

Maternal dietary intake and its associated socio demographic factors: evidence from Lahore, Pakistan

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Summary. *Background:* In developing countries, maternal under-nutrition is one of the causes of maternal morbidity and mortality. Good maternal nutritional status, resulting from long term dietary intake; also has great implications for neonatal health. The current study aimed at assessing the dietary intake of pregnant women and its associated socio demographic factors in Lahore, Pakistan. *Methods:* In a cross sectional survey 82 pregnant women were approached in a purposely selected tertiary care hospital in Lahore, Pakistan at the beginning of second trimester. Participants aged 19-45 years, were enrolled consecutively after taking written informed consent. Socio-demographics were recorded by a structured, pre-tested questionnaire. Maternal dietary intake was assessed by 24-hr Recall and Food Frequency Checklist. Data was collected from April-September 2013. Results were analyzed using SPSS version 21. *Results:* Mean age of the participants was 26 years, mean height was 157 cm, mean weight was 70 kg and mean BMI was 28.5 kg/m². Self report decrease in dietary intake was 48% (n=39), while 33% (n=47) reported an increase and 62% (n=51) reported to be moderately active. Food frequency checklist revealed that chapatti was the staple; and 98% (n=81) consumed it daily. Data analysis of 24 hour recall highlighted that 98% (n=81) were unable to fulfill their caloric requirements. 91.5% (n=75) of the participants were consuming inadequately from vegetable group, 73.2% (n=60) from milk group, 63.3% (n=52) from fruit group, 26.8% (n=22) from cereal group and 25.3% (n=21) from meat group. Among age, education, employment, parity and income, it was revealed that age less than 24 years was associated with inadequate intake of all food groups and calories except meat intake although the association was not statistically significant. *Conclusion:* It was concluded that dietary intake of pregnant women in Pakistan is far from satisfactory. Antenatal nutritional counseling and mass media campaigns can be helpful in raising awareness.

Key words: pregnant women, dietary intake, food group

Background

Maternal under-nutrition is one of the most important causes of maternal morbidity and mortality, particularly in the developing countries. The weight of the neonate at birth is a powerful predictor of neonatal growth and survival, and is strongly influenced by maternal health and nutrition during pregnancy (1). A woman's nutritional requirement increases during preg-

nancy in order to meet the needs of the growing fetus and of the maternal tissues associated with pregnancy. Balanced dietary intake is necessary to ensure sufficient energy intake for adequate growth of the fetus without drawing on mother's own tissues to maintain her pregnancy (2). A pregnant woman has to make healthy food choices to meet the high nutrient demands of pregnancy. It is recommended that an additional 340 kcal/day should be taken during the 2 trimester and an extra 450

kcal/day during the third. Ample carbohydrates, ideally 175gm or more /day and an additional 25 grams/day of protein are recommended in pregnancy. RDA of folate increase to 600µg/day, Vitamin B12 2.6µg/day, Iron 27mg/day and Zinc 11mg/day. Furthermore, Vitamin D, calcium, phosphorus, magnesium and fluoride are in great demand during pregnancy (3). To promote health it is important to eat an appropriate mix of foods from the food groups and subgroups, keeping in mind the calorie level. USDA Dietary Guidelines for Americans (2015-2020) recommends that at 2000 calories level one should consume, 3 servings from milk group, 6 ounces from cereal group, 2.5 cups of vegetable group, 2 cups of fruit group and 5.5 ounces from meat group (4).

Poor maternal nutritional status has been related to adverse birth outcomes; however, the association between maternal nutrition and birth outcome is complex and is influenced by many biologic, socioeconomic, and demographic factors, which vary widely in different populations (5). Dietary patterns are associated with socio-demographic characteristics like age, education, occupation, parity, race and ethnicity. Food insecurity, lack of knowledge and awareness regarding nutritious foods, myths and taboos, cultural practices, and gender discrimination are some of the most prevalent factors affecting dietary diversity and nutritional status of pregnant women in Pakistan (6). Women's dietary behaviours and intake during pregnancy are strongly influenced by different cultural practices, myths and taboos (7).

According to Pakistan National Nutritional Survey (2011) nutritional indicators of pregnant women in Pakistan are very poor (8). Limited research is available regarding dietary intake of pregnant women in Pakistan (9-11). Thus this study was conducted to assess the adequacy of dietary intake and its associated socio demographic factors among pregnant women in Lahore, Pakistan.

Methods

Study design & Settings: This is a cross-sectional design. Out of several hospitals and maternity homes situated in Lahore, a prominent tertiary care hospital was selected, which specialized in gynecological ser-

vices. The current study data is taken from the baseline data from a prospective cohort study of antenatal women with and without antenatal depression conducted from April till September 2013 conducted by the first author described elsewhere (12). The cohort aimed at assessing the effect of antenatal depression on maternal dietary intake and neonatal outcomes in middle income population of women attending a tertiary care hospital in Lahore.

Sample: Eighty-two pregnant women were approached at the beginning of second trimester. Participants aged 19-45 years, were enrolled consecutively after taking written informed consent. Pregnant women with history of chronic disease were not included in the study.

Demographic Data: The data collection tool was a structured and piloted questionnaire developed by the researcher. After taking written informed consent participants were inquired about relevant demographic questions such as age, education, parity, physical activity, self report change in eating habits, etc. The questionnaire was administered face to face.

Maternal Dietary Intake: Dietary intake was assessed through 24 Hour Recall and Food Frequency Checklist. A *24 hour dietary recall* is a retrospective method of dietary assessment where individuals were interviewed about their food and beverage consumption during the previous 24 hours. A modified food frequency checklist; including locally eaten food was used to assess habitual diet by asking about the frequency with which food items or specific food groups were consumed over a reference period. Categories ranging from 'never' or 'less than once a month' to '6+ per day' are used and participants have to choose one of these options. The interviewer was a trained nutritionist and visual aids were used for quantification of food items and probing was employed to inquire about cooking methods and snacks.

Anthropometric Measurements: Weight was recorded on digital scale (Seca 815, seca GmbH. Co. Kg, Germany) wearing summer clothing and rounded off to nearest 0.1 kg. Height was recorded on a stadiometer for mobile height measurement (Seca 217, seca GmbH. Co. Kg, Germany) without shoes and rounded off to nearest 0.1 cm. BMI was calculated by dividing weight (kg) by the square of height (cm).

Table 1. Socio demographic characteristics of the participants

Characteristics		Frequency	Percentage
Maternal Age	< 24 yr	25	30.5
	> 25 yr	57	69.5
Maternal Education	< 10 yr	23	28.0
	>11 yr	59	72.0
Maternal Occupation	no	75	91.5
	yes	7	8.5
Parity	prima	34	41.5
	multi	48	58.5
Income Rs.	< 24000	17	20.7
	>25000	65	79.3

Data Analysis: The consumed foods were broken down in servings and servings per food group were calculated. Caloric intake was calculated using food exchange list. Dietary guidelines by USDA (2015-2020) were used to determine adequacy of dietary intake. An intake less than recommendation were categorized as “inadequate intake” and consumption above recommendation servings was categorized as “adequate intake”. As almost all (98%) were consuming less than 2000 calories the data was categorized as participants consuming less than 1000 calories and greater than 1001 calories. Descriptive statistics, frequency and percentages were calculated for all variables. Odds ratio was calculated to observe association of socio-demographic variables and adequate intake of food groups. A p-value less than 0.05 were taken as significant and data was analyzed using SPSS v.21.

Results

Analysis of data of participants revealed that 51% were between the ages of 24-29 years and mean age of the participants was 26 years. The height of 66% women ranged from 151-160 cm and mean height was 157 cm. The mean weight of mothers was 70 kg and mean BMI was 28.5 kg/m². Average parity was 2.4 per woman and 41.5% of participants were primi-gravida (first conception). Mean household income was Rs. 37200 and majority lived as nuclear families (Table 1).

Forty-eight percent participants reported that their dietary intake has decreased during pregnancy

due to nausea and feeling of heaviness while 19% reported that their dietary intake was usual. Thirty three percent thought that they feel hungry all the time and their food consumption has increased (Fig. 1).

Thirty-five percent participants reported being physically very active, but majority were moderately active during second trimester (Fig. 2).

Frequency of consumption of various foods by participants is presented in Table 2. Almost all of the participants were consuming chapatti on a daily basis whereas, 76% of the participants ate rice 1-2 times a week. 43% of the participants never consumed naan or paratha while 74% never ate pasta. Consumption of eggs was significantly low; 40% of the participants never ate eggs while 33% ate eggs 1-2 times a week. Majority of the participants were consuming meat 1-2 times per

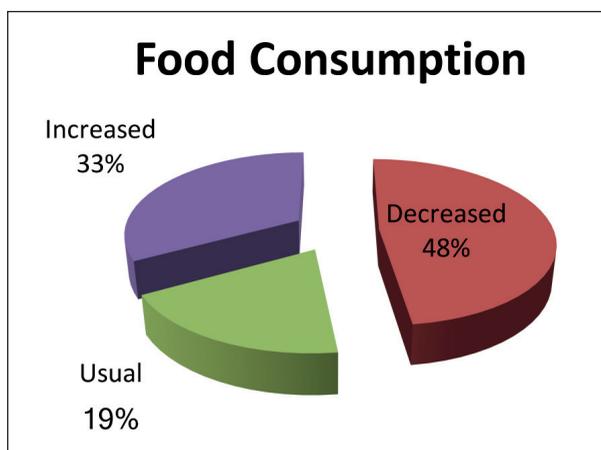


Figure 1. Self Perceived Change in Food Consumption during Pregnancy

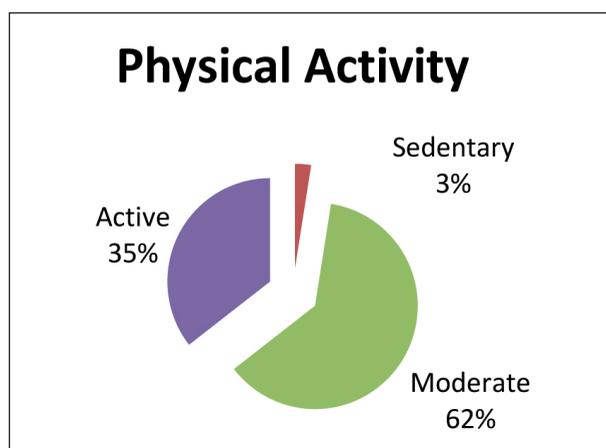


Figure 2. Self Perceived Changes in Physical Activity during Pregnancy

week. Fish was not consumed by any of the participants. Lentils/ beans were consumed by 84% 1-2 times a week. 78% of the participants consumed milk daily while 43% consumed milkshakes and 59% ate yogurt 1-2 times a week. 90% of the participants never consumed milk

desserts and 77% never drank tea. Intake of starchy vegetables was 96% and of non starchy vegetables was 54% in the 1-2 times a week category. 59% ate fruit daily while 77% never drank fruit juices.

The mean caloric intake of the study participants was merely 1430 ± 330.097 calories. Average serving from milk group was 1.274 cups, 7.704 servings from cereal group, 1.348 servings from vegetable, 1.260 servings from fruit group and 3.020 servings from meat group. 98% were unable to fulfill their caloric requirements. The consumption from cereal group was a lot better than the other food groups; only 26.8% were consuming inadequately from cereal group. Consumption from milk, vegetable, fruit and meat group were inadequate (Table 3).

Table 4 highlights the association of socio-demographic factors and inadequate intake of food groups. *Maternal Age less than 24 years* was associated with 3.6 times increased odds of inadequate milk intake, 2 times increased odds of inadequate cereal intake, 3.766 times increased risk of inadequate vegetable in-

Table 2. Percentage distribution of food frequency checklist

Food Groups		Daily	Weekly			Never
			1-2	3-4	5-6	
		%	%	%	%	%
Cereal group	Rice	0	76	18	0	6
	Chappati	98	0	1	1	0
	Naan/ Paratha	8	21	21	7	43
	Bread	29	18	32	14	7
	Pasta	0	26	0	0	74
Meat group	Eggs	4	33	15	8	40
	Beef/ Mutton	1	75	12	0	12
	Chicken	0	72	21	0	7
	Fish	0	0	0	0	0
	Lentil/ Beans	0	84	16	0	0
Milk group	Milk	78	6	5	7	4
	Milkshake	5	43	19	6	27
	Yogurt	5	59	13	0	23
	Milk Dessert	0	10	0	0	90
	Tea	22	1	0	0	77
Vegetable & Fruit group	Starchy Vegetables	0	96	4	0	0
	Non-starchy Vegetables	1	54	41	3	1
	Fruit	59	8	22	11	0
	Fruit Juices	1	16	6	0	77

Table 3. Descriptive analysis of 24 hour recall

Food Group	Mean	S.D.	Range	Requirements	Inadequate intake %	Adequate Intake %
Caloric intake	1430.89	330.097	1660	2000	98	2
Milk	1.274	0.866	4.00	3 c.	73.2	26.8
Cereal	7.704	2.965	16.00	6 oz.	26.8	73.2
Vegetable	1.348	1.376	6.00	2.5 c.	91.5	8.5
Fruit	1.260	1.372	5.00	2 c.	63.3	36.8
Meat (oz)	3.020	1.992	9.00	5.5 oz.	25.3	74.7

Table 4. Association of socio-demographic variables and adequate intake of food groups

Variables	Milk Intake OR (CI)	Cereal Intake OR (CI)	Vegetable Intake OR (CI)	Fruit Intake OR (CI)	Meat Intake OR (CI)	Calories Intake OR (CI)
Maternal Age	< 24 yr	3.606	2.000	3.766	1.786	6.910
	> 25 yr	(0.807-16.122)	(0.534-7.496)	(0.341-41.585)	(0.521-6.119)	(0.159-2.694)
Maternal Education	< 10 yr	2.547	0.393	0.675	1.034	3.402
	>11 yr	(0.626-10.367)	(0.096-1.605)	(0.109-4.171)	(0.338-3.165)	(0.281-3.406)
Maternal Occupation	no	2.250	0.112	1.967	1.337	1.167
	yes	(0.454-11.148)	(0.020-0.640)	(0.196-19.723)	(0.275-6.501)	(0.082-2.031)
Parity	prima	0.886	0.572	0.440	1.311	0.175
	multi	(0.259-3.033)	(0.161-2.025)	0.071-2.714)	(0.434-3.964)	(0.137-1.760)
Income (Rs.)	< 24000	0.639	0.696	1.243	0.985	1.509
	>25000	(0.154-2.656)	(0.157-3.081)	(0.125-12.379)	(0.276-3.522)	(0.338-5.541)

take, 1.786 times increased odds of inadequate fruit intake and 6.91 times increased odds of caloric intake less than 1000 kcal. Being a young mother was found to be protective against inadequate meat intake. *Maternal Education less than 10 years* was found to increase the odds of inadequate milk intake by 2.547 times and caloric intake less than 1000 kcal by 3.402 times. Being less educated was protective against inadequate intake of cereal, vegetable, fruit and meat group. No *Maternal Employment* was associated with milk inadequacy (OR=2.250), vegetable inadequacy (OR=1.967), fruit inadequacy (OR=1.337) and caloric inadequacy (OR=1.167). Maternal unemployment was found to be protective against inadequate intake of cereal and meat group. *Having first child* was associated with 1.311 times increased odds of inadequate fruit intake but protected against inadequate intake of milk, cereal, vegetable, meat group and caloric intake less than 1000

kcal. *Income less than Rs. 24000 per month* was associated with increased odds of inadequate vegetable intake (OR=1.243), inadequate meat intake (OR=1.369) and caloric intake less than 1000 kcal (OR=1.509). But it was found to be protective for inadequate consumption of milk, cereal and fruit intake.

Discussion

Dietary behaviour during pregnancy is characterized by specific food cravings or food aversion (13) and food preferences change as the pregnancy progresses (14). The most predominant changes in the behaviour of pregnant women are concerned with food choice and eating habits. Pregnant women are more conscious about their diet and that their food choices are stronger driven by safety concerns, as compared to

non-pregnant women (15). In the current study the participants were enrolled at the start of second trimester. They reported change in their dietary intake as increased, decreased and usual. Almost half of the participants reported that they ate lesser than what they used to before the pregnancy commenced. In a previous study, participants also reported an altered dietary behavior; reduced eating during in pregnancy and restricted certain foods from their diet (sugared and cooled down foods) (16). Studies have demonstrated that hard physical labour during pregnancy is related with small for gestation (SGA) and Low birth weight babies (17). Majority of the participants reported their physical activity as moderate and only a few stated to be active involved in carrying out all household chores like cleaning, washing and cooking. None was involved in hard physical labour.

Sajjad and Khan reported that energy and protein intake of Pakistani pregnant women were higher than RDA except those in first trimester; though the diets were deficient in micronutrients in all income groups (9). In the current study however, when the data from 24 hour recall was categorized as adequate and inadequate intake, majority of the participants were not consuming an adequate diet in terms of calories and food groups even though the requirements have increased tremendously. Results of Shaikh et al 2014 were in accordance with the study at hand. They reported that most of the mothers regardless of trimester and nutritional status, were consuming less than the recommended amount of various foods. Bread and cereal intake of only 44% of mothers was according to the recommendation while 56% were consuming less than the recommended servings. Fruit and vegetable intake was incredibly low, pertaining to 96 and 93% of the study population respectively. Eighty percent of mothers were consuming less than a serving of meat per day whereas 94% had low milk consumption per day (10).

Socio-demographic factors such as gender, ethnicity, socioeconomic status, age, occupation and income largely determine food choice and diet quality (18) (19). In the current study varied results were obtained regarding socio demographic factors and adequate dietary intake of food groups. Among age, education, employment, parity and income, it was revealed that age less than 24 years was associated with inadequate

intake of all food groups and calories except meat intake. Ali et al 2014 found that dietary diversity was not associated with socio-demographic or socioeconomic status of pregnant women in Pakistan (11).

Optimal maternal and fetal pregnancy outcomes are dependent upon the intake of sufficient nutrients to meet maternal and fetal requirements (20). Given the significance of adequate diet in pregnancy and magnitude of neonatal consequences associated with malnutrition and micronutrient deficiencies in the pregnant women. This situation is quite alarming and there is a dire need for action in this regard. Dietary counseling and lifestyle interventions during pregnancy have been shown to be a cost-effective method in health care to increase dietary intake (21) (22).

A major limitation of this research was the self report nature of majority of data. The element of reporting bias and error in memory could be present. The study was an analysis of baseline data of an antenatal cohort who are difficult to recruit and follow in Pakistan- a country where women do not seek antenatal care. Nevertheless, it has provided sufficient evidence regarding situation of dietary inadequacy among Pakistani population.

Conclusion

It was concluded that dietary intake of pregnant women in Pakistan is far from satisfactory. Among the socio-demographic variables, maternal age was associated with reduced intake of majority food groups, delaying age of marriage and child birth should be encouraged. Antenatal nutritional counseling to pregnant women to increase dietary intake and mass media campaigns to improve preconception nutritional status of adolescent girls; supported by the government can be helpful in raising awareness among general population.

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