Household Food Insecurity and Malnutrition in an Urban Field Practice Area of a Medical College

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ABSTRACT

Introduction: The Global Hunger Index 2017 ranks India at 100 out of 118 countries. FAO estimates that about 190.7 million people are undernourished in India, which accounts for 14.5% of the population. Food security is a fundamental human right for all citizens in its interim constitution. It is also a determinant of nutritional outcomes, especially for children. An adequate food intake, in terms of quantity and quality, is a key to healthy life. Malnutrition is the most serious consequence of food insecurity and has a multitude of health and economic implications.

Objective: The study conducted to determine the prevalence of food insecurity at the household level and to assess the association between food insecurity and malnutrition of under-five children.

Methodology: This cross-sectional study was conducted among the mothers of under-five children in urban field practice area of Sri Siddhartha Medical College, Tumkur. Household Food Insecurity Access Scale (HFIAS) was administered to the mother to assess the food insecurity and anthropometric measurements were taken for under-five children.

Results: In the present study, the prevalence of food insecurity was 33.5%. There was a statistically significant association between food insecurity and wasting and under-nutrition. There was no association between food insecurity and stunting.

Key words: Food insecurity, under-five, malnutrition, hunger.

INTRODUCTION

Food insecurity per se, exists when all people, at all times, do not have physical and economic access to the sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (Food and Agriculture Organisation, FAO, 1996).[1] Food insecurity is a gigantic problem in the world. At least 25,000 die people every day due lack of proper diets. Poverty easily coexists with food insecurity and is the main cause of hunger and malnutrition.[2]

India is a country of its people, being the world's largest democracy. Within this democracy people still live everyday being food insecure. More than a fifth (21 percent) of children in India suffer from wasting. India ranks 100th in the Global Hunger

Index (GHI) of 119 countries at GHI score of 31.4, at the high end of the serious category. While India has seen impressive economic growth in recent years, the country still struggles with widespread poverty and hunger. India's poor population amounts to more than 300 million people, with almost 30 percent of India's rural population living in poverty.[3]

There is paradoxical situation in endemic mass-hunger coexisting with the mounting food grain stocks. The paradox lies in the inherent flaws in the existing policy and implementation bottlenecks.[4]

India has among the world's largest urban population with below poverty line incomes and the world's largest population living in slums.[5] Estimated 7.3 million people move into the rapidly

growing urban areas of India every year. Though the number of middle class citizens is growing, there is an extreme gap between the rich and poor. Around 35 percent of the population is living below the poverty line.[6]

With nearly 195 million undernourished people, India shares a quarter of the global hunger burden. Nearly 47 million or 4 out of 10 children in India are not meeting their full human potential because of chronic under nutrition or stunting.[7] Childhood nutritional deficiencies are responsible, in part, for poor school enrolment, absenteeism, early dropout, and poor classroom performance, with consequent losses in productivity during adulthood.[8] Not only does food insecurity in itself has deleterious effects on households and individuals but efforts at achieving food security may also pose a heavy economic toll if households must spend most of their income on obtaining food. On a household level, presence of food insecurity probably suggests a high degree of vulnerability to a broad spectrum of consequences, including psychosocial dysfunction in children, socio-familial problems, and overall poor health status.[9]

There is evidence that household food insecurity affects parenting behaviors with adverse outcomes for children. Mothers in food insecure households are more likely to have unhealthy eating patterns themselves while children in these families consume more low cost, less nutritious, and high energy foods. Therefore, children from food insecure households are at an increased risk of being overweight and micronutrient deficient.[10]

Various studies have been conducted to assess food insecurity at the global level; however, the literature is limited as far as India is concerned. Lack of sufficient studies on the burden of the problem poses a hurdle in formulating strategies to combating this issue.

Hence this study was taken up to assess the prevalence of food insecurity at the household level and to assess the association between food insecurity and malnutrition of under-five children in the urban field practice area of Sri Siddhartha Medical College.

METHODOLOGY

This cross-sectional study was conducted in the urban field practice are of a Medical College in Tumkur between February to August 2018. Mothers of under-five children who were residents of the area for at least 6 months and who consent for the study were included and migrant population and mothers who were not available even after two visits were excluded.

Sample size was calculation using formula n = $4pq/d^2$ where P was prevalence of food insecurity (61% according to study by Emily et al)[11]; q was 100-p (39%); and d was absolute precision (10%). So the calculated n was 95. After applying design effect of 2, n is equal to 190 which was rounded to 200.

After taking the clearance from Institutional Ethical committee, all the mothers of under-five children in the study area were line-listed. In the study area there are 2786 houses, the population of whole area was 11289 and mothers of under-five children were 1680. House to house survey was done and every 7th mother who fulfils the inclusion & exclusion criteria's were included in the study till the sample size of 200 is reached. Data was collected using Pre tested semi structured questionnaire which contains information regarding their socio-demographic details. Household Food Insecurity Access Scale (HFIAS), developed by the FANTA project Coates et al.[12], was administered to assess the food insecurity in the household. Anthropometric measurements like weight, height of under-five were measured according to standard procedure and plotted in WHO growth charts to assess malnutrition. Confidentiality of the study subjects was ensured.

The questions contained in the Household Food Insecurity Access Scale (HFIAS) were asked with a recall period of four weeks (30 days). If the respondent answered 'yes' to an occurrence question, a frequency-of-occurrence question was asked to determine whether the condition happened rarely (once or twice), sometimes (3 to 10 times), or often (more than 10 times) in the past four weeks.

The operational definitions used in the current study were as follows:

Food-secure: When the members 'rarely', in the past four weeks, worried about not having enough food and had replied 'no' to question number 2 to 9 (Table 2)

Mildly food-insecure: The members of the household worried about not having enough food sometimes or often, and/or were unable to eat preferred foods, and/or ate a more monotonous diet than desired, and/or ate some foods considered undesirable but only rarely.

Moderately food-insecure: The household member sacrificed quality more frequently by eating a monotonous diet or undesirable foods sometimes or often, and/or had started to cut back on quantity by reducing the size of meals or number of meals, rarely or sometimes.

Severely food-insecure: The individuals in the household had to cut back on meal-size or number

of meals often, and/or experienced any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating)

Data analysis: Data was entered in Microsoft excel and subsequently transferred to SPSS version 22 for statistical analysis. Descriptive statistics like percentages was used for socio-demographic characteristics, food insecurity, and malnutrition. Chi square test and Logistic regression analysis was performed to determine the factors associated with food insecurity. The regression analysis was performed considering outcome in dichotomous form, i.e. food-secure and food-insecure. The food-insecure group included mild, moderate and severe food insecurity. Initially, each independent variable was regressed against each dependent variable. Those variables with a minimum p value of 0.25 were considered for multiple logistic regression analyses. All the predictor variables that were significant in bi-variate analysis were entered in the model and regressed using stepwise backward elimination. A p value of <0.05 was finally considered to be statistically significant in the multivariate model. Similarly association was calculated for food insecurity and malnutrition (underweight, stunting and wasting) followed by logistic regression.

RESULTS

Socio-demographic profile: In the present study, majority of study subjects were in the age group of 20-29 years (87.0%). 133 (66.5%) were Muslim by religion, 170 (85.0%) were hailing from nuclear family. Family size was <4 in majority of study subjects (84.5%). 106 (53.0%) were residing in their own houses, 92 (46.0%) were educated till high school, 167 (8305%) were unemployed and 107 (53.5%) had income of 5000-10000 rupees per month.

Prevalence of food insecurity: In the present study, 133 (66.5%) were food secure and 87 (33.5%) were food insecure. (Table 1) Table 2 shows the food insecurity based on HFIAS scale.

Determinants of food insecurity: There was a statistically significant association between food insecurity and age of study subjects, religion, type of house and education of mother. The variables significantly associated with food insecurity have been shown in Table 3.

Logistic regression showed that compared to mothers aged >30years, mothers aged <20 years (OR 14.358, CI 1.291-159.644, p<0.05) had higher chances of being food insecure. Mothers with rented house had higher chances of being food insecure compare to mothers with own house (OR 3.282, CI 1.728-6.235 p<0.05).

Prevalence of malnutrition among children of study subjects: In the present study, WHO standard growth charts were used to plot weight for age, height for age and weight for height to detect malnutrition which showed the results.

Table 1: prevalence of different levels of food insecurity among households

Household food insecurity level	Households (%)
Food-secure	133 (66.5)
Mildly food-insecure	3 (1.5)
Moderately food-insecure	55 (27.5)
Severely food-insecure	9 (4.5)

Table 2: Prevalence of food insecurity based on Household Food Insecurity Access Scale

Question	Never	Rarely	Some-times	Often
In the past four weeks, did you worry that your household would not have enough food?	25 (12.5)*	114 (57.0)*	57 (28.5) †	4 (2.0) †
In the past four weeks, were you or any household members not able to eat the kinds of foods you/ they preferred because of a lack of resources?	22 (11.0) †	89 (44.5) †	87 (43.5) †	2 (1.0) †
In the past four weeks, did you or any household members have to eat a limited variety of foods due to a lack of resources?	20 (10.0) †	82 (41.0) †	95 (47.5) ‡	3 (1.5) ‡
In the past four weeks, did you or any household members have to eat some foods that you/ they really did not want to eat because of a lack of resources to obtain other types of food?	21 (10.5) †	81 (40.5)†	90 (45.0) ‡	8 (4.0) ‡
In the past four weeks, did you or any household members have to eat a smaller meal than you/ they felt you/ they needed because there was not enough food?	24 (12.0)‡	88 (44.0)‡	80 (40.0) ‡	8 (4.0) ¶
In the past four weeks, did you or any household members have to eat fewer meals in a day because there was not enough food?	31 (15.5)‡	104 (52.0)‡	58 (29.0)‡	7 (3.5)¶
In the past four weeks, was there ever no food of any kind to eat in your household because of lack of resources to get food?	120 (60.0)	60 (30.0) ¶	17 (8.5) ¶	3 (1.5)¶
In the past four weeks, did you or any household members go to sleep at night hungry because there was not enough food?	106 (53.0)¶	70 (35.0)¶	22 (11.0)¶	2 (1.0)¶
In the past four weeks, did you or any household members go a whole day and night without eating anything because there was not enough food?	160 (80.0)¶	32 (16.0)¶	8 (4.0)¶	0¶

*Food-secure; †Mildly food-insecure; ‡Moderately food-insecure; ¶Severely food-insecure

Table 3: Association between socio-demographic characteristics & food insecurity

Determinant	Food-secure	Food insecure	p-value	OR	CI	p-value
Age (years)						
<20	5 (41.67)	7 (58.33)	<0.05*	14.358	1.291-159.644	<0.05
20-29	115 (66.09)	59 (33.91)		5.726	0.703-46.607	0.103
>30	13 (92.86)	1 (7.14)		1		
Religion						
Hindu	51 (79.7)	13 (20.3)	<0.05*	0.48	0.23-1.003	0.051
Muslim & others	82 (60.3)	54 (39.7)		1		
Type of family						
Nuclear	109 (64.1)	61 (35.9)	0.089	-		
Joint & 3-generation	24 (80.00)	6 (20.00)		-		
Family size						
<4	108 (63.91)	61 (36.09)	0.069	1.381	0.463-4.123	0.563
4 & more	25 (80.6)	6 (19.4)		0.668	0.056-7.996	0.75
Type of house						
Rented	84 (79.25)	22 (20.75)	<0.05*	3.282	1.728-6.235	<0.05*
Own	49 (52.13)	45 (47.87)		1		
Education						
Literate	-	6 (100.00)	<0.05*	-		
Illiterate	35 (50.00)	35 (50.00)		-		
Occupation						
Employed	21 (63.6)	12 (36.4)	0.703	0.991	0.396-2.483	0.98
Unemployed	112 (67.07)	55 (32.93)		1		

*statistically significant

Table 4: Relationship between food insecurity and malnutrition

Parameter	Food-security		Chi square	P value	OR	CI	p-value
	Food insecure	Food secure					
Under weight	43 (64.2)	37 (27.8)	24.543	<0.05*	4.649	2.483-8.73	<0.05*
Normal	24 (35.8)	96 (72.2)			1		
Stunting	33 (49.3)	56 (42.1)	0.922	0.338	1.335	0.74-2.407	0.338
Normal	34 (50.7)	77 (57.9)			1		
Wasting	36 (53.7)	32 (24.1)	17.48	<0.05*	3.665	1.965-6.837	<0.05*
Normal	31 (46.3)	101 (75.9)			1		

*statistically significant

According to weight for age, 120 (60.0%) were normal, 63 (31.5%) were under-weight and 17 (8.5%) were severely under-weight. According to height for age, 111 (55.5%) were normal, 74 (37.0%) were stunted and 15 (7.5%) were severely stunted. According to weight for height, 132 (66.0%) were normal, 40 (20.0%) were wasted and 28 (14.0%) were severely wasted. (Table 4)

Relationship between food insecurity and malnutrition: There was a significant association between food insecurity, under-weight and wasting. Children of mothers who were food-insecure had more chances of underweight compared to children of mothers who were food-secure (OR 4.64, CI 2.48-8.73, p<0.05). Similarly, children of mothers who were food-insecure had more chances of stunting (OR 1.33, CI 0.74-2.40, p=0.33) and wasting (OR 3.66, CI 1.96-6.83, p<0.05) compared to children of mothers who were food-secure. (Table 4)

DISCUSSION

The problem of hunger is complex. Hunger is usually understood to refer to the distress associated with lack of sufficient calories. Despite years of progress, food security is still under threat. Although it has been said that "hunger does not discriminate," it does. It emerges the strongest and most persistently among populations that are already vulnerable and disadvantaged. This shows the hunger and poverty do coexist, resulting in dreaded consequences in terms of health. Children are majorly affected as they are vulnerable and can result in changes in them that are irreversible. Food insecurity still persists, in spite of the attempts by our Government to curb it. Various programs, linkages with non-governmental organizations, health education, and proper monitored food supplementation are all the need of the hour.

In the present study, majority of study subjects were in the age group of 20-29 years (87.0%). 133 (66.5%) were Muslim by religion, 170 (85.0%) were hailing from nuclear family. Family size was <4 in majority of study subjects (84.5%). 106 (53.0%) were residing in their own houses, 92 (46.0%) were educated till high school, 167 (8305%) were unemployed and 107 (53.5%) had income of 5000-10000

rupees per month. In a study conducted in North India, 39.6% were in the age group 29-39 years. Majority were Hindus (94.8%). Majority of the households had a nuclear family setting (61.6%). Around 44.4% of the households had 5-7 members in their family. Majority had own house. 30.8% mothers had studied till secondary school. Around one-fourth (27.2%) of the households had a monthly income of less than Rs. 5,000.[9] In another study conducted in rural Rajasthan, 99.8% were Hindu, 90.8 % belonged to a tribe.[13] A study in Nepal showed 36.5% of mothers belonged to 35–49 years. 47.4% were illiterates. 56.6% were working women. 91.1 belonged to rural areas.[14] In a study conducted in North Karnataka, 56.6% of study subjects were in the age group of 20-24 years, 84.3% were Hindu by religion, 43% educated till secondary school, 64.8% belonged to lower socioeconomic status.[15] In another study conducted in Mangalore, 57.1% were Muslim by religion, 31.4% belonged to class IV socioeconomic status.[16] Another study in Kerala showed that, 64% belonged to nuclear family, 93.3% were Hindu by religion, 73.3% were from upper lower socioeconomic status.[17]

In our study 66.5% were food-insecure, 1.5% were mildly food-insecure, 27.5% were moderately food-insecure and 4.5% were severely food-insecure. The study conducted in Urban Resettlement Colony in North India showed that a total of 77.2% households were food-insecure, with 49.2% households being mildly food-insecure, 18.8% of the households being moderately food-insecure, and 9.2% of the households being severely food-insecure.[9] Another study in Allahabad showed that 26.6% mildly insecure worry about food while 63.3% households mildly insecure regarding eating their preferred food. 60% households were moderately insecure regarding variety of food and 33.3% moderately insecure regarding consumption of undesirable food due to unavailability. 36.6% households feel severely insecure regarding consumption of less amount of food and fewer meals in a day. Selected households were severely insecure regarding no availability of food in the household (31.6%) followed by go to sleep hungry (40%) and go a whole day and night without eating (31.6%).[18] Another study in Mangalore showed that 51.4% were food secure, 20% were food insecure with no hunger and 28.6% were food insecure with moderate hunger.[16] In another study on food insecurity, 47.7% were food secure, 39.5% were mildly insecure and 12.8% were moderate-severely insecure.[19] Another study in Kerala showed that, 42.7% were food secure, 26.7% were food insecure without hunger, 27.3% were food insecure with moderate hunger and 3.3% were food insecure with severe hunger.[17] In another study in Karnataka,

72.6% were food secure, 10.9%, 11.9% and 4.6% had mild, moderate and severe food insecurity.[15]

In the present study, there was a statistically significant association between food insecurity and age of study subjects, religion, type of house and education of mother. Logistic regression showed that compared to mothers aged >30years, mothers aged <20 years (OR 14.358, CI 1.291-159.644, p<0.05) had higher chances of being food insecure. Mothers with rented house had higher chances of being food insecure compare to mothers with own house (OR 3.282, CI 1.728-6.235 p<0.05). In another study in Kerala, household debt and socioeconomic status showed significant association with food insecurity. Subjects with household debt had higher chance of food security than subjects with no debts (OR 3.84, CI 1.90-7.73, p<0.05) and subjects from higher socioeconomic status had higher chance of food security than subjects from lower socioeconomic status (OR 3.25, CI 1.29-8.16, p<0.05).[17] In another study in North India, females having primary or middle school education (OR 0.30, 95% CI 0.10-0.90; p≤0.03) and secondary or senior secondary school education (OR 0.37, 95% CI 0.15-0.92; p≤0.03) had less chances of being food-insecure compared to those households where the respondent was non-literate. Also, compared to households with per-capita monthly income between Rs. 1,000 and 2,000, those with per-capita monthly income of less than or equal to Rs. 1,000 had higher chances of being food-insecure (OR 4.77, 95% CI 1.66- 13.65; p≤0.004). With a unit increase in the number of working members in a household, the chances of being food-insecure decreased by 0.32 (p=0.04).[9]

In our study, there was a statistically significant association between food insecurity and wasting and under-nutrition (<0.05). There was no association between food insecurity and stunting. Another study on food insecurity and malnutrition, showed that in severely food-insecure households, 51% of children were stunted and 40% were underweight. No association was found between household food insecurity and wasting among children.[20]

In the present study, children of mothers who were food insecure had more chances of underweight compared to children of mothers who were food secure (OR 4.64, CI2.48-8.73, p<0.05). Similarly, children of mothers who were food insecure had more chances of stunting (OR 1.33, CI 0.74-2.40, p=0.33) and wasting (OR 3.66, CI 1.96-6.83, p<0.05) compared to children of mothers who were food secure. Another study in Nepal showed that food insecurity was significantly associated with both stunting and underweight. Children from severely food-insecure households were 1.50 (95% CI, 1.15 to 1.97) times as likely as children from food-secure households to be stunted. Children from moderate-

ly food-insecure households were 1.40 (95% CI, 1.08 to 1.80) times as likely as children from food secure households to be stunted. Likewise, children from severely food-insecure households were significantly more likely to be underweight than children from food-secure households (odds ratio, 1.40; 95% CI, 1.05 to 1.85).[14]

Limitation of the study: In the present study, HFAIS scale measured food security at the household level. But there are other factors such as gender discrimination in food allocation, quality of the food consumed, food fads, and preferences etc which had to be analyzed to study the dynamics of intra-familial food distribution.

CONCLUSION

In conclusion, the present study revealed high level of food insecurity (66.5%) at household level in the selected area. More such studies are required to generate enough evidence to influence policy so that measures are taken against this food insecurity problem in the already marginalized section of the urban society.

RECOMMENDATION

Regular monitoring and analysis of food in security and malnutrition of children and women are needs to be done at national, state & regional level. Government needs to supplement the provision of food security by strengthening the public food distribution system, promoting universal education, ensuring ample employment opportunities, improving the standard of living. Inter-sectoral coordination, involvement of non-governmental organizations, and ensuring women's empowerment will be the best strategies for long-term sustainability.

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