

Nutritional Status of Children under Five Years in a Human-induced Disaster Emergency in Bangladesh

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Abstract:

➤ *Background:*

Child malnutrition is extending in Bangladesh where it is estimated that nearly one half of the child malnourished due to lack of care and knowledge. Malnutrition bears devastating faith for children's in emergency and post-emergency situations. The death rate among children under five years old is significantly higher than that of some other age groups. **Objective:** To find out the nutritional status among the Rohingya children under 5 years of age living in a human induced emergency situation in Bangladesh.

➤ *Methodology:*

This is a cross sectional survey, conducted in two refugee camps in Southern Bangladesh where children aged between 1 to 5 years.

➤ *Result:*

The result shows among children 40.5% (n=100) were female and 59.5% (n=147) were male. The prevalence of hindering per height for age z-score (HAZ) was 74.5%, wasting per weight for height z-score (WHZ) was 7.7% and underweight per weight-for-age z-score (WAZ) was 30.4%. Besides that, the prevalence of Global Acute Malnutrition (GAM) per WHZ was 7.7% (n=19), which is under the WHO threshold of 5–9%, labeled as “poor”. Moderate Acute Malnutrition (MAM) and Severe Acute Malnutrition (SAM) represents 2.8% (n=7) and 4.9% (n=12) respectively. In terms of age segregation, 4 and 5 years hold a higher percentage of GAM and the lowest percentage belongs to 3 years' age group (3%).

➤ *Conclusion:*

The mortality is especially high in crisis influenced populaces due to the synergy of a high rises of unhealthiness and expanded rate of transmittable and irresistible infections. So the policy- and decision-makers in Bangladesh should recognize the value of integrating nutrition into society and in an emergency situation in Bangladesh.

Keywords:- Nutritional status, Five years, Emergency, Bangladesh.

I. INTRODUCTION

Emergencies can dramatically change living conditions for entire communities or societies following the wake of normal or human-made disasters, for instance drought, floods, earth quakes, agricultural and environmental calamities, war, common distress, and serious political agitation and financial downturn. In any event, for young generation the individuals who are just somewhat malnourished, the danger of death from an episode of sickness are twice that of all around same children. This hazard is more prominent still for the individuals who are seriously malnourished [1]. A child's eating regimen ought to give enough vitality admissions to appropriate development and improvement while forestalling abundance weight gain. For sure, numerous exercises learned and rehearsed in crises can possibly illuminate non-crisis programming [2]. An optimal feeding and care is the fundamental mean to prevent malnutrition in infants and young children. Perfect nourishment for youthful newborn children is breast milk and it can significant contribute altogether to the nutrition of younger babies and young children. Mortality prevention remains the main objective of the emergency nutrition intervention [3]. European Commission concurs with the idea and adopted its policy that it would lessen or stay away from abundance mortality and morbidity in light of under nutrition in a humanitarian emergency [4]. In looking into the condition of information on sustenance in crises, Young et al. 2004 reports that there has been a sizable increment in the group of research on the various types of lack of healthy sustenance present with regards to emergencies such as wasting, micronutrient deficiencies, severe stunting, and now also obesity. When disaster hits, whole communities, sometimes entire countries and regions, are thrown into disarray [5]. Experience shows that even in previously healthy populations, child morbidity and crude mortality rates can increase 20-fold in as short a period as two weeks. The majority are not considered to be citizens by the Myanmar Government, and live in a condition of statelessness [6]. The rohingya, stateless minority group of people faced massive violence in Rakhine State, Myanmar. This disastrous condition forced them into Bangladesh for a long time, with huge spikes following rough assaults in 1978, 1991-1992, and again in 2016. An expected 745,000 Rohingya—including in excess of 400,000 kids—have fled into Cox's Bazar and as of January 2019, more than 900,000 stateless Rohingya displaced people dwell in Ukhiya and Teknaf Upazilas of Cox's Bazar locale [7]. This

investigation means to portray intense malnourished health as far as various indicators of ailing health and evaluate the prevalence of malnutrition among the Rohingya childrens under 5 years old living in a crisis in Bangladesh.

II. MATERIALS AND METHODS

➤ *Selection and description of the study area*

The greater part of the Refugee were moved to Cox's Bazar locale, under Chittagong division in the south-eastern Bangladesh (Fig. 1). Two enlisted exile camps (United Nations High Commissioner for Refugees (UNHCR): Kutupalong and Nayapara) and two temporary settlements

existed at Cox's Bazar before the refugee surge in August 2017. The influx of refugee after August the 25th, 2017 extended the limit of the current camps and temporary settlements, and extra unconstrained settlements were set up in Hakimpara, Jamtoli, and Unchiprang (International Organization for Migration, 2017). By far most lives in 34 incredibly expansion camps and the biggest single site, the Kutupalong-Balukhali Expansion Site, has roughly 626,500 Rohingya (Fig. 2) [8]. Our investigation included two Rohingya Camps, (1) Unchiprang Camp, under Teknaf Sub-area and (2) Mainnerghona Camp, under Ukhiya sub-region of Cox's Bazar locale in Bangladesh (Fig. 2).

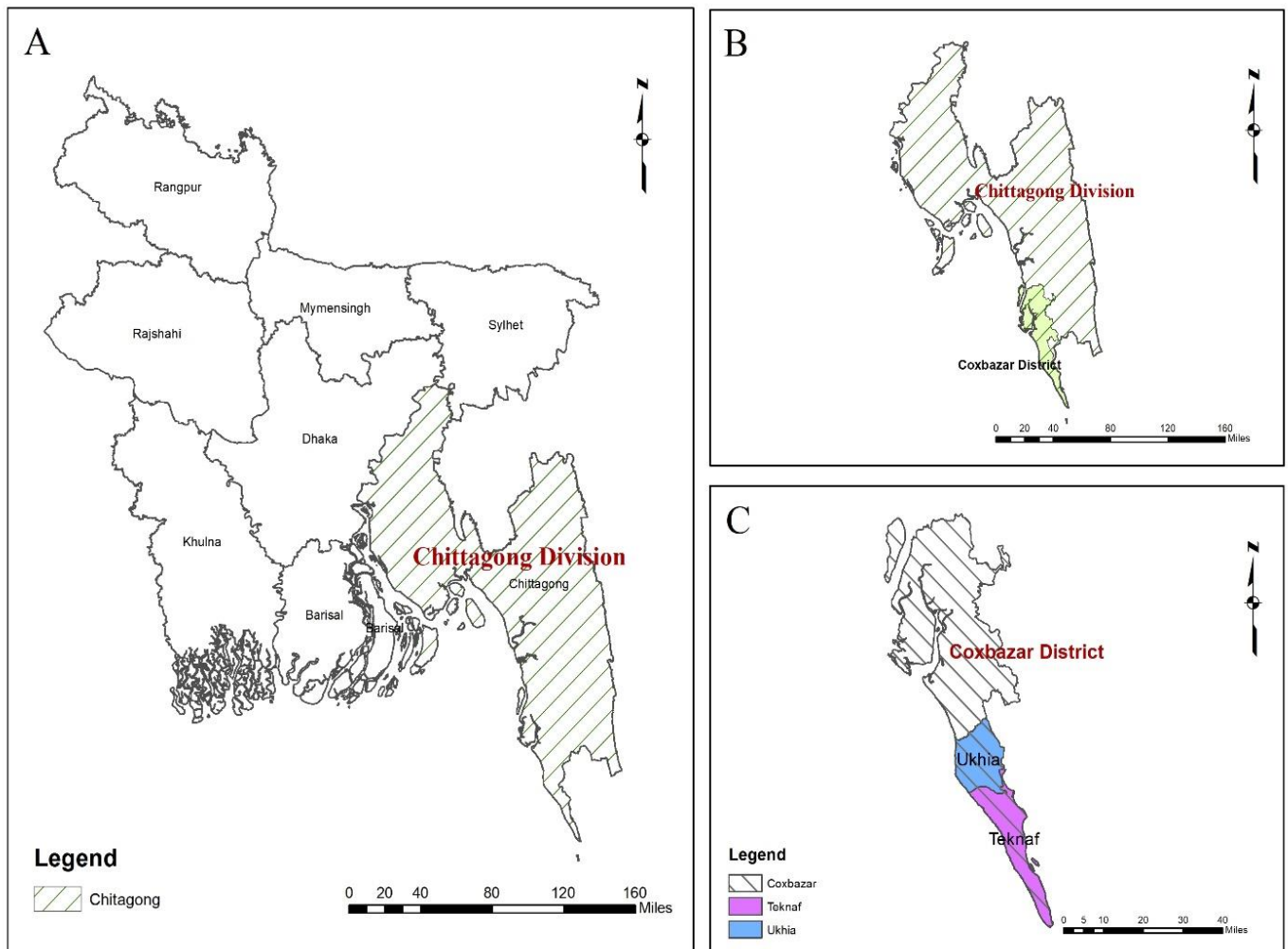


Fig 1:- Study area in Bangladesh

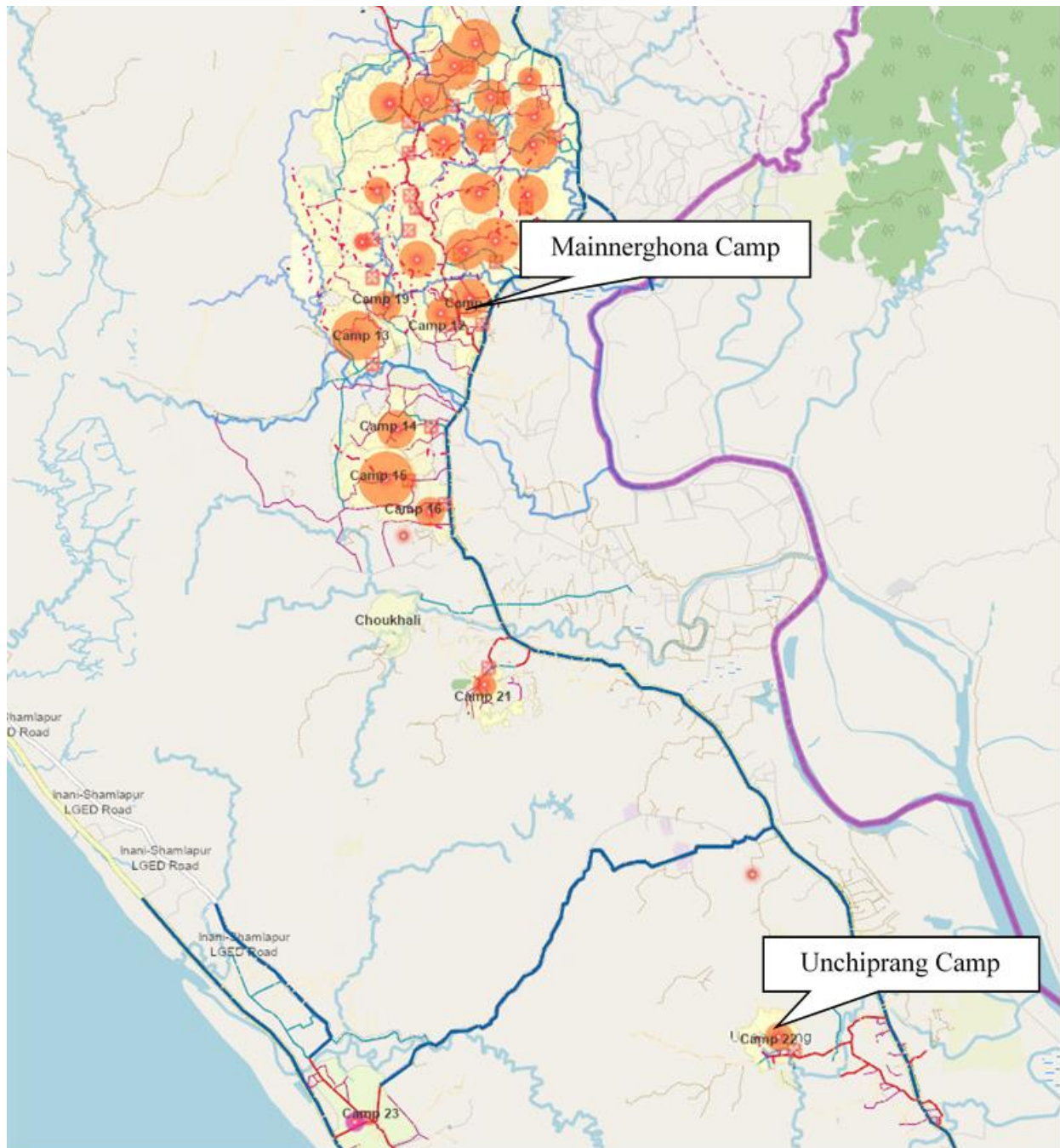


Fig 2:- Location of the studied Rohingya camps in Ukhiya and Teknaf (source: ISCG 2018)

➤ *Sampling and data collection*

A cross-sectional survey was conducted on 247 Rohingya children, aged between 1 and 5 years.

➤ *Survey tools:*

The anthropometric information were gathered utilizing the technique specified by the WHO (1995) [9] for taking anthropometric estimations. Adherence to this method was guaranteed. The conventions utilized are as per the following: Weight: Salter Scale with adjustments of 100 g-unit was utilized. The scale was balanced before weighing each children by setting it to zero. The female child's remained gently dressed before weighing, though garments for the male childrens were removed. Two readings were taken for every kid, and the normal was

recorded on the poll. Length: The kids were made to lie flat on the length board. The sliding piece was put at the edge of the uncovered feet as the head (with crushing of the hair) contacted the opposite finish of the estimating device. At that point two readings were taken and the normal figured and enlisted. Arm Circumference: The Mid Upper Arm Circumference was estimated utilizing a MUAC tape to the closest 0.1 cm. Two readings were taken and the normal recorded for every Children. Kid Age Determination: We decided age of the children's utilizing accessible confirmation records such development checking/center participation cards and birth authentications. Moreover, schedules of occasions were likewise utilized as intermediaries to the age assurance.

➤ *Calculation method of indicators*

• *Anthropometric Indices*

Three standard records of physical development that depict the dietary status of kids were considered for the anthropometric investigations: I) weight-for-age (underweight), ii) height for-age (hindering) and iii) weight-for-height (wasting). Every one of these records is communicated as far as the quantity of standard deviation units (z-score) from the middle of the NCHS/WHO universal reference populace [10] and gives different data about the nourishing status of kids. A z-score beneath - 2 for any marker characterizes moderate malnourished health, whilst a z-score below -3 defines severe malnutrition. For

example, a weight-for-height z-score (WHZ) below -2 is classified as moderate wasting, whereas a WHZ below -3 is classified as severe wasting. Stunting, wasting, and underweight refers to a z-score below -2 for height-for-age (HFA), weight-for-height (WFH), and weight-for-age (WFA) respectively.

• *Acute malnutrition*

Acute malnutrition is defined either by WHZ below -2 or MUAC below 125 mm. The classification of acute malnutrition based on WHZ according to the World Health Organization (WHO) is presented in the table 1.

Indicator	Weight-for-Height z-score (WHZ)
Moderate acute malnutrition (MAM)	-3 <WHZ< -2
Severe acute malnutrition (SAM)	WHZ < -3
Global acute malnutrition (GAM)	WHZ < -2

Table 1:- Classification of acute malnutrition (Source: Guidelines for Nutrition Surveys –Bangladesh, 2015) [11]

Severity of malnutrition	Prevalence of wasting (<- 2 z scores WFH)	Prevalence of stunting (<-2 z-scores HFA)	Prevalence of underweight (<-2 z-scores WFA)
Acceptable	<5%	<20%	<10%
Poor	5-9%	20-29%	10-19%
Serious	10-14%	30-39%	20-29%
Critical	>=15%	>=40%	>=30%

Table 2:- Classification of severity of malnutrition (WHO) (Source: Guidelines for Nutrition Surveys – Bangladesh, 2015) [11]

➤ *Statistical analysis*

Standardized anthropometric body measurements were employed to assess the height and weight of the participants. Anthropometric body measurements were analyzed using the WHO Anthro Survey Analyser (<https://whonutrition.shinyapps.io/anthro/>). Chi-squared goodness-of-fit test was employed to differentiate the incidence of different indicators between male and female and among the age groups. All levels of significance were

set to $\alpha = 0.05$. All statistical analyses were conducted using R, version 3.5.2 [12].

III. RESULTS

➤ *Descriptive Statistics of Nutrition*

Among the surveyed children, 40.5% (n=100) were female and 59.5% (n=147) were male children. Sample population desegregated by age and sex are provided in Table 3.

Age Group (Years)	Female		Male		Total
	(n=)	(%)	(n=)	(%)	(n=)
1	29	38.7%	46	61.3%	75
2	18	37.5%	30	62.5%	48
3	29	51.8%	27	48.2%	56
4	11	35.5%	20	64.5%	31
5	13	35.1%	24	64.9%	37
Total	100	40.5%	147	59.5%	247

Table 3:- Age and sex wise sample distribution

Percentages of stunted, wasted and underweight in under-five children cohort in the study area with emergency status.

The prevalence of stunting per height-for-age z-score (HAZ) among children in the refugee camp was 74.5%, which is way above the WHO emergency (critical) cut-off of 40% [10]. The prevalence of wasting per weight-for-height z-score (WHZ) among the children was 7.7%, which falls between the range (5–9%) specified by WHO as a poor threshold. The prevalence of underweight per weight-for-age z-score (WAZ) among children in the refugee camp was 30.4%, which is slightly above the critical threshold (30%) suggested by WHO.

	Prevalence of stunting (<-2 z-scores HFA)	Prevalence of underweight (<-2 z-scores WFA)	Prevalence of wasting (<-2 z-scores WFH)
Severity of malnutrition	74.5%	30.4%	7.7%
	Critical	Critical	Poor

Table 4:- Severity of malnutrition based on prevalence of wasting, stunting, underweight

➤ *Difference between groups in malnutrition*

- *Percentage of stunted*

Age group (Year)	n =	% within the age group
1	56	74.7%
2	35	72.9%
3	45	80.4%
4	22	71.0%
5	26	70.3%

Table 5:- Age wise percentage of stunted

73.86% (n=184) of children under 5 was stunted. No difference in the incidence of stunting was observed between female (44.02%, n=81) and male (55.98%, n=103) ($\chi^2(1) = 0.28, P=0.60$). Moreover, we found no difference among age groups in the percentage of stunting ($\chi^2(4) = 0.88, P=0.93$).

- *Percentage of wasted*

Age Group (Years)	n=	% within the age group
1	5	6.7%
2	3	6.3%
3	2	3.6%
4	4	12.9%
5	5	13.5%

Table 6:- Percentage of wasted desegregated by age

A total of 19 (8.6%) children was found to be wasted. Difference between male (63.15%, n=12) and female (36.84%, n=7) in terms of wasting was insignificant ($\chi^2(1) = 0.09, P=0.76$). Similarly, no difference was found among the age groups in terms of percentage of wasted ($\chi^2(4) = 8.88, P=0.06$).

- *Percentage of underweight*

Age group	n=	%
1	39	52.0%
2	7	14.6%
3	15	26.8%
4	7	22.6%
5	7	18.9%

Table 7:- Percentage of underweight desegregated by age

The prevalence of underweight among children in the refugee camp was 30.4% (n=75), which crossed the critical threshold of 30% set by WHO. Difference between male (29.9%, n=44) and female (31%, n=31) in terms of underweight was not significant ($\chi^2(1) = 0.02, P=0.89$). Incidence of underweight was found to be significant among the age groups ($\chi^2(4) = 31.21, P<0.000$). Interestingly, children in the age group of 1 year had much higher incidence of underweight (52%) than the other age groups. In fact, prevalence of underweight in the age groups other than 1 year do not cross the critical threshold of 30%. However, they belong to the status of either poor or serious condition.

➤ *Global Acute Malnutrition: differences by year of age*

The prevalence of Global Acute Malnutrition (GAM) per WHZ was 7.7% (n=19), which is under the WHO threshold of 5–9%, labelled as “poor”. Moderate Acute Malnutrition (MAM) and Severe Acute Malnutrition (SAM) represents 2.8% (n=7) and 4.9% (n=12) respectively.

In term of age segregation, 4 and 5 years hold the higher percentage of GAM and lowest percentage belongs to 3 years’ age group (3%). Other percentages are shown in the table below.

Age Group (year)	GAM		MAM		SAM	
	n	%	n	%	n	%
1	5	6.7%	0	0.0%	5	6.7%
2	3	6.3%	3	6.3%	0	0.0%
3	2	3.6%	0	0.0%	2	3.6%
4	4	12.9%	1	3.2%	3	9.7%
5	5	13.5%	3	8.1%	2	5.4%
Grand Total	19	7.7%	7	2.8%	12	4.9%

Table 8:- Age wise distribution of Child malnutrition

Based on age groups, difference was significant for MAM ($\chi^2(4) = 15.22, P=0.004$) and SAM ($\chi^2(4) = 10.25, P=0.036$) while GAM ($\chi^2(4) = 8.9, P=0.06$) remained marginally significant.

IV. DISCUSSION

Results of our study in terms of stunting, wasting and underweight call for immediate intervention, or modification of existing nutritional programs in the study area. Our study found out the status of stunting and underweight being at a critical and wasting at a poor condition. Although sex differential in terms of nutrition is common in the rural setup of southeast Asia [13], our investigation found no sexual orientation based contrast in hindering, wasting and underweight in the contemplated population. Praditsorn et al. 2019 [14] found the similar findings between child’s of 6 to 59 months of age in refugee camps along Thailand-Myanmar border. The non-difference of malnutrition between male and female children is perhaps a typical of emergency situation. The result shows that an emergency situation creates severe malnutrition in both the sex groups of children, thus both the groups requires similar attention. Limited and fixed amount of rations in an emergency setup leave no choice for parents/ guardians in doing partiality in terms of food distribution between both sexes of children. In other words, during the time of plenty, discrimination may occur frequently, but a time of scarcity impacts all groups. Incidence of underweight was found to be significant among the different year groups. Children with the age 1 year had much higher incidence of underweight than the other age groups. Underweight at birth can happen because of several reasons. Age of mother could be one possible reason. Early marriage is a common cultural practice within the Rohingya Muslim communities in Myanmar, thus child marriages are common [15]. In addition, multiple birth because of inherent cultural views in Rohingya community results in low birthweight in the children. Most importantly, mother’s deteriorated health could be one of the major reasons for such overwhelming prevalence of underweight in the children of 1-year old. During the latest influx of

Rohingya into Bangladesh in August 2017, pregnant women experienced a psychological trauma in addition to lack of nutritional food, which in turn resulted in the birth of underweight children [16].

This investigation additionally indicated that the older age of the kids is a significant related elements for acute malnutrition among these children. The reality may reflect a choice of bias. Nonetheless from Bangladesh [17], from India [18], and from Uganda [19] also found, older age of a child to be significantly associated with malnutrition.

Classification of the severity of global acute malnutrition (GAM) in refugee settings is critical. The Global Nutrition Cluster decision-making tool, a guideline was developed to guide the selection of appropriate programming approaches in emergency situations [20]. According to this tool, GAM prevalence (low weight-for-height) is considered high when prevalence is above 15%, medium when between 10 -15% and low when it is < 10. The prevalence of GAM (7.7%) found in this study belongs to the low level of severity. At this level, 3 types of programs can be recommended: i) For high level of risk: Prevention; and treatment, if appropriate, ii) For medium degree of hazard: Monitor circumstance; treat and prevent, if proper, iii) For low degree of hazard: Monitor situation. In spite of the fact that, the seriousness with respect to GAM is low, the discoveries uncovered that the circumstance of hindering and underweight among the Rohingya children's reviewed was basic.

According to the findings of Emergency Nutrition Assessment Round 3 conducted from October 20th to November 8th, 2018 in Cox’s Bazar, the prevalence of GAM among children aged 6-59 months using weight-for-height (WHZ) has slightly decreased in Makeshift Settlements, from 12.0% in Round 2 to 11.0% in Round 3 and in Nayapara Registered Camp from 13.6% in Round 2 to 12.1% in Round 3 but the level of reduction is very modest and insignificant. Although the prevalence of acute malnutrition in both camps is below the WHO emergency thresholds (15%) findings still depict a serious nutrition

state of the Rohingya children. Chronic malnutrition (stunting) among children aged 6-59 months has declined but remains near the WHO critical threshold (40%) in the Makeshift Settlements [21, 22].

V. CONCLUSION

The outcomes of extreme malnutrition subsequently hampered the intellectual property and physical potential for both present and people in the future. For minimize the physically challenge people and death rate that are so basic among young generation during crises is to ensure that they are satisfactorily thought about and taken care of. Rohingya and refugee the minority groups that lives in Bangladesh as Refugee status need more facilities to defeat with the malnutrition in an Emergency situation.

ETHICAL CONSIDERATION

The approval letter from the BMRC (Bangladesh Medical Research Council) as well as from the authority of Maulana Azad University of Jodhpur, India was taken for the conduction of the research. Purpose and objectives of the research were fully explained to the child's parents before conducting the measurement. Privacy and confidentiality were maintained. Before taking any photograph or audio, a written permission was taken from the participants. We adhered to all the rules and regulations of Bangladesh government as well as Maulana Azad University of Jodhpur, India in conducting the research.

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➤ Availability of Data and Materials

Data is available upon request from corresponding author.

➤ Funding

The study was self-funded by the authors.

➤ Conflict of Interest

The author declared no conflict of interest.

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