

*Article*

## **Prevalence of malnutrition and associated factors affecting the nutritional status of Adivasi (tribal) children aged 24-59 months in Bangladesh**

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**Abstract:** Despite of recent progress in reducing the incidence of child malnutrition in Bangladesh, there are large disparities exists across gender, geographical regions, ethnic and economic groups. Adivasi's (tribal people) are regarded as one of the most exploited and deprived section of the society and their children are one of the worst victims of under-nutrition. This study aimed to estimate the prevalence and associated factors of malnutrition in different tribal children aged 24-59 months. Data was extracted from a project named "Adivasi Fisheries Project (AFP)" and the study considered 125 children from four purposively selected household (HH) clusters of four ethnic groups (Santal, Garo, Oraon, and Hajong) by quota-sampling design using the farmer field school (FFS) as the sampling frame. Malnutrition status was determined by measuring underweight, stunting and wasting and the associations between variables and malnutrition status were found out. Regression analysis then confirmed the contributions of risk factors. The prevalence of underweight, stunting and wasting was 28%, 42% and 13% respectively. Malnutrition was found to be higher among Hajong and Oraon compared to Santal and Garo. Significant association was observed between family income and malnutrition status. Having a family income below 4000 BDT (~\$50) significantly increased the risk for underweight, stunting and wasting. Moreover, younger mother's (age < 20 years) was more prone to have underweight and wasted children than their older counterparts. The study pinpointed that the standard of living of adivasi (tribal) people need to be improved and socio-demographic issues need to be addressed to tackle the malnutrition status of their children.

**Keywords:** malnutrition; adivasi (tribal); associated factors; children; Bangladesh

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### **1. Introduction**

Childhood malnutrition is one of the leading causes of the global burden of disease in low and middle income countries including Bangladesh (Jesmin *et al.*, 2011; Ahmed & Ahmed, 2009; Faruque *et al.*, 2008; Black *et al.*, 2008). Malnutrition is the underlying causes of around 3.5 million deaths and 35% of the disease burden in children of below 5 years of age. As malnutrition is pervasive in developing world, it has been estimated that nearly one-half of all children in South Asia are malnourished (Deolalikar, 2005).

Bangladesh, a developing country, is the worst victim of malnutrition where child malnutrition is very high (Rahman & Chowdhury, 2007). According to the Bangladesh Demographic Health Survey (BDHS) Report 2014, all three indicators of malnutrition showed large number of malnourished children (33% children were underweight, 36% were stunted and 14% were wasted). Bangladesh is trying very hard to reduce child

malnutrition and managed to achieve some success. According to BDHS reports of 2004 to 2011, the level of stunting has declined from 51% in 2004 to 36 % in 2011 (NIPORT, 2016).

Adivasi (also called indigenous and/or aboriginal people) originated from different parts of the Indian sub-continent. Historical evidence suggests that the *Adivasi* came to Bangladesh during the colonial period to live a better and more secure life. Initially, these people started to live in the north-west and north-east part of Chittagong Hill Tracts (CHT) of Bangladesh. Gradually, they divided themselves into small groups and moved from CHT to different parts of Bangladesh. There are 29 indigenous groups in Bangladesh constituting approximately 1.2 million people that gives a share of 1.1% of the total population of the country (BBS, 1991). Among the indigenous groups Garo, Santal, Hajong, and Oraon are well known and they have the largest number of people. Data for this study has also been collected from these four tribal groups.

Tribal people are one of the most exploited and deprived group of population in the Indian subcontinent including Bangladesh and they are at risk of under nutrition mostly because of poverty and improper health seeking behavior. Most of the tribal people depend on primitive agricultural practices and irregularity of food supply negatively affects their nutritional requirement (Parimalavalli, 2012; Xaxa, 2011). Compared to the non-tribal population the problem of low standard of living, hunger, starvation followed by vicious cycle of malnutrition, illiteracy, recurrent attack of diseases and poor sanitary and household facilities are very serious among the tribal population (Vasudevachary, 2006). Children are worst victim of all these turbulence and Bangladesh has one of the highest levels of malnutrition in the world. A study of tribal population in Bangladesh found that most of the tribal people were illiterate and belonged to low income group and their food intake was also inadequate (Parimalavalli, 2012). The present study aims to estimate the prevalence of malnutrition and what contributing factors affect the malnutrition status of tribal children aged 24-59 months, living in north and north-western region in Bangladesh.

## 2. Materials and Methods

### 2.1. Data source and study design

The data used for the thesis was collected from a project named “Adivasi Fisheries Project (AFP)” which was implemented to upgrade the economic status and standard of living of the tribal people (Garo, Hajong, Santal, and Oraon). The AFP was implemented by the World Fish Centre (WFC) in collaboration with Caritas Bangladesh and the Bangladesh Fisheries Research Forum (BFRF). The project was implemented in four areas in Bangladesh: Santal from Dinajpur district, Oraon from Rangpur district, Garo from Sherpur district and Hajong from Netrokona district. In 2009, the AFP performed a cross sectional survey to evaluate the socio-economic, anthropometric and food consumption situations of the Adivasi people under the supervision of Professor Dr. Abu Torab M.A. Rahim, Dhaka University, Bangladesh.

There were around 750 children (24- 59 months) in the project area and ten percent of these children (i.e. 75) were considered as the minimum number of statistically sufficient study subject and the study choose 125 children at the end. The study considered children of 2-5 years of age as mothers were supposed to breastfed their babies up to 2 years and thereafter the child has to depend only on family food. Malnutrition can affect this crucial time if not handled carefully because malnourished children have lower resistance to infection and are more likely to die from common childhood ailments, such as diarrheal diseases and respiratory infections (Black *et al.*, 2008).

The 125 children were selected from 4 purposively selected household (HH) clusters of four ethnic groups (Santal, Garo, Oraon, and Hajong) by quota-sampling design (minimum 20 children per HH cluster) using the FFS as the sampling frame. Socioeconomic and demographic data was collected by face-to-face interview of the HH head (mothers/ caregivers, if HH head not present) using a validated and structured questionnaire. Anthropometric data was collected by standard measuring instruments and using WHO procedure.

### 2.2. Measures of malnutrition

The dependent variable is malnutrition status (Table 1). Malnutrition status was determined by measuring three indicators: stunting, wasting and underweight. Each of these indices provides different information about growth and body composition that can be used to assess nutritional status. Stunting is a condition, which reflects the cumulative effect of chronic malnutrition of children, whereas, wasting reflects acute or current nutritional deficit. A child can be underweight for his age because he is stunted, because he is wasted or both (NIPORT, 2013). Height-for-age measures linear growth. A child who is more than two standard deviations below the median (-2 SD) of the WHO reference population in terms of height-for-age, weight-for-height and weight-for-age is considered stunted, wasted and underweight respectively (WHO, 2006). Independent variables considered

for the study were children sex, age, religion, ethnicity, family income, family size, mother's education and mother's age.

**Table 1. Definition and measurement of variables of the study.**

Variables	Definition	Measurement
Malnutrition status:		
Underweight	When children's weight for age is below minus two standard deviations (< -2 SD) from the WHO reference population weight.	Categorized into two groups: yes and no.
Stunting	When children's height for age is below minus two standard deviations the WHO reference population height.	Categorized into two groups: yes and no.
Wasting	When children's weight for height is below minus two standard deviations from the WHO reference population weight (WHO, 2006).	Categorized into two groups: yes and no.
Child 'age (months):	Age of the children	Categorized into three groups: 24-36, 37-48 and 49-.
Child sex:	Sex of the child	Categorized into two groups: boys and girls.
Child religion:	Religion of the child	Categorized into three groups: Santan, Hindu and Christian.
Child ethnicity:	Race of the child	Categorized into five groups: Garo, Oraon, Santal, Hajong and others.
Family income (BDT/month):	Monthly income of the family in Taka	Categorized into three groups: < 4000 BDT (~\$ 50), 4000-5000 BDT (~\$ 50-60) and > 5000 BDT (~\$ 60).
Family size:	Size of the family	Categorized into two groups: ≤ 5 and >5 members.
Mother's age (years):	Age of the mother in years	Categorized into three groups: -19 years, 20-29 years and 30- years.
Mother's education:	Highest education level attained by mother	Categorized into three groups: illiterate, primary (5 <sup>th</sup> grade) and secondary (10 <sup>th</sup> grade) or higher.

### 2.3. Data processing and analysis

Data were analyzed using the Statistical software SPSS version 19 after editing, coding, recoding, classification and tabulation. Descriptive statistics describes prevalence of malnutrition and general characteristics of study population. Cross-tabulation for different variables was made to observe relationship between variables and Pearson's Chi-square test was performed to test the degree of association between child malnutrition and other variables under study. To estimate the impact of background variables bivariate and multivariate logistic regression was performed calculating odds ratios (OR) and 95% confidence intervals (CI). P-value less than 0.005 were considered as statistically significant. Variables significant in the bivariate analysis were included in the multivariate analysis for further analysis which reflected the controlled effect of variables on child malnutrition.

### 3. Results

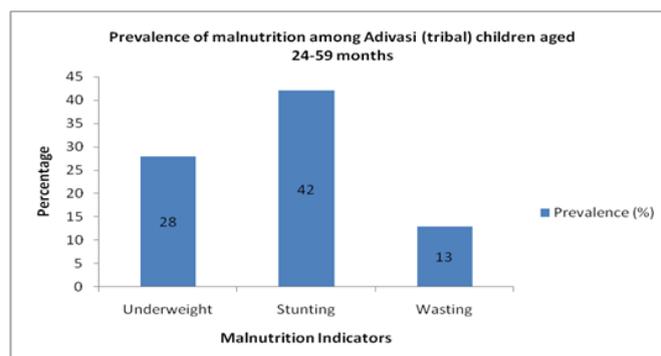
Table 2 shows the basic characteristics of study population. In the study population 59% of the children were boys, 41% were girls and 46% of them were below three years old. Half of the children belonged to the religious group of Sanatan, 45% were Christian and only 5% were Hindu and most of the children were Santal (35%) and Garo (30%). One family out of four had family income of less than 4000 BDT (~\$ 60 around) per month. Only 26% of mothers had secondary or higher education.

**Table 2. Background characteristics of study population.**

Characteristics	Categories	Percentage
Child age (months):	24-36	46
	37-48	38
	49-	16
Child sex:	Boys	59
	Girls	41
Child religion:	Hindu	5
	Sanatan	50
	Christian	45
Child ethnicity:	Garo	30
	Santal	35
	Oraon	25
	Hajong	10
Family income (BDT/per month):	<4000 (~\$50)	26
	4000-5000 (~\$ 50-60)	28
	>5000 (~\$60)	46
Family size:	≤5	54
	>5	46
Mother's age (years):	-19	39
	20-29	54
	30+	7.0
Mother's education:	Illiterate	41
	Primary	35
	Secondary or higher	24

BDT = Taka (Currency of Bangladesh); Primary = Grade 5; Secondary = Grade 10

Figure 1 illustrates the prevalence of malnutrition in terms of underweight, stunting and wasting. In the study population 28% of the children were underweight, 42% were stunted and 13% were wasted.

**Figure 1. Prevalence of malnutrition among adivasi (tribal) children aged 24-59 months.**

The malnutrition status of the study population according to background characteristics is presented in Table 3. The prevalence of underweight, stunting and wasting among boys was 26%, 45% and 14% respectively. The corresponding estimate for girls was 32%, 40% and 12% respectively. No significant difference found between boys and girls. Family income and mother's age found to be associated with different malnutrition indicators. The prevalence of wasting in the income group of <4000 BDT (~\$50), 4000-5000 BDT (~\$ 50-60) and > 5000 BDT (~\$60) was 32%, 11% and 2% respectively. Same trends were also observed in case of stunting and underweight children where the number of malnourished children decreased with the improvement of family income. Furthermore, the prevalence of wasting of children in the -19 years, 20-29 years and 30+ years old mother's was 28%, 5% and 0% respectively which remained true for other indicators as well. A significant association between the child's ethnicity and underweight was also observed. The prevalence of underweight varied from 58% among Hajong to 16% among Garo.

**Table 3. Malnutrition status of study population according to background characteristics.**

Characteristics	Categories	Underweight		Stunting		Wasting	
		Percent (%)	p-value	Percent (%)	p-value	Percent (%)	p-value
Child age (months):	24-36	26	0.60	49	0.42	14	0.82
	37-48	31		36		14	
	49-	30		40		10	
Child sex:	Boys	26	0.50	45	0.57	14	0.73
	Girls	32		40		12	
Child religion:	Hindu	17	0.35	33	0.86	17	0.95
	Sanatan	34		44		13	
	Christian	24		43		13	
Child ethnicity	Garo	16	0.009	48	0.32	10	0.90
	Santal	24		32		12	
	Oraon	44		52		15	
	Hajong	58		50		17	
Family income (BDT/per month):	<4000 (~\$50)	66	< 0.001	51	0.12	32	< 0.001
	4000-5000 (~\$ 50-60)	17		40		11	
	>5000 (~\$60)	15		34		4	
Family size:	≤5	25	0.37	38	0.30	13	0.52
	>5	33		48		13	
Mother's age (years):	-19	48	< 0.001	49	0.45	28	< 0.001
	20-29	16		40		5	
	30+	14		29		0	
Mother's education:	Illiterate	33	0.61	49	0.48	14	0.91
	Primary	26		40		14	
	Secondary or higher	24		36		11	

P-value derived from Pearson's chi-square test

Table 4 depicts the result of bivariate and multivariate logistic regression of underweight, stunting and wasting. In the bivariate analysis only family income and mother's age was significant (though varied across groups) and included in the multivariate analysis which showed that children with a family income below 5000 BDT/month (~\$ 60 US) increased the risk for underweight sevenfold as compared with children with a family income of 5000 BDT/month or more and children with a 20-29 year old mother had a double risk (OR=2.3; 95% CI: 0.21-7.0). Children with a mother younger than 20 years had more than three times (OR=3.3; 95% CI: 1.2-8.7) higher risk than children with a mother equal or older than 30 years.

**Table 4. Bivariate and multivariate logistic regression of malnutrition (underweight, stunting & wasting).**

Characteristics	Categories	Underweight		Stunting		Wasting	
		Bivariate analysis	Multivariate analysis	Bivariate analysis	Multivariate analysis	Bivariate analysis	Multivariate analysis
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Child age (months)	24-36	1		1		1	
	37-48	1.1 (0.32-3.8)		0.80 (0.51-2.3)		0.80 (0.50-2.3)	
	49-	1.2 (0.36-4.0)		0.70 (0.40-21)		1.5 (0.70-3.2)	
Child sex	Boys	1		1		1	
	Girls	1.3 (0.63-2.9)		1.1 (0.70-2.1)		1.2 (0.58-1.9)	
Child religion	Hindu	0.50 (0.21-2.3)		0.70 (0.40-1.7)		1.3 (0.55-2.3)	
	Sanatan	1.5 (0.21-14)		0.61 (0.30-2.1)		1.3 (0.59-2.5)	
	Christian	1		1		1	
Child ethnicity	Garo	1		1		1	
	Santal	1.2 (0.05-3.1)		0.30 (0.03-3.2)		2.7 (0.28-33)	

Indicator of malnutrition		Underweight		Stunting		Wasting	
Characteristics	Categories	Bivariate analysis	Multivariate analysis	Bivariate analysis	Multivariate analysis	Bivariate analysis	Multivariate analysis
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
	Oraon	1.4 (0.10-3.2)		0.70 (0.06-7.1)		2.4 (0.27-27)	
	Hajong	1.2 (0.05-3.7)		0.34 (0.02-3.2)		1.9 (0.24-23)	
Family income (taka/per month):	< 4000 BDT (~\$50)	<b>11.0 (6.5-25.0)*</b>	<b>8.5 (2.6-28.0)*</b>	2.6 (0.71-4.5)	2.0 (0.15-4.5)	<b>12 (6.5-23)*</b>	<b>6.3 (1.2-34.0)*</b>
	4000-5000 BDT (~\$ 50-60)	<b>9.6 (2.4-16.0)*</b>	<b>7.6 (2.4-23.1)*</b>	<b>2.0 (1.2-3.4)*</b>	<b>1.8 (1.2-3.5)*</b>	<b>4.6 (2.3-9.7)*</b>	3.0 (0.73-11)
	> 5000 BDT (~\$60)	1	1	1	1	1	
Family size:	≤ 5	1		1		1	
	> 5	1.4 (0.60-3.2)		1.5 (0.61-2.8)		0.93 (0.43-2.1)	
Mother's age (years):	-19	<b>5.0 (2.3-9.5)*</b>	<b>3.3 (1.2-8.7)*</b>	2.4 (0.54-8.5)		8.0 (0.74-16)	6.2 (0.72-15)
	20-29	4.6 (0.80-8.5)	2.3 (0.21-7.0)	1.4 (0.62-2.6)		<b>5.2 (2.3-9.5)*</b>	3.8 (0.63-7.6)
	30+	1	1	1		1	1
Mother's education:	Illiterate	1.5 (0.51-4.2)		1.7 (0.75-3.8)		1.3 (0.54-3.4)	
	Primary	1.4 (0.53-3.8)		1.4 (0.53-3.2)		0.90 (0.64-2.7)	
	Secondary or higher	1		1		1	

OR (Odds Ratio), 95% CI (Confidence Interval), \*= Significance at 0.005 level; 1= reference group

Moreover, children with a family income below 5000 BDT/month (~\$ 60 US) increased the risk for stunting by two times (OR= 2.0, 95% CI: 1.2-3.4) than the reference income (> 5000 BDT (~\$60)). For wasted children, multivariate analysis showed that children with a family income below 4000 BDT/month (~\$ 50 US) increased the risk for wasting by more than six fold (OR= 6.3, 95% CI: 1.2-34) compared to the children with family income over 5000 BDT/month (~\$ 60 US).

#### 4. Discussion

The prevalence of malnutrition among tribal children aged 24-59 months was very high and it varied insignificantly across gender and ethnicity. There was an association between child ethnicity and malnutrition status to some extent. The prevalence of underweight, stunting and wasting was highest among Hajong and Oraon and lowest among Santal and Garo. Very strong association between family income and child malnutrition has been found and the association remained strong across ethnicity. The multivariate logistic regression analysis showed that having a family income below 4000BDT (US ~\$50) significantly increased the risk for underweight, stunting and wasting. Furthermore, children with a family income below 5000 BDT/month (~\$ 60 US) increased the risk for underweight as compared with children with a family income of 5000 BDT/month or more. Moreover, result showed mother's age also significantly affected child malnutrition. Younger mothers (< 20 years) were more prone to have underweight and wasted child compared to older mothers (≥30 years). It showed child with a mother younger than 20 years had three times higher risk of being underweight than child with a mother equal or older than 30 years.

Two out of three children were underweight, half were stunted and more than one-third were wasted if the family income was less than 4000 BDT (~\$50 US). However, the figure drops down to a large extent if the family income of the children rises above 5000BDT (~\$ 60 US). A cross-sectional study on tribal children in India found that low family income attributed low malnutrition status of children in the family (Parimalavalli, 2012). A study on non-Adivasi children in Bangladesh also suggested that malnutrition was strongly associated with poor socio-economic status (Mohsena *et al.*, 2010; Van de Poel *et al.*, 2007). Several studies in Bangladesh found that child malnutrition rates were associated with household living standards e.g. family income, family

size, area of living etc. (Rahman & Chowdhury, 2007; Deolalikar, 2005;). The importance of socio-economic status on children's health had also been acknowledged by Fotso & Kuate-Defo (2005) and Pollack *et al* (2007). Moreover, the present study revealed that age difference of children did not have big effect on malnutrition status. In case of religion and ethnicity, children who belonged to the Sanatan religion and Garo ethnicity had more malnourished children compared to the other religion and ethnic group.

According to United Nations Children's Fund (UNICEF), the prevalence of malnutrition in Bangladesh was amongst the highest in the world as malnutrition passes from one generation to the next because malnourished mothers give birth to infants who struggle to thrive or grow well. In addition, one half of child deaths attribute to malnutrition due to weakening immunity as survivors of malnutrition were left vulnerable to illness, stunted and intellectually impaired (UNICEF, 2007). The malnutrition status of Adivasi children found in this study is more or less similar to the children of the whole country (BDHS, 2016). It suggests that poor nutrition status of children prevails across the whole country whether they are Adivasi or not. The government of Bangladesh with the assistance of development partners has made substantial investments in nutrition, including the National Nutrition Programme (NNP) which provides comprehensive nutrition services to children and women at community level which involved Adivasi areas as well (Ministry of Health and Family Welfare, 2012). Because of this effort and collaboration significant improvement in reducing some forms of malnutrition was achieved and the numbers of underweight, stunted and wasted children are decreasing day by day (Millennium Development Goals, Bangladesh Progress Report 2012, 2013; NIPORT, 2013; UNICEF, 2007). However, major improvements (e.g. improving family income) are continuously needed in order for all children to be free from malnutrition.

## 5. Conclusions

Prevalence of malnutrition which was staggeringly high among the Adivasi children, Government, NGO's and development organizations should work combinely and deliberately to address the poverty and other underlying socio-demographic factors which severely affects malnutrition status. As Adivasi population is still regarded as deprived group of population in the society, especial focus is required to improve their standard of living which in turn will help to reduce the child malnutrition.

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## Conflict of interest

None to declare.

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