Original Research Article

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20214258

Food intake and eating patterns of underprivileged women in a metropolitan city

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Received: 17 September 2021 Accepted: 22 October 2021

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ABSTRACT

Background: India faces the burden of dual-malnutrition due to several influences affecting the dietary-pattern. These causes include economic and social factors. Many migrants come to metropolitan cities in search of livelihood. This study aimed to study the dietary intake of 100 low-socioeconomic women in Mumbai.

Methods: These participants were migrants from various states. They lived in slums and worked to supplement family income. A detailed food-frequency questionnaire and a 24-hour dietary-recall were obtained from them.

Results: All participants consumed white rice, junk-food and oil. Ninety-five subjects consumed potato, milk and sugar. Areca nut was regularly consumed 33 women. According to the Indian recommended dietary allowances (RDA, 2020), none of the subjects met their energy and protein needs. However, their average fat intake exceeded the recommendation. Older women (33-40 years) had significantly higher intake of calories and fat, compared to younger women (25-32 years) (p=0.03). Fat intake was positively correlated to the abdominal obesity (p=0.04). These women had a low fruit, vegetable, protein and overall caloric intake but a high fat, junk-foods, areca nut and sugar intake.

Conclusions: Poor economic conditions and affordability may cause inappropriate dietary-patterns resulting in dual malnutrition which can put these women at a high-risk for metabolic diseases.

Keywords: Dual malnutrition, Food intake, Fruit and vegetable intake, Junk food

INTRODUCTION

India has experienced the burden of dual nutrition since the nineties; with inadequate dietary intake and under nutrition on one side and poor physical activity patterns and excess food consumption/ over nutrition on the other side. Presently, India is going through rapid socioeconomic, demographic, infrastructural, nutrition and health transition. The problem of dual malnutrition still exists, with chronic insufficient energy intake on one side, and diet-related non-communicable diseases on the other side. Also, gender inequality is a common problem in India. These gender inequalities are seen in the fields of education, profession and income. This limits the opportunities that women get and also affects their health status. It is universally accepted that inadequate access to resources- food and health care facilities are some of the

causes which lead to poor health and are related to socioeconomic status.⁵ A study by Luhar et al has stated that there exists a correlation between overweight/obesity and socioeconomic status (SES).6 The problem of overweight and obesity is especially striking in women and men of urban regions with a higher socioeconomic profile.⁷ This might be due to increased consumption of refined packaged products and decrease in physical activity. On the other hand, malnutrition is a major health issue in rural and even urban parts of India. Malnutrition is largely a result of dietary inadequacy and unhealthy lifestyles. The other contributing factors for the poor include low purchasing capacity, incorrect feeding habits, big family size, recurrent infections, stress and unavailability of necessary health care facilities.^{8,9} Under and over nutrition burden results in nutritional deficiencies, poor work productivity, weak immunity,

more diseases and mortality which impacts the nation's economic growth and overall progress. Hence this study was conducted with the aim to study dietary trends in women from poor social class.

METHODS

This study was approved by inter system Biomedica ethics committee (ISBEC/NR-30/ KM-JVJ/ 2017). A written consent was taken from participants. Those who were illiterate put their thumb impression. This cross-sectional study included 25-to 40-year-old, 100 non-pregnant and non-lactating women, from the lower socioeconomic group. This research study was conducted in a metropolitan region of Maharashtra, India. Participants in the study included road side vendors, house maids, beggars, rag-pickers, sweepers, garbage pickers, women residing in slums/ road side huts. Each participant was informed about the research project and their consent was taken before beginning the interview. They were interviewed in the language familiar to them. For most of them it was Hindi.

Data collection

A questionnaire was filled by interviewing them about their age, education qualifications, job profile and household income. The participant's anthropometric measurements height, weight, waist circumference and hip circumference were taken using standardized protocols. ¹⁰ Body mass index (BMI) was calculated. The waist to hip ratio was calculated. ¹¹

Food intake of participants, their preferences (vegetarian/ non vegetarian) were noted. Other eating practices were recorded in the food frequency questionnaire. One day dietary recall was also recorded along with their amounts. The subjects were also asked about the consumption of areca nut (Areca catechu- tropical crop; also known as betel nut and usually it is used for chewing with betel leaves), selection of the type and quality of fat and sugar. Their intake of fried and fermented food; as well as packaged and street food was inquired.

Statistical analysis

The data was analyzed using the statistical package for the social sciences (SPSS) version 22.0.

RESULTS

We found 57% women had completed their basic primary school education, 14% had a high school certificate, only 1 subject was a graduate and 28% were illiterate. Seventy nine percent women were unskilled employees. They were rag pickers, babysitters, fruit or vegetable or fish vendors, household maids etc. Maids indulged in manual work like sweeping, cleaning vessels, cooking and preparing food, washing and/ or ironing clothes etc.

Twenty one percent subjects were unemployed and were house-makers.

Anthropometry

The mean BMI was 23.56 ± 4.82 kg/m², which is categorized in the overweight category for Asians. ¹² The mean waist circumference and hip circumference in the two age groups 25-32 years and 33-40 years were found to be 78.86 ± 14.41 cm and 94.41 ± 11.17 cm, respectively. The mean waist to hip ratio was 0.82 ± 0.07 .

Dietary information

Food preferences and food frequency data were obtained from subjects and it was found that 77% of women were non-vegetarian and 23% of them were vegetarian.

Cereal and pulse intake: It was seen that, all the participants consumed milled rice and the mean intake was 9.89±5.25 portions (standardized cups) per week. Whole wheat flour and white bread was consumed by 91% [mean intake=10.32±54.60 portions (standardized cups)/ week] and 80% [mean intake=6.40±5.18 portions (standardized cups)/ week], respectively. commonly used cereals were rice flakes, semolina, sago; used by 56% of the subjects. Most of the participants (86%) consumed split pigeon pea, with the mean intake being 3.14±4.17 portions (standardized cups)/week. Eighty-one subjects consumed whole green gram, with a mean intake of 1.45±1.40 portions. Red kidney beans, cowpea and red gram legumes were mostly consumed once a week but their amounts consumed were less compared to the split pigeon pea.

Fruit and vegetable intake: It was observed that, tomato was consumed by 95% women (mean consumption being 2.72±1.62 portions/week). Apple and banana were consumed by 60% and 57% of the subjects, respectively. The mean intake was highest for banana (3.62±9.40 portions). Among the leafy vegetables, mustard leaves, cabbage and spinach were consumed by 83% of the subjects. The mean intake of leafy vegetables was ½ standardized cup/ week. Over ninety percent of the subjects preferred to use onions and potatoes in their meals. The mean intake of onions and potatoes were 2.01±1.32 and 1.98±1.37 portions/week, respectively. Sweet potato, white radish and beetroot were incorporated in the diet by 41% of women. Gourd vegetables were consumed by most of the participants, with its mean intake of 3/4 standardized cup/ week. About 90% subjects selected ladies-finger and cauliflower vegetable in their diet.

Nut intake: Most of the participants, that is, 85% and 83% consumed coconut (dry/fresh) and groundnut, respectively regularly in their food. Thirty-three percent of the women consumed areca nut (Areca catechutropical crop; also known as betel nut and usually it is

used for chewing with betel leaves), with its mean consumption being 32.10±29.07 pieces per week.

Intake of dairy and non-vegetarian foods: Most of the participants (95%) consumed milk only in the form of tea. Their average tea intake was 6.27±4.28 cups per week. The average weekly intake of curds taken by 45% of the women was 1.72±2.15 portions. The mean chicken consumption by 68% of the subjects was 0.64±0.50 portions per week and fish was consumed by only 19% of the women. Sixty-five participants relished 2 eggs (hen) per week.

Oil and sugar consumption: Oil was consumed by all subjects, with its mean being 18.36±13.29 tablespoons per week. The sugar consumption was found to be 11.69±7.88 tablespoons per week, among 95% of the subjects. About 40% women used jaggery mostly in their vegetable preparation.

Ready to eat foods and junk food intake: We observed that all subjects consumed some junk food frequently. Some of the Indian street food popular among all age groups include vadapav (fried snack made with potato stuffing sandwiched between bread), idli (fermented and steamed preparation made with rice and pulse combination), dosa (pancake like preparation made using oil and fermented batter of rice and pulse combination), medu-wada (fried snack made using fermented batter of rice and pulse combination) chaat (variety of preparations made with the combination of curd, datestamarind paste, coriander-mint paste, fried crunchy preparation of refined flour, fried crunchy preparation of pulse, boiled potatoes, puffed rice, onions, tomatoes).

Sixty percent subjects had potato or banana wafers; 71% subjects consumed vadapav. Idli, dosa and medu-wada were frequently eaten breakfast food-items, consumed by 66% of subjects. The mean intake of idli and medu-wada was 3.41±4.21 per week and 2.68±2.76 portions per week, respectively. Chaat was savoured by 56% of the participants and more than 70% subjects reported that they relished biscuits usually with tea. The mean intake of biscuits was 21.60±14.47 numbers/week. Sixty percent of participants enjoyed ice cream, once a week.

One day recall: A 24-hour recall was taken from all subjects and the average daily macronutrient intake was calculated and is shown in Table 1.

Table 1: Average daily energy and macronutrient intake of the participants.

Energy, macronutrients/	Mean and SD
Energy (Kcal) per day	820.63±238.67
CHO (gm) per day	122.42±40.95
Protein (gm) per day	21.95±8.51
Fat (gm) per day	27.29±8.09

Subjects, in the present study were divided into two age groups, that is 25-32 years and 33-40 years and the macronutrient consumption in the two age groups was noted and shown in Table 2. Older women had a higher intake of macronutrients and calories. Energy and fat consumption were significantly higher in older age group categories (p=0.03). Similarly, fat intake was also significantly related to the age group categories (p=0.03). Carbohydrate and protein consumption not significantly related.

Table 2: Daily energy and macronutrient intake in different age group categories.

Energy and macro- nutrients	25-32 years Mean ± SD, (n=50)	33-40 years Mean ± SD, (n=50)	F	P
Energy (Kcal)	770.46± 195.28	870.80± 267.98	4.57	0.03
Carbs (gm/day)	115.28± 32.82	129.57± 46.97	3.11	0.08
Proteins (gm/day)	20.71± 7.12	23.19± 9.62	2.14	0.14
Fats (gm/day)	25.61± 8.15	28.97± 7.75	4.44	0.03

The macronutrient intake was compared in the BMI categories. Obese subjects had a mean energy intake of 886±285.47 Kcal per day, which was highest among all the BMI categories and the lowest caloric intake (743±241 Kcal per day) was observed in the underweight subjects. The carbohydrate consumption was highest in normal weight subjects (130.91±40.80 gm/day), followed by obese subjects (129.88±45.16 gm/day). Underweight subjects had a low protein intake (19.92±6.36 gm/day), compared to the normal weight individuals (23.32±8.20 gm/day). The fat intake was highest (31.09±10.22 gram/day) among obese subjects and least (22.65±7.45 gm/day) among the normal weight subjects. No significant difference was seen in energy and macronutrient intake in the BMI categories as shown in the Table 3.

The total energy and macronutrient intake among different waist circumference categories was compared. Forty-five participants who had a waist circumference ≥80 cm, had a higher energy (848.97±255.58 Kcal per day), carbohydrate (124.48±42.64 gm per day) and fat (29.22±8.52 gm per day) intake, but the difference in intake was not significant. Except fat intake (p=0.04), none were significantly related to the WHR.

A negative correlation was observed with vadapav and samosa/samosa pav consumption and WHR and WC, but it was not significant. A positive correlation was found with the biscuit consumption and WHR as well as WC (r=0.026, 0.101; respectively), but that too was not significant (p=0.823, 0.382; respectively).

Daily energy and macronutrient	Mean and SD Underweight,	Normal,	Overweight,	Pre obese,	Obese type 1,	F, P
consumption	(n=15)	(n=34)	(n=14)	(n=26)	(n=11)	
Energy (Kcal)	743±241	861.41±233.24	810.57±185.34	789.84 ± 248.95	886±285.47	0.96, 0.43
Carbohydrates (gm/day)	115.40±41.39	130.91±40.80	117.22±33.36	115.03±43.19	129.88±45.16	0.82, 0.51
Proteins (gm/day)	19.92±6.36	23.32±8.20	23.17±9.54	20.60±8.74	22.10±10.49	0.66, 0.62
Fats (gm/day)	22.87±8.49	22.65±7.45	27.85±6.52	27.46±7.94	31.09±10.22	1.81, 0.13

Table 3: Daily energy and macronutrient intake in different BMI categories.

DISCUSSION

Lack of affordability, poor interest or lack family support, might have forced the subjects in this study to drop education. Also, most of them said that, they worked to support their livelihood financially. House maids had a higher monthly family income (>Rs. 16,077), compared to rag pickers or fruit/vegetable/fish vendors earned. Our study results were in contrast to a study done by Frank et al., who reported their study of 542 subjects in Ghana. They found that 76% females were of low SES. Out of these, 35.4% were unemployed, 45.9% were illiterate and 35.2% lacked formal education.

In our study, the mean BMI and WHR fell under the overweight and abdominal obese category according to the WHO cut offs. ¹⁰ Whereas a research study conducted by Thankachan et al had reported the average BMI to be 21.8±4.7 kg/m² among the 100 low socioeconomic status women in Bangalore. ¹⁴

The rice intake was high in this study, due to its low cost, easy cooking and low preparation time. They also buy rice at subsidized rates in government ration shops. Also, participants said that they preferred rice because it satiated hunger. Wheat flour was mostly used as a variety of Indian breads (rotis, chapatis, phulkas). Other common cereal preparations were sago khichadi, upma, sheera, poha etc. The pulse (toor dal) was mostly consumed with rice.

Meenakshi and Bindra analysed their data from the consumer expenditure surveys of the national sample survey organization (NSSO) for 1993-2004 and 2011-2012. They had observed that by 2011-2012 the intake of oils and sugars had increased from 135 to 216 calories per capita per day, among the lowest income groups, and a much greater rise that was 340-390 calories per capita per day seen among the high-income groups. Their results stated that there was a shift from a traditional high-carbohydrate, low-fat diet to diets rich in saturated fat, sugar and salt with lower carbohydrate proportion. The poor consumption pattern of complex cereals, pulses, fruits and vegetables, coupled with higher caloric

consumption from refined foods and unhealthy fats, along with poor physical activity are the most likely contributors to the increasing levels of overweight and obesity, dyslipidemia, metabolic syndrome, diabetes mellitus, and ischemic heart diseases, seen among the Indians. ¹⁶

In our study, tomato was a daily ingredient used to prepare curries, chutney and other vegetables. The fruit intake was low among the subjects because of high cost. Leafy-vegetables were prepared in a gravy form, but were not preferred, so the mean consumption one portion/ week. Most of them used a combination of onion-potato to make their vegetable preparations. Carrot and beetroot were incorporated as a salad. Bottle gourd, bitter gourd, snake gourd, ivy gourd and ridge gourd were commonly consumed gourd vegetables as they were cheaper compared to certain vegetables like cauliflower, peas etc. However, the portion size for vegetables was only about ½ to ¾ of the standardized cup, indicating a low vegetable intake. The mean fruit and leafy vegetable intake among the low socioeconomic status women was reported to be 35.9±43.7 gm/day and 23.9±32.1 gm/day, respectively in a Bangalore study.14

The recommended dietary allowances (RDA) for Indians suggest fruits and vegetables intake to be 400 gm/day and milk 200 gm/day for non-vegetarians and 300 gm/day for vegetarians, to prevent micronutrient deficiencies and non-communicable diseases. But in the last few years, the prices of vegetables and fruits have increased, which is found to be the major limiting factor that leads to poor consumption of vegetables, especially in poorer households. But the service of the service of

Coconut and groundnuts were incorporated into various vegetable or curry preparations. Subjects frequently consumed areca nut, to suppress their hunger and to delay their meals. Areca nut consumption is found to be associated with oral cancers, central obesity etc. ¹⁹⁻²¹

Among the subjects, in this study, only fish sellers and few others had fish on a daily basis as the high price was unaffordable. Curd was taken as thin buttermilk or salted curds. Milk was only included in the form of tea. Consumption of tea was high. This also like areca nuts delayed hunger. Hulshof et al has reported the mean intake of tea among women to be 483 and 443 ml per day among the low SES groups and very low SES groups, respectively.²²

Groundnut, palm and sunflower oils were popular oils consumed by the subjects in this study. Oil was used for vegetable, dal and curry preparations, for frying and roasting chapatis. The sugar was mostly added to the tea, vegetable, pulse and sweet preparations. Hulshof et al reported that, 45 gm of oil and 38 grams of sugar was consumed by low SES Dutch women per day.²³

In this study, vada pav was preferred due to its easy availability, taste preference and low cost. Idli, dosa and medu-wada were the most frequently breakfast fooditems. Pani-puri, bhel-puri, and sev-puri were the commonly consumed chaats. Marie, Good-day, 50-50, Parle G, were the most commonly consumed sweet biscuits. As these foods were readily purchased, they could be high in fats, food colors, additives, and lower in nutritive value. Similar results were found by Hulshof et al where the average consumption of cakes and pastries, was 53 grams and 55 grams per day among the low SES and very low SES groups, respectively. 22,23 They also concluded that low SES women consumed more of potatoes, fats and oils, meat and soft drinks. Over the 10year period of follow up, they had observed that the consumption of vegetables and fruits decreased significantly, whereas the consumption of ready-to-eat meals had increased across all SES groups.

India is facing a nutritional imbalance due to changing food environment and dietary patterns with easy availability of food stuffs which are high in energy, salt, sugar and fats, and poor in micronutrients. This is also coupled with rising incomes for some, urbanization, sedentary lifestyle and higher rural-to-urban migration.²⁴ These changes have led to a transition from undernutrition, which was predominant earlier, to higher rates of overweight, obesity and non-communicable diseases.²⁵

None of the subjects in this study met their energy needs when compared to the RDA; which recommends 1900 Kcal for sedentary working lifestyle and 2230 Kcal for moderately-active lifestyle. Similarly, none of the participants met the protein requirements given in the RDA, which was 1 gm/kg body weight (average of 55 grams of protein per day). The average total fat was 29.92% of the total calories consumed, which was higher than recommendation (20% of the total calories). Similar results have been reported by Khanam et al; where the average daily energy and macronutrient intake among the rural women of Uttar Pradesh was 1657.81±461.91 Kcal/day, and 45.05±18.79 gm/day of proteins and 37.52±31.16 gm/day of fat (energy and protein less than RDA and fat more than RDA).²⁶

Ramachandran and Kalaivani reported in their study that 30% of older urban Indian women are over-nourished. Also, data from NFHS-3 (IIPS 2009) shows that the occurrence of undernutrition was higher in younger women which has an impact on their reproductive health and that of over nutrition was higher in older women and urban areas putting them at a higher risk of noncommunicable diseases.²⁷

A high fat intake was associated to a higher waist circumference by Hooper et al.²⁸ The correlation between the weekly intake of vada-pav, samosa/ samosa pav and biscuits with waist circumference and waist to hip ratio was studied, because these high energy foods were savored by many subjects due to their easy availability and economic constrains, which might have a negative impact on their body composition and health.

CONCLUSION

Women from the low-socioeconomic group had a low fruit, vegetable, protein and overall caloric intake but a high intake of fat, junk-foods, areca nut and sugar. Their taste-preference, poor economic conditions and working-schedules, resulted in irregular dietary-patterns and resulted in higher BMI, WC and abdominal obesity, putting them under a high-risk for metabolic diseases.

ACKNOWLEDGEMENTS

Author would like to thanks to the participants of the study. We are also grateful to Dr. Mitravinda Aneesh for the statistical analysis of this study.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by Inter System Biomedica Ethics Committee (ISBEC/NR-30/KM-JVJ/2017).

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Cite this article as: Patil RS, Kaku N. Food intake and eating patterns of underprivileged women in a metropolitan city. Int J Community Med Public Health 2021;8:5273-8.