



Comparison of Socio-economic and Health Status in Rural Primary School Students: A Case of Bangladesh

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Authors' contributions

This work was carried out in collaboration among all authors. Author MAAF designed the study, collected data and edited the final draft of the manuscript. Authors MNH and TT collected the data. Author MMS designed the study and reviewed the final draft. Author TKC performed the statistical analysis and wrote the first draft of the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Objective: Although Bangladesh is rapidly gaining economic development, education and health related indices are not equally developed in all parts of the country. The objective of the study was to compare the socio-economic and health status of students in public and private primary schools.

Methods: This was a cross sectional study conducted among 99 public and 128 private primary school children during 2018. Two public and two private primary schools were selected purposively from 2 villages of Chandpur. Subjects were divided into 2 groups: public primary school students and private primary school students. During a 'free health check-up and treatment program', guardians were asked to participate in the study. After taking informed written consent, students and guardians were asked about demographic, socioeconomic (such as, education, occupation,

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monthly income), and health related factors (such as, antenatal checkup, mode of delivery, immunization, deworming); then, anthropometric measurements (height, weight) and physical examinations of the children were done. Comparison was done between groups.

Results: On socioeconomic status, monthly family income was more and paternal education was higher in private-school students than the public-school students. On health indices, antenatal care (ANC), Caesarian section (CS), living standard, use of sanitary latrine, and nutritional status of private school students were significantly better than public-school students. However, Public school students had higher deworming rate.

Conclusion: Students in private schools had better socio-economic and health status in Bangladesh. Health-related indices are comparable to national parameters. It is recommended that socio-economic and education status needs further improvements for sustainable health and well-being.

Keywords: Socio-economic status; health; nutrition; primary school; children; public; private.

ABBREVIATIONS

NGO : Non-Government Organization
 km : Kilometer
 ANC : Antenatal Check-up
 WHO : World Health Organization
 GAVI : Global Alliance for Vaccination and Immunization
 CS : Caesarian Section
 NVD : Normal Vaginal Delivery
 AVD : Assisted Vaginal Delivery

1. INTRODUCTION

Socio-economic status is considered as a leading predictive variable of health and well-being and there is consistent evidence that people who are socio-economically in better condition do better on most of the measures of health [1,2]. Bangladesh is the 8th most populous country in the world and rapid economic growth had enabled Bangladesh to reach the lower middle-income country status in 2015 [3,4]. It has been awarded several times for its achievements especially in health-related parameters [5–7]. However, not all parts of Bangladesh are achieving the same level of prosperity and there are pockets of areas where the living and health status are not comparable to many lower-middle income countries. In the rural areas of Bangladesh, there are many primary schools which are mainly governed and financed by the public sector and there are also private schools run by Non-government organizations (NGOs), donors, philanthropists, educationists and missionaries. Usually some families who have financial solvency send their children to private schools. However, there are other non-government schools scattered in the country who provide free education. In spite of these efforts in education, literacy rate for above 7 years people is estimated to be 72.3% (male 74.3% and

female 70.2%) [8]. There have been several large-scale and community-based studies on socioeconomic and health status among under-five children in Bangladesh [9–12]. However, analyses of these factors among primary school children were scanty, sparse and varied among studies [13,14]. It has been shown that school-based screening can identify children with health conditions, and monitor their growth and well-being which have impact on their future health and health of the nation [15]. It also provides opportunity for evidence-based planning and community engagement for the children of this age group. Chandpur is a district of Bangladesh where the socio-economic and health indices are lower than many metropolitan cities in the country. The aim of this study is to pick up a cross section of Chandpur to assess the socioeconomic and health status indicators and to compare it to the available country data and find areas which needs more concentration for improvement.

2. MATERIALS AND METHODS

2.1 Study Design

Population based cross sectional comparative study.

2.2 Study Period

January to December, 2018.

2.3 Place of Study

Bakila and Gogra villages of 2 No. Bakila Union, Haziganj Upazilla, Chandpur district, Bangladesh.

2.4 Study Subjects

Primary school children in the study area.

2.5 Study Procedure

Subjects were divided into 2 groups: Those who were attending public primary school and those who were attending private primary school. Data were collected from 99 children of two public school and 128 children of 2 private schools selected purposively. All the schools are beside pucca road and within 1 Kilometer (km) of the bus stand. Railway stations are also well connected to the schools and within 4 km from the schools. Union health sub-center is within 1.5 km and well connected to the schools. Along with various government organizations, five NGOs have been working in this Union for the last 10 years. The study was conducted under a 'free health check-up and treatment program'. Guardians of the children were informed about the date and time of the program. They were briefed about the research and the benefit to their children. Union Chairman, school teachers, one member of the school committee and one representative of the guardian and some volunteers were involved with the entire process. Guardians who were willing to permit their children to participate in this program was asked to register the names of their children with detailed particulars and sign the consent form. They were requested to come along with their children on a given date and time. All the children were interviewed and examined according to a pre-formed data sheet with the help of their guardians. Demographic data, socio-economic and health related data were collected by interview of parent or guardian and by anthropometric measurement, history and physical examinations of the children.

2.6 Data and Variables

The age and sex, father's education, father's occupation, number of family members, monthly family income, house hold, drinking and sanitation, maternal antenatal check-up (ANC), place and mode of delivery, vaccination and deworming, height and weight were recorded.

2.7 Statistical Analysis

Categorical variables were described as frequency and percentage and compared using Chi-square or Fisher's exact test. Continuous variables were expressed as mean or median \pm standard deviation or interquartile range and comparison was done by independent sample t test. Statistical package for social science

(SPSS) version 22 was used for analysis. All data were expressed as mean \pm standard deviation, whenever possible. *P* value < 0.05 was considered to be significant. Weight-for-age-z score of WHO growth standard was used to create the underweight variable. Children whose weight-for-age-z scores were below minus two were defined as underweight and those who had height-for-age-z scores were below minus two were defined as stunted. WHO AnthroPlus software version 1.0.4 was used to calculated underweight and stunting.

3. RESULTS

A total of 227 students were included in the study. Among them 99 were from public school and 128 were from private school. Age ranged from 4 to 14 years (Median 7 years). Over all, male students were 132 and female 95 (male to female ratio was 1.39:1). Female education was about 4.36% more in private school, but there was no significant difference ($P=0.51$) between public and private schools with regards to sex distribution. However, there was significant difference in age between the two schools (mean 8.11 ± 1.91 years in private vs 6.30 ± 1.88 years in public, $P<0.01$). There was also significant difference in height (mean 117.83 ± 11.045 cm in private vs 112.91 ± 10.69 cm in public, $P<0.01$). But there was no significant difference in weight between the groups (mean 20.87 ± 4.52 kg in private vs 19.65 ± 5.18 kg in public, $P=0.06$).

Monthly family income (in taka) of the parent was significantly more in private schoolers (mean $8,843.43 \pm 5052.60$ in public vs $21,625 \pm 18,431.72$ in private, $P<0.01$). Similarly, mean per capita monthly income (in taka) was also more than double in parents in private schools compared to public schools (2014.39 ± 1398.95 in public vs 4203.91 ± 3089.50 in private, $P<0.01$). Majority of the fathers (53.53%) in public school did not complete their primary education (class V) and only 24.24% at least completed their school education (class X). There was none with a Master's degree. On the other hand, 26.57% fathers in private schools did not complete their primary education and 46.88% were at least SSC (class X) pass. However, only 2 fathers were Masters pass. Table 1 shows education level of fathers of all the students in both groups. Number of family members were similar in both groups (mean 5.04 ± 1.47 , range 3-10, in public and 5.36 ± 1.77 , range 3-14, in private school, $P= 0.14$).

Table 1. Education level of fathers of the students of primary schools

	Public school		Private school		Total	
	No (n=99)	%	No (n=128)	%	No (N=227)	%
No formal education	26	26.26%	1	0.78%	27	11.89%
Signature only	10	10.10%	12	9.38%	22	9.69%
Below class V	17	17.17%	21	16.41%	38	16.74%
Primary school (class V) pass	22	22.22%	34	26.56%	56	24.67%
SSC/class X pass	10	10.10%	29	22.66%	39	17.18%
HSC/class XII pass	9	9.09%	17	13.28%	26	11.45%
Graduate	5	5.05%	12	9.38%	17	7.49%
Masters	0	0.00%	2	1.56%	2	0.88%
Total	99	100%	128	100%	227	100%

*SSC: Secondary school certificate, HSC: Higher school certificate

Majority of the fathers in public schools were day laborer (42.42%) or farmer (23.23%), while in private schools, majority of fathers did private job (32.81%) or had businesses (28.13%). About 17.97% fathers in private schools were expatriates, while only 5.05% of fathers in public schools were expatriates. Table 2 shows occupation of fathers of school children in both groups. There was significant difference between groups in housing status ($P<0.01$). Majority in both groups lived in tin shade house (87.88% in public vs 63.28% in private school); however more student in private school lived in pucca house than public school (32.81% vs 3.03%, respectively). Residence in semi-pucca house was 9.09% in public school and 3.91% in private school.

About half (48.02%) of the mothers of all children in the study did not have antenatal check-up during their pregnancy. There was no significant difference between groups with regards to antenatal check-up ($P=0.07$). However, mothers in private school had more antenatal check-up by doctors than mothers in public school (42.19% vs 27.27% respectively). But there was significant difference between public and private schools with regards to mode of birth of the students ($P<0.01$). Majority of the children in both groups

were born by normal-vaginal delivery at home (85.86% in public school vs 64.84% in private school). 19.35% children were born by caesarian section (CS) in private schools while CS rate in public schools was only 3.03%. Immunization was complete in about 96.48% of the children and there was no significant difference between groups with regards to immunization ($P=0.06$). Still, 4 children in public school did not have immunization at all. There was significant difference between groups in use of sanitary toilet at home (99.22% in private school vs 88.89% in public school, $P<0.01$). All the children in both groups used tube-well as source of drinking water. Deworming rate was more than 75% in the children, however, 10 (7.81%) children in private school did not take anthelmintic at all while all children in public school had either regular or irregular deworming. Table 3 shows health related indicators between students of public and private schools.

Since the age of the students varied within a wide range of 4 to 14 years, we performed age group stratified analysis of some health indicators which might be affected by the age of the students (Table 4). 56 students were "less than 5 years", 151 students were "5 to 10 years", and 20 students were "more than 10 years" old.

Table 2. Occupation of fathers of the students of primary schools

	Public school		Private school		Total	
	No (n=99)	%	No (n=128)	%	No (N=227)	%
Day labor	42	42.42%	14	10.94%	56	24.67%
Private job	14	14.14%	42	32.81%	56	24.67%
Business	12	12.12%	36	28.13%	48	21.15%
Farmer	23	23.23%	7	5.47%	30	13.22%
Job abroad	5	5.05%	23	17.97%	28	12.33%
Govt. job	3	3.03%	6	4.69%	9	3.96%
Total	99	100.00%	128	100.00%	227	100.00%

* Data were arranged on descending order of frequency of occupation of fathers of total students

It showed that deworming was more irregular in “more than 10 years” age group (30%); however, both deworming and immunization were not statistically different among age groups ($P=0.53$ and 0.36 , respectively). On the contrary, the “5 to 10 years” age group was significantly more underweight and stunted than the other two age groups (25.83% and 29.14%; $P=0.00$ and 0.02 respectively). We also compared these age stratified parameters between public and private schools. It was found that, both “less than 5 years” and “5 to 10 years” old students of public schools (37.50% and 35.44%, respectively) were significantly ($P=0.00$) underweight than private school students (2.08% and 15.28%, respectively). Although, 5 to 10 years” old students of public schools (41.177%) were significantly ($P=0.00$) stunted than private school students (15.28%); the difference

between less than 5 years age group (25% vs 8.33%, $P=0.20$) was not statistically significant. Students of private schools belonging to “5 to 10 years” age group had significantly less deworming than same age students of public schools (no deworming in 9.00% vs 0.00%, respectively; $P=0.02$). There were only 20 students in “more than 10 years” age group and there was no significant difference between public and private students in this age group regarding these parameters.

4. DISCUSSION

This study has been conducted to have a snapshot view of the socioeconomic and health parameters of primary school children in Chandpur. The findings of the study suggest that

Table 3. Health indicators between students of public and private school

	Public school		Private school		Total		P value
	No (n=99)	%	No (n=128)	%	No (N=227)	%	
Maternal ANC							
None	54	54.0%	55	42.9%	109	48.0%	0.07
Doctor	27	27.0%	54	42.1%	81	35.6%	
FWV	18	18.0%	19	14.8%	37	16.3%	
Mode of birth							
NVD-home	85	85.8%	83	64.8%	168	74.0%	0.00
CS-hospital	3	3.03%	25	19.5%	28	12.3%	
NVD-hospital	5	5.05%	9	7.03%	14	6.17%	
AVD-hospital	3	3.03%	7	5.47%	10	4.41%	
AVD-home	3	3.03%	4	3.13%	7	3.08%	
Immunization							
Complete	94	94.9%	125	97.6%	219	96.4%	0.06
Incomplete	1	1.01%	3	2.34%	4	1.76%	
No vaccination	4	4.04%	0	0.00%	4	1.76%	
Use of toilet at home							
Sanitary	88	88.8%	127	99.2%	215	94.7%	0.00
Non-sanitary	11	11.1%	1	0.78%	12	5.29%	
Deworming							
Regular	79	79.8%	95	74.2%	174	76.6%	0.02
Irregular	20	20.2%	23	17.9%	43	18.9%	
Not done	0	0.00%	10	7.81%	10	4.41%	
Mile stone of development							
Normal	95	95.9%	127	99.2%	222	97.8%	0.17
Delayed	4	4.04%	1	0.78%	5	2.20%	
Weight for age							
Underweight	32	32.3%	12	9.38%	44	19.3%	<0.01
Not underweight	67	67.6%	116	90.6%	183	80.6%	
Height for age							
Stunted	38	38.3%	17	13.2%	55	24.2%	<0.01
Not stunted	61	61.6%	111	86.7%	172	75.7%	

*ANC: Antenatal check-up; NVD: Normal vaginal delivery; Cs: Caesarian section; AVD: Assisted vaginal delivery

Table 4. Health indicators stratified by age group

	<5 years		5-10 years		>10 years		Total		P value
	No (n=56)	%	No (n=151)	%	No (n=20)	%	No (N=227)	%	
Deworming									
Irregular	8	14.29%	29	19.21%	6	30.00%	43	18.94%	0.53
Not taken	3	5.36%	7	4.64%	0	0.00%	10	4.41%	
Regular	45	80.36%	115	76.16%	14	70.00%	174	76.65%	
Immunization									
No vaccine	0	0.00%	3	1.99%	1	5.00%	4	1.76%	0.36
Complete	56	100%	144	95.36%	19	95.00%	219	96.48%	
Incomplete	0	0.00%	4	2.65%	0	0.00%	4	1.76%	
Weight for age									
Not underweight	52	92.86%	112	74.17%	19	95.00%	183	80.62%	0.00
Underweight	4	7.14%	39	25.83%	1	5.00%	44	19.38%	
Height for age									
Not stunted	50	89.29%	107	70.86%	15	75.00%	172	75.77%	0.02
Stunted	6	10.71%	44	29.14%	5	25.00%	55	24.23%	

these 2 villages in Chandpur are lagging behind on several parameters of socioeconomic standards for a lower- middle income country. Bangladesh is rapidly gaining economic stabilization. But to sustain the achievements all parts of it need to be progressing simultaneously. These 2 villages are not very remotely located and lie within 15 km from the center of Chandpur district, about 8 km from the Upazilla/Thana and have a very good transport system through roads, railways and river. Moreover, these two villages are very near to government and private healthcare facilities. However, it can also be noted that most parameters have improved in comparison to the 2011 census reports.

Chandpur is one of 64 districts in Bangladesh with an area of 1645.32 square km and about 81% of its households are in rural area. It had a population of about 2.5 million in 1230 villages according to the last census of 2011. About 83% live in kutcha house and only 7% live in pucca house. Tube well is the source of drinking water in 88% of population and only 69% uses sanitary latrine. Only 39% of the population completed at least their primary education with only less than 2% people had bachelor degree or above. Although number of people who had not passed any class were reduced from 35% in 2001 to 24% in 2011, passing rates for higher classes changed minimally and still 52% population of 5-29 years are not attending schools. Employment

rate is 30% and about half of them are involved in agriculture, 11% in service and 3% are involved in industry. About 14% of the population of Chandpur lives in Haziganj Upazilla. Among them about 82% lives in kutcha house, 7% in Pucca house and 10% lives in semi pucca house [16]. This study was conducted in 2 villages of Haziganj Upazilla.

In this study, the students of public schools had higher mean age than that of private schools. This may indicate that start of schooling is delayed in some students of public schools. It can be assumed that families with a higher income level can afford to get their children admitted in private schools. There was significant difference in income between the two groups. Although not significant, the proportion of female students were higher in private schools meaning that there may still be some families in which girls are not sent to schools. Education of parent is also not very satisfactory but the situation has improved in comparison to 2011 census report [16]. The literacy rate of Bangladesh is estimated to be 72.3% in 2017. However, national literacy rate for more than 7 years old population had increased to only 51.8% in 2011 census from 46.2 in 2001 census. The literacy rate of Chandpur was 55% in 2011 census. In this study about 12% father were illiterate who are unable to write their signatures. Involvement in farming has reduced from the census report and

involvement with other occupations increases. Still, 42% of fathers in public school and 11% in private schools are dependent on day labor. Foreign currency is an important source of family income and about 18% fathers in private schools are expatriate. However, illiterate or less educated people are usually engaged in day labor [10]. Median house hold size was 5 (mean 5.22) which is larger than the average household size for Bangladesh (4.2) and Chandpur (4.7) [8].

Although there is rapid economic development in the world, developing countries still have the greatest prevalence of early childhood malnutrition despite recent rapid economic development [11,17]. Bhattacharyya & Sarkar (2010) showed that maximum under-nourished children was found among those fathers were agricultural laborers while service holders' children had minimal under nutrition [18]. This is because service holders are usually educated and conscious about health of children. This was also true for this study. The adverse impacts of malnutrition are linked to decreases in the development of social skills among children [11]. WHO stated underweight as the single largest risk factor for the disease burden in developing countries and about 53% of all deaths among young children are attributable to underweight [11,19]. In Bangladesh, underweight prevalence rate was reported to be 22% in Bangladesh demographic and health survey, 2017 [20]. In this study overall underweight rate was 19%; however, there were significant differences between groups both for underweight and stunting. A number of studies have been conducted in Bangladesh which suggested that maternal education is a strong and significant predictor for child underweight [12,21–23]. Although maternal education was not analyzed in this study, from the situation of father's education it can be assumed that the situation is far less than satisfactory level. Paternal education has also been found to be an independent determinant of child underweight in Bangladesh [11,24]. Das et al. reported that children of illiterate fathers had 30% more likelihood of being underweight than the children of fathers who had completed primary education [24]. Siddiqi et al found a positive association between paternal education and risk of child underweight [25]. Studies have also confirmed that status of latrine, poor household income, maternal antenatal and postnatal care, maternal decision making autonomy, residence in rural area have influence on child's nutritional status [11,12,22,24,26]. About half of the mothers of the children in this

study did not have antenatal care. The national coverage for ANC is 31% for 4 visits and 64% for at least 1 visit [8]. In both groups ANC coverage was more with doctors than with family welfare visitors. Sanitary latrine usage was 95% in this study. This is much better than 2011 census report where only 69% population in Chandpur used sanitary latrine. However, the use was significantly higher in private school children. National usage of sanitary latrine increased from 38% in 2001 census to 64% in 2011 census.

Delivery was conducted at home in 77% of the mothers of children in this study which is more than the national rate of 62.2% [8]. This was not because of lack of hospital facilities. There are quite a number of government and private hospitals in the vicinity of these areas. However, the presence of skilled birth attendance during delivery was not recorded in this study. Kamal et al reported that there is inequalities in the use of SBAs [27]. CS rate among mothers of children of private school was about 20% which is similar to national rate of about 23% [8]. However only 3% of public-school children were born by CS. Overall, institutional delivery rate was about 23% which is higher than the rate reported by Kamal et al. [28]. Immunization was complete in about 97% of the children which is better than the 87% coverage rate for all vaccinations in Bangladesh. Bangladesh received GAVI Alliance Award for its outstanding performance in improving child health immunization from WHO in 2009 and 2012; and "the vaccine hero award" in 2019 [6,7]. Overall, deworming rate was 96% including irregular deworming. However, this is less than the national achievement of 99% deworming rate [8].

There has been a major improvement of the overall health status of people of this country over the last few decades. Child mortality per 1000 population has been reduced from 13.6 in 1991 to 2.71 in 2011 [29]. Encouragement of ANC and hospital delivery or delivery by trained birth attendant reduced neonatal mortality per 1000 live births from 48 in 1996 to 17 in 2017 [9,30]. 1000 live births in 2017 [8]. Infant mortality rate per 1000 live births was also reduced to 24 in 2018 from 87 in 1991 and under 5 mortality reduced to 31/1000 live births [8]. These findings suggest that the health-related indices such as ANC, CS, immunization, deworming, safe drinking water and sanitation are comparable to national parameters and in some instances is better than the national achievement. Bangladesh has a good health care infrastructure

and by proper use of these facilities, health related parameters can be further improved [31]. On the contrary, socio-economic and educational status needs further improvement for sustainable health and well-being. This is in accordance to the so called Bangladesh paradox where there was exceptional health achievement despite economic poverty [32].

This study has some limitations. The data on socio-economic status were based on answers provided by the participants and there might be tendency among them to exacerbate or reduce the actual figure, especially with regards to monthly income. The information was not also cross checked. This was also not a longitudinal study, sample size was small and samples were taken purposively, not randomly. The data represent only a small part of 2 villages and cannot be generalized.

5. CONCLUSION

Socioeconomic and health related parameters in the studied areas of Chandpur district depict that there is a part of population where developmental goals have not been achieved completely. Children in private primary schools have better socioeconomic and health related parameters than children in public primary schools. More attention is needed to improve the overall socio-demography of these areas.

CONSENT

Informed written consent was taken from parents of the participants.

ETHICAL APPROVAL

The study was conducted after approval from head of department of Pediatric Surgery, Chittagong Medical College Hospital, chairman of 2 No Bakila Union parishad and heads of the concerned schools. The current study has guaranteed the confidentiality of our data by expressly omitting names from the case record forms. The current study has collected and processed the data in absolute anonymity.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Kuate-Defo, Barthelemy, Fotso J-C. Measuring socioeconomic status in health research in developing countries: Should we be focusing on households, communities or both? *Soc Indic Res.* 2005; 72:189–237.
2. Pollack CE, Chideya S, Cubbin C, Williams B, Dekker M, Braveman P. Should health studies measure wealth? a systematic review. *Am J Prev Med.* 2007;33: 250–65. Available: <https://doi.org/10.1016/j.amepre.2007.04.033>.
3. The World Bank. World Bank Bangladesh 2020. Available: <https://www.worldbank.org/en/country/bangladesh/overview#:~:text=Rapid growth enabled Bangladesh to,track for graduation in 2024.> (Accessed July 12, 2020)
4. Current Population 2020. Available: <https://www.census.gov/popclock/print.php?component=counter> (Accessed July 12, 2020)
5. Reuters. UN to Award Bangladesh Reducing Child Mortal 2010. Available: <https://www.reuters.com/article/us-bangladesh-mortality/un-to-award-bangladesh-for-reducing-child-mortality-idUSTRE68J3SA20100920> (Accessed July 12, 2020)
6. Bangladesh again honored with GAVI award 2012. Available: <https://dghs.gov.bd/index.php/en/home/91-english-root/events-held/156-gavi-award> (Accessed July 12, 2020)
7. GAVI 2019. Available: <https://www.gavi.org/news/media-room/prime-minister-bangladesh-receives-2019-vaccine-hero-award> (Accessed July 12, 2020)
8. Health Bulletin. 2018:4–6. Available: <https://dghs.gov.bd/images/docs/Publications/HB 2018 final.pdf>.
9. DGHS. Health Bulletin; 2018.
10. Haque M, Islam K. Socio-economic condition, dietary pattern and nutritional status of pre-school ethnic children in Bandarban district of Bangladesh. *J Nutr Heal Food Eng Res.* 2020;8:395–402. Available: <https://doi.org/10.15406/jnhfe.2018.08.00302>.
11. Chowdhury TR, Chakrabarty S, Rakib M, Saltmarsh S, Davis KA. Socio-economic

- risk factors for early childhood underweight in Bangladesh. 2018;1–12.
12. Mohsena M, Mascie-taylor CGN, Goto R. Association between socio-economic status and childhood undernutrition in Bangladesh; a comparison of possession score and poverty index. *Public Heal Nutr.* 2010;13:1498–504. Available: <https://doi.org/10.1017/S1368980010001758>.
 13. Hossain S, Ahmed F, Hossain S. Hygiene Practices of Rural School Practices of Rural School Age. 2018;7. Available: <https://doi.org/10.5195/cajgh.2018.282>.
 14. Sultana N, Afroz S, Tomalika N, Momtaz H. Prevalence of childhood obesity and undernutrition among urban school. 2018; 1–10. Available: <https://doi.org/10.1017/S0021932018000093>.
 15. Nordstrand MA, Saxe DS, Abdirizak M, Adam MB, Andreas M, Saxe DS, et al. Health and disease among Somali primary school children in Hargeisa Health and disease among Somali primary school children in Hargeisa. *Glob Health Action.* 2019;12. Available: <https://doi.org/10.1080/16549716.2019.1598648>.
 16. Population & Housing Census 2011 Zila Report: Chandpur; 2015.
 17. Pasricha S, Biggs B. Undernutrition among children in South and South-East Asia. *J Paediatr Child Heal.* 2010;46:497–503. Available: <https://doi.org/10.1111/j.1440-1754.2010.01839.x>
 18. Bhattacharyya K, Sarkar TK. Nutritional profile of children under 5 years of age in a tribal community in the District of Maldah, West Bengal. *J Prim Care Community Health.* 2010;1:184–6. Available: <https://doi.org/10.1177/2150131910378692>
 19. Wolde M, Berhan Y, Chala A. Determinants of underweight, stunting and wasting among schoolchildren. *BMC Public Heal.* 2015;15:1–9. Available: <https://doi.org/10.1186/s12889-014-1337-2>
 20. Bangladesh Demographic and Health Survey. 2019;5–7. Available: https://www.aidsdatahub.org/sites/default/files/publication/DHS_Bangladesh_2017-18_key_indicators_2019.pdf
 21. Devkota S, Panda B. Socioeconomic gradients in early childhood health: Evidence from Bangladesh and Nepal. *Int J Equity Health;* 2016. Available: <https://doi.org/10.1186/s12939-016-0364-2>
 22. Srinivasan CS, Zanello G, Shankar B. Rural-urban disparities in child nutrition in Bangladesh and Nepal. *BMC Public Health.* 2013;13:1–15.
 23. Ahsan KZ, Arifeen S El, Al-mamun A, Khan SH, Chakraborty N. Effects of individual, household and community characteristics on child nutritional status in the slums of urban. *Arch Public Heal.* 2017;75:1–13. Available: <https://doi.org/10.1186/s13690-017-0176-x>
 24. Das S, Gulshan J. Different forms of malnutrition among under five children in Bangladesh: A cross sectional study on prevalence and determinants. *BMC Nutr.* 2017;1–12. Available: <https://doi.org/10.1186/s40795-016-0122-2>
 25. Siddiqi MNA, Haque MN, Goni M. Malnutrition of under-five children: evidence from Bangladesh. *Asian J Med Sci.* 2011;2:113–9.
 26. Rahman MM, Saima, Umme, Goni MA. Impact of Maternal household decision-making autonomy on child nutritional status in. *Asia-Pacific J Public Heal.* 2015; 27:509–20. Available: <https://doi.org/10.1177/1010539514568710>
 27. Kamal SMM, Hashim C, Kabir MA. Inequality of the use of skilled birth assistance among rural women in Bangladesh: Facts and factors. *Asia-Pacific J Public Heal.* 2015;27:1321–32. Available: <https://doi.org/10.1177/1010539513483823>
 28. Kamal SMM, Hassan CH, Alam GM. Determinants of institutional delivery among women in. *Asia-Pacific J Public Heal.* 2015;27:1372–88. Available: <https://doi.org/10.1177/1010539513486178>
 29. BBS. Population and Housing Census: Socio- economic and demographic report; 2015.
 30. DGHS. Health Bulletin; 1997. (Accessed July 10, 2020)

31. Banu T, Chowdhury TK, Kabir M, Talukder R, Lakhoo K. Bringing surgery to rural children: Chittagong, Bangladesh experience. *World J Surg.* 2013;37. Available:<https://doi.org/10.1007/s00268-013-1916-x>
32. Chowdhury AMR, Bhuiya A, Chowdhury ME, Rasheed S, Hussain Z, Chen LC. The Bangladesh paradox: Exceptional health achievement despite economic poverty. *Lancet.* 2013;382: 1734–45.

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