping Meals:	
1. Do you skip your meals often?	Yes/No
2. If yes, then when?	Breakfast/Midday food/Lunch/Evening food/Dinner
3. What are the reasons behind skipping meals?	
4. Did you ever skip any food because of superstition?	Yes/No
5. What was the food and what was the superstition?	
Household Cleaning System:	
1. What is the source of your drinking water?	Tube well/ Well /Others
2. Do you boil before drinking water?	Yes/No
3. Do you have a toilet in your home?	Yes/No
4. How many people use your toilet?	
5. Do you often clean your toilet?	Yes/No
6. Do you wash your hands after visiting from toilet?	Yes/No
7. Which material do you use for handwashing?	Soap/Soil/Water/Other
8. Do you use sandle while visiting toilet?	Yes/No
9. Do you brush your teeth regularly?	Yes/No
Illness Issue:	
1. Have you been sick in the last month?	Yes/No
2. What happened?	Fever/ Cough or cold/ Diarrhea/Dysentery/Stomach pain/Breathing Problem/ Skin Diseases/ Ear-Eye problem/ Other
3. How many days were you sick?	
4. Did you have diarrhea in last month?	Yes/No

5. Did you take immunization dose?	Yes/No
6. Did you take deworming tablet in last 3 months?	Yes/No
Information of disability	
Type of disability	
How long have you been suffering from disability?	
Do you have any caregiver?	Yes/No
Are you using any assisting device?	Yes/No
Anthropometric measurement Information:	
1. Child MUAC?	
2. Child Height?	
3. Child Weight?	
4. Child Z-score?	
For Adult , BMI= $\frac{Weight\ in\ Kg}{Height\ square\ in\ meter}$	

Thanks for your participation!!!!

Annex 2: Washington Questionnaires

The Washington Group Short Set of Questions on Disability

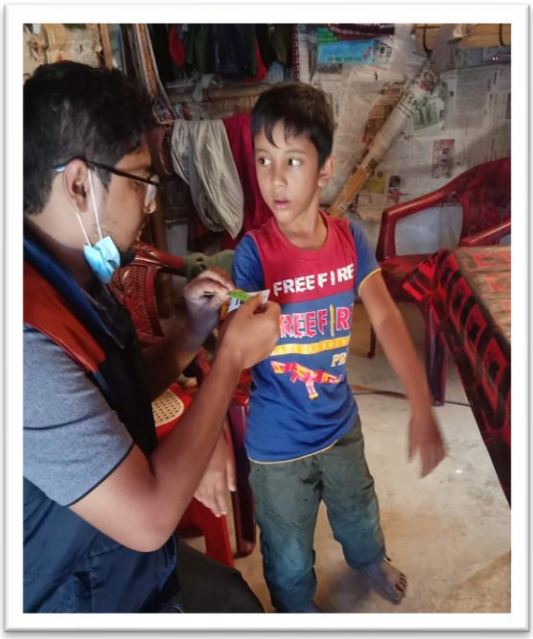
The next questions ask about difficulties you may have doing certain activities because of a **HEALTH PROBLEM.**

Question	Answer
1. Do you have difficulty seeing, even if wearing glasses?	a. No - no difficulty b. Yes – some difficulty c. Yes – a lot of difficulty d. Cannot do at all
2. Do you have difficulty hearing, even if using a hearing aid?	a. No - no difficulty b. Yes – some difficulty c. Yes – a lot of difficulty d. Cannot do at all
3. Do you have difficulty walking or climbing steps?	a. No - no difficulty b. Yes – some difficulty c. Yes – a lot of difficulty d. Cannot do at all
4. Do you have difficulty remembering or concentrating?	a. No - no difficulty b. Yes – some difficulty c. Yes – a lot of difficulty d. Cannot do at all
5. Do you have difficulty (with self-care such as) washing all over or dressing?	a. No - no difficulty b. Yes – some difficulty c. Yes – a lot of difficulty d. Cannot do at all
6. Using your usual (customary) language, do you have difficulty communicating, for example understanding or being understood?	a. No - no difficulty b. Yes – some difficulty c. Yes – a lot of difficulty d. Cannot do at all

Annex 3: Photo Gallery

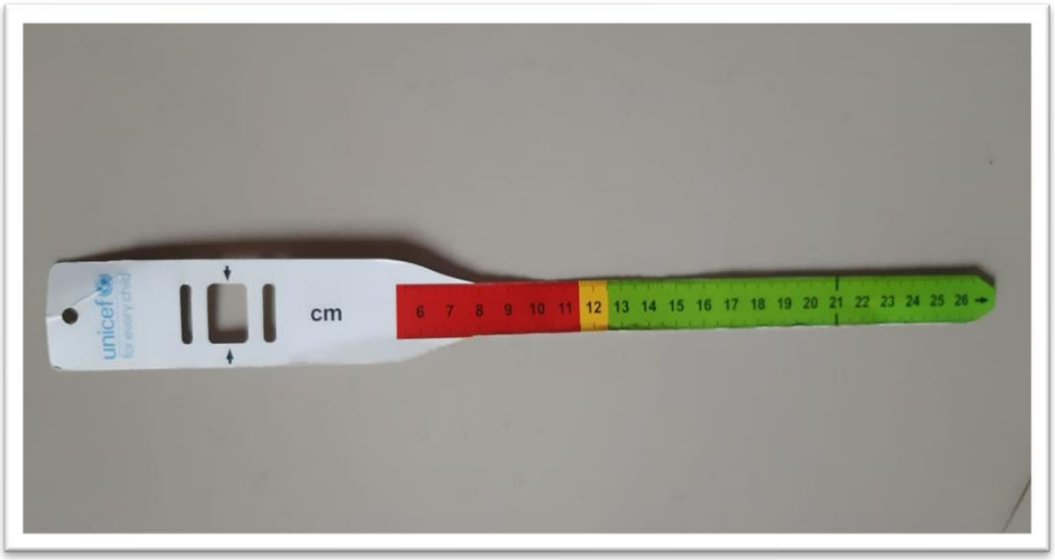
Data Collection

Height measurement



MUAC measurement

Weigh measurement



MUAC tap for child (Using for under 5 years)

Weigh Machine

MUAC tap for adult

Brief biography

This is **Muhammad Zahirul Islam**, Son of Bashir Ahmed and Ferdousi Akter. He had passed the Secondary School Certificate Examination in 2010 under Madrasha education board and then Higher Secondary Certificate Examination in 2012 under Chittagong board. He received Bachelor of Food Science and Technology (BFST) degree from Faculty of Food Science and Technology, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram. Now, He is a candidate for MS in Applied Human Nutrition and Dietetics under the Department of Applied Food Science and Nutrition, Faculty of Food Science and Technology, CVASU. He is keen to do further research in the Applied Nutrition and Clinical Nutrition sector and contributes his knowledge in improving the nutritional status of the people throughout the world.