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FISH CONSUMPTION (MARINE AND RIVERINE) PATTERN OF SELECTED URBAN AND RURAL ADOLESCENT GIRLS

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Abstract

A comparative study was carried out amongst 121 urban and 121 rural adolescent girls between ten to nineteen years of age of a school and college of Dhaka city and a village school of Kishoreganj districtto observe the difference in fish intake between them. The mean fish intake was 49.6g/day and 61.3g/day in urban and rural group respectively. Which means the average fish intake was higher among rural ones. Marine fish intake was relatively lower among both groups. Frequency of big fish (riverine) consumption was higher among urban group and small fish (riverine) consumption was higher among rural group. Among the various marine fishes urban respondents mainly consumed *Pampuschinensis* (Rupchanda), *Auxisrochei* (Surma) and *Harpodonneherous* (Loitta). There was no respondent in rural area who consumed *Auxisrochei* (Surma) and *Euthynnusaffinis* (Tuna). In urban area *Tenualosailisha* (Illish) and *Labeorohita* (Rui) consumptions were high among riverine (big) fishes. However, for rural ones, these places were occupied by *Pangasiuspangasius* (Pungas) and *Katlakatla* (Katla). Rural adolescent girls did not consume *Wallagoattu* (Boal), *Ompokpabo* (Pabda) and *Ailiacoila* (Kajoli) at all over a four week period of survey. Urban respondents consumed *Amblypharyngodonmola* (Mola) while rural respondents consumed *Batasiobatasio* (Tengra) and *Puntiuschola* (Puti) mainly among riverine (small) fishes. *Labeobata* (Bata) and *Neotropiusatherinoides* (Batasi) were rarely consumed by urban adolescent girls. Marine fish is limited in some parts of rural areas in Bangladesh, hence the consumption is limited compared to riverine fish, therefore, it should be increased both freshwater and marine fish production and consumption at convenient ways.

Key words: Adolescent girls, fish intake pattern, marine and riverine fish, urban and rural comparison

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Introduction

Fish is an integral component of a balanced diet. The health benefits of fish have been well documented and widely promoted in recent years. The digestibility and the concentrations of essential amino acids in food proteins are important determinants of the efficacy of protein absorption into the body. In this respect, protein from animal-source foods is superior to that of plant-source foods (Kawarazuka, 2010). Fish is one of the cheapest sources of animal protein and availability and affordability is better for fish in comparison to other source of animal protein. Fish provides major contribution to the survival and health of a significant portion of the world's population. Fish serves as a health-food for the affluent world owing to the fish oils which are rich in polyunsaturated fatty acids (PUFAs); especially the ω-3 PUFAs, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), at the same time, it is a health-food for the people in the other extreme of the nutrition scale owing to its proteins, oils, vitamins and minerals (Mohanty, 2010). A number of health benefits are believed to be associated with regular fish consumption. Fish is especially important in the developing world, often referred to as "rich food for poor people".

Bangladesh is an agro-based riverine country, connected by a network of rivers and their tributaries, numbering about 290 with a length of about 24,140 km, which covers 8% area of the country (BBS, 1991).Total fish production in Bangladesh during 2008-2009 was 27, 01,370 MT of which 73% obtainedfrominland waters and 27% from marine water (DOF, 2010). Rivers have been the major sources of fish production in Bangladesh form time immemorial. Naturally, due to geographical locations a readily available fish contributes to traditional Bangladeshi diet as a major category of animal protein source (Murry and Burt, 1992). Generally, fresh water fish are more popular than marine fish in Bangladesh. The average fish intakes were 37,23 and 16g/day in 1965, 1982 and 1992 respectively. According to recent nutrition survey reports, the average percapita fish intake was found to be 33g/day in Bangladesh and it was also found that fish contributes about 54% of the total animal protein intake in Bangladesh. The fish intake pattern of Bangladeshi population reflects that fish is an integral part of a Bangladeshi diet (Jahan and Hossain, 1998).

In Bangladesh, almost one-fourth of the total population consists of adolescents (BBS, 1998). Teenagers like to experiment and their experimentation might include risky food behavior leading to poor eating habits or tendencies to consume highly processed foods. Girls often view food as a threat to being thin, while boys may frequently take muscle-building supplements. The phenomenal growth that occurs in adolescence, second only to that in the first year of life, creates increased demands for energy and nutrients. Total nutrient needs are higher during adolescence than any other time in the lifecycle. Nutrition and physical growth are integrally related; optimal nutrition is arequisite for

achieving full growth potential. Poor nutritional status during adolescent is an important determinant of health outcomes at later stage of life. Adolescent girls are future mothers and the most serious consequence of nutritional deficiency is impaired fetal development. In Bangladesh, a large number of adolescent girls suffer from various degrees of nutritional disorders (Ahmed *et al.*, 2000; Ahmed *et al.*, 2008). The main nutritional problems of adolescents are micronutrients deficiencies, iron deficiency anemia in particular (Kurz and Johnson-Welch, 1994). As a source of major animal food, fish provides both macro and micronutrients in Bangladeshi diet (Nettleton, 1985). A wide variety of minerals in fish flesh are usually present in a form, which are readily available for body. Fish is an important source of essential minerals such as zinc, copper, iron, magnesium, calcium, phosphorus, sodium and potassium. Marine fishes are important source of iodine (Clucus and Ward, 1996).Therefore, considering the importance of fish consumption, the present study thus aims at investigating marine and riverine fish intake pattern of selected adolescent girls of urban and rural locations and to compare the results obtained.

Materials and Methods

A comparative study was carried out among 121 urban adolescent girls of Mission International School and College, Adabar, Dhaka and121 rural adolescent girls of Mahinada High School, Amirganj, Kishoreganj, aged between 10-19 years during March 2011 to February 2012. The fish intake pattern of urban and rural adolescent girls was assessed and compared. A standard questionnaire was developed containing both close and open ended questions to obtain relevant information on fish intake (marine and riverine) and then data were collected with maximum precaution. Marine fish means fishes found in sea and riverine fish means fishes found in river, canal, beel and other land water sources. The terms “big fish” and “small fish” which are used in this study as those fishes which are consumed without bones (edible portions are only fleshes) and which are consumed whole with bones, heads and viscera respectively. The 24 hour-recall method and food frequency questionnaire were used to determine the fish intake. Statistical analysis was done by using SPSS 16 windows program. Appropriate statistical analysis was performed by usingt-test for paired data. Values were considered significant at $p < 0.05$. Results were expressed as mean$\pm$SD.

Results

The mean fish intake was 49.6g/day in urban area and 61.3g/day in rural area. Mean fish protein intake was 9.1 g/day in urban area and 11.2 g/day in rural area. Again fat intake from fish was 3.8 g/day in urban area and 4.7 g/day in rural area. Mean calcium intake from fish was 264.2 mg in urban and 326.5 mg in rural area (Table 1).

Table 1. Respondent's nutrient intake per day from fish by area

Intake	Urban		Rural	
	Mean	Std.	Mean	Std.
Fish intake (g)	49.6	6.3	61.3	7.3
Energy (kcal)	77.3	9.0	95.5	11.3
Protein (g)	9.1	0.4	11.2	0.7
Fat (g)	3.8	0.8	4.7	1.0
Carbohydrate (g)	1.6	0.2	2.0	0.4
Calcium (mg)	264.2	15.4	326.5	23.3
Iron (mg)	0.7	0.1	0.9	0.3
Vit-A (IU)	9.1	1.9	11.2	2.0
Niacin (mg)	0.6	0.2	0.7	0.1
Vit-C (mg)	10.5	0.5	13.0	1.3
Zinc (mg)	1.0	0.2	1.2	0.6

Table 2. Percent distribution of the respondents according to frequency of marine fish consumption

Frequency of consumption	Area		p value
	Urban	Rural	
Never	28.1%	54.5%	**0.000**
1-3 days	62.0%	29.8%	
4-5 days	5.8%	14.0%	
6-7 days	4.1%	1.7%	

About 4.1% of urban and 1.7% of rural adolescent girls consumed marine fish daily (Table 2). Again 28.1% among urban and 54.5% among rural adolescent girls did not consume marine fish at all during the survey period. It is to be noted that the consumption of marine fish was low for both urban and rural subjects.

Table 3. Distribution of the respondents according to frequency of riverine (big) fish consumption

Frequency of consumption	Area		p value
	Urban	Rural	
Never	8.3%	19.0%	**0.000**
1-3 days	58.7%	37.2%	
4-5 days	14.8%	32.2%	
6-7 days	18.2%	11.6%	

The frequency of big fish consumption was higher among the urban respondents (Table 3). The difference was highly significant ($p = 0.000$).

Table 4. Distribution of the respondents according to frequency of riverine (small) fish consumption

Frequency of consumption	Area		p value
	Urban	Rural	
Never	14.9%	14.0%	**0.028**
1-3 days	58.7%	47.9%	
4-5 days	20.6%	19.8%	
6-7 days	5.8%	18.3%	

About 5.8%of urban and 18.3% of rural respondents consumed small fish daily (Table 4). Again 14.9% among urban and 14.0% among rural respondents did not consume small fish during the survey period. However, the rural respondents consumed more small fish than urban ones. The difference was significant (p=0.028).

Table 5. Percent distribution of respondents according to the kind of fish consumed

Kinds of Fish	Name of Fish	Area	
		Urban (n=121)	Rural (n=121)
Marine Fish	*Pampuschinensis* (Rupchanda)	38.8%(47)	33.1%(40)
	Auxisrochei (Surma)	19.8%(24)	0%(0)
	Harpodonneherous (Loitta)	15.0%(18)	5.8%(7)
	Trichiurushaumela (Chhuri)	7.4%(9)	9.1%(11)
	Euthynnusaffinis(Tuna)	5.0%(6)	0%(0)
	Otolithoidespama (Marine Poa)	10.0%(12)	5.8%(7)
Riverine Fish	*Labeorohita* (Rui)	55.4%(67)	45.0%(54)
	Tenualosailisha (Illish)	73.6%(89)	13.2%(16)
	Pangasiuspangasius (Pungas)	40.5%(49)	76.0%(92)
	Wallagoattu (Boal)	19.0%(23)	0%(0)
	Katlakatla (Katla)	28.9%(35)	76.0%(92)
	CirrhinusCirrhosus (Mrigel)	6.6%(8)	24.0%(29)
	Sperataaor (Ayre)	12.4%(15)	4.1%(5)
	Chitalachitala (Chitol)	14.0%(17)	8.3%(10)
	Hypophthalmichthysmolitrix (Silvercarp)	14.9%(18)	52.9%(64)
	Labeocalbasu (Kali Baus)	5.8%(7)	18.2%(22)
	Coricasoborna (Kachki)	41.3%(50)	8.3%(10)
	Amblypharyngodonmola (Mola)	42.1%(51)	32.2%(39)
	Batasiobatasio (Tengra)	27.3%(33)	67.8%(82)
	Labeobata (Bata)	2.5%(3)	14.9%(18)
	Mastacembelusarmatus (Bain)	5.0%(6)	28.9%(35)
	Oreochromismosasambicus (Tilapia)	30.6%(37)	20.7%(25)
	Neotropiusatherinoides (Batasi)	3.3%(4)	5.8%(7)
	Gonialosamanmina (Chapila)	9.1%(11)	5.8%(7)
	OmpokPabo (Pabda)	4.1%(5)	0%(0)
	Ailiacoila (Kajoli)	5.8%(7)	0%(0)
	Puntiuschola (Puti)	33.9%(41)	62.8%(76)
	Chandanama (Chanda)	7.4%(9)	38.0%(46)
	Channapunctata (Taki)	22.3%(27)	5.8%(7)

The percent distribution of respondents according to the kind of fish consumed varied widely (Table 5). Among the various marine fishes 38.8% urban respondents consumed *Pampuschinensis* (Rupchanda). For rural respondents this was 33.1%. There was no respondent in rural group, who consumed *Auxisrochei* (Surma) and *Euthynnusaffinis* (Tuna) during the survey period, but for urban group those were 19.8% and 5% respectively. In urban area *Tenualosailisha* (Illish) consumption was highest (73.6%) among riverine (big) fishes. Next place was occupied by *Labeorohita* (Rui, 55.4%).

On the other hand, in rural area *Pangasiuspangasius* (Pungas) and *Katlakatla* (Katla) consumptions were high 76% and 76% respectively. Rural respondents did not consume *Wallagoattu* (Boal) over a four week period. *Amblypharyngodonmola* (Mola 42%) consumption was high in urban group; *Batasiobatasio* (Tengra 67.8%) and *Puntiuschola* (Puti 62.8%) consumptions were high among riverine (small) fishes in rural group. *Labeobata* (Bata, 2.5%) and *Neotropiusatherinoides* (Batasi, 3.3%) were rarely consumed by urban adolescent girls. *Ompokpabo* (Pabda) and *Ailiacoila* (Kajoli) were not consumed at all during the survey period by rural adolescent girls.

Discussion

The present study compared the fish intake pattern of selected population of urban and rural group of Bangladesh. We found, mean fish intake was 49.6g/day and 61.3g/day in urban and rural group respectively. Mean fish intake was higher among rural group and for that, most of the nutrients (energy, protein, fat, carbohydrate, calcium, iron, zinc) intake form fish were found also higher among them. According to recent nutrition survey reports, the average percapitafish intake was found 33g/day in Bangladesh (Jahan and Hossain, 1998); which is loweras compared to the present study. The reason for this disparity may be the age group (total people vs adolescent girls) of the population of the studies. Besides that another reason of high fish intake, especially in rural group; may be the data collection period (in fish catching season) of the study. Different studies on fish consumption show very substantial variation on depending on location, income and season (Belton *et al.,* 2011). Daily per capita fish consumption of Bangladeshi people was reported ranging from as little as 15g to as high as 96g in another study (Thompson *et al.*, 2002); which findings were similar to our study. About 4.1% of urban and 1.7% of rural subjects consumed marine fish daily. Again 28.1% among urban and 54.5% among ruralsubjects did not consume marine fish during the survey period. It is to be notedthatconsumption of marine fish was low for both urban and rural respondents. Among the various marine fishes 38.8% urban respondents consumed *Pampuschinensis* (Rupchanda). For rural respondents this was 33.1%. During the survey, there was no respondent in rural group, who consumed *Auxisrochei* (Surma) and *Euthynnusaffinis* (Tuna); however for urban group those value were19.8% and 5% respectively. Frequency

of big fish (riverine) consumption was higher among urban group. However, as regards small fish (riverine), the consumption was higher for rural respondents as compared to that for urban ones. The difference was significant (p=0.028). In urbanarea *Tenualosailisha* (Illish) consumption was highest (73.6%) among riverine (big) fishes. Next place was occupied by *Labeorohita* (Rui, 55.4%). On the other hand, in rural area *Pangasiuspangasius* (Pungas) and *Katlakatla* (Katla) consumptionswere high. 76% and 76% respectively. Rural respondentsdid not consume *Wallagoattu* (Boal) during the survey period. *Amblypharyngodonmola* (Mola 42.1%) consumption was high in urban group. *Batasiobatasio* (Tengra 67.8%) and *Puntiuschola* (Puti 62.8%) consumptions were high among riverine (small) fishes in rural group. *Labeobata* (Bata, 2.5%) and *Neotropiusatherinoides* (Batasi, 3.3%) were rarely consumed by urban adolescent girls. *Ompokpabo* (Pabda) and *Ailiacoila* (Kajoli) were not consumed during the survey period by rural adolescent girls. A survey conducted in Dhaka, showed that frequency of fish consumption increased with income. Medium sized freshwater capture species and hilsha (including immaturejatka) were the first and second most important categories of fish eaten by all income groups (Belton *et al.*, 2011).According to a study conducted among Danish adolescent girls and boys, median fish intake was found 10.7 g/day and tended to be higher in boys than in girls (14.3 vs 8.0g/day) (Lauritzen*et al.*, 2012). A study done in Iceland reported that the average fish consumption of adolescent girls was only 14.8g/day. Less than 65% consumed fish twice per week on average (Gunnarsdottir *et al.*, 2010).

Conclusions

The results obtained in the present study showed that mean fish intake was higher among rural group. Marine fish intake was relatively lower among both groups. Frequency of big fish (riverine) consumption was higher among urban group and small fish (riverine) consumption was higher among rural group. Among the various marine fishes urban respondents mainly consumed Rupchanda, Surma and Loitta fishes. There was no respondent in rural area who consumed Surma and Tuna fishes during the survey period. In urban area Illish and Rui consumptions were high among riverine (big) fishes. However, for rural ones, these places were occupied by Pungas and Katla. During the survey, rural adolescent girlsdid not consume Boal, Pabda and Kajolifishes. Urban respondents consumed Mola while rural respondents consumed Tengra and Puti mainly among riverine (small) fishes. Bata and Batasi were rarely consumed by urban adolescent girls. In conclusion, it can be said that marine fish intake should be increased in both groups. As marine fish is not available in the rural area, so attempts should be taken to make marine fishes available to them by government and private efforts.

References

Ahmed, F., M.R. Khan, C.P. Banu, M.R. Qazi and M. Akhtaruzzaman. 2008. The coexistence of other micronutrient deficiencies in anaemic adolescent school girls in rural Bangladesh, *Eur. J. Clin. Nutr.* **62**: 365-372.

Ahmed, F., M.R. Khan, M. Islam, I. Kabir, G.J. Fuchs. 2000. Anaemia and iron deficiency among adolescent school girls in peri-urban Bangladesh, *Eur. J.Clin. Nutr.* **54**: 674-683.

BBS. 1991. Statistical Year book of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, Bangladesh, Statistics Division, Ministry of Planning, Government of the Peoples Republic of Bangladesh.

BBS. 1998. Statistical Year book of Bangladesh, Bangladesh Bureau of Statistics, Dhaka, Bangladesh, Statistics Division, Ministry of Planning, Government of the Peoples Republic of Bangladesh.

Belton, B., M. Karim, S. Thilsted, K.M.E. Jahan, W. Collis and M. Phillips. 2011. Review of aquaculture and fish consumption in Bangladesh, Studies and Reviews 2011-53. The World Fish Center. November 2011.

Clucus, I.J., A.R. Ward. 1996. Post-harvest fisheries development: A guide to handling preservation, processing and quality. Natural Resources Institute, United Kingdom.

DOF, 2010. Sharonika, Matshya Pakha 2010, Department of Fisheries, Ministry of Fisheries and Livestock, Government of Peoples Republic of Bangladesh, pp 134.

Gunnarsdottir, I., B.E. Gunnarsdottir, L. Steingrimsdottir, A. Magge, A.J. Johannesson and I. Thorsdottir. 2010. Iodine status of adolescent girls in a population changing from high to lower fish consumption, *Eur. J. Clin. Nutr.* **64**: 958-964.

Jahan, K. and M. Hossain 1998. Nature and extent of malnutrition in Bangladesh, National Nutrition Survey, 1995-96, University of Dhaka.

Kawarazuka, N. 2010. The contribution of fish intake, aquaculture, and small- scale fisheries to imprving nutrition: A literature review. The WorldFish Center Working Paper No. 2106.The WorldFish Center, Penang, Malaysia.

Kurz, K.M., C. Johnson-Welch. 1994. The nutrition and lives of adolescents in developing countries: Findings form the nutrition of adolescent girls research program, ICRW.

Lauritzen, L., L.B.S. Harslof, L.I. Hellgren, M.H. Pedersen, C. Molgaard and K.F. Michaelsen, 2012. Fish intake, erythrocyte n-3 fatty acid status and metabolic health in Danish adolescent girls and boys, *Br. J. Nutr.* **107**: 697-704.

Mohanty, B.P. 2010. Fish as health food. In: Ayyappan S, Moza U, Gopalakrishna A, Meenakumari B, Jena JK, Pandey AK (eds) Handbook of fisheries and aquaculture, 2nd edn. ICARDKMA. New Delhi, pp 843-861.

Murry, J. and J.R. Burt. 1992. The composition of fish, Ministry of Agriculture, Fisheries and Food, Torry Research Station.

Nettleton, A. 1985. Nutrients and substances in fresh sea food. In: Sea food nutrition facts. Issues and marketing of nutrition of fish and shell fish. Van Nostrand Reinhold, New York. pp 25-64.

Thompson, P., N. Roos, P. Sultana and S.H. Thilsted. 2002. Changing significance of inland fisheries for livelihoods and nutrition in Bangladesh, *J. Crop Prod.* 6: pp 249-318.