Study on Anemia in Adolescent Girls due to Food Habit at Magura District in Bangladesh

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ABSTRACT

Adolescence is one of the most imperative stages of growth and development of human life cycle and nutritional imbalance during this stage is supposed to have prodigious impact on proper growth. The research aims to examine the impact of a nutrition education on nutritional status and knowledge of adolescent girls in rural and urban areas Magura district in Bangladesh. Detailed questionnaire was used to collect socio-demographic and nutrition related data. Gomez classification and MUAC was used to classify the nutritional status of the respondent. Nutrition awareness and nutritional status of each of the respondent was assessed both before and after the nutrition education program. The 1st and 2nd survey showed a significant impact of nutrition education and improvement of nutritional status. Good hygienic practice was improved. Irregularities in food consumption and foods taboos were found to be reduced after nutrition education. Concept about nutrition and balanced diet was disseminated. From the result it was found that 35% students' body structures were moderately thin, 42% respondents' weights were mild to moderate stunted, 70% respondents' dietary diversity status were lowest dietary diversity. The result of the study also revealed that respondents' food intakes per capita/day were not adequate as recommended food.From the result it was found that daily intake of energy and nutrients were less than recommended daily allowances. Most of the respondents know about anaemia but few respondents know about the reason of anaemia. Most of the respondents know about balanced diet but very few respondents know how to prevent anaemia that 35% respondents' anemia type was mild anaemic.

Keywords: Adolescent girls, Nutrition education, Balanced diet, Body Mass Index (BMI), Nutrition awareness, Malnutrition, School student.

INTRODUCTION

The World Health Organization (WHO) defines adolescents as those people between 10 and 19 years of age. Today there are 1.2 billion adolescents, worldwide. Nearly 90 percent live in developing countries like Bangladesh. During this period, adolescents gain up to 50% of their adult weight, 20% or more than that of their adult height and 50% of their adult skeletal mass. The remarkable growth that occurs in adolescent time is second only to that in the first year of life and this physical growth occurs concomitantly with dramatic cognitive and psychosocial changes. Beside it is the period when sexual development occurs.

So, it creates increased demands for energy and nutrition. Requirements of calories and protein are maximal at this time. Requirements of other nutrients, e.g. iron, calcium, and vitamins are also very high at this time. Failure to consume an adequate diet during this time period can result in delayed sexual maturation and can arrest or slow linear growth.

As for adolescent girls in the slum, they do not only face undernutrition problem, but they also have inadequate infrastructures problem that leads them not to have proper health care during illness.They are more susceptible to nutritional deficiency due to physical and social vulnerability. More than 60% of schoolgirls aged 10-16 years in Magura city consume protein, iron, and calcium less than 75% of the RDA for age. The nutritional status of adolescent girls affects their health and condition in later life. The high prevalence of chronic energy and micronutrient deficiencies of today's adolescent girls is directly linked to the quality of the next generation. Without addressing these deficiencies, the vicious cycle of inter-generational undernutrition, chronic diseases, and poverty perpetuates. Malnutrition early in the life of adolescent girls has long-lasting effects which affect negatively the overall growth, morbidity, cognitive development, educational attainment and adult productivity.

Undernourished adolescent girls are likely to grow into of adolescent girls is much worse in the slum area. Reasons associated with the poor nutrition of adolescents are poverty, periodic food-shortage, child labor, the frequency of the disease, inadequate infrastructure, low awareness, poor knowledge about long-term consequences of undernutrition of

adolescents, poor housing condition, inadequate quantity and quality of food and lack of access to health and nutrition services. Within slum areas, poor environmental conditions and infrastructures are common scenarios.

As the adolescences of the slum area are subjected to poverty they often do not have a proper balanced diet. Long-term inadequate intake of balanced diet causes stunting as well as wasting. The world's adolescent population in about 1200 million persons at the age of 10–19 years and about 19% of the total population of the world faces a series of serious nutritional challenges in developing country.

Bangladesh is one of the poorest countries, with over a 150 million population and densely populated countries of the world (881/sq km), and about 60 million people (40%) live below the poverty line and 34.6% currently lives in urban area. whereas 60.4% of the population lives in the urban area of Iran. There are about 27.7 million adolescents aged 10-19 years of age in Bangladesh and about 13.7 million girls, who make up about one-fifth of the total population, and, in Iran, with a population of 15 million people, 21.90% are adolescents aged 10–19 years. Sixty-seven percent and over of the adolescent girls are married. This includes 48% girls aged 15–19 years. About 50% of the pregnancies occur by the age of 18 years.

Adolescence is a crucial part of their life. During this period, adolescents gain up to 50% of their adult weight, 20% or more than that of their adult height and 50% of their adult skeletal mass. Requirements of calories and protein are maximal, as also requirements of other nutrients, e.g. iron, calcium and vitamins, which increase. One US study showed that female adolescents generally did not tend to increase energy intake with increasing age. Nutrition is one of the most important factors influencing the quality of human life. Nutritional status is also an important health indicator to assess a country's health status and morbidity pattern. Studies of nutrition status are very important in the adolescent of child bearing age because of low to moderate prevalence of possible deficiency.

OBJECTIVE OF THE STUDY:
The objectives of the study are as follows:
1. To identify the real scenario of nutritional status and dietary intake of adolescent girls in Bangladesh.
2. To identify the challenges and find out necessary solution about nutritional status and dietary intake of adolescent girls in Bangladesh.
3. To find out necessary developments of nutritional status and dietary intake of adolescent girls in Bangladesh.

METHODOLOGY OF THE STUDY

Study design: The design of the study was cross sectional study.

Study area: The study was conducted at urban and rural areas of Magura district in Bangladesh.

Study Period: The study was conducted from July 2021 to May 2023.

Sampling method: Random sampling method was used for the study.

Sample Size: Total 200 respondents were selected for the study. The respondents of the study were adolescent school girls' students. Data were collected from the students. Schools were selected for the study. From eight school's 25 students were selected from the study area.

Sources of Data: Data were collected from primary and secondary sources.

Sources of Primary Data: Primary Data were collected from the respondents of the study area.

Sources of Secondary Data: Secondary Data were collected from Books, Research Report, Journal, Thesis, Internet etc.

Tools for Data Collection: Questionnaire was used for data collection.

Method of Data Collection: Data were collected by face to face interview with the respondents.

Inclusion Criteria: Girls students were only included. Their nutritional status and dietary intakes were included. No other diseases were included.

Exclusion Criteria: All diseases were excluded.

Ethical Consideration: Permission for ethical consideration was taken from the School Authorities. All the girls' students were briefly understood about the purpose of the study and informed written consent was taken.

Data Processing and Analysis: In qualitative study the researcher has the freedom to marshal gathered data to meet the desired objectives of the study (Creswell 2009). Partial data of questionnaire survey were processed using simple statistics. The rest of the data were explained carefully to meet the aim of the study and research question and also attempted to establish relation among the variables. Some important and strong statements were referred in the analysis part to add value to the findings. Computer Program Statistical Packages for the Social Sciences were used for data analysis. Data were analyzed according to the objectives of the study. Tables, graphs and statistical analysis were done by Computer Program Statistical Package for the Social Sciences.
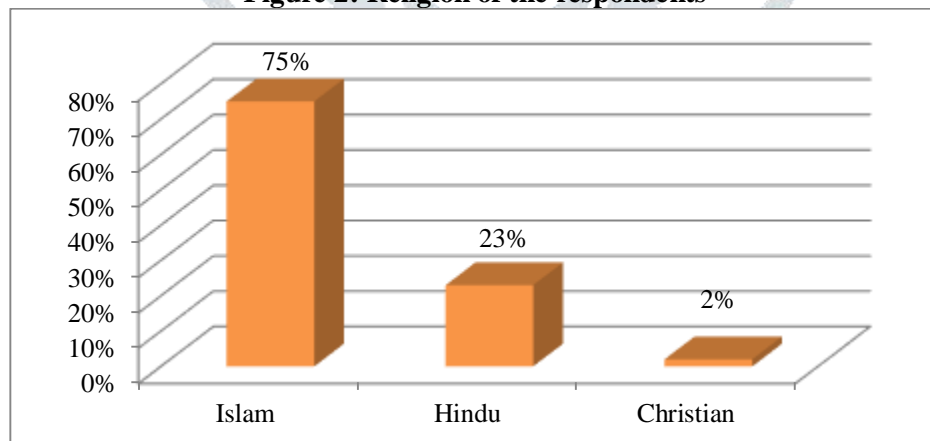
RESULTS AND DISCUSSION

Figure 1: Age of the respondents
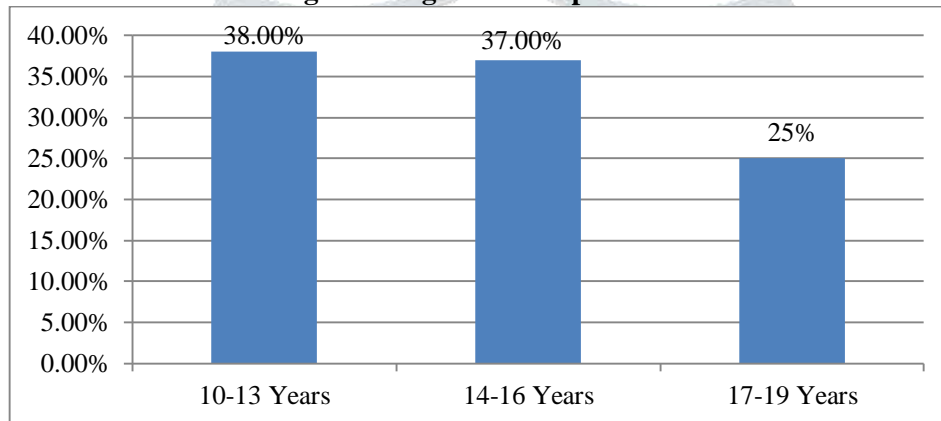
Source: Field survey, 2023

Age of the respondents has shown in the above graph 1. From the result it was found that age group 10-13 years was 38% which was maximum but age group 17-19 years was 25% which was minimum. On the other hand age group 14-16 years was 37%.
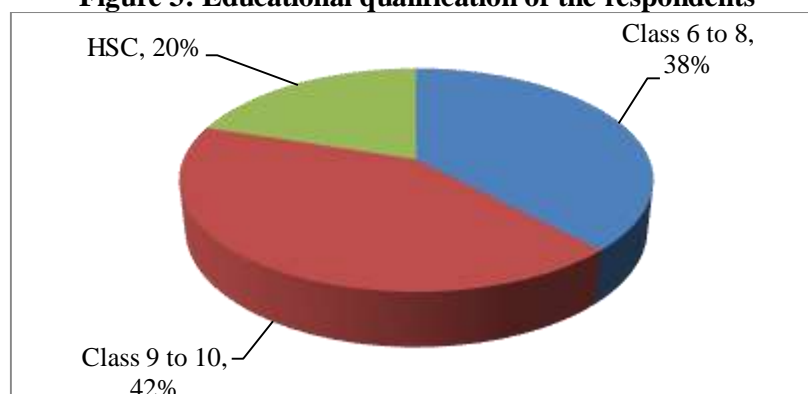

Figure 2: Religion of the respondents

Source: Field survey, 2023

Religion of the respondents has shown in the above graph 2. From the result it was found that 75% respondents were from Islam which was maximum but only 2% were from Christian which was minimum. On the other hand, 23% were from Hindu.
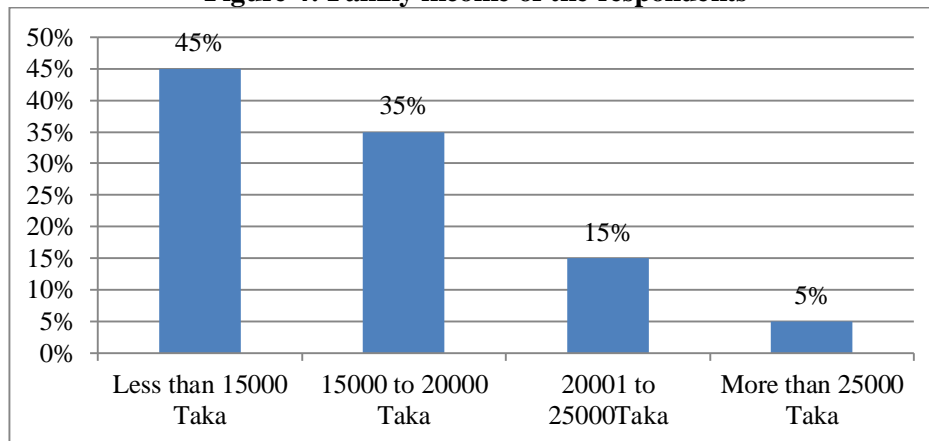

Figure 3: Educational qualification of the respondents

Source: Field survey, 2023

Educational qualification of the respondents has shown in the above graph 3. From the result it was found that 42% respondents were from the students of class 9 to 10 which was maximum but only 20% respondents were from the students of HSC which was minimum. On the other hand, 38% respondents were from the students of class 6 to 8.
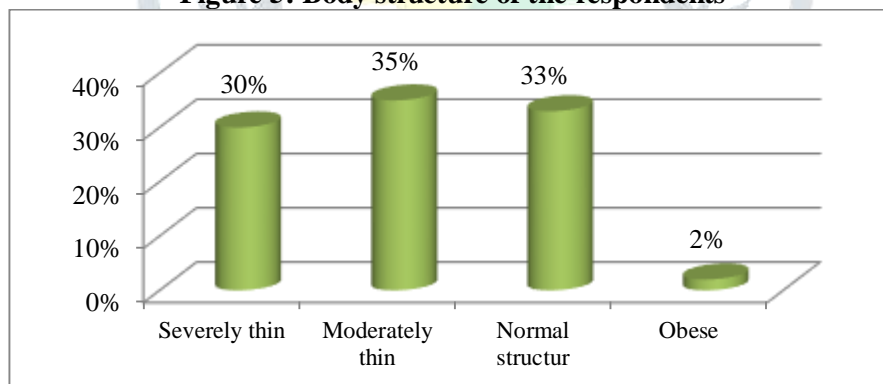
Figure 4: Family income of the respondents

Source: Field survey, 2023

Family income of the respondents has shown in the above table and graph. From the result it was found that 45% respondents' family income were less than 15000 Taka which was maximum but only 5% respondents' family income were more than 25000 Taka which was minimum. On the other hand 35% respondents' family income was 15000 to 20000 Taka and 15% respondents' family income was 20001 to 25000 Taka.
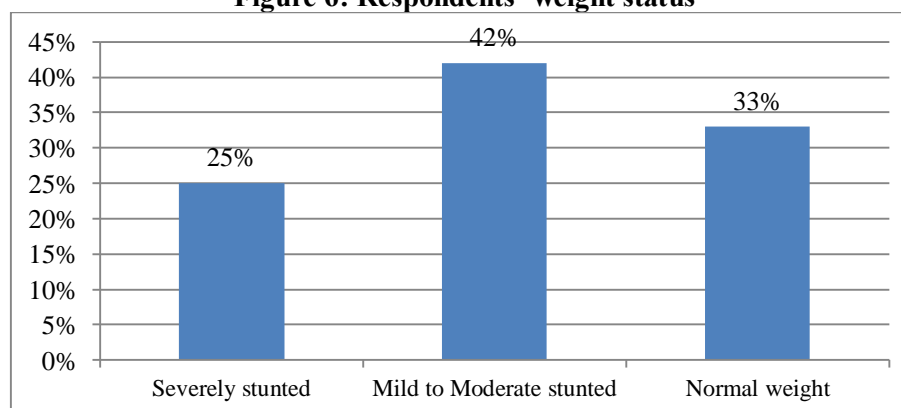
Figure 5: Body structure of the respondents
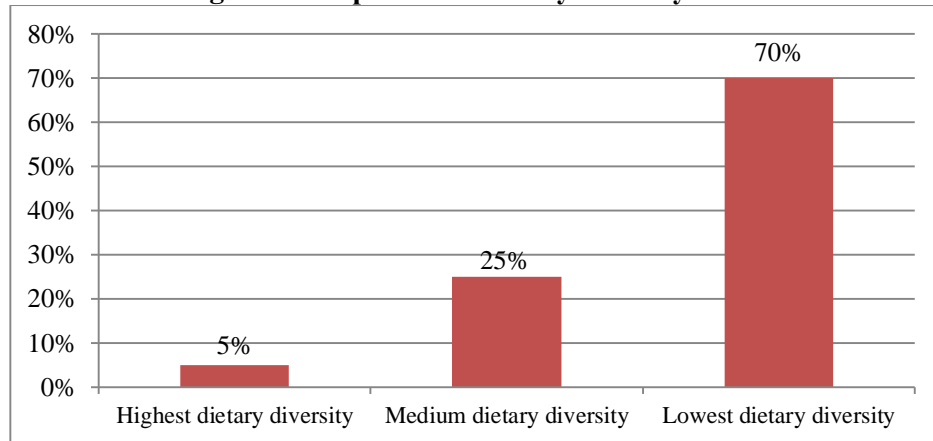

Source: Field survey, 2023

Body structure of the respondents has shown in the above table and graph. From the result it was found that 35% students' body structures were moderately thin which was maximum but 2% students' body structures were obese which was minimum. On the other hand 30% students' body structures were severely thin and 33% students' body structures were normal.

Figure 6: Respondents' weight status

Source: Field survey, 2023

Respondents' weight status has shown in the above table and graph. From the result it was found that 42% respondents' weights were mild to moderate stunted which was maximum but 25% respondents weight were severely stunted which was minimum. On the other hand 33% respondents' weights were normal.

Figure 7: Respondents' dietary diversity status

Source: Field survey, 2023

Respondents' dietary diversity status has shown in the above table and graph. From the result it was found that 70% respondents' dietary diversity status were lowest dietary diversity which was maximum but 5% respondents' dietary diversity status were highest dietary diversity which was minimum. On the other hand 25% respondents' dietary diversity statuses were medium dietary diversity.

Table1: Respondents' food intake per capita/day

Food groups (gm)	Scanty	Less than Normal	Normal	Sufficient	Percentage
Rice				√	100%
Wheat		√			25%
Potato				√	100%
Carrot	√				2%
Radish		√			10%
Pulses		√			50%
Nut		√			40%
Vegetables					
Green banana		√			30%
Kolar Mocha		√			25%
Kolar thor		√			20%
Pointed gourd (Potol)		√			30%
Bitter gourd (Korola)		√			20%
Bean (Shem)		√			30%
Borboti		√			15%
Green leafy vegetables					
Aram leaf		√			10%
Palongshak		√			20%
Data shak		√			30%
Spinach		√			20%
Lal shak		√			25%
Kalmishak		√			20%
Fruits					
Banana		√			40%
Jackfruit		√			45%
Guava		√			35%
Dates		√			20%
Mango		√			40%
Black berry		√			20%
Koromcha	√				5%
Papaya		√			30%
Pomegranate	√				5%
Orange	√				10%
Dragon fruit	√				5%
Gab	√				2%
Sabeda		√			20%
Meats					
Red meat					

Goat/Cow		√			20%
Lever	√				10%
Chicken				√	60%
Birds		√			25%
Egg		√			62%
Fish					
Big fish		√			44%
Small fish		√			38%
Sea fish	√				3%
Local fish		√			51%
Milk and milk product					
Ghee	√				6%
Cheese	√				4%
Curd		√			22%
Fats and Oils				√	100%

Source: Field survey, 2023

Respondents' food intake per capita/day has shown in the above table. From the result it was found that Respondents' food intakes per capita/day were not adequate as recommended food.

Table 2: Daily intake of energy and nutrients

| Calorie and nutrients	Total intake	Recommended Daily Allowance
Energy (Kcal/day)	1800-2000	2200/day
Protein (g/day)	35(g/day)	50(g/day)
Carbohydrate (g/day)	250 (g/day)	130(g/day)
Fat (g/day)	7(ml/day)	10 (ml/day)
Iron (mg/day)	1 mg/day	8.7 mg/day
Vitamin A (RE, micro gram/day)++	100 µg(micro gram)	700-900 micro gram
Vitamin C (mg/day)	40 mg	75 mg

Source: Field survey, 2023

Daily intake of energy and nutrients has shown in the above table. From the result it was found that daily intake of energy and nutrients were less than recommended daily allowances.

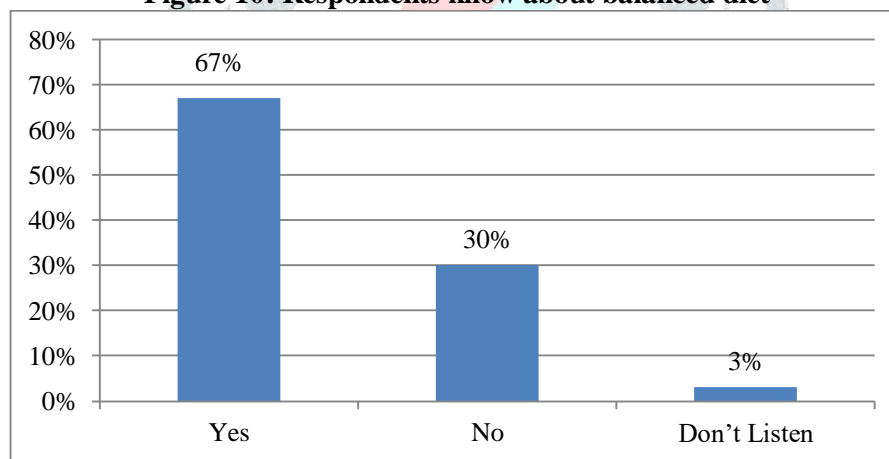**Figure 8: Respondents know about anaemia**
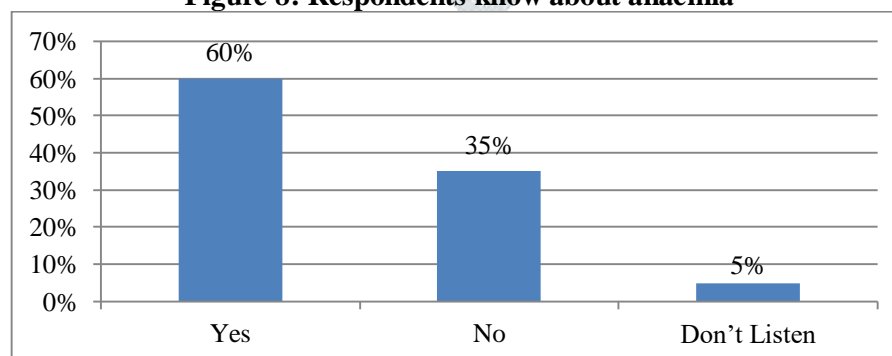
Source: Field survey, 2023

Respondents know about anaemia has shown in the above table and graph. From the result it was found that 60% respondents know about anaemia which was maximum but only 5% respondents don't listen about anaemia which was minimum. On the other hand 35% respondents don't know about anaemia.

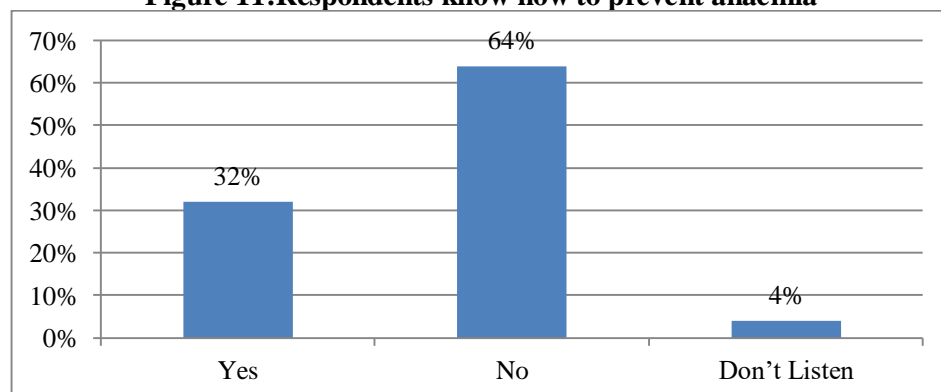**Figure 9: Respondents know about the reason of anaemia**
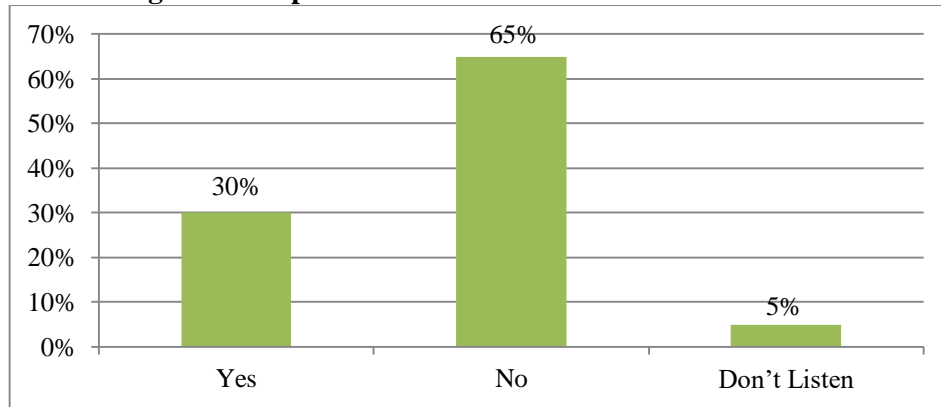
Source: Field survey, 2023

Respondents know about the reason of anaemia has shown in the above table and graph. From the result it was found that 30% respondents know about the reason anaemia which was maximum but only 5% respondents don't listen about the reason of anaemia which was minimum. On the other hand 65%respondents don't know about the reason anaemia.

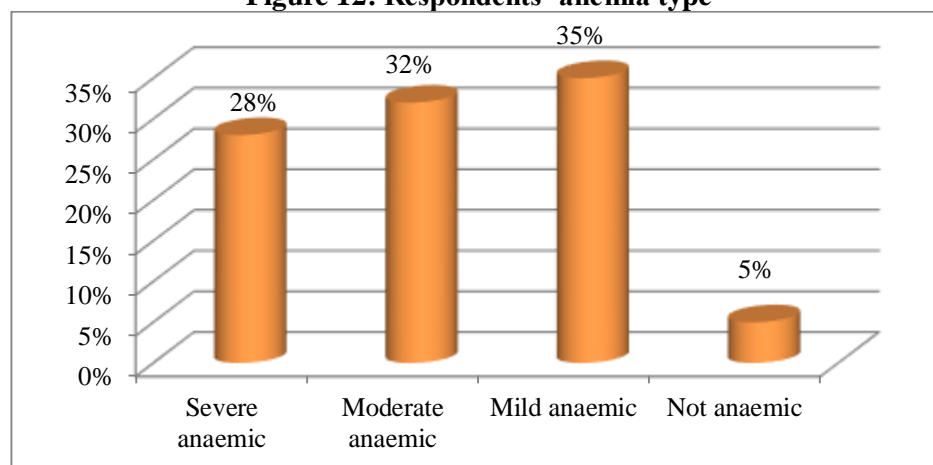**Figure 10: Respondents know about balanced diet**

Source: Field survey, 2023

Respondents know about balanced diet has shown in the above table and graph. From the result it was found that 67% respondents know about balanced diet which was maximum but only 3% don't listen know about balanced diet which was minimum. On the other hand 30% respondents don't knowabout balanced diet.

Figure 11:Respondents know how to prevent anaemia

Source: Field survey, 2023

Respondents know how to prevent anaemia has shown in the above table and graph. From the result it was found that 64% respondents don't know how to prevent anaemia which was maximum but only 4% respondents don't listen to prevent anaemia which was minimum. On the other hand 32% respondents don't know how to prevent anaemia.

Figure 12: Respondents' anemia type

Source: Field survey, 2023

Respondents' anemia type has shown in the above table and graph. From the result it was found that 35%respondents' anemia type was mild anaemic which was maximum but only 5% respondents' anemia type was not anaemic which was minimum. On the other hand 32% respondents' anemia type was moderate anaemic and 28% respondents' anemia type was severe anaemic.

CONCLUSION

A nutrition transition from undernutrition to overweight is occurring in Bangladeshi adolescents, but undernutrition remains a large concern, particularly stunting and micronutrient deficiencies. Diet quality of adolescents is very poor, and they would benefit from increased intakes of micronutrient-dense and fiber-rich whole foods, especially ASFs. Early marriage is declining but still common and secondary school enrolment is low.

The prevalence and determinants of malnutrition indicators for adolescents often vary considerably by subpopulation. This presents opportunities to intervene along the pathway to poor nutrition outcomes in adolescents as well as challenges in understanding the complexity of interactions between these and other factors. While each indicator varies by subpopulation, in general, targeting by wealth and/or geography is particularly important, since the most nutritionally vulnerable subpopulations are poorer and often live in particular areas. Secondary school feeding programs along with conditional cash transfers or take-home rations are an ideal way to reach in-school adolescents and have potential for multiple benefits.

Further disaggregation of available data on adolescents is needed to provide more detailed insight into the complex nutritional issues of adolescents in Bangladesh. This could be done by secondary analysis of raw data where available. However, collection of nationally representative data on adolescents, including boys, is essential to better guide interventions and monitor progress.

- Anaemia and micronutrient deficiencies are common in adolescents, notably vitamin A, zinc, and iodine, and other deficiencies such as calcium are also likely common, since dietary intakes are far below requirements.

- Both boys and girls are vulnerable to malnutrition to varying degrees depending on the indicator.

- More than half of females 10-49 years have inadequately diverse diets, and there are strong differences by subpopulation, particularly by wealth quintile.

- Adolescent girls 10-16 years are at least twice as likely as boys 10-16 years to go to sleep hungry, skip meals, and take smaller meals, and one-and-a-half times more likely to eat only rice, as coping strategies during food insecurity.

- There are large variations in malnutrition and its determinants by subpopulations, where national-level data often masks large disparities.

- Interventions are needed that prioritize foods high in micronutrients (especially animal-source foods) and/or fiber, including vegetables, legumes, fish and shellfish, eggs, meats (particularly organ meats), and milk and its products, and that aim to reduce consumption of energy-dense, nutrient-poor foods, such as refined flours, sugar, vegetable oils, and ultra-processed foods.

- Secondary school and higher secondary level feeding programs that include conditional cash transfers and/or provide take-home food rations could incentivize school and college enrolment, delay marriage, increase educational attainment, improve consumption of nutritious foods, and allow targeting of the poorest households.

- Improving coverage of iodized salt should be a priorityonly 58% of households have adequately iodized salt.

- Population-weighted, nationally representative nutritional and dietary data on adolescent boys and girls is lacking and should be reported by disaggregated subpopulations to provide better programmatic guidance.

From the result it was found that 35% students' body structures were moderately thin ,42% respondents' weights were mild to moderate stunted, 70% respondents' dietary diversity status were lowest dietary diversity. The result of the study also revealed that respondents' food intakes per capita/ day were not adequate as recommended food. From the result it was found that daily intake of energy and nutrients were less than recommended daily allowances. Most of the respondents know about anaemia but few respondents know about the reason of anaemia. Most of the respondents know about balanced diet but very few respondents know how to prevent anaemia that 35% respondents' anemia type was mild anaemic.

RECOMMENDATIONS

Based on the main findings, several implications and recommendations are presented here at the individual, micro and macro-systems levels.

At the individual level, the prevalent nutritional related problems (anaemia, overweight and underweight) imply immediate interventions by individual themselves, their families, schools and health professionals. This calls for focused targeted programmes that aim to identify nutrition-related problems as early as possible. Prevention should start from the early age of girls and boys at the kindergarten stage by educating and modifying the behaviour of girls, boys and their parents about healthy food choices. In addition, educational classes should be included in adolescent girls' and boys' schools and colleges, to enhance their knowledge and perceptions about body image, healthy eating and the importance of physical activities in their life.

These preventive efforts should take into consideration the influence of culture and societal norms in order to develop culturally sensitive programmes when tackling these issues. There is also a need to prepare clear guidelines on how to prevent and control weight problems among adolescent girls and boys, targeting education and health workers and other related professionals.

Comprehensive and multisectoral programmes directed towards combating nutrition-related problems (overweight, underweight and anaemia) should be applied by Bangladesh government. These programmes should include schools, college and education through the mass media.

The data collected here, and findings could be used as a basis for preparing materials for nutrition-related problems' interventions in Bangladesh.

From the research point of view, national-base studies on overweight and underweight status among pre-schoolers, school and colleges children, and adolescents should be carried out in Bangladesh.

Several factors should be considered when planning for such studies, including the following:

1) The use of standardized cut-offs for measuring weight status.

2) In addition to BMI, researchers should include sensitive indicators such as waist circumference, to measure obesity.

3) The use of standardized questionnaire will allow for comparison of data between different regions in Bangladesh.

4) The questionnaire should include information related to dietary habits, physical activity and lifestyle of participants. Further efforts should include other individual factors when investigating nutrition-related problems (e.g. including questions in future surveys to evaluate if the severely underweight girls are suffering from eating disorders.

5) The focus should be on both, private schools, colleges and public schools and colleges.

Furthermore, there is a need for longitudinal follow up cohort studies to assess the course of nutrition-related problems, and to draw stronger evidence-based associations of these problems with other socio-demographic and health profiles (clinical and biochemical profiles).

At the micro-system level, the influence of the family and immediate physical environment of girls' and boys' schools and girls' and boys'colleges in Bangladesh should be targeted for prevention and intervention to improve their nutrition knowledge, to encourage uptake of standardized international guidelines of healthy school and college meals. In addition, public health education using school and college venues, media and leaflets could help in distributing proper information about healthy eating and lifestyle for both adolescents and their families.

Future research should include families, schools and colleges as they influence adolescent eating behaviours and lifestyles. For example, research on knowledge among overweight and underweight parents could help to examine the home environment that adolescents live in. This should include long-term follow-up and evaluation to assess the degree of commitment and implications of standardized guidelines assigned to tackle nutrition-related problems and prevent later chronic health problems.

At the macro-system level, media and lack of physical activities at girls' and boys' schools and colleges as regulated by the government work hand in hand against the international recommendations concerned with food advertising and provision of healthy physical environment by the government. Therefore, Bangladesh government is recommended to follow and adapt international guidelines with a culturally sensitive approach in order to join the international community effort in tackling nutrition-related problems.

Furthermore, a national action across departments and sectors should be taken, to re-balance the food system and reduce the burden of diet-related disease among adolescents in Bangladesh.

From the research point of view, ongoing follow-up studies are imperative to evaluate the application of policies and procedures concerning the guidelines and regulations about nutrition-related problems and their prevention.

Barriers to implications and recommendations

In order to achieve goals and recommendations presented in this thesis, explicit policies are needed at the country level. This will be only achieved through a combination of policies involving various sectors at various levels of responsibility.

To achieve goals, a number of obstacles should be considered:

1. Governments play a large role, extending from their influence over the physical environments in which adolescent live and access food, and regulations that influence adolescent choices of food, drinks and physical activity. In order to achieve goals of this study, policy makers need to reach these recommendations, read them and go through them.

2. The food industry and their advertising partners should cooperate with other institutions and sectors such as schools, colleges and health sectors, to control the types and quantities of HFSS products they produce and market.

3. Since schools and colleges should provide nutrition education, healthy meals and environments. The Bangladesh government should control schools and colleges those provide HFSS food or accept sponsorship from companies selling these products. This is because providing such food, will undermine classroom lessons and provide a confusingly poor example.

4. In addition, family and cultural factors contribute many barriers to healthier eating and lifestyle. For example, some families do not like to change their eating habits such as eating together.

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