

# Effect of Mother's Nutritional Knowledge and Hygiene Practices on School-Going Adolescents Living in Dhaka City of Bangladesh

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## Abstract

**Background:** Adolescence which is a critical stage for growth and development is influenced by various issues along with maternal nutritional knowledge, control over their earnings, freedom of movement, and participation in household decision-making over child's health care. **Objective:** This study focused on assessing mothers' nutritional knowledge and hygiene practices and their effect on dietary diversity as well as the nutritional status of school-going adolescents of Dhaka city. **Methods:** A community-based cross-sectional study was conducted at 44 schools in Dhaka city. A total of 710 school-going adolescents aged 10–17 years were randomly selected and their mothers were interviewed for assessing their knowledge on nutrition and hygiene practices. One-way ANOVA and multivariate linear regression were used to examine the association between dietary diversity and the nutritional status of the adolescents with their mother's nutritional knowledge and hygiene practices. **Results:** About one-third (35.8%) of the mothers maintained hygiene and sanitation satisfactorily. Although 53.1% of them had satisfactory general knowledge about a healthy diet, only 6.5% showed good knowledge of the nutritional value of food. The prevalence of stunting, thin, and overweight was 8, 4.6, and 5.8%, respectively. Fair hygiene practices were positively associated ( $P = 0.048$ ) with height for age z-score. Maternal knowledge on the nutritional value of food was positively associated ( $P = 0.027$ ) with the dietary diversity of the adolescents. **Conclusion:** Adequate nutritional knowledge and hygiene practices of the mothers have positive effects on children's dietary diversity and nutritional status. Providing nutrition education to mothers would ensure better nutritional status and improved dietary practices for their children.

**Keywords:** Adolescent, Bangladesh, dietary diversity, hygiene practices, nutritional knowledge, nutritional status

## INTRODUCTION

Adolescents—aged between 10 and 19 years—comprise a large portion of the world, which is around 1.8 billion according to the United Nations. Approximately 90% of the adolescents living in low-middle-income countries suffer from various forms of undernutrition.<sup>[1]</sup> Undernutrition is a global health problem that not only affects the growth of the body but also causes slow behavioral development and even mental retardation.<sup>[2]</sup> Maternal nutritional knowledge along with control over their earnings, freedom of movement, and participation in household decision-making are often associated with the nutritional outcome and health status of their children.<sup>[3]</sup>

In Bangladesh, several indicators reflect a continuous improvement of household economic and education status. According to the Bangladesh Health and Demographic

Survey of 2017–18, the proportion of ever-married women aged 15–49 who completed secondary education increased from 14 to 17% between 2014 and 2017.<sup>[4]</sup> As mothers are the primary caregiver of their children, it is assumed that their education and nutritional knowledge largely affect children's health and food consumption. For example, Harold and Derek in their study stated that maternal education plays a bigger role in nutritional return than paternal education.<sup>[5]</sup> A study in Turkey showed that mothers with a higher level of

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nutritional knowledge avoided giving unhealthy foods and feeding them more healthy foods such as vegetables, fruits, and dairy products.<sup>[6]</sup> Similar results were observed in a study of Bangladesh where they demonstrated that maternal education is significantly associated with a child's weight and overall nutritional status.<sup>[7]</sup>

Proper knowledge of hygiene practices of mothers can provide optimum nutrition to the adolescents in a way in which they can grow and develop well.<sup>[8]</sup> A study of Nigeria found that proper hygiene practices of the mother were positively associated with HAZ and WHZ scores of their children.<sup>[9]</sup> Hygiene practices of the mother can improve sanitation and water quality condition within a household.<sup>[10]</sup> However, the attitude and hygiene practice of the mother is thought to be affected by various sociodemographic issues such as educational status, age, occupation, and social norms.<sup>[11]</sup> Currently, cases of malnutrition is not only been found in families with low income but also seen in families where mothers' do not maintain hygiene practices and children are nurtured by a maid.<sup>[12]</sup>

Maternal nutritional knowledge is a paramount to overcome the burden of the vicious cycle of undernutrition. Good nutrition during adolescence, especially for girls, is vital for their growth, development, and eventually for their children.<sup>[13]</sup> Therefore, the study aimed to assess the nutritional knowledge and hygiene practices of mothers of adolescents living in Dhaka city. The study also examined the effect of mothers' nutritional knowledge and hygiene practices on adolescents' dietary diversity as well as overall nutritional status.

## METHODS

A community-based cross-sectional study was conducted at randomly selected 8 thanas and 44 schools in Dhaka city of Bangladesh. A total of randomly selected 710 adolescents aged 10–17 years have participated in our study. Study participants were the mothers of the adolescents.

A structured and pretested questionnaire was used for covering the following topics: household socioeconomic condition; women empowerment; water, sanitary and hygiene practices; nutritional knowledge and practice of mother; cooking practices; family and children's food habit; and data on the food frequency table. The anthropometric data of the adolescents were collected using calibrated instruments for evaluating their nutritional status.

The questionnaire was designed by the principal investigator, validated by related Bangladesh Institute of Research and Training on Applied Nutrition officials and other experts by validation workshops. The questionnaire was pretested in the fields before starting the data collection process.

For assessing nutritional status, anthropometric data (height and weight) were collected from each adolescent. Then, height for age z-score (HAZ) and BMI for age z-score (BAZ) were calculated using WHO Anthro Plus software. HAZ value less than -2 was categorized as stunted and within -2 to +2 as

normal adolescents. BAZ value less than -2 was categorized as thin, within -2 to +2 as normal, and above +2 as overweight adolescents.<sup>[14,15]</sup> For assessing the dietary diversity of the adolescents, information on how many food groups among 16 groups consumed during the previous 24 h was taken. It was a continuous variable having a scale of 0–16.

## Statistical analysis

One-way ANOVA with Games Howell post hoc comparison was performed to identify the effect of maternal hygiene and nutritional knowledge on adolescents' anthropometry and dietary diversity. Furthermore, multiple linear regression (Enter method) was applied to study the impact of maternal knowledge on nutritional status and dietary diversity of adolescents. Three regression model was built up for three different dependent variables: HAZ, BMI for age z score, dietary diversity score (DDS). Along with maternal knowledge-related variables, the age of adolescents, gender, street food consumption, the literacy level of the mother, family size, households' monthly income were included as covariates. Normality of variables was investigated through descriptive analysis (mean, median, SD, skewness, kurtosis); statistical test (Shapiro–Wilk test and Kolmogorov–Smirnov test); and thorough visual inspection of the histogram, Q–Q plot, and box plot. All statistical analyses were performed by SPSS version 25, and a *P* value less than 0.05 was used as a cutoff for defining statistical significance for all statistical tests.

Verbal and written consent from the participants was taken prior to interview.

## RESULTS

The sociodemographic characteristics of the respondents showed that about 70% of the participants were girls. Most of the boys and girls were at early adolescent ages. About two-thirds (74.4%) of the mothers had formal education of completion of secondary school or above. Most of the mothers (92.2%) were found to be involved in their household courses. About 85% of them were above 40 years.

The health status of the adolescents is shown in Table 1. Only about 8% of them were found to be stunted. The prevalence of stunting was slightly higher (8.9% vs 7.7%) among the boys compared to girls. Most of the adolescents were within the normal cutoff in their BAZ score, and only 4.6 and 5.8% were thin and overweight, respectively.

Table 2 shows the mothers' nutritional knowledge and hygiene practices. Only about 8.7% of the mothers were found to maintain hygiene and sanitation poorly. More than one-third (35.8%) maintained hygiene and sanitation satisfactorily. Only 6.5% of the mothers showed good knowledge of food as a source of nutrients. More than half of them (53.1%) had satisfactory general knowledge about a healthy diet; on the contrary, only 11.4% had poor knowledge of a healthy diet.

One-way ANOVA test to identify the effect of maternal hygiene and nutritional knowledge on adolescents' anthropometry and

dietary diversity has been described in Table 3. Both mean HAZ and mean DDS were found to significantly differ with knowledge about food as sources of nutrients and general knowledge on a healthy diet. However, hygiene practices were found to have no significant effect on the nutritional status and dietary diversity of the children.

A multivariate regression model was used to find the association of mothers' nutritional knowledge and hygiene practices with adolescents' health and dietary diversity that has been demonstrated in Table 4. Mothers' nutritional knowledge and hygiene practices (poor and good) were not significantly associated nutritional status (either with HAZ or BAZ) of the adolescents. Only fair hygiene practices were positively associated with HAZ. Maternal knowledge about sources of nutritious food was significantly associated with the dietary diversity of the adolescents.

## DISCUSSION

The present study depicted the effect of a mother's nutritional knowledge and hygiene practices on a child's nutritional status and dietary diversity. The data from 710 school-going adolescents and their mothers were collected from 44 schools around Dhaka. All the adolescents were in the age range of 10–17 years, and among them 214 (30.1%) were boys and 496 (69.9%) were girls. The proportion of girls was significantly higher than boys which may be due to lower registration of boys in the schools, absence in the school on the day of data collection, or may be due to random selection. About 35.7% of the fathers were businessmen and 35.5% of them were service holders. In the case of mothers, around 92.2% of them were housewives, whereas only 5.4% of them were related to business.

In our study, the prevalence of stunting was about 8% and slightly higher (8.9% vs 7.7%) among the boys compared to girls. Only 4.6 and 5.8% of the adolescents were thin and overweight, respectively. Global School-based Student Health Survey of 2014 (GSHS) was conducted among school-going adolescents and provides valuable estimates of their nutritional status.<sup>[16,17]</sup> The prevalence of stunting was 14.2%, which is almost double the prevalence of stunting found in our study. The rate of thinness (11.1% vs 4.6%) was also more than double compared to our study. Unlike stunting and thinness, the percentage of overweight (BAZ >2SD) in our study was higher (5.8% vs 1.5%) than the rate found in GSHS-2014.<sup>[17]</sup> A study of Bangladesh conducted in 2013 among urban children reported an approximately 5-fold increase in overweight and obesity over the past two decades.<sup>[18]</sup> Generally, higher socioeconomic status, parents' higher education, higher rank occupation, parental obesity, consumption of fast foods, and urban residence were found to be positively associated with overweight and obesity.<sup>[19]</sup>

In assessing the effect of maternal nutritional knowledge and hygiene practices (ANOVA test), it was found that both mean HAZ and mean DDS significantly differed with knowledge

about food as sources of nutrients and general knowledge on a healthy diet. Multivariate regression analysis showed the effect of the mother's nutritional knowledge and hygiene practices adjusting other possible variables. Fair hygiene practices were positively associated ( $P = 0.048$ ) with HAZ. Nutritional literacy

**Table 1: Percent distribution of malnourished adolescents aged 10-17 years by anthropometric indicator: Height for age (HAZ) and BMI for age (BAZ) (n=710)**

Anthropometric Indicator	Boys n (%)	Girls n (%)	Total n (%)
Height for age (HAZ)			
Normal	195 (91.1)	458 (92.3)	653 (92.0)
Stunted	19 (8.9)	38 (7.7)	57 (8.0)
BMI for age (BAZ)			
Thin	17 (7.9)	16 (3.2)	33 (4.6)
Normal	174 (81.3)	462 (93.1)	636 (89.6)
Overweight	23 (10.7)	18 (3.6)	41 (5.8)

**Table 2: Knowledge score of mothers about hygiene, food as a source of nutrients, and functions of nutrients in the human body (n=710)**

Characteristics	n (%)
Hygiene practices (out of 9)	
Poor ( $\leq 5$ scores)	62 (8.7)
Fair (6-7 score)	394 (55.5)
Good ( $\geq 8$ scores)	254 (35.8)
Knowledge about food as a source of nutrients (out of 9)	
Poor ( $\leq 3$ scores)	271 (38.1)
Fair (4-6 scores)	393 (55.4)
Good ( $\geq 7$ scores)	46 (6.5)
General knowledge about healthy diet (out of 9)	
Poor ( $\leq 3$ scores)	81 (11.4)
Fair (4-6 scores)	252 (35.5)
Good ( $\geq 7$ scores)	377 (53.1)

**Table 3: Effect of maternal nutritional and hygiene knowledge on nutritional status and dietary diversity of their children (n=710)**

Variables	HAZ Mean (SD)	BAZ Mean (SD)	DDS Mean (SD)
Hygiene practices			
Poor (n=62)	-0.39 (1.27) <sup>a</sup>	0.35 (0.88) <sup>a</sup>	7.79 (1.53) <sup>a</sup>
Fair (n=394)	-0.57 (1.17) <sup>a</sup>	0.23 (1.31) <sup>a</sup>	7.82 (1.54) <sup>a</sup>
Good (n=254)	-0.41 (1.27) <sup>a</sup>	0.36 (1.24) <sup>a</sup>	8.07 (1.31) <sup>a</sup>
Knowledge about food as sources of nutrients			
Poor (n=271)	-0.61 (1.23) <sup>a</sup>	0.22 (1.37) <sup>a</sup>	7.54 (1.5) <sup>a</sup>
Fair (n=393)	-0.47 (1.22) <sup>a</sup>	0.33 (1.21) <sup>a</sup>	8.1 (1.39) <sup>b</sup>
Good (n=46)	-0.06 (1.02) <sup>b</sup>	0.3 (1.3) <sup>a</sup>	8.46 (1.37) <sup>b</sup>
General knowledge of a healthy diet			
Poor (n=81)	-0.71 (1.21) <sup>a</sup>	0.14 (1.3) <sup>a</sup>	7.31 (1.41) <sup>a</sup>
Fair (n=252)	-0.62 (1.24) <sup>b</sup>	0.37 (1.23) <sup>a</sup>	7.76 (1.52) <sup>b</sup>
Good (n=377)	-0.37 (1.18) <sup>a</sup>	0.27 (1.26) <sup>a</sup>	8.14 (1.39) <sup>c</sup>

Values not sharing the same letter (a-c) denote significant variance

**Table 4: Multivariate regression model showing factors associated with different nutritional indices (n=710)**

	Multivariate model <sup>[3]</sup>	
	B (95%CI)	Beta
Height for age z score		
Age in years	-0.36 (-0.41,-0.32)	-0.53
Gender	-0.49 (-0.65,-0.33)	-0.18
Family size	-0.01 (-0.08,0.12)	0.01
Family income	0.00	0.04
Dietary diversity	0.02 (-0.03,0.07)	0.03
Literacy level of mother		
Below SSC vs HSC or higher	0.06 (-0.18,0.31)	0.02
SSC pass vs HSC or higher	0.07 (-0.14,0.27)	0.02
Street food consumption	-0.06 (-0.23,0.1)	-0.02
Hygiene practices		
Fair vs poor	0.29 (-0.002,0.58)	0.12
Good vs poor	0.29 (-0.01,0.59)	0.11
Maternal knowledge about source of nutritious food	0.08 (-0.12,0.27)	0.03-0.03
Fair vs poor	-0.15 (-0.49,0.19)	
Good vs poor		
General knowledge of a healthy diet	0.07 (-0.22,0.37)	0.03-0.05
Fair vs poor	-0.13 (-0.47,0.21)	
Good vs poor		
Adjusted R <sup>2</sup> : 0.34		
BMI for age z score		
Age in year	-0.09 (-0.14,-0.03)	-0.12
Gender	-0.09 (-0.3,0.11)	-0.03
Family size	-0.08 (-0.21,0.05)	-0.05
Family income	0.00	0.13
Dietary diversity	0.02 (-0.04,0.09)	0.03
Literacy level of mother		
Below SSC vs HSC or higher	-0.14 (-0.45,0.16)	-0.04-0.02
SSC pass vs HSC or higher	-0.06 (-0.32,0.2)	
Street food consumption	0.14 (-0.07,0.35)	0.05
Hygiene practices		
Fair vs poor	0.05 (-0.31,0.41)	0.02-0.04
Good vs poor	-0.1 (-0.48,0.27)	
Maternal knowledge about source of nutritious food	-0.11 (-0.36,0.13)	-0.04-0.01
Fair vs poor	-0.05 (-0.47,0.38)	
Good vs poor		
General knowledge of a healthy diet	-0.19 (-0.57,0.17)	-0.07-0.004
Fair vs poor	-0.01 (-0.43,0.41)	
Good vs poor		
Adjusted R <sup>2</sup> : 0.26		
Dietary diversity of adolescents		
Age in year	-0.005 (-0.06,0.05)	-0.007
Gender	-0.14 (-0.37,0.09)	-0.04
Family size	-0.01 (-0.16,0.13)	-0.009

Contd...

**Table 4: Contd...**

	Multivariate model <sup>3</sup>	
	B (95%CI)	Beta
Family income	0.00	0.11
Literacy level of mother		
Below SSC vs HSC or higher	0.56 (0.21,0.9)	0.16
SSC pass vs HSC or higher	0.18 (-0.12,0.48)	0.05
Hygiene practices		
Fair vs poor	0.14 (-0.27,0.56)	0.049
Good vs poor	0.01 (-0.42,0.44)	0.005
Maternal knowledge about source of nutritious food		
Fair vs poor	-0.23 (-0.51,0.05)	-0.07
Good vs poor	0.54 (0.06, 1.03)	0.09
General knowledge of a healthy diet		
Fair vs poor	0.04 (-0.38,0.46)	0.01
Good vs poor	0.04 (-0.44,0.52)	0.01
Adjusted R <sup>2</sup> : 0.56		

\*P < 0.05, Gender: 0=male, 1=female; street food: 0=no, 1=yes; education: 0=below SSC, 1=HSC/higher; 0=SSC pass, 1=HSC/higher; knowledge: 0=fair, 1=poor; and 0=good, 1=poor

and proper knowledge of hygiene practices of mothers can provide optimum nutrition to the adolescents in a way in which they can grow and develop well.<sup>[8]</sup> Maternal knowledge about the source of nutritious food was positively associated ( $P = 0.027$ ) with the dietary diversity of the adolescents. Another study on the effect of a mother's nutritional knowledge on a child's dietary intake also found that maternal nutritional knowledge can improve meal frequency, dietary diversity, and water quality within a household.<sup>[10]</sup> It is assumed that the mothers who have good nutritional knowledge prefer the right foods for themselves and their children.<sup>[20]</sup> A strong correlation had been found between mothers' nutritional knowledge and the nutritional status of their children.<sup>[6]</sup> A study conducted in Somalia showed that households that had unhygienic conditions had higher numbers of malnourished children.<sup>[21]</sup> Improving education, knowledge, nutritional status, mental well-being, autonomy, and social support among mothers would facilitate the provision of optimal care for children.<sup>[22]</sup>

The implications of the study are many. The government should make policies to increase the rate of female education. It should offer more stipends and social protection programs such as school-feeding programs to female students of both urban and rural areas. The authorities and policymakers should create more working opportunities for women so that they can get empowered and exercise power in making family decisions. Dissemination of nutritional education through different media should be a way to improve mothers' nutritional knowledge and hygiene practices.

The limitation of the study is that the data were collected from only 44 schools of Dhaka city and no data from English medium schools were collected. The list of variables examined

was limited and statistical significance was not found within most of the variables. For future research, a similar study can be conducted for rural adolescents.

## CONCLUSION

The present study determined that adequate nutritional knowledge and hygiene practices of the mothers have positive effects on children's dietary diversity and nutritional status. Furthermore, it depicted the current nutritional status and eating behavior of the school-going adolescents of Dhaka city. Giving more nutritional education to mothers would ensure the better nutritional status of their children and all family members. Although this study is a cross-sectional study, it would help to indicate points of intervention for urban adolescents. Further, we recommend further study about family nutritional habits including the father's nutritional knowledge to give a clearer insight.

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## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Christian P, Smith R. Adolescent undernutrition: Global burden, physiology, and nutritional risks. *Ann Nutr Metab* 2018;72:316-28.
2. Moestue H, Huttly S. Adult education and child nutrition: The role of family and community. *J Epidemiol Community Health* 2008;62:153-9.
3. Akhtaruzzaman M, Khan NI, Akter F, Islam SN. Nutrition, Health and Demographic Survey of Dhaka-1000, Bangladesh-2011. 2013. p. 1-130.
4. Ahsan KZ, Jamil K, Islam S, Al-Sabir A. Bangladesh Demographic and Health Survey 2017-18: Key Indicators Report. 2019. Available from: <https://dhsprogram.com/publications/publication-PR104-Preliminary-Reports-Key-Indicators-Reports.cfm>. [Last accessed on 2022 Mar 03].
5. Alderman H, Headey DD. How important is parental education for child nutrition? *World Dev* 2017;94:448-64.
6. Yabancı N, Kısacık İ, Karakuş SŞ. The effects of mother's nutritional knowledge on attitudes and behaviors of children about nutrition. *Procedia Soc Behav Sci* 2014;116:4477-81.
7. Hossain M. Is there any interaction effect of mothers' education and their bargaining power on children's nutritional status? Evidence from rural Bangladesh. *World Dev Perspect* 2020;18:100179.
8. Awasthi R. Impact of mother's nutritional knowledge on children's dietary intake. *Int J Appl Pure Sci Agric* 2016;2:149-54.
9. Fadare O, Amare M, Mavrotas G, Akerele D, Ogunniyi A. Mother's nutrition-related knowledge and child nutrition outcomes: Empirical evidence from Nigeria. *PLoS One* 2019;14:1-17.
10. Kajjura RB, Veldman FJ, Kassier SM. Effect of nutrition education on knowledge, complementary feeding, and hygiene practices of mothers with moderate acutely malnourished children in Uganda. *Food Nutr Bull* 2019;40:221-30.
11. Variyam JN, Blaylock J, Lin B, Ralston K, Smallwood D. Mother's nutrition knowledge and children's dietary intakes. *Am J Agric Econ* 1999;81:373-84.
12. Kolby Brawley L. The Impact of Parent Education on Parental Feeding Practices. 2013. Available from: <http://scholarworks.uark.edu/etdhttp://scholarworks.uark.edu/etd/846>. [Last accessed on 2022 Mar 03].
13. Sukandar D, Khomsan A, Anwar F, Riyadi H. Nutrition knowledge, attitude, and practice of mothers and children nutritional status improved after five months nutrition education intervention. *Int J Sci Basic Appl Res* 2015;23:424-42.
14. Physical status: The use and interpretation of anthropometry. Report of a WHO Expert Committee. *World Health Organ Tech Rep Ser* 1995;854:1-452.
15. Cashin K, Oot L. Guide to anthropometry: A practical tool for program planners, managers, and implementers. *Food Nutr Tech Assist III Proj (FANTA)/FHI360* 2018;93-115.
16. Jubayer A, Islam H, Nayan M, Khan NI. Prevalence and factors associated with nutritional status and individual level double burden of malnutrition among school going adolescents of Bangladesh: Findings from Global School-based Student Health Survey-2014. *Int J Sci Res Biol Sci* 2020;7:51-7.
17. Bangladesh-Global School-Based Student Health Survey 2014. Available from: <https://extranet.who.int/ncdsmicrodata/index.php/catalog/485>. [Last accessed on 2022 Mar 03].
18. Bhuiyan MU, Zaman S, Ahmed T. Risk factors associated with overweight and obesity among urban school children and adolescents in Bangladesh: A case-control study. *BMC Pediatr* 2013;13:72.
19. Anuradha RK, Sathyavathi RB, Reddy TM, Hemalatha R, Sudhakar G, Geetha P, *et al.* Effect of social and environmental determinants on overweight and obesity prevalence among adolescent school children. *Indian J Endocrinol Metab* 2015;19:283-7.
20. Beal T, Tumilowicz A, Sutrisna A, Izwardy D, Neufeld LM. A review of child stunting determinants in Indonesia. *Matern Child Nutr* 2018;14:e12617.
21. Kalid M, Osman F, Sulaiman M, Dykes F, Erlandsson K. Infant and young child nutritional status and their caregivers' feeding knowledge and hygiene practices in internally displaced person camps, Somalia. *BMC Nutr* 2019;5:1-11.
22. Basnet S, Frongillo EA, Nguyen PH, Moore S, Arabi M. Associations of maternal resources with care behaviours differ by resource and behaviour. *Matern Child Nutr* 2020;16:e12977.