Research Article

Dietary diversity among women of reproductive age: New evidence from an observational study in a slum of Kolkata

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Received: May 16, 2017; **Accepted:** June 14, 2017

ABSTRACT

Background: Despite significant improvement in the intake of calorie, diet quality continues to remain poor among individuals. Women of reproductive age (WRA) are nutritionally more vulnerable because of pregnancy, lactation, and menstruation requiring nutrient-dense quality food. Food situation is worse in developing countries. Dietary diversity is an indicator of micronutrient adequacy. **Objectives:** This study was aimed at determining the "proportion of WRA" attaining "minimum dietary diversity (MDD)" and exploring the predictors associated with it. **Materials and Methods:** An observational, community-based, cross-sectional study was conducted in a slum of Kolkata. A total of 182 women took part in the study who were selected by simple random sampling. Face to face interviews were conducted using structured schedule that included questions on sociodemographic as well as dietary diversity. Body mass index was calculated for each participant. Data were summarized with descriptive statistics and adjusted with binary logistic regression analysis in Statistical Package for Social Sciences (version 16). **Results:** "Proportion of WRA" attaining "MDD" was found to be 46.2% only. On multivariable logistic regression, it was observed that there was significant association between dietary diversity and small family size (less number of children) adjusted odds ratio (AOR [confidence interval (CI)]): 2.201 (1.046-4.635), upper socioeconomic status AOR (CI): 2.933 (1.473-5.841), higher educational level AOR (CI): 2.835 (1.444-5.567), and occupation other than homemaker AOR (CI): 2.378 (1.138-4.969). **Conclusion:** Less than half of WRA achieved "MDD." Based on the findings, information, education, and communication activities are recommended with an emphasis on locally available, low-cost nutritious diet.

KEY WORDS: Minimum Dietary Diversity; Community Based Study; Women of Reproductive Age; Slum of Kolkata

INTRODUCTION

In less-resourced countries, food security policies generally focus on calorie intake and less emphasis is given on food quality. Therefore, micronutrient deficiencies continue to prevail in developing countries.[1] In resource-poor environment across the globe, low-quality monotonous diets are the norm. Diet quality becomes even inferior when cereal or tuber-based staple foods dominate, and the diet lacks fruits, vegetables, and animal-source food, thereby making them prone to micronutrient deficiencies.[2] Consequently, a gap develops between requirement and intake.

Access this article online	
Website: http://www.ijmsph.com	**Quick** Response code
DOI: 10.5455/ijmsph.2017.0513114062017	

Dietary diversity is an indirect measure of diet quality which reflects the three pillars of food security - availability, accessibility, utilization.[3] As such, dietary diversity represents a "proxy indicator" for micronutrient adequacy of the diet of an individual.[4]

"Women of reproductive age (WRA)" are nutritionally vulnerable owing to the physiological demands of pregnancy as well as lactation.[5] Iron requirement is higher even in

non-pregnant and non-lactating (NPNL) women. These vulnerabilities and gaps in diet quality for WRA are more frequent in low- and middle-income countries. Promotion of diverse diet is one of the many approaches to improve micronutrient nutrition for WRA.

Three micronutrient deficiency diseases are of highest priority in our country. These are nutritional anemia, xerophthalmia, and endemic goiter which may represent only the tip of the iceberg.[6] Nambiar et al. in their study found that anemia and vitamin A deficiency are major public health problems among the tribal adolescents.[7]

Although the paradigm shift from food security to nutrition security has been adopted in India through dietary diversification, micronutrient adequacy is not ensured in Indian diet, especially among women residing in slums. Dual curse of poverty and gender bias, coupled with incomplete knowledge about the diet quality are major obstacles in ensuring minimum dietary diversity among women (MDD-W) in this area.

As there is limited information specific of dietary diversity among women residing in slums, our current study was aimed at exploring the "proportion of WRA" attaining "MDD" and factors influencing it in a slum of Kolkata.

Objectives

1. To determine the proportion of WRA attaining "MDD"
2. To explore the predictors affecting "MDD" among WRA.

MATERIALS AND METHODS

Study Design and Setting

An observational, cross-sectional, community-based study was conducted from June to September of 2016 in a slum of Kolkata. It is located within the field practice area of an urban health center which is associated with a postgraduate training institute of preventive and social medicine. It provides research- and community-based training program as well as primary health care services to the community, catering to a population of about 36,000 people within its service area of approximately 3.9 km^2.

Study Participants

In our current study, we enrolled WRA who were NPNL during the study period. A complete list of WRA was obtained from Urban Health Unit and sample of WRA was selected by simple random sampling.

Working Definitions

Dietary diversity was measured by counting number of food groups consumed by WRA as adapted from "MDD-W: A guide for measurement."[5] "Minimum dietary diversity for women or MDD-W is a dichotomous indicator of whether or not women of 15-49 years of age have consumed at least 5 out of 10 defined food groups the previous day or night. The proportion of these women who achieve this minimum in a population can be used as a proxy indicator for higher micronutrient adequacy, an important dimension of diet quality."[5]

The 10 specified food groups were: (1) Starchy staple: Cereals (rice, wheat), roots, tubers and plantains, (2) pulses and legumes (lentils, beans, peas), (3) oilseeds and nuts, (4) milk product, (5) fish, meat, poultry, (6) egg, (7) fruits and vegetables rich in vitamin A (β-carotene), (8) green leafy vegetables, (9) other fruits, (10) other vegetables.

Intake of a minimum of 15 g of any specified food was necessary to be considered for counting and the reference period was the preceding 24 h. Food consumed outside home was also considered.

If a woman consumed five or more of the above-mentioned food groups, she was said to have attained "MDD."

Sample Size Calculation

A pilot study was conducted involving 30 study participants and "proportion of WRA" attaining "MDD" was found to be 35.7%. Considering the prevalence of MDD of 35.7% among women, the estimated sample size was calculated as follows:

$n = Z^2 P Q/L^2 = 172$

$Z = 1.96$; $P = 35.7\%$; $Q = 1-P = 64.3\%$; L = Allowable error (20% of P) = 7.14

Considering 5% of nonresponse rate final sample size calculated was 181.

In the current study, 182 women were enrolled who fulfilled the inclusion criteria and gave informed written consent.

Study Procedure

An interviewer-administered structured schedule was developed that included sociodemographic characteristics and dietary diversity questionnaire consisting of open recall as well as list based questions. Open recall method involved structured probing, leading to complete recall of food. In case of the latter, a number of food items were read out to the participant. The participant would have to respond "yes" for each food item she consumed during the past 24 h.

The purpose of the study was explained to the study participants. After obtaining informed consent, face to face interviews were conducted at the participants' home ensuring confidentiality.

Body mass index (BMI) was calculated for each study participant.

Ethical Approval

Permission was obtained from the Department of Preventive and Social Medicine of a Postgraduate Medical Institute, under whose service jurisdiction the study area was located. As the study was an observational one and no form of intervention was given, a formal ethical clearance was not sought. However, written informed consent was obtained from each participant.

Statistics

Statistical Package for Social Sciences version 16 was used for analysis of data. Measures of central tendency and dispersion were used to summarize numerical data and proportions to summarize categorical variables. Association between MDD and predictor variables was estimated in univariate and multivariable logistic regression. Odds ratio with 95% confidence interval was computed. Explanatory variables found to be statistically significant in univariate logistic regression were entered into multivariable logistic regression for adjustment. A $P \leq 0.05$ was considered statistically significant.

RESULTS

The mean age of study participants was 33.1 years (standard deviation = 9.08), and it ranged from 15 to 49 years. As shown in Table 1, the majority (80.2%) belonged to Hindu religion, and 33.5% belonged to SC, ST, and OBC category. Nearly, 49.5% of the participants had low educational level, either illiterate or below middle level. Nearly, 36.8% belonged to low socioeconomic (SE) class (BG Prasad Class IV and V).

Only 84 participants, of 182 consumed five or more of the 10 specified food groups the previous day. Therefore, "proportion of WRA" attaining "MDD" was 46.2% (Table 1).

Association between MDD-W, i.e., "proportion of WRA" attaining "MDD," the outcome variable, and different predictor variables, was examined employing univariate logistic regression. From Table 1, it was evident that the participants' higher level of education, occupation other than a homemaker, less number of children, and higher social classes were associated with dietary diversity in univariate logistic regression analysis. The association was statistically significant.

All these four explanatory variables found to be associated with dietary diversity (MDD-W) were then entered into multivariable logistic regression for adjustment (Table 2).

From Table 2, it was obvious that in the multivariable logistic regression analysis, all the four explanatory variables retained their significance even after adjustment. Value of Nagelkerke R^2 being 0.297 with non-significant Hosmer–Lemeshow test supported good fit of the model. Therefore, all the four variables were associated with the outcome variable, i.e., MDD and the association was found to be statistically significant. Women who were either students or working for pay, had 2.378 times higher odds of attaining MDD as compared to those who were homemakers, while those with less number of children were 2.2 times more likely to reach MDD than those with more than two children. Women who belonged to higher SE class had 2.93 times higher odds of achieving MDD when compared to those who belonged to lower SE class. Women who had higher educational level were 2.84 times more likely to attain MDD than those who were illiterate or having a lower level of education.

As shown in Table 3 nearly 48% of the participants had normal BMI, and 18.7% were overweight or obese. Proportions of WRA reaching MDD among them were 49% and 14%, respectively.

DISCUSSION

In our study, "proportion of WRA" attaining "MDD" was found to be 46.2% only. There was a significant association between dietary diversity and small family size (less number of children), upper SE status, higher educational level, and occupation other than a homemaker. Nearly, 48% of the participants had normal BMI, and 18.7% were overweight or obese. Proportions of WRA reaching MDD among them were 49% and 14%, respectively.

In the current study, "proportion of WRA" attaining "MDD" was found to be 46.2%. This is consistent with the findings of Shashikanta et al. where they have shown it to be more than 50%.[8] In our study, dietary diversity was associated with higher SE status which is consistent with the findings of the study conducted by Parapputharu S. et al.[3] Rebecca K. Campbell et al. in their study conducted in Nepal found that women of lower socioeconomic status consumed less pulses, legumes and nuts, milk and milk products, tubers, fruits and vegetables, and miscellaneous snacks than women of higher means.[9] Suryanarayana R et al. in their study found that anemia was predominantly observed among below poverty line families (59.4%) compared with above poverty line families (5.4%). This finding is consistent with our finding.[10] Strong statistical association was also observed between dietary diversity and level of education, a number of children and occupation. Women who were either students or working for money had 2.378 times higher odds of attaining "MDD" as compared to those who were homemakers.

Table 1: Univariate logistic regression between MDD-W and different predictor variables (*n*=182)

Variables	Participants *n*=182 (%)	MDD-W *n*=84 (%)	OR (95% CI)	*P* value
Age in years				
<33	85 (46.7)	42 (49.4)	1	0.409
≥33	97 (53.3)	42 (43.3)	1.279 (0.713-2.296)	
Religion				
Hindu	146 (80.22)	66 (45.2)	1	
Non-Hindu	36 (19.78)	18 (50)	1.212 (0.584-2.516)	0.606
Caste				
SC, ST, OBC	61 (33.52)	24 (39.3)	1	0.192
General	121 (66.48)	60 (49.58)	1.516 (0.811-2.834)	
Education				
Illiterate, up to primary	90 (49.45)	28 (31.1)	1	
Middle and above	92 (50.55)	56 (60.86)	3.444 (1.868-6.352)	0.001*
Occupation				
Homemaker	112 (61.54)	37 (33.04)	1	
Students, works for pay	70 (38.46)	47 (67.14)	4.142 (2.194-7.820)	0.000
SE class				
Class I, II, III	115 (63.2)	40 (34.78)	1	
Class IV, V	67 (36.8)	44 (65.67)	3.587 (1.903-6.760)	0.000*
Type of family				
Nuclear	107 (58.79)	48 (44.85)	1	
Joint	75 (41.21)	36 (48)	1.135 (0.628-2.051)	0.676
Marital status				
Currently married	106 (58.24)	48 (45.28)	1	
Others	76 (41.76)	36 (47.37)	0.921 (0.509-1.660)	0.781
Number of children				
More than two	70 (38.46)	20 (28.57)	1	
Two or less	112 (61.54)	64 (57.14)	3.333 (1.759-6.318)	0.000*

**P*≤0.05 was considered statistically significant. MDD-W: Minimum dietary diversity-women, OR: Odds ratio, CI: Confidence interval, SE: Socioeconomic

Table 2: Multivariable logistic regression between MDD-W use and four explanatory variables (*n*=159)

Variables	OR (95% CI)	AOR (95% CI)	*P* value*
Occupation			
Homemaker	1	1	0.021
Students, works for pay	4.142 (2.194-7.820)	2.378 (1.138-4.969)	
SE class			
Class IV, V	1	1	0.002
Class I, II, III	3.587 (1.903-6.760)	2.933 (1.473-5.841)	
Education			
Illiterate, primary	1	1	0.002
Middle and above	3.444 (1.868-6.352)	2.835 (1.444-5.567)	
Number of children			
More than two	1	1	0.038
Two or less	3.333 (1.759-6.318)	2.201 (1.046-4.635)	

**P*≤0.05 was considered statistically significant. OR: Odds ratio, CI: Confidence interval, SE: Socioeconomic, AOR: Adjusted odds ratio, MDD-W: Minimum dietary diversity-women

Table 3: Distribution of study population according to their BMI (*n*=182)

BMI	WRA (*n*=182) *n* (%)	MDD-W (*n*=84, 46.2%) *n* (%)
<18.5	61 (33.5)	21 (34.4)
18.5-24.9	87 (47.8)	49 (56.3)
>25	34 (18.7)	14 (41.2)

BMI: Body mass index, WRA: Women of reproductive age, MDD-W: Minimum dietary diversity-women

WRA having two or less number of children were 2.2 times more likely to achieve "MDD" than those with more than two children. Women who had higher level of education were 2.84 times more likely to attain "MDD" than those who were illiterate or having lower level of education. Dietary diversity also reflects micronutrient adequacy. Bhandari et al. in their study, on dietary diversity among WRA found that "women having formal education were 1.4 times more likely to be anemic than women having informal education."[11] This finding, however, is not consistent with that of our study. In our study, normal range of BMI was found to be 48% among WRA. This finding was consistent with the findings of Shashikanta et al.[8] Nearly, 18.7% WRA were overweight or obese, but that did not ensure their micronutrient adequacy. According to NFHS-4 report (2015-16), overweight and obesity affect approximately 30.6% of women of child-bearing age (15-49 years) in urban area of West Bengal.[12] This can be explained by the fact that our study setting was a slum area where inhabitants were urban poor. In our current study, it was evident that dietary diversity was not always ensured among individuals whose BMI was normal or more. As 48% of the participants had normal BMI and 18.7% were overweight or obese, proportions of women achieving "MDD" among them were 49% and 14%, respectively. Hence, diet quality was not good enough for those WRA although calorie intake was normal or higher.

Limitation of the Study

Socioeconomic factors encountered in this slum make it difficult to generalize this study to the urban population of Kolkata at large. Information obtained from the study relied on the participants' self-report who might underreport or overreport. There may be a possibility of recall bias.

Strength of the Study

To the best of our knowledge, ours is one of the few studies exploring "the proportion of WRA" attaining "MDD" in the community which has efficiently examined the predictors associated with it.

It was a community-based study bringing out the true picture of diet quality in a marginalized population.

CONCLUSION

The study revealed more than half of WRA failed to achieve "MDD." The finding of the study will help in designing tailored intervention program of nutrition. Emphasis should be given on health education about locally available, low-cost nutrient-dense food consumption. Overall improvement of SE condition and level of education of the residents of the area will go a long way to solve this public health problem of hidden hunger.

ACKNOWLEDGMENTS

We acknowledge the Officer-in-Charge, UHUTC, All India Institute of Hygiene and Public Health, Kolkata for giving us permission to conduct the research work. As we adapted the dietary diversity indicator from "MDD among WRA," we acknowledge Food and Agriculture Organization of the United Nations.

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How to cite this article: Pal M, Paul B, Dasgupta A. Dietary diversity among women of reproductive age: New evidence from an observational study in a slum of Kolkata. Int J Med Sci Public Health 2017;6(8):1302-1307.

Source of Support: Nil, **Conflict of Interest:** None declared.