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A profile of illnesses prevailing in the secondary schools of rural communities of Bangladesh

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Abstract

Background and objectives: The childhood population in Bangladesh is ~20% of the 166.5 million. The rural population comprises almost 70%. Approximately, Bangladesh has more than 23,500 high schools. There has been no published data on the profile of illness commonly observed among the high school children. The aims of the study were a) to determine a profile of common illness among the students of rural high schools; b) to assess the nutrition status related to socio-economic class and c) to find out the correlations between anthropometry and blood pressure and between anthropometry and blood glucose status.

Methods: The study was conducted in purposively selected high schools in Santhia thana under the district of Pabna. Local leaders and the school teachers volunteered to communicate the study objectives and investigation details to the eligible students. The teachers prepared the list of participants. All the willing participants were advised to attend the investigation site in the morning in a fasting state. Each participant was interviewed. Socio-demographic and clinical history was taken. Investigations included anthropometry – height (ht), weight (wt), waist- and hip-circumference (waist, hip). Adiposity indices namely body mass index (BMI – wt in kg/ht in met. sq.), waist/hip ratio (WHR) and waist/ht ratio (WHtR) were calculated. Resting blood pressure was taken. Clinical examination (general and systemic) was done. Fasting blood glucose (FBG) was estimated using glucometer strip and blood grouping by test kit. Test kit was also used for detection of urinary protein.

Results: From six schools, 1069 students (boys/girls = 392/677) of age 10 to 19 years participated in the study. The participants from middle class family were 52.7% and upper were 14.4%. Their mothers were mostly housewives (95.5%) and only 16% had academic education of ten years or more. The mean (± SD) values of BMI, WHR, WHtR and FBG were 18.2 (± 2.9), 0.81 (± 0.07), 0.43 (± 0.05) and 5.26 (± 0.45) mmol/L respectively. Adiposity was significantly higher in upper socio-economic class than the middle and lower class, though no differences were observed in blood pressure and blood glucose level. Of the illnesses, the most common were sinusitis (21.4%), tonsillitis (13.3%) and toothache plus dental caries (10.7%).

Conclusions: The most common illnesses were sinusitis, tonsillitis and dental caries. Anthropometric measures indicated that adiposity was not uncommon in rural children. Though adiposity was found higher among the upper than the lower socio-economic class, blood pressure and blood glucose level showed no difference indicating equal risk of non-communicable diseases (NCDs) irrespective of socio-economic class. These findings envisage that the existing status of child health might lead to NCDs in adult life. We suggest adiposity, blood pressure and blood glucose status of a high school cohort may be prospectively followed for eventual future health events.

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Introduction

There were substantial number of studies that addressed health of children, adolescents and adults [1–5]. Some observed nutritional trend from 1975 to 2016 [1] and some found the childhood adiposity [3,6]. But there are very few studies conducted on illness commonly encountered by school children in rural communities of Bangladesh. There has been no published data neither in rural nor even in the urban communities on illness nature of secondary schools. This study was taken to determine the nature and extent of illnesses commonly affecting rural school children. Additionally, the study investigated the association between a) nutrition (adiposity) and socio-economic class, b) adiposity (BMI, WHR, WHtR) and fasting blood glucose (FBG) status and c) adiposity and blood pressure (SBP - systolic blood pressure, DBP - diastolic blood pressure).

Methods

The protocol was approved by the Ethical Review Committee of Bangladesh Diabetes Somity (BADAS).

Site selection: The study was purposively conducted at six selected schools of Santhia thana under Pabna district. These schools enroll the children from remote villages not connected with roads. Most of the children attend school on foot and in groups.

The local elected body of Vulbaria Union Council (UC) under Santhia was communicated. The UC members agreed to cooperate. They suggested the names of schools. The study team discussed the study procedure (clinical history, anthropometry, blood pressure, clinical examination, fasting blood glucose) in detail with the school teachers. The teachers agreed to volunteer to communicate with the students and informed them the procedural details. The students who showed their interest to participate in the study were enlisted by the respective class teachers.

Enlistment of participants: The school teachers made the list of willing participants. The students of class five to class ten were considered eligible. The study team discussed with the participants about the objectives and stepwise investigation procedure before the day of investigation. The printed questionnaire sheet was explained to the participants. They were advised to attend the school campus in the next morning in fasting condition.

Investigations**:** Investigations included interviewing, anthropometry, blood pressure measurement, clinical examination, estimation of blood glucose, determination of blood grouping and proteinuria.

Each participant was interviewed with the help of the class teacher on: a) clinical history (present illness, medication if any, past illness and treatment); b) mothers' education and occupation; c) family income and number of family members for assessment of social-economic class.

After completion of the interviewing session each student was investigated for a) anthropometry (height, weight, waist- and hip-circumference; b) blood pressure (SBP, DBP); c) fasting blood glucose using glucometer. The anthropometry measurements, blood pressure and fasting blood glucose were determined as cited in the previous study [7]. Finally, blood grouping was done using blood grouping test kit and a semi-quantitative dipstick test kit was used for detection of proteinuria.

Then every participant was examined clinically. Both general and systemic examinations were done by the two physicians of the team. General examination determined any gross deformity, anemia, jaundice and edema. Systemic examination included alimentary, respiratory, cardiovascular and musculoskeletal system. Presence of abnormalities of vision (finger count and color), ear (discharge), nose (polyp, septal deviation), throat (tonsils), oral cavity (ulcer, spongy gum), teeth (decay/caries) and skin (scabies, ringworm, pigmentation) were sought.

Statistical analyses: The socio-demographic data were presented in percentages. The illness prevalence data were also presented in percentages. Unpaired t-test was applied to compare the characteristics between boys and girls. All the quantitative variables were shown as – a) mean with standard deviation, b) mean with 95% confidence interval (CI). Comparisons of BMI, WHR, WHtR, SBP, DBP and FBG are shown according to social class using ANOVA.

Results

A total of 1069 students (boys/girls = 392/677) volunteered the study. The mean age of participants was 13.5 ± 1.47 years. Socio-demographic variables of the participating students are shown in Table-1. More than half of the participants were from the middle and less than a third were from the upper socio-economic class. Almost a third of their mothers were illiterate. More than a half of the mothers had no access to academic education though they knew how to put their signature. Only 3.4% mothers had graduation equivalent to 12 or more years of schooling. As regards mothers' occupation, almost all were housewives (95.5%). Very few had employment at local rural non-government organization (NGOs). The mean family size of the children was 4.7 (95% CI: 4.63, 4.79).

Table-1: *Socio-demographic characteristics of the participants (n = 1069) of school children*

Characteristics	N (%)
Sex	
Boys	394 (36.7)
Girls	679 (63.3)
All	1073 (100)
Socio-economic class	
Upper	155 (14.4)
Middle	565 (52.7)
Lower	353 (32.9)
Mothers' education	
Illiterate	348 (32.4)
Read and write (no academic education)	554 (51.6)
Secondary (SSC/HSC)	135 (12.6)
Graduate (and plus)	36 (3.4)
Mothers' occupation	
Housewife	1025 (95.5)
Employment (local NGOs)	48 (4.5)
Family size (number of family members)	
Mean (95% confidence interval)	4.7 (4.63–4.79)

Table-2 illustrates the biophysical characteristics of all participants and compares these variables between boys and girls. They were the students of academic class from VI (6^{th}) to X (10^{th}). The mean (± SD) of age was 13.5 (± 1.47) (y); and their height, weight, waist-girth and hip-girth were 153 (± 8.96) cm, 43.2 (± 9.10) kg, 65.3 (± 7.78) cm and 80.4 (± 7.76) cm, respectively. The comparisons between boys and girls showed, despite significantly higher age in the boys, the girls had significantly higher BMI, SBP and DBP; whereas, the boys had significantly higher WHR and FBG.

Correlations of blood pressures (both SBP and DBP) and FBG with adiposity variables (BMI, WHR, WHtR) were shown in Table-3. Adjusted for age and sex, both SBP and DBP correlated significantly with the adiposity variables namely BMI, WHR and WHtR; whereas, FBG did not, though it showed significant correlation with SBP.

The investigated biophysical characteristics (age, height, weight, waist, hip, BMI, WHR, WHtR, pulse, SBP, DBP, FBG) were put on view according to sex for each academic class in Table-4a, 4b and 4c. The values were displayed in mean with 95% confidence interval (CI).

Table-5 demonstrates the values of the anthropometry at 15^{th}, 85^{th} and 95^{th} levels for possible lower and upper limits of nutrition and adiposity. Likewise, the values of SBP, DBP and FBG at the same levels (15^{th}, 85^{th} and 95^{th}) may be used to assess the trend of metabolic outcomes related to non-communicable diseases.

The complaints or illnesses presented or observed are shown in Table-6. Of the otolaryngologic (ear, nose and throat) illnesses, sinusitis and tonsillitis were the most common complaints or illnesses. Alimentary system including orodental hygiene, though thought to be the most common, only a total of 18% were observed; and of these, tooth decay (dental caries) was the highest (10.7%). Only 711 participants were tested for the presence of proteinuria. Gross proteinuria (3+) was found in 0.4%. For the musculoskeletal system, history of fracture and plaster was observed in 9.3% though there was no deformity. Bone deformity following fracture was found in 1.3%. Testing of blood group revealed that the most common group was B+ve (33.4%), followed by O+ve (27.0%) and A+ve (24.3%).

Anthropometric measures (BMI, WHR, WHtR) for nutrition and adiposity were compared among the socio-economic classes; and so are the blood pressures (SBP, DBP) and fasting blood glucose (Table-7 and 8). Of the adiposity measures, BMI of upper class had significantly higher than the lower class but the difference was neither significant between upper and middle and nor between middle and lower class. The upper class had significantly higher WHR than middle class and the middle class had significantly higher than their lower counterparts. Again, the upper class had significantly higher WHtR than the lower and also the middle class. All these analysis indicate that adiposity was more prevalent among the upper socio-economic class students than their lower counterparts. Of these adiposity measures, WHtR proved to be the robust adiposity index as it could detect the slightest difference among the three social classes.

Table-2: *Characteristics of total participants (n = 1069) including comparisons between boys and girls*

	Both (n = 1069)		Boys (n = 392)		Girls (n = 677)		
Variables	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**p¥**
Age (y)	13.5	1.47	13.6	1.61	13.3	1.37	0.001
Height (cm)	153.3	8.96	157.8	10.8	150.6	6.3	0.000
Weight (kg)	43.2	9.10	45.2	10.7	42.0	7.8	0.000
Waist (cm)	65.3	7.78	67.0	7.7	64.1	7.7	0.000
Hip (cm)	80.4	7.76	80.0	8.4	80.5	7.4	0.271
BMI	18.2	2.92	17.9	2.91	18.4	2.9	0.006
WHR	0.813	0.065	0.839	0.062	0.796	0.062	0.000
WHtR	0.426	0.046	0.424	0.041	0.425	0.048	0.815
Pulse/min	82.86	10.46	79.8	10.4	84.4	10.6	0.000
SBP (mmHg)	100.9	13.7	99.5	15.5	101.4	13.1	0.029
DBP (mmHg)	64.3	9.0	63.0	9.7	65.1	8.6	0.000
FBG (mmol/L)	5.26	0.45	5.44	0.42	5.23	0.47	0.001

SD – standard deviation; p¥ – values after unpaired t-test between boys and girls; BMI – body mass index (weight in kg/height in met. sq.); FBG – fasting blood glucose; SBP – systolic blood pressure, DBP – diastolic blood pressure; WHR – waist-to-hip ratio; WHtR – waist-to-height ratio.

Table-3: *Correlations among biophysical variables controlling for age and sex*

Variables		**SBP**	**DBP**	**FBG**	**BMI**	**WHR**	**WHTR**
SBP	*r*	1.000	.646	.075	.329	.070	.246
	p	.	.000*	.015*	.000*	.022*	.000*
DBP	*r*		1.000	.055	.267	.074	.198
	p		.	.073	.000*	.015*	.000*
FBG	*r*			1.000	-.016	.050	-.003
	p			.	.597	.099	.930
BMI	*r*				1.000	.175	.727
	p				.	.000*	.000*
WHR	*r*					1.000	.641
	p					.	.000*

*The mean difference is significant at the 0.05 level; *r* – correlation coefficient; *p* – level of significance; SBP and DBP correlated significantly with BMI, WHR and WHtR; whereas, FBG showed no correlation with these anthropometric variables.

Table-4a: *The biophysical characteristics are shown according to sex by academic class (mean with 95% CI)*

		Boys				Girls			
Variables	**Class**	**N**	**Mean**	**95% CI**		**N**	**Mean**	**95% CI**	
Age (y)	VI	102	11.9	11.8	12.0	138	11.8	11.7	11.9
	VII	83	12.8	12.6	12.9	153	12.2	12.1	12.2
	VIII	80	13.7	13.6	13.9	99	13.4	13.2	13.5
	IX	46	14.7	14.5	14.9	135	14.2	14.1	14.3
	X	83	15.9	15.8	16.0	154	15.1	15.0	15.1
	Total	**394**	**13.6**	**13.5**	**13.8**	**679**	**13.3**	**13.2**	**13.4**
Height (cm)	VI	102	147.0	145.2	148.8	138	147.0	146.0	148.1
	VII	83	156.1	154.3	158.0	153	149.2	148.2	150.1
	VIII	80	161.0	159.1	162.9	99	151.6	150.4	152.8
	IX	46	163.7	161.6	165.7	135	152.4	151.4	153.4
	X	83	166.0	164.5	167.5	154	153.0	152.1	154.0
	Total	**394**	**157.7**	**156.6**	**158.8**	**679**	**150.6**	**150.1**	**151.1**
Weight (kg)	VI	102	36.2	34.5	37.9	138	37.8	36.6	39.0
	VII	83	43.1	40.9	45.2	153	39.5	38.4	40.7
	VIII	80	47.6	45.4	49.8	99	43.0	41.7	44.3
	IX	46	51.1	48.8	53.3	135	43.8	42.6	45.0
	X	83	52.6	50.9	54.2	154	45.8	44.6	47.0
	Total	**394**	**45.1**	**44.1**	**46.2**	**679**	**42.0**	**41.4**	**42.5**
Waist (cm)	VI	102	62.0	60.7	63.3	138	61.2	60.0	62.5
	VII	83	65.9	64.3	67.6	153	63.5	62.3	64.7
	VIII	80	69.2	67.3	71.1	99	63.8	62.5	65.0
	IX	46	69.7	67.8	71.7	135	66.8	65.5	68.2
	X	83	70.2	69.0	71.4	154	66.0	64.8	67.2
	Total	**394**	**66.9**	**66.1**	**67.7**	**679**	**64.3**	**63.7**	**64.9**
Hip (cm)	VI	102	73.9	72.4	75.4	138	76.1	74.9	77.3
	VII	83	78.3	76.7	80.0	153	78.3	77.2	79.3
	VIII	80	81.7	80.0	83.5	99	80.8	79.5	82.1
	IX	46	84.3	82.5	86.2	135	83.0	81.9	84.1
	X	83	85.0	83.8	86.2	154	84.6	83.5	85.7
	Total	**394**	**80.0**	**79.2**	**80.8**	**679**	**80.6**	**80.0**	**81.1**

CI – confidence interval.

Table-4b: *The biophysical characteristics are shown according to sex by academic class (mean with 95% CI)*

		Boys			Girls		
Variables	**Class**	**N**	**Mean**	**95% CI**	**N**	**Mean**	**95% CI**
BMI	VI	102	16.6	16.0, 7.1	138	17.4	16.9, 17.8
	VII	83	17.6	16.8, 8.1	153	17.7	17.2, 18.1
	VIII	80	18.3	17.5, 18.9	99	18.7	18.2, 19.2
	IX	46	19.0	18.3, 19.7	135	18.8	18.3, 19.3
	X	83	19.1	18.5, 19.6	154	19.5	19.1, 20.0
	Total	**394**	**17.9**	**17.6, 8.2**	**679**	**18.4**	**18.2, 18.6**

WHR	VI	102	0.841	0.829, 0.851	138	0.805	0.792, 0.818
	VII	83	0.842	0.830, 0.853	153	0.811	0.801, 0.821
	VIII	80	0.847	0.832, 0.863	99	0.789	0.778, 0.801
	IX	46	0.827	0.812, 0.841	135	0.804	0.794, 0.815
	X	83	0.825	0.816, 0.835	154	0.779	0.770, 0.789
	Total	**394**	**0.837**	**0.832, 0.843**	**679**	**0.798**	**0.793, 0.803**
WHtR	VI	102	0.422	0.414, 0.430	138	0.418	0.409, 0.427
	VII	83	0.422	0.412, 0.432	153	0.425	0.418, 0.433
	VIII	80	0.430	0.419, 0.441	99	0.420	0.412, 0.428
	IX	46	0.426	0.414, 0.439	135	0.438	0.430, 0.447
	X	83	0.423	0.416, 0.429	154	0.431	0.423, 0.439
	Total	**394**	**0.424**	**0.420, 0.428**	**679**	**0.427**	**0.424, 0.431**

CI – confidence interval; BMI – body mass index (wt in kg/ht in met. sq); WHR – waist-to-hip ratio; WHtR – waist-to-height ratio.

Table-4c: *The biophysical characteristics are shown according to sex by academic class (mean with 95% CI)*

		Boys			**Girls**		
Variables	**Class**	**N**	**Mean**	**95% CI**	**N**	**Mean**	**95% CI**
Pulse/min	VI	102	80.1	77.9, 82.1	138	82.3	80.6, 83.9
	VII	83	82.6	80.5, 84.8	153	85.0	83.5, 86.5
	VIII	80	78.4	75.9, 80.8	99	84.7	82.5, 87.0
	IX	46	78.2	76.2, 80.2	135	84.9	83.3, 86.5
	X	83	79.6	77.3, 81.8	154	85.5	83.8, 87.3
	Total	**394**	**79.9**	**78.9, 80.9**	**679**	**84.5**	**83.7, 85.3**
SBP (mmHg)	VI	102	90.2	88.0, 92.4	138	96.9	94.4, 99.4
	VII	83	96.2	93.4, 99.0	153	100.0	98.0, 102.0
	VIII	80	101.9	98.8, 105.0	99	100.2	97.6, 102.8
	IX	46	108.0	103.9, 112.1	135	103.0	100.9, 105.0
	X	83	108.7	105.7, 111.7	154	106.8	105.0, 108.6
	Total	**394**	**99.8**	**98.3, 101.3**	**679**	**101.5**	**100.5, 102.5**
DBP (mmHg)	VI	102	57.4	56.0, 58.8	138	63.0	61.4, 64.7
	VII	83	60.4	58.3, 62.6	153	64.8	63.4, 66.3
	VIII	80	64.5	62.7, 66.3	99	67.0	65.4, 68.6
	IX	46	67.3	64.8, 69.9	135	64.5	63.3, 65.8
	X	83	68.0	66.0, 70.1	154	66.7	65.4, 68.0
	Total	**394**	**62.9**	**61.9, 63.8**	**679**	**65.1**	**64.5, 65.8**
FBG (mmol/L)	VI	102	5.28	5.21, 5.36	138	5.14	5.05, 5.22
	VII	83	5.32	5.24, 5.40	153	5.27	5.21, 5.33
	VIII	80	5.37	5.25, 5.48	99	5.29	5.21, 5.37
	IX	46	5.28	5.15, 5.40	135	5.27	5.19, 5.35
	X	83	5.93	4.67, 7.20	154	5.17	5.08, 5.25
	Total	**394**	**5.44**	**5.18, 5.71**	**679**	**5.23**	**5.19, 5.26**

CI – confidence interval; SBP – systolic blood pressure; DBP – diastolic blood pressure; FBG – fasting blood glucose.

Table-5: *Anthropometric measures, blood pressure and fasting blood glucose levels at 15th, 85th, 95th percentiles are shown separately for male and female students*

	15th		85th		95th	
Variables	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**
Age (y, approximate)	11.5	11.5	15.5	15.5	16.5	16.5
Height (cm)	145.0	143.5	163.0	160.5	169.0	168.0
Weight (kg)	35.0	34.0	55.0	50.0	60.0	59.0
Waist (cm)	58.5	56.5	76.5	71.5	82.5	79.0
Hip (cm)	74.5	71.5	90.5	87.5	95.5	93.0
BMI	15.8	15.4	21.6	21.1	24.9	23.4
WHR	0.76	0.74	0.88	0.87	0.91	0.91
WHtR	0.39	0.38	0.49	0.47	0.53	0.52
SBP (mmHg)	85	85	110	110	118	118
DBP (mmHg)	55	55	70	70	75	77
FBG (mmol/L)	4.75	4.75	5.65	5.65	5.75	5.80

The above findings may be compared with that of table 1, which showed significant differences between sexes; but at the level of 15th, 85th and 95th percentile the measures are almost similar. BMI – body mass index (weight in kg/height in met. sq); FBG – fasting blood glucose; SBP – systolic blood pressure; DBP – diastolic blood pressure; WHR – waist-to-hip ratio; WHtR – waist-to-height ratio.

Table-6: *The prevalence of illnesses observed or reported during investigation*

Organ/System	**N (%)**
Ear, nose and throat	
Discharge from any ear (pus or fluid)	29 (1.3)
Perforation of tympanic membrane	5 (0.5)
Hearing impairment (self complain and witnessed by fellows)	45 (4.2)
Nasal polyp/nasal septal deviation	32 (3.0)
Frontal headache treated locally as sinusitis	230 (21.4)
Sore throat, difficulty swallowing, treated locally as tonsillitis	143 (13.3)
Bad breath (self complain and witnessed by fellows)	22 (2.1)
Alimentary system	
Abdominal pain treated as peptic ulcer disease	21 (2.0)
Ulcer painful and detected in oral mucosa	38 (3.5)
Dental caries (tooth decay, discoloration of teeth)	115 (10.7)
Unhealthy gum (red, swollen)	25 (2.3)
Respiratory system	
Wheezing (breathing difficulty) treated as bronchial asthma	22 (2.1)
Urinary system (proteinuria was done by strip test: n = 711)	
trace	51 (7.2)
+	9 (1.3)
++	4 (0.6)
+++	3 (0.4)
Total	711 (100)
Musculoskeletal system	
Fracture (based on history of plaster)	100 (9.3)
Bone deformity (mostly the sequel of fracture)	14 (1.3)

Hematological system (blood group)	
A+ve	260 (24.3)
A-ve	11 (1.0)
B+ve	358 (33.4)
B-ve	19 (1.8)
O+ve	289 (27.0)
O-ve	7 (0.7)
AB+ve	114 (10.6)
AB-ve	14 (1.3)
Total Rh+ve	1021 (95.2)
Total Rh-ve	51 (4.8)

Table-7: *Distribution of anthropometric measures (BMI, WHR, WHtR), blood pressure (SBP, DBP) and fasting blood glucose are shown according to social class*

	Social class	N	Mean	SD	95% CI
BMI	Upper	155	18.75	3.07	18.27, 19.24
	Middle	565	18.29	3.04	18.03, 18.54
	Lower	353	18.01	2.61	17.73, 18.28
	Total	1073	18.26	2.92	18.09, 18.44
WHR	Upper	155	0.821	0.056	0.812, 0.830
	Middle	565	0.806	0.068	0.800, 0.811
	Lower	353	0.820	0.059	0.813, 0.826
	Total	1073	0.812	0.064	0.809, 0.816
WHtR	Upper	155	0.440	0.051	0.432, 0.448
	Middle	565	0.426	0.047	0.422, 0.430
	Lower	353	0.421	0.039	0.416, 0.425
	Total	1073	0.426	0.046	0.423, 0.429
SBP	Upper	155	100.5	14.1	98.3, 102.7
	Middle	565	101.6	13.6	100.4, 102.7
	Lower	353	100.0	13.8	98.6, 101.5
	Total	1073	100.9	13.7	100.1, 101.7
DBP	Upper	155	65.2	8.9	63.8, 66.6
	Middle	565	64.5	9.0	63.8, 65.3
	Lower	353	63.6	8.9	62.7, 64.6
	Total	1073	64.3	9.0	63.8, 64.9
FBG	Upper	155	5.27	0.41	5.20, 5.33
	Middle	565	5.25	0.46	5.22, 5.29
	Lower	353	5.25	0.45	5.20, 5.30
	Total	1073	5.25	0.45	5.23, 5.28

SD – standard deviation; CI – confidence interval; BMI – body mass index (wt in kg/ht in met. sq); WHR – waist-to-hip ratio; WHtR – waist-to-height ratio; SBP – systolic blood pressure; DBP – diastolic blood pressure; FBG – fasting blood glucose.

Table-8: *Multiple comparisons of anthropometric measures (BMI, WHR, WHtR), blood pressure (SBP, DBP) and fasting blood glucose (FBG) are shown according to social class using ANOVA (Scheffe)*

Dependent Variable	(I) SEC	(J) SEC	Mean difference (I-J)	p
BMI	Upper	Middle	0.46683	0.211
		Lower	0.74604	0.030
	Middle	Upper	-0.46683	0.211
		Lower	0.27921	0.370
WHR	Upper	Middle	0.01550*	0.029
		Lower	0.00160	0.967
	Middle	Upper	-0.01550*	0.029
		Lower	-0.01390*	0.006
WHTR	Upper	Middle	0.01446*	0.002
		Lower	0.01969*	0.000
	Middle	Upper	-0.01446*	0.002
		Lower	0.00523	0.243
SBP	Upper	Middle	-1.069	0.694
		Lower	0.492	0.934
	Middle	Upper	1.069	0.694
		Lower	1.561	0.249
DBP	Upper	Middle	0.675	0.711
		Lower	1.554	0.202
	Middle	Upper	-0.675	0.711
		Lower	0.879	0.356
FBG	Upper	Middle	0.01114	0.964
		Lower	0.01658	0.931
	Middle	Upper	-0.01114	0.964
		Lower	0.00543	0.985

*The mean difference is significant at the 0.05 level. BMI, upper class had significantly ($p = 0.03$) higher than the lower counterpart; whereas, middle class differed neither from the upper nor from the lower. WHR differed significantly between upper and middle ($p = 0.029$) and between middle and lower ($p = 0.006$). WHtR differed significantly between upper and middle ($p = 0.002$) and between upper and lower ($p < 0.001$). In contrast, SBP, DBP and FBG showed no significant differences among the classes.

Discussions

This study is the first of its kind not only in Bangladesh but also in other neighboring countries. There has been no published report addressing common illnesses encountered by the school children of Bangladesh. This study was designed to determine the common illnesses affecting our rural school going children and adolescents. Many a studies on school health observed the trend of nutrition, obesity and other NCDs [1-9], though none studied the prevalence of common illnesses whether be it communicable or non-communicable diseases.

Possibly, the global health is in transition experiencing a wide spectrum of diseases. The developed world has low prevalence of communicable diseases; whereas, the developing countries have the double burden of both communicable and non-communicable diseases. Thus, the above mentioned studies [1-9] underlined the global trend of increasing NCDs. A very large study on "Child and adolescent health from 1990 to 2015" observed the global burden of diseases, injuries, and risk factors from 1990 to 2015 [10], but not any specific illness.

There is little opportunity to compare the findings of this study with any other study due to paucity of data. Only one study from Bangladesh compared the NCDs according to socio-economic class. In their study it was found that the burden of NCDs was higher in low income people in rural area while it was higher in urban high income group [11]. This study was limited to rural schools and showed no significant difference of SBP, DBP and FBG when compared between upper vs. middle and middle vs. lower socio-economic class (Table-7 and 8). It is interesting to note that the adiposity (anthropometric) measures did differ significantly among the social class though blood pressure and blood glucose did not. More interesting was that the adiposity (BMI, WHR, WHtR) measures correlated well with blood pressure but none with blood glucose level (Table-3). In India, Moola et al. found that two-thirds of primary school children were suffering from health problems and boys and girls were equally affected [12]. They also observed that the sufferings were most prevalent (95%) in the lower economic class. Our findings are not consistent with the findings of Moola et al.

The strength of the study is that all anthropometric and other measures were presented separately for boys, girls for each class and both combined. The quantitative variables were presented at the level of 15^{th}, 85^{th} and 95^{th} percentiles for boys and girls (Table-5) for the assessment and also for the comparison with different age-groups and different community populations. It is of interest to note that differences of BMI, WHR and WHtR among the upper, middle and lower classes were significant but not for SBP, DBP and FBG. It is not clear why there was no significant difference of blood pressure and blood glucose between upper and lower classes despite the upper class had significantly higher adiposity. Possibly, the effect of adiposity on blood pressure and blood glucose is not manifested in childhood or even in adolescent. A well designed cohort study from childhood through adulthood would explain this interesting observation.

There are weaknesses of the study. Firstly, we could not take the fathers' education and occupations. The diagnosis of illness or disease was solely based on the statement of student with the assistance of his/her class teacher. No ancillary investigation could be done and there may be some error in detection of illnesses. The major limitation was that we could not assess eye (vision) problems properly.

Of the illnesses, the most common were sinusitis (21.4%), tonsillitis (13.3%) and toothache plus dental caries (10.7%). The level of adiposity, blood pressure and blood glucose may envisage the school health problems in general and future dimension of the adult health in particular. We strongly propose to undertake a cohort study for tracking the adiposity, blood pressure and blood glucose for its effect on future adult health, which would help to predict risks of NCDs.

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Conflict of interest

The authors declare no conflict of interest.

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