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Dietary Habits of Female Urban Slum-dwellers in Mumbai

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Abstract

Research Question—Intakes of micronutrient-rich foods are low among women of child-bearing age living in slums. We investigated relationships between consumption of these foods and socio-demographic variables.

Methodology—A 91-item Food Frequency Questionnaire was administered to women (n=1651) aged 16-40 yrs living in a Mumbai slum. We identified associations between categorical demographic variables and consumption frequency of these foods using chi-square tests. Associations with age and body mass index were investigated using one-way ANOVAs.

Results—A quarter of women ate fruit and green leafy vegetables < 3 times per week, Apart from in tea, median consumption of milk and milk products was < twice a week, 16% never consumed non-vegetarian foods. Median consumption of non-vegetarian foods was 4.5 times per week. Women employed in unskilled jobs and those whose husbands had skilled occupations ate green leafy vegetables more frequently. Participants educated to tertiary level consumed fruit and milk most frequently ($p<0.05$).

Keywords

diet; fruit; milk; green leafy vegetable; India; slum

INTRODUCTION

Several studies have shown that young Indian women's micronutrient intake is substantially lower than the Indian Council for Medical Research (ICMR) recommended daily allowances (RDA).(1) Intakes of calcium and vitamin A by men and women living in slum areas were below 70% of the RDA(2) A small study in a Delhi slum found that 34% and 10% of pregnant women were consuming less than the RDA for zinc and magnesium respectively. There is evidence that micronutrient deficiencies including iron, zinc and folate affect between 30-50% of pregnant women.(3) Prevalence of Iron Deficiency Anaemia (IDA) among pregnant and lactating women was found to be over 90% in some states.(4) In a study set in a slum area of the city of Mumbai, India, over 75% of women (n=174) examined had IDA.(5)

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Poor quality diets before pregnancy are thought to be an important factor contributing to intra-uterine growth retardation.[6] Diets containing a greater quantity of micronutrient-rich foods such as green leafy vegetables, fruit and milk during pregnancy have been associated with favourable infant outcomes including birth weight.[7]

According to the Indian National Family Health Survey (NFHS), in which dietary data was collected from over 90,000 women in 26 states using a 7-item food frequency questionnaire (FFQ),[8] diet habits varied widely between states and almost half of women in some states consumed micronutrient-rich foods such as green leafy vegetables, milk and fruit less than once a week.

To our knowledge there have been few detailed studies investigating the dietary intake of women living in urban slums. Those that report such data show that intakes of fruit and vegetables are well below the recommended 5 portions per day.[9-11]

The objectives of the current study were to investigate the frequency of consumption of individual foods in a sample of non-pregnant women of reproductive age living in a slum area of Mumbai and to determine whether consumption of these foods was associated with demographic and anthropometric factors.

MATERIAL AND METHOD

Study Setting

The study took place in a chaal area of Prabhadevi, Mumbai. The data were collected at the time of recruitment into an ongoing randomised controlled trial named the Mumbai Maternal Nutrition Project (MMNP) investigating the effect of daily consumption of a food-based micronutrient rich supplement on infant outcomes.[12]

Mumbai Maternal Nutrition Project

Of a population of 10,484 families, 4212 married women were identified as eligible for the MMNP by a household census undertaken by health workers from the Streehitakarini health post, which provides primary care and family planning services to this community. The census gathered information on the type of dwelling, members and ages of the household, marital status of the women and type (if any) of contraception being used by the married women. Eligible women were non-pregnant, not sterilised and not using contraception, aged between 16 to 40 years, married and likely to deliver in Mumbai.

Ethical permission for the study was granted by the Nair Hospital Ethics Committee, Mumbai, India and all participants gave informed consent.

Dietary Assessment

Dietary intake data over the preceding month was collected using a 91-item FFQ administered by trained health workers either at the study centre or the woman's home. The FFQ was developed after a series of five focus group discussions with a total of 46 women. The discussion were conducted in small groups of between 8-11 women of reproductive age who lived in slums in and around the study area and were led by a senior nutritionist who had experience of developing FFQs in the state of Maharashtra. The FFQ was administered to women at the time of registration to the MMNP between January 2002 and June 2005.

Anthropometry and Demographic data

Height was measured to the nearest 0.1cm using a Harpenden portable stadiometer (CMS Instruments Ltd, London, UK) and weight to the nearest 10g using digital weighing scales

(SECA, Hanover MD, USA). Educational attainment was recorded in 7 groups ranging from illiterate to post-graduate. The women's occupation and that of their husband was recorded in five groups ranging from unskilled worker to professional. Housewife was recorded as a separate category for women who were not in paid employment. The women's religion and first language were also recorded.

Data Analysis

Food frequency data were obtained from 1668 women who registered for MMNP. Interviews were not fully completed for seventeen women; completed FFQs were available for 1651 women. For the purposes of the pilot study, portion size data were not collected from all women and have not been used for this analysis. Data were collected in the form of frequency codes (D1= once a day, D2 = twice a day, W1 = once a week etc.). Numerical values (frequency scores) were assigned to these codes to correspond with the number of times the food was eaten in a 28-day period. Food items from the FFQ were grouped into the following categories: fruit; GLV; milk products; non-vegetarian (chicken, mutton, fish, eggs); pulses; potatoes; bread; rice. Frequency scores within each food group were summed to give a total 'food group score' for each participant. For example, the frequency of consumption of apples, oranges, bananas and other fruits eaten in a 28-day period were added together to give a 'fruit score'.

Continuous variables that were not normally distributed were log transformed for analyses with the exception of food group scores for which ordered categorical variables were created with six 'frequency' groups. In order to investigate associations between the food groups of interest (GLVs, fruit and milk) and the demographic variables, the groups were collapsed to give three groups according to intake (<1/week, ≥1/week - <1/day and ≥1/day). Pearson chi-square statistics were calculated to examine the association between categorical variables. One-way ANOVAs were run to investigate differences in mean age and BMI according to intake group. All statistical analyses were carried out using SPSS version 15.0.

OBSERVATIONS

Participants

A quarter of the women were chronically energy deficient (Table I). Almost half were in paid employment, the majority of these were unskilled workers while 57% were housewives. Virtually all of the women's husbands were employed, nearly half were unskilled or semi-skilled workers (e.g. shop assistant, rickshaw driver or porter) and a third were professionals or skilled workers with the remainder being self-employed. Two thirds of participants spoke Marathi as their first language. The majority of the women (89%) were Hindu.

Dietary Intake

Table II shows the frequency of consumption of each of the food groups represented on the FFQ. Almost all of the women consumed pulses, bread, rice and milk in tea at least once a day. Fruit and GLVs were eaten daily by 43% and 30% of women respectively. The most frequently consumed fruits were bananas and apples, fenugreek and spinach were the most frequently eaten GLVs (data not shown). Approximately a quarter of women reported eating fruit and GLVs three times or less per week. A fifth of women consumed milk products other than in tea at least daily but over half had milk products (other than in tea) less than three times per week and 39% had them less than once per week. Non-vegetarian foods were consumed at least once a week by 80% of women, of all non-vegetarian foods, fish was eaten most frequently.

Seasonality

There was little variation in consumption according to time of year for any of the food groups. Total fruit and GLV consumption were lower during the summer months but this difference was not substantial (figures 1 and 2).

Factors Associated with Dietary Intake

There was a small but statistically significant association between the occupation of the woman and GLV consumption, women with unskilled or semi-skilled jobs consumed GLVs more frequently than housewives or women in more skilled professions (table 3). GLVs were eaten at least once a day by 36% of women employed in semi and unskilled jobs compared with 25% of housewives. There was significant differential distribution of occupation by level of GLV consumption, ($p<0.001$). A third of women married to skilled, professional or self-employed husbands consumed GLVs at least once a day compared to 24% and 25% of those married to semi-skilled or unskilled husbands respectively, again a small but positive relationship between husbands' occupation level and consumption frequency of GLVs was found ($p<0.001$). Education level of both the woman and that of her husband was positively associated with more frequent milk consumption ($p<0.001$ for both). BMI was also positively associated with frequency of milk intake (data not shown). First language was modestly but significantly related to consumption frequency of GLVs with women speaking Hindi as a first language consuming both foods more frequently than women with other first languages (data not shown). There was no significant association between consumption frequency of the three food groups and age or religion.

DISCUSSION

We investigated the baseline dietary habits of women enrolled in an RCT set in a Mumbai slum and found considerable variability in dietary intake. There were associations between some scocio-demographic factors and frequency of consumption of fruit, GLVs and milk.

Strength of this study is the relatively large sample size in this type of population and the method by which the FFQ was designed. A potential criticism of our data is that portion size information was not collected in a usable form so quantity of intake is not included in the analysis. However, studies have shown that FFQ portion size data may have limited ability to characterise variance in intake.[13;14] Another limitation is that the FFQ was not validated against another dietary assessment method. A more general issue is that of the accuracy of reporting of food frequencies using FFQs. It can be difficult for participants to conceptualise their diet in relation to periods of time. FFQ data such as that presented here may be more useful for investigating relative differences in intakes between groups as opposed to absolute differences.

Dietary habits of Indian women

The staple foods for most women in the present study were rice and bread. More than half of the women ate GLVs and fruit less than once a day. The ICMR recommend daily consumption of fruit and GLVs.[1] Some varieties of fruit and GLV are seasonal and are consumed less or not at all at certain times of the year. Both are consumed least often during the rainy season, this is probably due to poor availability at this time. Most women consumed milk daily in tea to which they would add a small amount (approximately 20ml) but few had a larger serving of milk or milk products every day.

During the 1990s the price of cereals, oils and sugar rose considerably more slowly than milk and vegetables[15] which may in part explain infrequent consumption of these foods.

Socio-demographic factors affecting food intake

Women in less skilled employment ate GLVs more frequently than housewives and those with more skilled jobs. This may be due to less skilled women having greater income than housewives and more time for preparation of GLVs than skilled workers who may have to travel further to work. Women with husbands who were professionals or skilled employees consumed more GLVs than those with unskilled or semi-skilled husbands. This suggests a positive correlation between household income and frequency of GLV consumption. This finding is similar to that in a rural study whereby household income was positively associated with frequency of GLV consumption among pregnant women.[16] A study using NFHS data found that women with a higher standard of living had a more varied diet. However in contrast to our findings those who had 'skilled' professions and were housewives had a more varied diet compared to those who worked in unskilled jobs.[17]

Education level was positively associated with milk intake in our sample of women which concurs with data collected from women of the Khasi tribe in North East India.[18] Fruit and GLV consumption was associated with first language indicating that choices about food intake could be the result of cultural factors rather than availability of foods in this population. Standard of living and occupation have been observed to be negatively related to prevalence of IDA in the NFHS[4] and in another urban slum-based study, iron status was positively associated with education level.[11] Socio-economic status was negatively related to the proportion of rural adolescent girls that were short for age (stunted) in a nationwide study conducted by the National Nutrition Monitoring Bureau.[19]

CONCLUSION

This study shows that these slum-dwelling women's diets lack adequate micronutrient-rich foods. Standard of living and education may have an impact on dietary choice and nutrition status, therefore it is important that any interventions aimed at changing women's dietary behaviour are targeted to the setting in which the woman lives and take into account the availability, cost and other factors which may affect whether she is able to consume a particular food.

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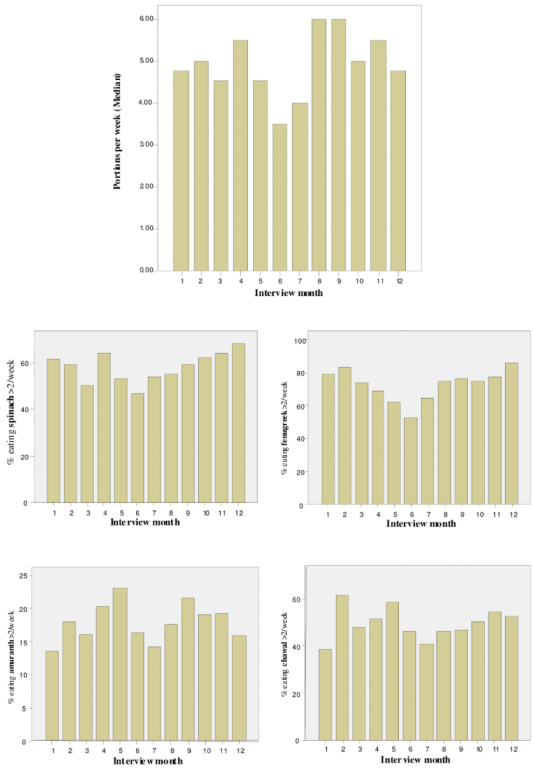

Figure I. Seasonal variation in Green Leafy Vegetable consumption

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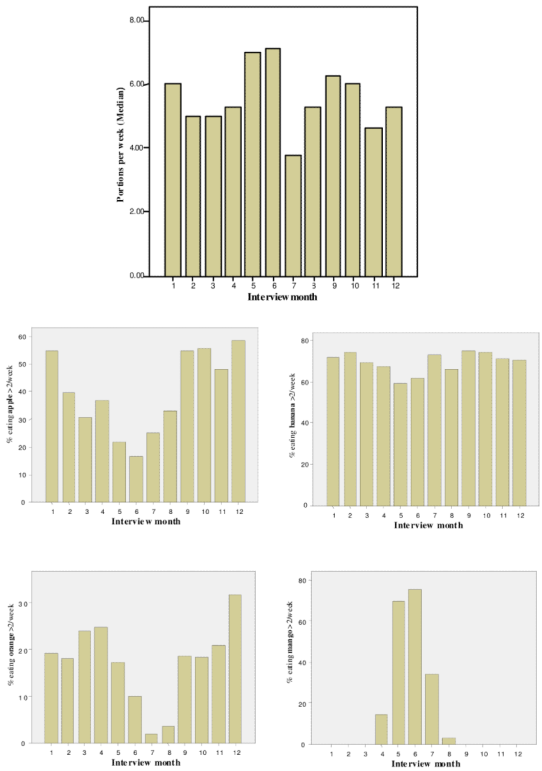

Figure II. Seasonal variation in fruit consumption

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Table I

Participant characteristics

Characteristic	Mean	Standard Deviation	Median	InterQuartile Range
Age (years)	27.3	4.9	27.0	24.0 - 30.0
Weight (kg)	49.0	9.5	48.1	42.0- 54.7
Height (m)	1.51	5.6	1.51	1.47 - 1.55
BMI (kg/m^2)	21.4	3.9	20.9	18.4-23.8
		Participant % (n)	**Husband** % (n)	
Occupation	Self-employed	**4** (68)	**23** (379)	
	Professional	**1** (23)	**9** (148)	
	Skilled	**1** (20)	**18** (291)	
	Semi-skilled	**1**(23)	**33** (550)	
	Unskilled	**32** (532)	**13** (215)	
	Housewife/Unemployed	**57** (928)	**2** (36)	
	Not reported/Not known	**4** (59)	**2** (32)	
Education	Illiterate	**8** (124)	**3** (49)	
	Primary (1st-5th Standard)	**5** (88)	**3** (51)	
	Secondary (5th -10th Standard)	**66** (1080)	**61** (1010)	
	Higher Secondary (11-12th Standard)	**12** (196)	**18** (293)	
	Graduate	**9** (152)	**13** (219)	
	Post-graduate	**<1**(9)	**1** (24)	
	Not known	<1(4)	**<1**(3)	
First Language	Marathi	**67** (1091)		
	Hindi	**12** (200)		
	Gujarathi	**9** (138)		
	Telegu	**7** (119)		
	Other	**5** (84)		
	Not Reported	**1** (18)		
Religion	Hindu	**89** (1462)		
	Neo-Buddhist	**6** (95)		
	Christian	**3** (43)		
	Jain	**1** (20)		
	Muslim	**1** (19)		
	Other	**<1** (12)		

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Table II

Percentage (n) of women consuming items from each food group by frequency of consumption

Food Group	Frequency of Consumption % (n)												
	Never		<1/week		1-3/week		3.1-6/week		1-2/day		>2/day		Median Frequency (servings/week)
Fruit	**1**	(38)	**6**	(98)	**20**	(336)	**28**	(455)	**33**	(543)	**10**	(181)	**6**
GLVs	**1**	(20)	**5**	(89)	**18**	(303)	**46**	(751)	**26**	(423)	**4**	(65)	**5**
Milk (including tea)	**2**	(36)	**1**	(19)	**2**	(35)	**2**	(24)	**18**	(291)	**75**	(1246)	**14**
Milk (not including tea)	**19**	(314)	**20**	(336)	**20**	(330)	**19**	(312)	**18**	(293)	**4**	(66)	**1.75**
Non-vegetarian foods (meat, poultry, fish, eggs)	**16**	(260)	**4**	(66)	**14**	(224)	**43**	(706)	**20**	(342)	**3**	(51)	**4.5**
Chicken	**37**	(613)	**41**	(685)	**20**	(325)	**2**	(31)	**0**	(0)	**0**	(0)	**0.25**
Mutton	**44**	(732)	**36**	(588)	**18**	(294)	**2**	(37)	**0**	(0)	**0**	(0)	**0.25**
Fish	**32**	(520)	**12**	(197)	**38**	(634)	**17**	(283)	**1**	(17)	**0**	(0)	**1.5**
Eggs	**24**	(402)	**12**	(193)	**54**	(889)	**9**	(144)	**1**	(23)	**0**	(0)	**1.5**
Pulses	0	(0)	**0**	(0)	**1**	(18)	**8**	(131)	**35**	(575)	**56**	(927)	**15**
Potatoes	**6**	(98)	**19**	(322)	**37**	(612)	**35**	(574)	**2**	(36)	**1**	(9)	**1.5**
Bread	**1.5**	(25)	**<1**	(15)	**1.5**	(25)	**1.5**	(24)	**25**	(402)	**70**	(1160)	**4.75**
Rice	**<1**	(4)	**<1**	(2)	**<1**	(5)	**<1**	(6)	**19**	(307)	**80**	(1328)	**14**

*
GLV: Green leafy vegetable

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Table III

Frequency of GLV and fruit consumption by women's occupation and education

	Consumption Frequency % (n)								
	GLV			**Fruit**			**Milk**		
	<1/week	**≥1/week −<1/day**	**≥1/day**	**< 1/week**	**≥1/week −<1/day**	**≥1/day**	**<1/week**	**≥1/week −<1/day**	**≥1/day**
Occupation									
Full-time housewife	**8** (72)	**66** (617)	**26** (238)	**7** (70)	**48** (443)	**45** (414)	**39** (362)	**40** (372)	**21** (193)
Semi-skilled and Unskilled	**5** (27)	**59** (325)	**36** (200)	**11** (59)	**45** (250)	**44** (243)	**41** (225)	**38** (208)	**22** (119)
Self-employed, Professional and Skilled	**7** (8)	**69** (77)	**24** (27)	**4** (5)	**59** (66)	**37** (41)	**34** (38)	**43** (48)	**23** (26)
Husband's Occupation									
Unskilled and Unemployed	**11** (27)	**63** (157)	**26** (66)	**8** (19)	**48** (121)	**44** (110)	**42** (105)	**41** (102)	**17** (43)
Semi-skilled	**6** (35)	**69** (382)	**25** (135)	**8** (43)	**49** (272)	**43** (237)	**42** (232)	**37** (203)	**21** (117)
Self-employed, Professional and Skilled	**6** (47)	**60** (492)	**34** (278)	**9** (70)	**47** (385)	**44** (362)	**37** (298)	**40** (329)	**23** (190)
Education									
Illiterate & Primary	**5** (11)	**63** (131)	**32** (67)	**9** (19)	**45** (94)	**46** (96)	**39** (81)	**47** (98)	**14** (30)
Secondary (5^{th}-10^{th} Standard)	**7** (74)	**64** (695)	**29** (311)	**8** (88)	**50** (541)	**42** (451)	**42** (456)	**39** (418)	**19** (206)
Higher Secondary, Graduate & Postgraduate	**6** (23)	**63** (227)	**30** (108)	**8** (28)	**43** (155)	**49** (175)	**31** (111)	**36** (128)	**33** (119)
Husband's Education									
Illiterate & Primary	**13** (13)	**61** (61)	**26** (26)	**12** (12)	**39** (39)	**49** (49)	**46** (46)	**44** (44)	**10** (10)
Secondary (5^{th}-10^{th} Standard)	**7** (70)	**64** (644)	**29** (295)	**8** (86)	**49** (493)	**43** (430)	**43** (434)	**39** (390)	**18** (185)
Higher Secondary, Graduate & Postgraduate	**5** (26)	**64** (345)	**31** (168)	**7** (37)	**48** (257)	**45** (245)	**31** (169)	**39** (211)	**30** (159)