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FOOD VARIETY, DIETARY DIVERSITY AND PERCEIVED HUNGER AMONG LACTATING WOMEN (0-6 MONTHS POSTPARTUM) IN A LOW SOCIO-ECONOMIC AREA IN NAIROBI, KENYA

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ABSTRACT

Breastfeeding has profound benefits for the child and has always been the gold standard for infant feeding. It is also an integral part in the physiologic completion of the reproductive cycle of mammals, including humans and the most energetically demanding phase of human reproduction. Therefore, it is important to determine the nutritional status of lactating women and guide them to optimal health since depleting maternal nutrient stores during lactation poses a risk of malnutrition to the mother. This study was conducted among lactating women to assess domestic hunger, food variety and dietary diversity in order to obtain information that can be used in nutrition intervention programs for optimising breast feeding. It was a descriptive cross-sectional survey carried out at Mbagathi District Hospital which is located at the edge of Kibera slum area (Nairobi). Convenience sampling was used in selecting 120 lactating women who volunteered and consented. The hunger scale was used for assessing domestic hunger and a 24 – hr recall (NFCS, 1999) was analysed for food variety and dietary diversity. Perceived hunger corresponded with narrow food variety and dietary diversity. The women had a mean Food Variety Score of 6.6 ($\pm$ 2.0) and Dietary Diversity Score of 4.3 ($\pm$ 1.0). The mean adequacy ratio (excluding niacin) was 0.74. The lowest median nutrient adequacy ratio (NAR) for calcium was (0.41) and folic acid (0.59). The NAR for energy was 0.62. The highest frequency of consumption (100%) was from cereals, tubers/roots, other vegetables and oils/fats. Vitamin A rich vegetables/fruits (6.6%) and dairy products (1.7%) had the lowest frequency of consumption. Overall, 35.8% of households were food secure while 64.2% were either hungry (5 or more positive responses) or at risk of hunger (1-4 positive responses) (36.7% and 27.5% respectively).There seems to be a need for well designed nutrition intervention programs focusing on nutrient intake from culturally acceptable and affordable foods to increase dietary diversity of lactating women in this low socio-economic area, which will eventually improve their nutritional status.

Key words: lactation, dietary diversity, food variety

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INTRODUCTION

Good nutritional intake may support the stamina, patience and self-confidence that nursing an infant demands. Helping breastfeeding women achieve appropriate nutritional status is important and it requires consideration of both energy and nutrient needs [1].

Nutrient requirements are considerably more elevated during lactation than any other stage of a woman's reproductive life [2]. Therefore, women of reproductive age need to be prepared for lactation since they have special needs which are primarily related to their reproductive role and besides the lactation; they are also responsible for rearing other children, working in the home and outside the home to earn a living [3]. The preparation involves education. Providing information about bodily functions, health risks and how to avoid them is not effective in bringing about specific behavioural changes to maintain optimal health. The key is to show that modification of the diet is desirable and will have positive outcomes [4]. Social support from husbands, mothers, sisters, healthcare providers, communities, employers and policy makers will provide additional support towards success [5]. This study assesses the association between food variety/dietary diversity and domestic hunger among lactating women living in a low socio-economic area in Nairobi.

STUDY AREA AND SUBJECTS

Study area

This study was done at a maternal-child health clinic in Mbagathi District Hospital, located at the edge of Kibera slums, and other neighbourhood centres like Langata and Nairobi West estate in Nairobi west district. Mbagathi District Hospital is the only district hospital in Nairobi and it is adjacent to two large Hospitals; Kenyatta National Hospital which is the main hospital in the country and main referral centre for East African countries and the War Memorial Hospital which caters mainly for the soldiers, their families and other government officials.

Kibera is one of the largest slums in the world [6] and it is estimated that up to one million people live in Kibera [6]. The estimated population density is 2000/hectare and it represents almost all of Kenya's 40 tribes.There are 12 villages in Kibera. As a result of the unofficial status of the settlement, there are few government or social services available to the residents of Kibera. The lack of services, combined with overcrowding, has resulted in negative health implications for the residents of Kibera [6].

Subjects

One hundred and twenty lactating women who volunteered and consented were interviewed. The study participants were selected in the order that they visited the Maternal-Child Health Clinic to bring the children for immunisation. Convenience sampling was used as sampling technique using the criteria for participation as; the lactating women were between 20 - 40 years of age, the women were living in the low

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socio - economic community, the age of child being breastfed was between 0-6 months postpartum and the women reported breastfeeding their infant at least three times a day.

The nature of the study was fully explained to each of them when they brought the child into nutrition room for growth monitoring and written consent was obtained.

MATERIALS AND METHODS

Materials

The Radimer hunger scale questionnaire (Table 2), [7] the Quantitative Food Frequency Questionnaire (QFFQ*)* and the 24-hr recall methods (adapted with permission from the South African Food consumption Survey, 1999) [8] were used to collect data which were analysed for nutrient adequacy, domestic hunger, food variety and dietary diversity.

Methods

Dietary assessment

The researcher collected the data by means of interviewer-administered questionnaires. The researcher asked the respondents to state the foods and the amounts they had consumed in the past 24 hours and the information was recorded on the 24 hr recall sheet. Each of the respondents was also asked to give the amount and frequency she consumed each of the food items in the QFFQ which was recorded as daily, weekly or monthly consumption. During the recall, the respondents were asked whether the food consumption was as usual or whether there was something peculiar about it, for example the presence of visitors, eating away from home or attending a function. In order to obtain a participant's portion sizes for their food intake, food models and common household utensils used in the community were used to help with the recording of amounts. Ordinary household measures were converted into grams and millilitres.

Data analysis

The Food Variety Score (FVS) was defined as the number of different food items that were eaten during the 24-hr recall period in the study. The method was adapted from the studies of Krebs-Smith [9], Drewnowski [10] and Hatloy [11]. The total number of foods included in the FVS was 45 food items independently of the frequency and quantity consumed. The Dietary Diversity Score (DDS) was defined as the number of food groups from which foods were consumed over a 24-hr period in the study. The diet was classified according to the nine food groups recommended by the FAO which included (1) cereals, roots and tubers; (2) vitamin-A-rich fruits and vegetables; (3) other fruit; (4) other vegetables; (5) legumes and nuts; (6) meat, poultry and fish; (7) fats and oils; (8) dairy; and (9) eggs [3]. Other remaining items such as tea, sugar and sweets were not used in the DDS and FVS calculations.

Responses to the questions on the radimer hunger scale were categorised into three: a score of five affirmative/positive (yes) responses or more out of a maximum possible

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of eight indicated a food shortage problem affecting everyone in the household. These families would be considered as "hungry." A score of one to four affirmative/positive (yes) responses indicated that the family was "at risk of hunger", a negative response (No) was assumed to mean a food secure household. Questions were also included to determine the state of the individual level of food security as well as the state of child hunger in the household. Further analysis was done on the hunger scale responses to include frequency of occurrence in the past thirty days if the question on the hunger scale gave a positive response.

RESULTS

Description of the sample

In the study group, a majority (89%) of the women were married and had received upper primary education and above (95%). However, over half (52%) of the women were housewives. While employment status might not be the only factor that influenced the hunger situation in the study group, it served as a pointer to the food uncertainty in the household. Table 1 presents a summary of the characteristics of the women in the sample.

Foods consumed

All the lactating women had eaten some kind of cereal, mainly maize, wheat, millet and rice and all the women used cooking oil/fat in their dishes (Table 3). The other food items that were eaten by over half of the women were kales (sukumawiki) and beans. In total 47% of the women consumed at least one item from the legumes nuts and seeds group, 40% of the women consumed at least one item from the meat, poultry and fish group and 35% of the women consumed at least an orange, banana or avocado, with 13% of the women consuming avocado (*which was in season*) during the study period. Eighteen percent (18 %) of the women consumed at least one egg during the 24 hr period. Vitamin A rich vegetables/fruits and dairy products were the least consumed foods during the 24 hr period by the women with 7% and 2%, respectively.

Nutrient Adequacy

To estimate the nutrient adequacy of the diet, a Nutrient Adequacy Ratio (NAR) was calculated for the nine nutrients (Table 4) and regression analysis was done between the Mean Adequacy Ratio (MAR), the FVS and the DDS (Table 5). The data used were obtained from the quantitative Food Frequency Questionnaire administered on the same sample of lactating women. The Nutrisurvey software program was used for nutrient analysis of the data since it contained the food database for Kenya. The NAR for a given nutrient is the ratio of a subject's intake to the current recommended allowance (in this case WHO reference standards were used) for the subject's sex and age category [12]. As an overall measure of the nutrient adequacy (MAR) was calculated as described by Madden *et al*. [13].

$$MAR = \frac{\sum NAR \text{ (each truncated at 1)}}{\text{Number of Nutrients}}$$

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An average of 10 NARs shown in Table 4 was used (excluding niacin which was unavailable from the software). The Nutrient Adequacy Ratio (NAR) was truncated at 1 so that a nutrient with a high NAR could not compensate for a nutrient with low NAR [13]. The proportion of women with a nutrient intake below the recommendations varied between the nutrients.

The results indicate that all the women had a sufficient intake of iron which had NAR above one. However, this would be so because the iron requirements during lactation decrease from 27mg/day in pregnancy to merely 9mg/day, compared to pre-pregnancy amounts of 18mg/day. This is because iron is not a significant component of breast milk and in addition breastfeeding usually suppresses menstruation for a few months minimizing iron losses. Overall, the mean MAR was 0.74. The ideal cut-off for the nutrient adequacy should be one (1), which would mean that all the nutrients were covered.

Food variety and dietary diversity

Forty five (45) different food items in total were eaten by the lactating women during the 24 hr period, corresponding to a theoretical maximum of the food variety score of 45. The mean FVS was 6.6 ($\pm$ 2.0) the minimum registration of FVS was 1 and the maximum 12 food items. The mean DDS was 4.3 ($\pm$ 1.0). For DDS the theoretical range was 1-9 while in the sample it varied from 2 to 6 food groups.

Perception of Hunger

The results were categorized according to household level or individual level of food security and child hunger. In this study, half of the households (n=61) reported that they sometimes ran out of food or relied on a limited number of food items to feed their children. Thirty nine households (33%) households recently ran out of food and 47 (39 %) households relied on a limited number of foods in the past month before the study. out of these 25 (21%) households ran out of money to buy food and 21 (18%) households relied on a limited number of foods for five days or more in that month. Individually, 48 (40%) women would sometimes cut the size of their meals or skip meals because there was not enough money for food. This happened to 41 (34%) women in the past month, with 29 (24%) women having had to eat less than they felt they should for five days or more in that month. When asked about how they fed their children, 33 (28%) women reported that their children ate less than they felt they should because they did not have enough money to buy food and 22 (18%) women reported that their children sometimes went to bed hungry. Out of these, children of 26 (22%) women were reported having eaten less than they should for five days or more in the previous month, with children of 18 (15%) women having gone to bed hungry for five days or more in that month. These results on perceived hunger are summarised on Table 2.

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DISCUSSION

Hunger can be viewed in two dimensions, first as the body's way of signalling that it is running short of food resulting in hunger pangs and second as a problem in household food supply, quality of diets, and feelings about the situation [14].

Among the millennium development goals set by the United Nations, halving the proportion of hungry people in the world is at the top of the list and is the key to development because when people are hungry all other development activities are thwarted [14]. Whereas good progress was made in reducing chronic hunger in the 1980s and the first half of the 1990s, hunger has been slowly but steadily rising for the past decade [15]. The more recent data from the Kenya Integrated Household Budget Survey showed significant regional disparities within the country with levels of food poverty reported at over 90% in some areas of the country. Kenya was found to be a low-income food-deficit country and in 2004 it was estimated that more than 10 million Kenyans were experiencing chronic hunger, with only a small decline in absolute numbers over the ten-year period ending in 2002 [16].

The Kenya nutrition profile further indicated that undernutrition in Kenya was associated with widespread micronutrient deficiencies and more long term strategies were needed to curb this trend [17].

This study illustrated the problem of food insecurity among the households of lactating women and also examined food variety and diversity scores. An average of seven food items were consumed by the lactating women during the 24 hr period out of a theoretical maximum of 45 food items, ranging from one food item to the maximum of 12 food items. The food items were consumed from an average of four food groups which varied from two to six food groups in the sample resulting in both the food items and food groups being less than half of the theoretical number. As indicated by Hatloy *et al*. [13] DDS and FVS cannot give a full picture of the adequacy of the nutrient intake but they are simple methods to estimate nutrient adequacy.

CONCLUSION

The observations made in this study revealed that the nutrient adequacy of the diets of the lactating women in this low socio-economic area was not optimal due to domestic hunger, limited variety and poor diversity of the diet. Dietary intake is a major determinant of nutritional status [18] although it cannot be used to classify a person or population as malnourished. It can identify an at risk state [19]. There needs to be an intervention to increase the dietary intake of the lactating mothers since breastfeeding is at its best when both the mother and infant benefit from the experience.

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Table 1: Demographic data of the lactating women in the Study group

(N=120) **Variable**	**Observations (n)**	**Mean**
Age (yrs)	120	24.34
BMI (Kg/m2)	120	23.9
Marital status	**Observations (n)**	**Percentage (%)**
Unmarried	10	8
Married	107	89
Separated	3	3
Education level	**Observations (n)**	**Percentage (%)**
Lower primary	7	6
Upper primary	49	41
High school	51	43
Tertiary	13	11
Occupation	**Observations (n)**	**Percentage (%)**
Housewife	62	52
Self-employed	20	17
Unskilled	13	11
Skilled	17	14
unemployed	8	7

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Table 2: The Radimer Hunger Scale with hunger scale results of the study group (N=120)

QUESTION	YES			
	HAS IT HAPPENED?	IN THE PAST 30 DAYS	5 OR MORE DAYS IN THE PAST 30 DAYS	
1) Does your house hold ever run out of money to buy food?	Yes (n=61) 50.8%	n=39 32.5%	n =25 24.2%	HOUSEHOLD LEVEL OF FOOD SECURITY
2) Do you ever rely on a limited number of foods to feed your children because you are running out of money to buy food for a meal?	Yes (n=47) 39.2%	n =34 28.3%	n= 21 17.5%	
3) Do you ever cut the size of meals or skip because there is not enough money for food?	Yes (n=48) 40.0%	n =34 28.3%	n =23 19.2%	INDIVIDUAL LEVEL OF FOOD SECURITY
4) Do you ever eat less than you should because there is not enough money for food?	Yes (n=61) 50.8%	n =41 34.2%	n =29 24.2%	
5) Do your children ever eat less than you feel they should because there is not enough money for the food?	Yes (n=33) 27.5%	n =27 22.5%	n =26 21.7%	CHILD HUNGER
6) Do your children ever say they are hungry because there is not enough food the house?	Yes (n=28) 23.3%	n =25 24.2%	n =22 18.3%	
7) Do you ever cut the size of your children's meals or do they skip meals because there is not enough money to buy food?	Yes (n=26) 21.7%	n =23 19.2%	n =20 16.7%	
8) Do any of your children ever go to bed hungry because there is not enough money to buy food?	Yes (n=24) 20.0%	n =22 18.3%	n =18 15.0%	

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Table 3: Food groups and food items used at least once during a 24 hour period in a low socio-economic area in Nairobi (N=120 lactating women 0- 6 months post partum)

Food groups	Frequency(%)	Food items
Cereals, tubers and roots	100	84%: maize meal (ugali) 27% maize 48%: wheat (bread) 48%: millet (porridge) 48%: rice 38%: wheat (mandazi) 18%: wheat (Chapati) <10%: wheat (injira), (pancakes), (Spaghetti), samp. 22% potatoes <10% green bananas
Yellow or orange vegetables, tubers or fruits	6.6	<10% sweet potatoes, carrots, peas < 10% pawpaw, mango
Other vegetables	100	58% kales (sukumawiki) 14% spinach <10% black night shade, spider leaves amaranth and cow pea leaves 28% cabbage and < 10% tomatoes
Other fruits	35	22% Oranges 20% banana 13% Avocado
Meat, Poultry and fish	39.9	< 10% liver, offal 25% beef < 10% sausage < 10% sardines, Tilapia
Eggs	18.3	18% eggs
Legumes, nuts and seeds	46.6	53% beans < 10 % green grams,
Dairy	1.66	< 10% fresh milk, fermented milk
Oils and fats	100	100% cooking oil/fat < 10% margarine

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Table 4: The Nutrient Adequacy Ratios for Energy and Nutrients considered in the research

NUTRIENT	WHO STANDARD	NUTRIENT ADEQUACY RATIO
Energy (KJ)	11340	0.619004
Protein (g/day)Median	68	0.740113
Calcium (mg/day)	1000	0.407287
Iron (mg/day)	12	1.020861
Zinc (mg/day)	12	0.670493
Folate (µg DFE/day)	500	0.593817
Vitamin A (µg RE/day)	850	0.892923
Thiamine (mg/day)	1.5	0.794444
Riboflavin mg/day)	1.6	0.661198
Niacin (mg/day)	17	-
Vitamin C	70	0.95545
TOTAL		**7.48**

Table 5: Regression analysis between MAR, FVS and DDS

Source	**Partial SS**	**df**	**MS**			
Model	0.011	2	0.006			
Residual	2.225	117	0.019			
mar	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.Interval]**	
dds	-0.009	0.0176	-0.53	0.596	-0.0441	0.025
fvs	0.006	0.008	0.76	0.448	-0.010	0.0222
_cons	0.735	0.062	11.89	0.000	0.613	0.858

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