

# Very high prevalence of overweight and obesity among girls attending English medium schools in South 24 Parganas, West Bengal, India

Prevalencia muy alta de sobrepeso y obesidad entre niñas que asisten a escuelas de enseñanza primaria en inglés en 24 Parganas Sur, Bengala Occidental, India

Prevalência muito alta de sobrepeso e obesidade entre meninas que frequentam escolas de ensino fundamental em inglês no 24 Parganas Sul, Bengala Ocidental, India

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## Abstract

According to recent findings, obese and overweight children are highly vulnerable to the problem of obesity in adulthood. The present cross-sectional study was undertaken among 297 girl students from private English medium primary schools, located in South 24 Parganas, West Bengal, India, to evaluate the prevalence of overweight and obesity, as well as the role of various socio-economic factors. Most of the girls came from affluent socio-economic family backgrounds. Height and weight were measured following the standard method. Overnutrition was assessed using established cut-off values. Socio-economic factors such as father's education, mother's education and parents' monthly income show a significant association with

overweight and obesity. The prevalence of over nutrition in this group of participants, as measured by overweight and obesity, was found to be very high (28.95%), out of which the prevalence of overweight was 21.21% and obesity was 7.74%. In the context of the present study, it can be concluded that a higher prevalence of overweight and obesity was significantly associated with their socio-economic background, especially parents' education and family income. *Rev Arg Antrop Biol* 28(1), e122, 2026. <https://doi.org/10.24215/18536387e122>

Keywords: female students; India; obesity; private school; socioeconomic factors; 24 PGs(S)

### Resumen

Según hallazgos recientes, los niños con obesidad y sobrepeso son altamente vulnerables a la obesidad en la edad adulta. El presente estudio transversal se realizó con 297 alumnas de escuelas primarias privadas de enseñanza en inglés, ubicadas en 24 Parganas Sur, Bengala Occidental, India, para evaluar la prevalencia del sobrepeso y la obesidad, así como el papel de diversos aspectos socioeconómicos. La mayoría de las niñas provenían de familias con un nivel socioeconómico alto. Se midieron la altura y el peso siguiendo el método estándar. La sobrealimentación se evaluó usando valores de corte establecidos. Aspectos socioeconómicos como la educación del padre, la educación de la madre y los ingresos mensuales de los padres muestran una asociación significativa con el sobrepeso y la obesidad. La prevalencia de sobrenutrición en este grupo de participantes, medida mediante sobrepeso y obesidad, fue muy alta (28,95%), de la cual la prevalencia de sobrepeso fue del 21,21% y la de obesidad del 7,74%. En el contexto del presente estudio, se puede concluir que una mayor prevalencia de sobrepeso y obesidad se asoció significativamente con el entorno socioeconómico, especialmente con la educación de los padres y los ingresos familiares. *Rev Arg Antrop Biol* 28(1), e122, 2026. <https://doi.org/10.24215/18536387e122>

Palabras Clave: alumnas; India; obesidad; escuela privada; factores socioeconómicos; 24 PGs(S)

### Resumo

De acordo com descobertas recentes, crianças obesas e com sobrepeso são altamente vulneráveis ao problema da obesidade na idade adulta. O presente estudo transversal foi realizado entre 297 alunas de escolas particulares de ensino fundamental com ensino em inglês, localizadas em 24 Parganas Sul, Bengala Ocidental, Índia, para avaliar a prevalência de sobrepeso e obesidade, assim como o papel de vários aspectos socioeconômicos. A maioria das meninas pertencia a famílias de alto nível socioeconômico. A altura e o peso foram medidos seguindo o método padrão. A sobrenutrição foi avaliada usando valores de corte estabelecidos. Aspectos socioeconômicos como educação do pai, educação da mãe e renda mensal dos pais mostram associação significativa com sobrepeso e obesidade. A prevalência de supernutrição entre este grupo de participantes, medida por sobrepeso e obesidade, foi considerada muito alta (28,95%), sendo a prevalência de sobrepeso de 21,21% e a de obesidade de 7,74%. No contexto do presente estudo, pode-se concluir que a maior prevalência de sobrepeso e obesidade esteve significativamente associada ao contexto socioeconômico, especialmente à escolaridade dos pais e à renda familiar. *Rev Arg Antrop Biol* 28(1), e122, 2026. <https://doi.org/10.24215/18536387e122>

Palavras-chave: alunas; India; obesidade; escola particular; fatores socioeconômicos; 24 PGs(S)

Mid childhood is a dynamic period of physical growth and mental development of a child. Proper assessment of nutritional status of children is required to assess the overall growth status. Over the last three decades, the growth in childhood obesity and overweight has received the attention of scholars, health policymakers, institutions, and the general public (Williams & Greene, 2018). Obesity in adolescents has been a cause for major concern, not just for affluent nations, but worldwide (World Health Organization [WHO], 2000). The World Health Organization recognized obesity as a major public health epidemic worldwide as early as in 1998, with rising incidence also noted in developing countries (Martorell *et al.*, 2000). Obesity has been noted with increasing incidence, particularly in Asian countries with improving economic performance (Gillespie & Haddad, 2003). Children belonging to 5-12 years of age group are particularly vulnerable due to their rapid growth rate (Nandy *et al.*, 2005). Higher prevalence of overweight was found among English medium school girls of Kolkata in the study by Mandal & Mandal (2012). The study concluded the existence of obesity threat persisting among school children of wealthier families. Overweight and obesity are epidemic and a 'public health crisis' among adolescents worldwide. The rising trends in adolescent obesity in girls are poorly documented in India (Maiti *et al.*, 2013). As a complex and serious public health problem in the United States and beyond, obesity in young children and adolescents is attributed to a myriad of causal factors including lack of access to healthy food options, absence of regular physical activity, regular exposure to unhealthy food adverts, poor food choices, hereditary and environmental factors (Kumar & Kelly, 2017). As a result, the problem of childhood obesity as experienced in modern society can be attributed to the physical environment, genetics and ecological aspects including the family, lifestyles, school and the community. Although obesity is a persistent health issue affecting all population demographics in the country, childhood obesity is a complex public health issue with additional consequences due to the high vulnerability of the affected populace (Nasem, 2016). Reduced health-related quality of life, peer stigmatization and discrimination, social and psychological problems associated with childhood obesity could lead to low self-esteem and negative self-image, alongside an increased risk of adulthood obesity (Kumar & Kelly, 2017). Obese and overweight children are highly vulnerable to the problem of obesity in adulthood, making it important to adopt comprehensive, holistic and multi-sectorial interventions and programs aimed at managing, preventing and responding to this particular health issue. Notably, childhood obesity is recorded in children and teenagers with a Body Mass Index (BMI) that is at or above the 95th percentile for their respective age, height, weight and gender (Yusuf *et al.*, 2020).

Overweight and obesity in childhood and adolescence is a global health issue associated with adverse outcomes throughout the life course (Zhang *et al.*, 2024). Underweight and obesity are associated with adverse health outcomes throughout the life course. An estimation was done for individual and combined prevalence of underweight or thinness and obesity, and their changes, from 1990 to 2022 for adults and school-aged children and adolescents in 200 countries and territories. From 1990 to 2022, the combined prevalence of underweight and obesity in adults decreased in 11 countries (6%) for women (NCD Risk Factor Collaboration [NCD-RisC], 2024). A comprehensive literature review on the prevalence of the double burden of malnutrition (DBM) at the individual level in children and adolescents of Asian continent revealed significant variability in DBM prevalence across studies, with a notable increase in research on this topic over the past decade (2013-2022) (Viana *et al.*, 2025). An analysis on the impact and association between global warming and obesity in children and differences by gender across Europe after

2000 shows an increase in obese than underweight people in the world (Prvulović *et al.*, 2023). Several countries worldwide have witnessed a doubling or tripling in the prevalence of obesity in the last 3 decades, likely due to urbanization, sedentary lifestyles, and increased consumption of high-calorie processed foods (Balasundaram & Daley, 2025).

However, few studies have specifically examined childhood obesity among English-medium school-girls in Eastern India, especially in West Bengal. Maiti *et al.* (2013) studied on overweight and obesity among early adolescent school girls in an urban area of West Bengal. Sarkar and colleagues (2021) tried to understand the prevalence of overweight and obesity among the people of West Bengal and its consequences. The study on assessment of childhood obesity and associated factors among school-aged children in a selected urban community of Bankura, West Bengal, was done by Biswas (2024). Another study done on prevalence of obesity with associated risk factors among school-aged children of West Bengal by Pervin and colleagues (2025).

Considering the above, this study aimed to evaluate the prevalence of overweight and obesity among girls attending English medium schools and to examine the influence of various socio-economic factors on overweight and obesity. Nutritional status has been assessed using conventional anthropometric indicators of overweight and obesity, alongside related socio-economic variables.

## **MATERIALS AND METHODS**

### **Study area**

The present study was conducted in two private English medium primary schools (Sarada Bidyapith and K. E. Carmel Girl's High School) of South Kolkata, South 24 Parganas, West Bengal, India. The two English medium schools were selected on the basis of their tuition fees. Both schools have no concept of mid-day meal and no BHATA (government schemes or programmes for providing free study stationaries or meals) or any other facilities like Kannyashree to the students.

### **Sample population**

This cross-sectional study was undertaken among 297 primary school girl students aged between 5 to 10 years. The data on anthropometric variables as well as the various socio-economic factors described below were collected from April 2023 to February 2024.

### **Research method**

The research method applied a mixed-method approach combining anthropometric measurements and questionnaire data.

### **Study variables**

The study variables were divided into three categories. Anthropometric variables such as height (cm) and weight (kg) have been measured following standard method (Lohmann, 1988). Independent variables of socio-economic and demographic factors like family size, income, parent's occupation, parent's education, dietary pattern information have been collected through a pre-tested questionnaire. A derived variable like BMI (kg/m<sup>2</sup>) has been calculated to evaluate the overweight and obesity among the studied children.

## Data collection tools

Data collection tools and instruments used for the study were weighing machine of 100 kg capacity and having the least count of 0.1 kg, Martin's Anthropometer for height measurement and a well-designed and pretested questionnaire to get nutritional knowledge.

## Socio-economic information

A well-designed and pretested questionnaire was used to collect information on nutritional knowledge including parental education, occupation, family income, dietary habits. All the participants of this study belonged to a higher socio-economic background, as indicated by the monthly tuition fees, which exceeded 8,000 rupees per month. All of the participants were Bengali Hindus. The parents were found to be mostly University graduates and some had higher studies too. None of the parents were noted to be illiterate. The occupational and educational profiles of the participant's parents further supported their elite socio-economic background and lifestyle. Both the parents were mostly noted to be having well paid government or private sector jobs. Some had well established business ventures of their own. Mothers were mostly found to be working, less number of house wives was found.

Annual family income of parents of the participants is way above 40 thousand per month (more than 50%). Most of them had their own houses (well-constructed brick and cement built houses), with proper sanitation and water resource facilities. Every household had their own washrooms with tap water facilities. There was no tube well concept found in any habitation. Some rented houses were also noted among the participants.

In the case of diet, most of the participants from this group reported having bread, butter, French toast, boiled egg, cornflakes and milk, fried egg in their breakfast. They have high calorie and high protein lunch and dinner every day with mandatory fish/chicken/egg being consumed regularly. Consumption of junk food like burger, pizza, rolls, eating out in restaurants, is found to be a regular practice among them. Consumption of carbonated drinks was found highly prevalent among the participants. This pattern corresponds to the participants as well as their parents.

## Assessment of nutritional status

The assessment of nutritional status as measured by over-nutrition has been done by following the age specific internationally accepted standard cut offs as proposed by Cole and colleagues (2000). [Table 1](#) shows age specific BMI cut off values for overweight and obesity. To assess overweight and obesity, ages were grouped using class centers. Children up to 5.5 years were classified as 5 years. Specifically, ages from 5.001 to 5.5 years were categorized as "5," ages above 5.5 to 6.5 years as "6," and so on.

## Statistical analysis

The mean and standard deviations were calculated for height, weight and BMI. To test the correlation of obesity with various socio-economic parameters, binary logistic regression analysis was done. All the analysis has been done by using SPSS (version 21.0).

**TABLE 1.** BMI cut off points for over-nutrition (Cole *et al.*, 2000)

Age (in years)	Overnutrition	
	Overweight	Obesity
5	17,15	19,17
6	17,34	19,65
7	17,75	20,51
8	18,35	21,57
9	19,07	22,81
10	19,86	24,11

## Ethical clearance

Ethical approval for the study was obtained from the institutional ethics committee (Ref No-CUIEC/03/08/2024-2025, Dated -22/11/2024). Informed consent from the parents or guardians and permission from the school authorities was obtained prior to conducting the study.

## RESULTS

The mean and standard deviation (SD) of the anthropometric variables evaluated among participants from the English medium schools, for each age group, is presented in [Table 2](#), where the mean value of height and weight show a gradual increase with age, from 5 years to 10 years. The highest increment in the height parameter is found in the age group of 5-6 years (AG-8.1 cm), in body weight it is found in age group of 7-8 years (AG-3.69 cm). Gradual increase of mean values in the anthropometric variables was found among the age groups of 8-10 years of participants. The BMI of the participants increases with age, except for 9-10 years where there is a gradual decrease. 'AG' stands for absolute growth which is derived by the difference of the referred mean values. Age differences for these variables were statistically significant.

**TABLE 2.** Mean(SD) of the anthropometric variables among the studied English medium girl students

Age (in years)	N	Height	Weight	BMI
5	22	102.10 (6.6)	17.79 (3.1)	17.00 (1.8)
6	58	110.20 (8.3)	21.11 (7.7)	17.17 (3.7)
7	53	118.82 (7.5)	24.69 (5.2)	17.48 (3.3)
8	40	126.60 (3.5)	28.38 (4.3)	17.71(2.7)
9	67	128.62 (5.0)	28.41 (4.0)	17.14 (1.9)
10	57	133.70 (6.4)	28.70 (4.1)	16.02 (1.5)
<b>TOTAL</b>	<b>297</b>	<b>122.20 (11.8)</b>	<b>25.63 (6.2)</b>	<b>17.04 (2.7)</b>
F ratio		115.65***	24.78***	2.25*

BMI= body mass index; \* p < .05; \*\*\* p <.001

[Table 3](#), in turn, represents the prevalence of over nutrition among the English medium school participants. It is noticed that more than half of the participants (71.04%) were normal of weight. Overall (age combined) prevalence of obesity is very high (28.95%) out of which, overweight is found to be 21.21% and obese, 7.74%. Regarding age specific obesity among the participants, the prevalence of overweight is seen more prominent in age groups 5 years (50%) and 6 years (32.8%). However, overweight participants are also

found among 7 (22.6%) and 8 (20%) years age group. Obesity is most prevalent in the 7 years age group (18.9%). There are more overweight participants (21.21%) than obese (7.74%) participants.

**TABLE 3.** Prevalence of overnutrition (Cole *et al.*, 2000), among the studied English medium girl students.

Age (in years)	N	Overnutrition			Non-obese
		Overweight	Obesity	Total	
5	22 (100%)	11 (50%)	2 (9.1%)	13 (59.09%)	9 (40.9%)
6	58 (100%)	19 (32.8%)	5 (8.6%)	24 (41.37%)	34 (58.62%)
7	53 (100%)	12 (22.6%)	10 (18.9%)	22 (41.5%)	31 (58.49%)
8	40 (100%)	8 (20%)	5 (12.5%)	13 (32.5%)	27 (67.5%)
9	67 (100%)	10 (14.9%)	1 (1.5%)	11 (16.41%)	56 (83.58%)
10	57 (100%)	3 (5.3%)	0 (0%)	3 (100%)	54 (97.73%)
<b>Total</b>	<b>297 (100%)</b>	<b>63 (21.21%)</b>	<b>23(7.74%)</b>	<b>86(28.95%)</b>	<b>211(71.04%)</b>

To further evaluate these variables, the binary logistic regression analysis of obesity with various socioeconomic variables is presented in Table 4, where the dependent variable is overweight + obesity. Father's education, mother's education ( $p < 0.01$ ) and monthly income of the family ( $p < 0.05$ ) of the participants showed significant association with high BMI values that is obesity. While other aspects like, father's occupation, mother's occupation, house type and drinking water source of the participants didn't show any significant association. In this line of analyses, and with respect to dietary habits, Table 5 shows that the consumption of fast-food including junk snacks, cold drinks, ice-cream, chocolate, is very frequent among the participants. More than half of the total partici-

**TABLE 4.** Results of the binary logistic regression analysis of overnutrition. (B=regression coefficient, SE=standard error, Exp B =beta, Wald = Wald statistic). [Overnutrition (overweight + obesity) is dependent variable].

Variables	Beta (B) values	Standard Error(SE)	Exp(B)	Wald
Father's education	0,422	0,144	1,525	8.616**
Father's occupation	-0,183	0,112	0,833	2.664 ns
Mother's education	0,179	0,067	1,196	7.088**
Mother's occupation	0,034	0,087	1,034	0.149 ns
Family income	0,161	0,075	1,175	4.677*
House type	-0,137	0,223	0,872	0.378 ns
Drinking water	-0,562	0,333	0,57	2.86 ns

\*  $p < .05$ ; \*\*  $p < .01$ ; ns = Not significant

**TABLE 5.** Prevalence of consumption of fast food, junk snacks, restaurant cooked food, ice-cream, cold drinks, chocolates, per week.

Age (in years)	N	≤ 2 days per week	2-3 days per week	≥ 3 days per week
5	22	0 (0%)	15 (68.2%)	7 (31.8%)
6	58	5 (8.6%)	36 (62.1%)	17 (29.3%)
7	53	10 (18.9%)	30 (56.6%)	13 (24.5%)
8	40	5 (12.5%)	23 (57.5%)	12 (30.0%)
9	67	10 (14.9%)	41 (61.2%)	16 (23.9%)
10	57	8 (14.0%)	33 (57.9%)	16 (28.1%)
<b>TOTAL</b>	<b>297</b>	<b>38 (12.7%)</b>	<b>178 (59.9%)</b>	<b>81 (27.2%)</b>

pants (59.9%) are found to consume junk food two to three times per week. It is noticed that the frequency of the consumption of fast food is the highest among the 5 years age group (31.8%), followed by the 8 years age group (30%), where the participants have reported having fast food three times per week.

With respect to the socioeconomic profile of the participants, Table 6 shows parental education levels have been categorized on the basis of non-literate, primary, secondary, high secondary, graduate and higher studies. The deceased parents and the parents who do not reside with the participants have been categorized separately. Most fathers and mothers are graduates (76.5% and 73.5%, respectively). Some parents are found to have higher education (11.6% fathers and 5.3% mothers). In this table, parental occupations have been categorized on the basis of service, business and manual labor. The deceased parents and the parents who do not reside with the participants have been categorized separately. The table shows that 73.5% of fathers are into service, while 23.8% are into business. It is found that 67.9% mothers are housewives and 28.8% are found to do service. It shows the family income of parents of the participants is way above 40,000 rupees per month (54.6%). In case of house type, drinking water resource and sanitary measures, all the participants reside in brick and cement built houses, with proper sanitary measures and tap water facilities.

**TABLE 6.** Frequency distribution of socio-economic parameters

Parental education	Deceased/not found	Non-literate	Primary	Secondary	Higher Secondary	Graduate	Higher studies
Father's education	1 (0.7%)	0 (0%)	0 (0%)	2 (0.7%)	31 (10.6%)	228 (76.5%)	35 (11.6%)
Mother's education	1 (0.3%)	0 (0%)	0 (0%)	7 (2.6%)	53 (18.2%)	220 (73.5%)	16 (5.3%)
Parental occupation	Deceased/not found	Service	Business	Manual labour	Housewife		
Father's occupation	1 (7%)	221 (73.5%)	69 (23.8%)	6 (2%)	NA		
Mother's occupation	2 (7%)	86 (28.8%)	8 (2.6%)	0 (0%)	201 (67.9%)		
Family income	5k-10k	10k-20k	20k-30k	30k-above			
	4 (1.7%)	43 (14.2%)	86 (29.5%)	164 (54.6%)			

NA = Not applicable

## DISCUSSION

The present study shows that the mean values of all anthropometric variables increased with the age of the participants, except for BMI. The prevalence of overnutrition, as indicated by overweight and obesity, was found to be very high, with overweight being more prevalent than obesity. The socio-economic background played a significant role in determining the nutritional status of the participants.

The means SD of the variables are shown with age trends of the participants, which shows the mean values of height ( $133.7 \pm 6.4$  in 10 years age), weight ( $28.7 \pm 4.1$  in 10 years age) and BMI (except in 10 years age group) are also increased with the increasing age of the children. This could be due to the beginning of pubertal growth spurt in girls (Aneja *et al.*, 1997). Similar results are found in another study among 5-12 years school children of North Bengal where maximum mean values of height ( $128.61 \pm 6.98$ ) and weight ( $24 \pm 4.24$ ) are found in the 10 years age group (Manna *et al.*, 2011). Similarly,

studies conducted in other parts of the country showed that the mean height of girls are higher at the age 10 (Srivastava *et al.*, 2012). According to anthropometric indicators of BMI, the majority of the participants belonged to normal category BMI with the highest mean 17.71 kg/m<sup>2</sup> in the 8 years age group. Similar result was found in another study (Wotsa *et al.*, 2019) on 7-9 years old children of Bikaner district, India where majority of the subjects (56.7-60%) belonged to normal category BMI with their mean 14.35, 14.42 and 14.64 kg/m<sup>2</sup> for the age group of 7, 8 and 9 years respectively.

Among the studied school participants, the prevalence of overnutrition as measured by overweight and obesity (Cole *et al.*, 2000) was found to be very high (29%), out of which the prevalence of overweight was 20.9% and obesity was 7.6%. These prevalence rates of overweight are lower than those obtained on children less than five years in western countries (Aarup *et al.*, 2008; Kimbro *et al.*, 2007; Keupper-Nybelen *et al.*, 2005; Manios, *et al.*, 2007). Study conducted in Chinese children 2-6 year of age has reported 10.7% overweight and 4.2% obesity (Jiang *et al.*, 2006). Another study (Bose *et al.*, 2007) from Bengali school girls of Kolkata noted more or less same level of overweight 17.63% and obesity 5.1%. The overweight among the children of Punjab was 14.3% (Sidhu *et al.*, 2006) and Chennai, India was 15.3% (Ramachandran *et al.*, 2002), both were also nearer to the present study. High prevalence of overweight (28.5%) was also noticed among the urban adolescent English medium school girls from Kolkata (Mandal Nandi & Mandal, 2012). In another study, very high prevalence of overweight and obesity (56.6%) was noted in comparison to thinness (10.9%) among Rajbanshi girl students from North Bengal (Bose *et al.*, 2020). Dual burden was reported among adolescent girl students of Cooch Bihar district of West Bengal (Bhowmik & Khatun, 2024) where overweight was 11%. Another study from college students of Midnapore district of West Bengal (Manna *et al.*, 2018) reported that prevalence of overweight-obese prevalence was 15.2%.

Present study shows socio-economic background played a significant role in overweight and obesity of the participants. Similar result was found in another study on high school students of Dibrugarh, Assam, India (Gupta & Mahanta, 2016). The present study shows significant positive association between higher levels of paternal and maternal education and overweight/obesity among the participants. Similar findings were reported from a study in the city of Wardha, in central India (Bharati *et al.*, 2008). The present study finds out inclusion of fast food; carbonated drinks are highly prevalent in the dietary practice of the participants. Similar findings were noticed in another study on adolescents (overweight- 13.53%, obese- 6.4%) of Surat city, Gujrat, India (Goyal *et al.*, 2011).

It has been noticed that the frequency is very high, 59.9% participants are found to consume fast food twice or three times per week, and 27.2% participants have reported having junk food three times per week. Similar result was found in another study on urban adolescent English medium school girls, of Kolkata, India, where most of the overweight participants (58.42%) consumed junk food (Mandal Nandi & Mandal, 2012). Another study on adolescents of south Indian population shows more than 70% of the students dine outside once or twice a week and only 19.3% of the students eat home-made food (Gayathri *et al.*, 2020). In another study on the school-aged adolescents of North India, the prevalence of overweight and obesity was seen to be higher in urban areas as compared to rural areas, which could be due to increased availability of packed foods high in saturated fats and sugars and increased sedentary behaviour (Goyal *et al.*, 2020). Sarkar and colleagues (2021) tried to understand the health issues related to the prevalence of overweight and obesity in West Bengal. They pointed out that overeating, a sedentary lifestyle, and a lack of physical exercise are the most evident causes of obesity and over-

weight, which are more prevalent in urban areas in West Bengal. The study on assessment of childhood obesity and associated factors among school-aged children in a selected urban community of Bankura, West Bengal, by Biswas (2024), revealed that 28.57% children were obese, and 84.38% belonged to upper socio-economic class families. Another study done on prevalence of obesity with associated risk factors among school-aged children of West Bengal, by Pervin and colleagues, (2025), revealed 15% of children were obese and 20% overweight. Both studies resemble the results of the present study in the context of overweight and obesity. Whereas a little less prevalence of overweight (10.62%) and obesity (7.64%) was noticed among the early adolescent school girls in urban areas of West Bengal (Maiti *et al.*, 2013).

Considering other parts of the world the same trend is prevalent. Likewise, Prvulović and colleagues (2023), studied the prevalence of overweight and obesity in European elementary school children from 2000 to 2020, and noted obese girls were in South Europe 7.51% (95% CI: 6.61-8.51) versus East Europe 2.86% (95% CI: 2.3-3.12). A study by the NCD Risk Factor Collaboration (NCD-RisC, 2024) on worldwide trends in underweight and obesity from 1990 to 2022 shows obesity in school-aged children and adolescents was more prevalent than thinness with a posterior probability of at least 0.8 among girls in 133 countries (67%). A study on worldwide prevalence of the double burden of malnutrition in children and adolescents at the individual level by Viana and colleagues (2025) shows the overweight/obesity prevalence ranges from 8.1 % to 37 %. In the study of global prevalence of overweight and obesity in children and adolescents done by Zhang and colleagues (2024), the overall prevalence of obesity in children and adolescents was found to be 8.5% (95% CI: 8.2-8.8). Higher prevalence of obesity among children and adolescents was reported in countries with Human Development Index scores of 0.8 or greater and high-income countries or regions. The pooled estimates of overweight and excess weight in children were 14.8% (95% CI: 14.5-15.1). Still, these are less than the scenario of the present study. According to the study of Balasundaram & Daley (2025), the alarming increase in childhood obesity forecasts a significant burden of chronic disease worldwide. Obesity prevention is critical in controlling obesity-related non-communicable diseases (OR-NCDs), including type 2 diabetes, insulin resistance/metabolic syndrome with hyperinsulinemia, hyperlipidemia, hypertension, metabolic-associated fatty liver disease, and coronary artery disease.

The very high prevalence of overweight and obesity observed in the study has serious public health implications. Similar high rates have been reported in other parts of the world. Appropriate and immediate intervention programs are required to address this growing health concern, and such programs should be culturally and ethnically specific. However, there are some limitations of the present study. The sample size was relatively small, and data were collected only from two English medium schools, including female participants only.

## CONCLUSION

In the context of the present study, it can be concluded that higher prevalence of overweight and obesity were highly associated with their socio-economic background, especially on parent's education and family income. It can be concluded that the study highlighted the existence of obesity threat, which is likely to persist among mid-childhood Bengali girls belonging from wealthier families.

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## AUTHOR CONTRIBUTIONS

M. Dasgupta: Investigation; Data curation; Formal analysis; Writing – original draft.  
K. Bose: Conceptualization; Formal analysis; Writing – review & editing.  
G. C. Mandal: Conceptualization; Methodology; Formal analysis; Supervision; Writing – review & editing.

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

## REFERENCES

- Aarup, M., Sokolowski, I., & Lous, J. (2008). The prevalence of obesity and overweight among 3-year-old children in the municipality of Aalborg and identification of risk factors. *Ugeskrift for Laeger*, 170(6), 452–456. <https://pubmed.ncbi.nlm.nih.gov/18252180/>
- Aneja, S. (1997). Nutritional concerns in adolescence. In S. Gupte (Ed.), *Recent advances in pediatrics* (pp. 415–428). Jaypee Brothers.
- Balasundaram, P., & Daley, S. F. (2025). Public health considerations regarding obesity. In *StatPearls*. StatPearls Publishing. <https://pubmed.ncbi.nlm.nih.gov/34283488/>
- Bharati, D. R., Deshmukh, P. R., & Garg, B. S. (2008). Correlates of overweight and obesity among school-going children of Wardha city, Central India. *Indian Journal of Medical Research*, 127(6), 539–543. <https://pubmed.ncbi.nlm.nih.gov/18765871/>
- Bhowmik, S., & Khatun, A. (2024). A study of nutritional status among rural Bengalee Muslim school-going adolescent girls. *International Journal of Community Medicine and Public Health*, 11(8), 3126–3131. <https://doi.org/10.18203/2394-6040.ijcmph20242174>
- Biswas, K. (2024). Study on assessment of childhood obesity and associated factors among school-going children in a selected urban community of Bankura, West Bengal. *International Journal of Advance Research in Community Health Nursing*, 6(2), 44–52. <https://doi.org/10.33545/26641658.2024.v6.i2a.193>
- Bose, A., Sinha, I., Tigga, P. L., Mondal, N., & Sen, J. (2020). Socio-economic and demographic determinants of double burden of malnutrition among the Rajbanshi school-going children aged 9–14 years from North Bengal, India. *Antrocom Journal of Anthropology*, 16(2), 141–152.
- Bose, K., Bisai, S., Mukhopadhyay, A., & Bhadra, M. (2007). Overweight and obesity among affluent Bengalee schoolgirls of Lake Town, Kolkata, India. *Maternal & Child Nutrition*, 3(2), 141–145. <https://doi.org/10.1111/j.1740-8709.2007.00085.x>
- Cole, T. J., Bellizzi, M. C., Flegal, K. M., & Dietz, W. H. (2000). Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ*, 320, 1240–1243. <https://pmc.ncbi.nlm.nih.gov/articles/PMC27365/>
- Gayathri, D., Syamily, & Kulandaivel, M. (2020). Prevalence of overweight and obesity among adolescents in South Indian population. *International Journal of Medical Research and Review*, 8(6), 404–409. <https://doi.org/10.17511/ijmrr.2020.i06.05>
- Gillespie, S., & Haddad, L. (2003). *The double burden of malnutrition in Asia: Causes, consequences and solutions*. Sage Publications.
- Goyal, A., Gadi, N. A., & Kumar, R. (2020). Prevalence of overweight and obesity among rural and urban school-going adolescents (10–19 years) in North India: a population-based study. *International Journal of Medical Science and Education*; 7(2), 61–65.

- Goyal, J. P., Kumar, N., Parmar, I., Shah, V. B., & Patel, B. (2011). Determinants of overweight and obesity in affluent adolescents in Surat City, South Gujarat region, India. *Indian Journal of Community Medicine, 36*(4), 296–300. <https://doi.org/10.4103/0970-0218.91418>
- Gupta, E., & Mahanta, T. G. (2016). Overweight and obesity and its associated factors among high school students of Dibrugarh, Assam, India. *Indian Journal of Community Health, 28*(3), 295–299.
- Jiang, J., Rosenqvist, U., Wang, H., Greiner, T., Ma, Y., & Toschke, A. M. (2006). Risk factors for overweight in 2- to 6-year-old children in Beijing, China. *International Journal of Pediatric Obesity, 1*(2), 103–108. <https://doi.org/10.1080/17477160600699391>
- Kimbro, R. T., Brooks-Gunn, J., & McLanahan, S. (2007). Racial and ethnic differentials in overweight and obesity among 3-year-old children. *American Journal of Public Health, 97*(2), 298–305. <https://doi.org/10.2105/AJPH.2005.080812>
- Kliegman, R. M., Behrman, R. E., Jenson, H. B., & Stanton, B. M. (2007). *Nelson textbook of pediatrics* (18th ed.). Elsevier.
- Kuepper-Nybelen, J., Lamerz, A., Bruning, N., Hebebrand, J., Herpertz-Dahlmann, B., & Brenner, H. (2005). Major differences in prevalence of overweight according to nationality in preschool children living in Germany: determinants and public health implications. *Archives of Disease in Childhood, 90*(4), 359–363. <https://doi.org/10.1136/adc.2004.052423>
- Kumar, S., & Kelly, A. S. (2017). Review of childhood obesity: from epidemiology, etiology, and comorbidities to clinical assessment and treatment. *Mayo Clinic Proceedings, 92*(2), 251–265. <https://doi.org/10.1016/j.mayocp.2016.09.017>
- Lohmann, T. G., Roche, A. F., & Martorell, R. (1998). *Anthropometric standardization reference manual*. Human Kinetics Books.
- Maiti S., De D., Ali, K. M., Bera T.K., Ghosh, D., & Paul S. (2013). Overweight and obesity among early adolescent schoolgirls in urban area of West Bengal, India: prevalence assessment using different reference standards. *International Journal of Preventive Medicine, 4*(9), 1070–1074.
- Mandal Nandi, A., & Mandal, G. C. (2012). Prevalence of overweight and obesity among the urban adolescent English medium schoolgirls of Kolkata, India. *Italian Journal of Public Health, 9*(3), e7535–1–6. <https://doi.org/10.2427/7535>
- Manios, Y., Costarelli, V., Kolotourou, M., Kondakis, K., Tzavara, C., & Moschonis, G. (2007). Prevalence of obesity in preschool Greek children, in relation to parental characteristics and region of residence. *BMC Public Health, 7*, 178. <https://doi.org/10.1186/1471-2458-7-178>
- Manna, M., Samanta, S., Sinha, N. K., & Maiti, S. (2018). Dual burden of malnutrition among female college students of Paschim Midnapore district, India. *Journal of Nutrition, Metabolism and Health Science, 1*(3), 36–42. <https://doi.org/10.18231/j.ijnmhs.2018.009>
- Manna, P. K., De, D., Bera, T. K., & Chatterjee, K. (2011). Anthropometric assessment of physical growth and nutritional status among school children of North Bengal. *The Anthropologist, 13*(4), 299–305.
- Martorell, R., Khan, L., Hughes, M. L., & Grummer-Strawn, L. M. (2000). Overweight and obesity in preschool children from developing countries. *International Journal of Obesity and Related Metabolic Disorders, 24*(8), 959–967. <https://doi.org/10.1038/sj.ijo.0801264>
- Nandy, S., Irving, M., Gordon, D., Subramanian, S. V., & Smith, G. D. (2005). Poverty, child malnutrition and morbidity: new evidence from India. *Bulletin of World Health Organization, 83*(3), 210–216. Retrieved from <https://pmc.ncbi.nlm.nih.gov/articles/PMC2624218/>
- National Academies of Sciences, Engineering, and Medicine. (2016). *Assessing prevalence and trends in obesity: Navigating the evidence*. National Academies Press. <https://doi.org/10.17226/23505>
- NCD Risk Factor Collaboration. (2024). Worldwide trends in underweight and obesity from 1990 to 2022: A pooled analysis of 3663 population-representative studies with 222 million children, adolescents, and adults. *The Lancet, 403*(10431), 1027–1050. [https://doi.org/10.1016/S0140-6736\(23\)02750-2](https://doi.org/10.1016/S0140-6736(23)02750-2)

- Paulose, A., & Aluckal, E. (2022). Prevalence of overweight and obesity in school children aged 5–12 years of Kottayam, India. *International Journal of Science and Healthcare Research*, 7(3), 60–66. <https://doi.org/10.52403/ijshr.20220760>
- Pervin, S., Biswas, G., Afrose, M. K., & Sahoo, S. (2025). Assessment of prevalence of obesity with associated risk factors among school-going children attending a tertiary care hospital of West Bengal: a cross-sectional study. *Student's Journal of Health Research Africa*, 6(12). <https://doi.org/10.51168/sjhrafrika.v6i12.2191>
- Prvulović, N., Djordjević, M., & Pantelić, S. (2023). Gender differences and climate zones in overweight and obesity prevalence in European elementary school children from 2000 to 2020: a systematic review and meta-analysis. *Frontiers in Public Health*, 11, 1198877. <https://doi.org/10.3389/fpubh.2023.1198877>
- Ramachandran, A., Snehalatha, C., Vinitha, R., Thayyil, M., Satish, C. K., Sheeba, L., Joseph, S., & Vijay, V. (2002). Prevalence of overweight in urban Indian adolescent school children. *Diabetes Research and Clinical Practice*, 57(3), 185–190. [https://doi.org/10.1016/S0168-8227\(02\)00056-6](https://doi.org/10.1016/S0168-8227(02)00056-6)
- Sarkar, B., Ghorai, S. K., Jana, S. K., Dasgupta, D., Acharya, C. K., Nahar, N., Ghosh, S., & Madhu, N. R. (2021). Overweight and obesity in West Bengal : a serious public health issue. *Veethika- An International Interdisciplinary Research Journal*, 7 (4), 9-14. <https://doi.org/10.48001/veethika.2021.07.04.002>
- Sidhu, S., Kaur, N., & Kaur, R. (2006). Overweight and obesity in affluent school children of Punjab. *Annals of Human Biology*, 33(2), 255–259. <https://doi.org/10.1080/03014460600578631>
- Srivastava, A., Mahmood, S. E., Srivastava, P. M., Shrotriya, V. P., & Kumar, B. (2012). Nutritional status of school-age children: a scenario of urban slums in India. *Archives of Public Health*, 70(1), 8. <https://doi.org/10.1186/0778-7367-70-8>
- Viana, R. S., De Araújo-Moura, K., & De Moraes, A. C. F. (2025). Worldwide prevalence of the double burden of malnutrition in children and adolescents at the individual level: systematic review and meta-regression. *Jornal de Pediatria*, 101(2), 158–166. <https://doi.org/10.1016/j.jped.2024.11.010>
- World Health Organization. (2000). *Obesity: Preventing and managing the global epidemic. Report on a WHO consultation* (WHO Technical Report Series, No. 894). World Health Organization. <https://iris.who.int/handle/10665/42330>
- Williams, S. E., & Greene, J. L. (2018). Childhood overweight and obesity: affecting factors, education and intervention. *Journal of Childhood Obesity*, 3(2), 1–6. <https://doi.org/10.21767/2572-5394.100049>
- Wotsa, S., Choudhary, N., & Goyal, M. (2019). Nutritional assessment of school-going girls. *International Journal of Current Microbiological and Applied Sciences*, 8(2), 3236–3245. <https://doi.org/10.20546/ijcmas.2019.802.378>
- Yusuf, Z. I., Dongarwar, D., Yusuf, R. A., Bell, M., Harris, T., & Salihu, H. M. (2020). Social determinants of overweight and obesity among children in the United States. *International Journal of Maternal and Child Health and AIDS*, 9(1), 22–33. <https://doi.org/10.21106/ijma.337>
- Zhang, X., Liu, J., Ni, Y., Yi, C., Fang, Y., Ning, Q., Shen, B., Zhang, K., Liu, Y., Yang, L., Li, K., Liu, Y., Huang, R., & Li, Z. (2024). Global prevalence of overweight and obesity in children and adolescents: a systematic review and meta-analysis. *JAMA Pediatrics*, 178(8), 800–813. <https://doi.org/10.1001/jamapediatrics.2024.1576>