

Food consumption patterns of the urban adult population in the field practice area of a teaching hospital in Kolkata, using food frequency questionnaire

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ABSTRACT

Background: Nutrition transition has replaced homemade foods with processed items that increased the prevalence of noncommunicable disease in adult population. But we know little about the food intake pattern of adults specially in urban sector. **Aims:** The study aimed at describing the food-consumption patterns in a sample of adults residing in urban area. **Settings and Design:** An observational cross-sectional study was done from April to June, 2019 at urban field practice area of a teaching hospital of Kolkata. **Methods and Material:** A prevalidated, pretested, 51-item, food-frequency questionnaire was applied to assess the food-consumption pattern of 110 participants. **Results:** Adults reported poor dietary intakes; more than half reported no consumption of green-leafy vegetables (GLV) (66.4%), other vegetables (52.8%), and fruits (63.6%). Whereas 72.7% reported consumption of three or more servings of energy-dense foods and 90.9% reported consumption of three or more servings of energy-dense beverages on previous day. Mean intake of food varied from 0.34 (SD = 0.47) for GLV to 8.19 (SD = 2.39) for cereals. Females consumed more servings of GLV, other vegetables, roots-tubers, and fruits than males. Fruit consumption was low in all age groups. Higher socioeconomic class people strikingly consumed no GLV. **Conclusions:** Study participants reported consumption of more energy-dense snacks, beverages than healthy food like GLV, fruits. Study findings highlight to design strategies to promote nutrition education and practical application of healthy food habits in target population group.

Keywords: Adults, food-frequency questionnaire, green-leafy vegetables, healthy eating, nutrition, urban

Introduction

Due to nutrition transition, there are huge changes in traditional Indian home-made meals that have been replaced by processed-foods. All sections of society are adopting the culture of fast-foods.^[1] Social, economic, marketing policies have triggered Indian nutrition transition^[2] associated with food consumption pattern and lifestyle changes among urban Indians.^[3-5] Processed and fast-foods being quick to serve, easily

accessible, good taste, and relatively inexpensive, has created great demand among all age groups.^[6] Various advertisements have increased the acceptance of these foods as being convenient in stressful-life.^[7,8] This trend has contributed to increased risk of noncommunicable diseases like insulin-resistance, high blood-pressure, diabetes mellitus, heart diseases,^[9] and obesity.^[10] Improving overall nutrition of urban adults by promoting dietary modification in everyday life will reduce such health risks. But there is not much known about the foods and drinks consumed by adults residing in urban sector, specially the types and quantity of their daily intake. Therefore, our study was undertaken to assess food-consumption patterns of urban adults residing in metropolitan city of Kolkata, West Bengal, India.

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Materials and Methods

The study was observational and cross-sectional in design, which was done in the study area from April to June 2019 at Baghbazar, Kolkata. Prevalence of intake of green leafy vegetables daily among urban household was found to be 7% from previous study.^[11] Taking allowable error of 5% and nonresponse rate of 10%, sample size was calculated to be 110. Ethical approval from Institutional Ethics Committee was taken prior to the study. There were 453 families residing in Baghbazar field practice area. At first 110 household were selected through simple random sampling. The list of adult family members is collected from the family folders kept in Urban health and training center (UHTC), Department of CM, RGKMCH. Pregnant and lactating mothers, adults on any special diet, clinically or mentally ill patients, and moribund patients were excluded from the study. One adult member from each household was selected through simple random method. After taking informed consent from the participants, a predesigned, pretested food frequency questionnaire was used from a study done by Rathi *et al.*^[12] and few modifications was done accordingly. The food-frequency questionnaire (FFQ) contained different types of meal, beverages and snacks, to provide information on food consumption patterns on previous day. To record food consumption of previous day, 3 point serving response scales over 7 time slots a day was used. Response scales were measured according to different food and beverage type.^[12] Cereals, vegetable, and lentil preparations were measured by using katori. Katori (150 ml bowl) measurements are divided in 3 points serving scales such as one serving means half katori, two servings means one katori, and three or more servings means two or more katori.^[12] For measuring milk and beverages, cup (200 ml) was used and measurement was done in 3 points serving scales, such as one serving means half cup, two servings means one cup, and three or more servings means two or more cup.^[12] For participants convenience life size images of bowl and cup were included in the FFQ. All food items and beverage were classified into ten groups, such as cereals, pulses, fruits, green leafy vegetables, other vegetables, root-tuber, milk and milk products, flesh food items, energy-dense snacks item, and energy-dense beverages.

Results

Sociodemographic profile has been shown in Table 1. Majority of them (41.8%) belongs to 30–40 years and most of the participants (46.4%) were from upper-lower class as per modified Kuppaswamy socioeconomic scale.^[13] Mean age (SD) of study participants was 39.22 (9.74) years. The list of foods consumed on the previous day by the participants were included in the FFQ [Table 2]. The foods reported by participants yielded 51 varieties of food items for inclusion in the FFQ [Table 2].

Among the ten food groups, most commonly consumed food was cereals (8.19 servings/day; SD = 2.39) [Table 3] followed by energy-dense snacks, flesh food items, energy-dense beverages items, root-tubers, pulses, milk and milk products, vegetables, fruits, green-leaf vegetables. The Mann-Whitney U test indicate

that food consumption of females significantly varied from males [Table 3]. There were differences among both sexes in the numbers of servings taken from different food groups. Female participants consumed more servings of green leafy vegetables, other vegetables, roots-tubers, and fruits than male participants (Table 3, $P < 0.05$). Male participants took more servings of milk and milk products and flesh foods in comparison to females (Table 3, $P < 0.05$). However, there were no significant differences in consumption of cereals ($P = 0.281$), pulses ($P = 0.751$), energy-dense snacks items ($P = 0.592$) and energy-dense beverages ($P = 0.134$).

Food intake in study participants of age group below 30 years significantly varied from older age group [Table 4]. Intake of energy dense snacks and energy-dense beverage were higher among younger age group than older age group (Table 4, $P < 0.05$). Fruit consumption was low in all age groups and there were no significant difference. In contrast, younger age group consumed more servings of cereals ($P = 0.019$), root-tubers ($P = 0.001$), flesh foods ($P = 0.001$) than older age group.

Among socioeconomic class [Table 5, Figure 1], study participants from upper-middle class consumed more cereals ($P = 0.001$), pulses ($P = 0.014$), other vegetables ($P = 0.001$), milk--milk products ($P = 0.001$), fruits ($P = 0.001$), nonvegetarian food ($P = 0.001$), energy-dense snacks ($P = 0.001$), and

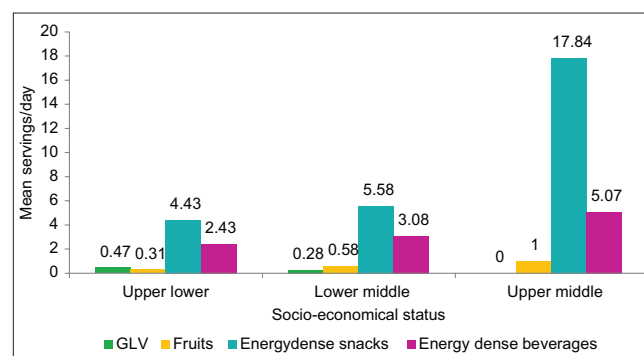


Figure 1: Bar diagram showing mean servings/day of food groups among various socioeconomic groups

Table 1: Sociodemographic characteristics of study participants (n=110)

Variable	Frequency	Percentage
Sex	Male	47 (42.7%)
	Female	63 (57.3%)
Caste	General	104 (94.5%)
	SC	6 (5.5%)
Socioeconomic class	Upper-lower	51 (46.4%)
	Lower-middle	46 (41.8%)
	Upper middle	13 (11.8%)
Religion	Hindu	110 (100%)
Age	<30 yr	16 (14.5%)
	30 yrs-40 yrs	46 (41.8%)
	41 yrs-50 yrs	34 (30.9%)
	Above 50 yrs	14 (12.7%)

Table 2: The list of 51 food and beverage items comprising the FFQ and their reported frequencies

Food items	Frequency	Food items	Frequency
Cereals		Flesh food items	
Breakfast cereal	23	Egg	39
Bread sandwich semolina rice-flakes puffed rice	25	Chicken	54
Roti/chapati (Indian bread)	29	Mutton	17
Paratha (deep-fried-Indian-bread) Loochi/	31	Fish	45
Kachuri (fried flour bread)	7	Energy-dense Snacks	
Rice/rice-preparation idli (savory item made of	44	Biscuits/cookies	137
Fermented batter of rice-black lentils)	77	Cake/pastry	36
dosa (preparation of fermented	33	Fried food/Pakora	49
rice and de-husked black lentils batter)	37	Samosa	13
	169	Papdi chat	27
	9	Chips	36
	20	Panipuri	16
Pulses		Chole Bhature	10
Masoor	83	Veg roll	8
Mug	40	Chicken roll	10
Chana	42	Egg roll	26
Green-leafy vegetable	40	Momo (dumpling)	10
Other vegetables	70	Bhujia (savory snacks)	14
Roots and tubers		Noodles	25
Potato	164	Ice-cream	37
Fruits		Energy-dense beverages	
Apple	14	Tea	213
Banana	9	Coffee	46
Guava	6	Health-drink	14
Mango	16	Soft-drink	62
Sweet lime	7		
Pear	4		
Milk and milk-products			
Milk	13		
Lassi	30		
Cottage cheese	16		
Sweets	56		

Table 3: Mean servings per day consumption of different food groups among both sex (n=110)

Food groups	Total (n=110) Mean (SD)	Male (n=47) Mean (SD)	Female (n=63) Mean (SD)	P
Cereals	8.19 (2.39)	8.43 (3.04)	8.02 (1.77)	0.281
Pulses	1.53 (0.88)	1.51 (0.65)	1.55 (1.02)	0.751
Vegetables	0.64 (0.73)	0.21 (0.41)	0.95 (0.77)	0.001*
GLV	0.34 (0.47)	0.15 (0.36)	0.48 (0.50)	0.001*
Root-tubers	1.74 (0.96)	1.51 (0.65)	1.9 (1.11)	0.041*
Milk-milk products	1.47 (1.52)	1.93 (0.98)	1.12 (1.75)	0.001*
Fruits	0.50 (0.78)	0.23 (0.42)	0.71 (0.92)	0.004*
Flesh foods	3.25 (2.75)	4.36 (2.24)	2.42 (2.82)	0.001*
Energy-dense snacks	6.50 (5.75)	5.21 (2.77)	7.4 (7.09)	0.592
Energy-dense beverages	3.01 (1.18)	3.12 (0.74)	2.93 (1.42)	0.134

*P-value obtained with Mann-Whitney U Test

energy-dense beverage ($P = 0.001$) than others. But strikingly upper-middle class consumed no green leaf vegetable in comparison to other groups and the difference is statistically significant ($P = 0.004$).

Discussion

Study findings highlight excess consumption of energy-dense, nutrient-poor snacks, and beverages and less consumption

of green-leafy vegetables, other vegetables, fruits among the sample of urban adults residing in Baghbazar slum, Kolkata. Unhealthy diet increases the risk of obesity and micronutrient deficiency among adults. There is an immediate need to modify such eating behaviors, enabling adults to develop healthy-food habits. As a consequence of food globalization, there is substantially increased intake of energy-dense and nutrient-deficient food items and sugary drinks in urban regions.^[14]

Table 4: Mean servings per day consumption of different food groups among age-group (n=110)

Food groups	Total Mean (SD)	<30 yrs Mean (SD)	30 ys-40 yrs Mean (SD)	41 yrs-50 yrs Mean (SD)	>50 yrs Mean (SD)	P
Cereals	8.19 (2.39)	8.13 (2.21)	8.85 (3.05)	7.65 (1.59)	7.43 (0.85)	0.019*
Pulses	1.53 (0.88)	0.62 (0.50)	1.56 (0.71)	1.91 (0.66)	1.57 (1.39)	0.001*
Vegetables	0.64 (0.74)	0.19 (0.4)	0.19 (0.40)	1.21 (0.88)	0.50 (0.51)	0.001*
GLV	0.34 (0.47)	0 (0)	0.13 (0.34)	0.71 (0.46)	0.50 (0.51)	0.001*
Root-tubers	1.75 (0.96)	2.12 (1.02)	2.12 (1.02)	1.47 (0.62)	1.47 (0.89)	0.001*
Milk-milk products	1.47 (1.52)	1.12 (1.20)	1.12 (1.20)	2.19 (1.64)	0.21 (0.42)	0.001*
Fruits	0.50 (0.78)	0.56 (0.81)	0.36 (0.48)	0.67 (0.97)	0.50 (1.01)	0.682
Flesh foods	3.25 (2.75)	4.00 (0.00)	4.19 (2.91)	2.76 (2.91)	0.50 (0.51)	0.001*
Energy-dense snacks	6.5 (5.75)	8.56 (3.38)	9.30 (7.24)	3.26 (1.74)	2.78 (0.42)	0.001*
Energy-dense beverages	3.01 (1.18)	3.18 (0.40)	3.50 (1.32)	3.26 (1.74)	2.78 (0.42)	0.001*

*P-value obtained with Kruskal-Wallis Test

Table 5: Mean servings per day consumption of food groups among socioeconomic class (n=110)

Food groups	Total Mean (SD)	Upper lower Mean (SD)	Lower middle Mean (SD)	Upper middle Mean (SD)	P
Cereals	8.19 (2.39)	7.14 (2.13)	9.00 (2.05)	9.46 (2.87)	0.001*
Pulses	1.53 (0.88)	1.39 (1.00)	1.50 (0.65)	2.23 (0.83)	0.014*
Vegetables	0.64 (0.74)	0.80 (0.84)	0.35 (0.60)	1.00 (0.00)	0.001*
GLV	0.34 (0.47)	0.47 (0.50)	0.28 (0.45)	0.00 (0.00)	0.004*
Root-tubers	1.75 (0.96)	1.92 (1.23)	1.60 (0.64)	1.53 (0.51)	0.474
Milk-milk products	1.47 (1.52)	0.17 (0.38)	2.23 (0.92)	3.84 (1.34)	0.001*
Fruits	0.50 (0.78)	0.31 (0.67)	0.58 (0.93)	1.00 (0.00)	0.001*
Flesh food	3.25 (2.75)	1.19 (1.46)	4.30 (1.84)	7.61 (2.10)	0.001*
Energy-dense snacks	6.5 (5.75)	4.43 (4.09)	5.58 (2.44)	17.84 (6.92)	0.001*
Energy-dense beverages	3.01 (1.18)	2.43 (1.00)	3.08 (0.46)	5.07 (1.25)	0.001*

*P-value obtained with Kruskal-Wallis Test

The over consumption is very much evident in our study as, mean servings of energy-dense snacks among study subjects was 6.5 (5.7) and that of energy-dense beverages was 3.01 (1.18) which was next to mean servings of cereal consumption. Due to attractive presentation of these foods, high palatability, and ready-to-serve properties,^[15] these nonessential, energy-dense food items are becoming quite dominant in regular diets in both economically developed country^[16-18] and developing countries.^[19,20] Data from this study further support this. Frequent intake of nonessential food items is contributing to negative health outcomes,^[21] such as metabolic syndrome that is cluster of obesity,^[22] type 2 diabetes mellitus,^[8] and hypertension leading to increasing risk of stroke and cardiovascular diseases.^[23] To prevent diet-related non communicable diseases, high calorie foods and drinks should be consumed in less amount.^[14] The study participants took a mean (SD) of 0.64 (0.74) serves/day of vegetables and 0.34 (0.47) serves/day of green leafy vegetable. The current dietary guidelines recommend daily intake of 3 portions of vegetables by adult male and female (one portion of green leafy vegetable and two portions of other vegetables; one portion = 100 g).^[14] This finding is consistent with other study^[11] As per this recommendation, it appears that the study participants had vegetable intakes below current national guidelines. Mean serves of fruit over the previous day was 0.50 serves/day which was also below the recommendation of national guidelines.^[14] Females in the present study demonstrated food habits that were more closely aligned with the national and international dietary guidelines^[14] than males. The present study provides outlook on food intake patterns of urban adults of study area.

An important finding from the study is that dietary intakes of the adults consist of excess intakes of energy-dense, nutrient-poor foods, and inadequate intakes of nutritious foods. This supports the need for healthy eating initiatives aimed at increasing the consumption of fruits and vegetables, milk products while decreasing the consumption of energy-dense, nutrient-poor foods, and sweetened beverages in adults. The health benefits associated with the consumption of nutritious foods like fruits, vegetables, and dairy products have been published widely.^[24-26] For example, vegetable intake is linked to reduced cardiovascular, cancer, and all-cause mortality.^[25] Similarly, regular fruit intake reduces the risk of developing non communicable diseases.^[26] Primary care physicians are expected to address nutrition, dietary behavior issues with their patients in the context of a brief clinical encounter and make them adopt currently accepted dietary guidelines. Overall, sense of patient's daily eating habits helps to identify major sources of saturated fat in their diet. Lifestyle issues are increasingly recognized as important aspects of preventive medicine.^[27] Given family physician's role in assisting patients with lifestyle modification and the association between health promotion and disease prevention, it is clearly important to provide nutritional information, guidance to patients. Unfortunately, most physicians are still not addressing dietary modification in comprehensive manner.^[28,29] Lack of time, inadequate nutrition training, lack of resources for referrals to registered dietitians have been identified as reasons for failure to provide nutrition screening and dietary intervention.^[28-30] Before attempting to improve patients' dietary habits or offer them nutritional guidance, it is necessary to assess their usual

daily food consumption pattern. Our study will quickly give family physicians of the field practice area information about the pattern of food intake by the community and will provide an opportunity to offer dietary education, recommendations linked with behavior outcomes.

Strengths and limitations

The FFQ included food and beverage items that are most noticeably consumed in the metropolitan city of Kolkata only. The FFQ does not include all foods consumed in other urban area of India. Apart from that, study findings may also be confounded by seasonal variation in food intake patterns and social desirability bias. 24 hour recall method also pose limitation such as recall bias from the respondent.^[31]

Conclusion

Overall, the food consumption pattern among urban adults of study area consists of excess intake of nutrient deficient, energy-dense foods, and sugary drinks and less intake of healthy foods from their daily meals, putting them at risk of developing noncommunicable diseases. Even though no single diet is appropriate for all persons, knowing the dietary pattern will heighten a person's awareness of nutritional health. The information of our study may encourage primary care physician to support dietary recommendations among the urban community. Individuals who are maintaining their dietary goals should be praised and further challenged to make efforts to cut down dietary fat, carbs, and calorie intake for health promotion and noncommunicable disease prevention.^[32] As the prevalence of noncommunicable diseases, obesity, and cardiovascular diseases which are diet related, actions must be taken so that adult population eat more healthily. Effective public health approach such as the adoption of food policies, information, education and communication for encouraging healthy eating habits among Indian adults should be fostered.

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Conflicts of interest

There are no conflicts of interest.

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