Sociodemographic factors associated with nutrient intake of women living in urban areas

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A well-nourished woman is able to perform satisfactorily domestic and reproductive functions. In the family, she most often provides order and discipline to the household. Women also spend more than half of their lives in reproductive years. Thus, they deserve special considerations in policies and intervention programs for food security. This study looked into the association between socio-demographic factors (age, parity, household size, frequency of eating outside of home per month and frequency of meals per day) and nutrient intake of selected Filipino women living in urban areas. A total of 73 women (28 non-pregnant, 22 pregnant, and 23 lactating), living in Metro Manila, Philippines participated in the study. Three questionnaires (Food Habits Questionnaire, Family Composition Questionnaire, and 24- hour food recall) were used to gather data on the socio-demographic characteristics and usual food intake. The nutrient contents of the recalled food items were computed using the values on the Philippine Food Composition Table. Backward multiple linear regression showed that frequency of meals per day significantly affects caloric, carbohydrate, protein, and most micronutrient intake of lactating, and women in general. On the other hand, eating out affects caloric, carbohydrate, protein, and a few of the micronutrient intake among pregnant women. The findings of the study may provide useful insights for formulating relevant policies or guidelines on women's nutrition and food security intervention programs as well as in effectively implementing existing ones.

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Email Address: ctbayaga@up.edu.ph
Date received: September 13, 2019
Date revised: March 17, 2020
Date accepted: April 7, 2020

KEYWORDS

food security, socio-demographic factors, nutrient intake, pregnancy, lactation, women

INTRODUCTION

Worldwide, poor diet quality is a key reason for mortality and disability. This increases the risk for underweight, overweight and non-communicable chronic diseases (NCDs) which have been identified as a global priority (Imamura et al. 2015). Outcomes of maternal undernutrition may have an impact on economic productivity of the household and also susceptibility to NCDs such as cardiovascular disease and diabetes (Victoria et al. 2008; Rothman et al. 2019).

Women play a major role in the economic productivity of their families and human reproduction. Majority of women are involved in production, marketing, processing, preparation, and intra-household distribution (Chatterjee 1989). Women also have essential roles in society as child bearers and caregivers. There is also an increasing number of female-headed households worldwide. Women spend approximately half of their lives bearing, nourishing, and caring for a child, which take a heavy toll on their own nutritional well-being during these years (Dunnerram and Jeewon 2015).

Mothers have increased nutrient and energy requirements during pregnancy to support the proper growth and development of the fetus. A pregnant woman with insufficient energy and nutrient

intake is more likely to deliver a low birth weight baby who is at a higher risk of death or illness throughout infancy. Some malnourished young children who may survive are likely to remain shorter than their peers and often are susceptible to illness in their growing years (Elder and Ransom 2003; Negrato and Gomes 2013). Hence, relevant studies are needed to guide interventions focused on alleviating food insecurity to improve maternal nutrition (Johnson et al. 2018; Ivers and Cullen 2011). A previous study (Wibowo et al. 2015) concluded that unequal intra-household food distribution that discriminates against mother and children increases the risk of dual forms of malnutrition on these vulnerable household members.

During lactation, the mother needs more energy and nutrients to produce the needed volume of breast milk, improve breast milk quality, and maintain maternal nutrient stores (Joshi and Kulshrestha 2018). Specifically, lactating mothers need additional 500 kcal, 27 g in protein, 2 mg in iron, 400 µg RE in Vitamin A, 0.2 mg Vitamin B_1, 0.6 mg Vitamin B_2, 4 mg Vitamin B_3, and 35 mg Vitamin C daily (PDRI 2015). Furthermore, according to UNICEF (2013), the Philippines ranks 5th with the greatest number of low birth weight infants worldwide. The recent national nutrition survey (2016) of the Department of Science and Technology, Food and Nutrition Research Institute (DOST-FNRI) reported that 20.1% of pregnant women were nutritionally at-risk, while another 11% of lactating mothers were undernourished. If these trends continue, the country's economy will also be compromised because the children of these vulnerable mothers are the country's future work force (Rodriguez 2014). Hence, identifying factors that may affect the nutrient intake of women may provide useful information toward efforts to improve the nutrition of women especially those in their reproductive age.

There are different factors that may affect the food and nutrient intake of a target population. Some of the studies reported the significant influence of personal, cultural, social, economic, and socio-demographic factors. A study conducted by Llanaj et al. (2018), assessed the patterns of food intake and eating out of homes by university students. Another study examined the role of the frequency of eating on total energy intake and diet quality in low-income, racially diverse sample of schoolchildren (Evans et al. 2015). Associations between eating frequency and energy intake, energy density, diet quality and body weight status in American adults was also studied (Zhu and Hollis 2016). In the study of Joshi and Kulshrestha (2018), cultural beliefs, social and family influences were the factors considered to affect food choices of lactating women in Kumaon Region of Uttarakhand in India. The study has shown that majority of the urban- and rural-based respondents avoided certain food items due to the belief that these food items have negative effect on their children, thus causing a decrease in the caloric intake of these lactating women. However, there are limited studies on the effect of socio-demographic factors on the nutrient intake of women especially in their reproductive years. This present study aimed to determine the socio-demographic factors that affect the nutrient intake of Filipino women living in urban areas. These include age, parity, household size, frequency of eating outside of home every month, and meal frequency per day.

MATERIALS AND METHODS

Study Sites

The cities of Makati, Mandaluyong, and Taguig in the National Capital Region (NCR) of the Philippines have been chosen as the study sites (Figure 1). These cities were chosen because they implement organized nutrition consultation systems which allowed for regular home visits and monitoring of participants. All study areas chosen were from urbanized, commercial cities

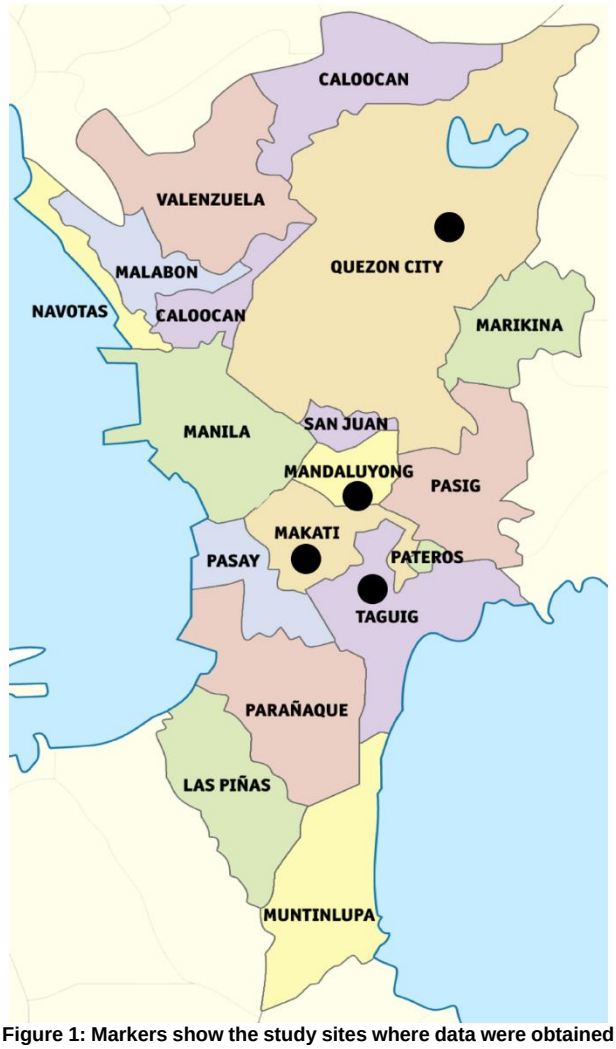

Figure 1: Markers show the study sites where data were obtained including the cities of Makati, Mandaluyong, and Taguig. The location of the laboratory where the study was based (Quezon City) is also marked.

of the NCR where most of the inhabitants are engaged in nonagricultural jobs. NCR is home to more than 10% of the Philippine population and residents come from all geographic areas of the country. All three cities have dense concentration of infrastructures such as houses, commercial buildings, roads, bridges, and railways.

Study Design

This is a cross-sectional study conducted as a part of a larger semi-longitudinal study that aims to establish the effect of maternal dietary intake on the microbiological and physicochemical characteristics of breast milk.

Study Participants

Women who (a) were 18-55 years old; (b) apparently healthy, who do not suffer from any acute or chronic diseases; (c) did not use antibiotic within the last 3 months; (d) did not take medication except for contraceptive pill; and (e) were not on a restrictive diet or undergoing treatment, were screened as potential participants. In addition, those who were lactating should be breastfeeding for more than 11 months; while those who were pregnant should be in their third trimester of pregnancy. A total of eighty (80) women were finally invited to participate in the study. The test population who completed the data collection phase consisted of 23 lactating, 22 pregnant, and 28 women who were neither pregnant nor lactating. There were eight mothers who dropped out due to schedule conflicts with

the face-to-face interviews and food recalls administration. All study participants that were invited to participate were randomly selected from the clients who consulted at the barangay health centers from October to mid-December 2016.

In addition to the aforementioned inclusion criteria, participants recruited belonged to low- to middle- income families. Based on the 2015 Family Income and Expenditure Survey, 37% of the country's population belonged to the lower income class while 26% fall within the lower middle-income class. Considering these facts, the study deemed it appropriate to represent the majority of individuals belonging to these income classes. The results generated could then be applicable not just for the target participants but also to other urban poor areas. Further, the participants included in the study were classified as low- to middle-income class using an arbitrary index set by the research team. Participants were considered to belong to the low-income class if their combined utilities bill (electricity and water) was below Php 2,000.00. Participants with combined utilities bill amounting to or more than Php 2,000.00 were classified as the middle-class income group.

Dietary Data Collection

All data were collected using a face-to-face interview, conducted by two trained, registered nutritionist-dietitians. The questionnaires used to gather dietary and socioeconomic data were the food habits survey, family composition questionnaires, and the 24-hour food recall form. The food habits survey questionnaire was patterned after survey questionnaires (Moore 2017; Cancer Prevention and Control Research Network 2017) and adopted for use in this study in consultation with two Nutrition and Food Science experts after pre-testing. This questionnaire aimed to obtain general knowledge on the common dietary practices of the participant such as frequency of meals per day, common food items eaten per day, and number of times she eats out of home. It also included basic socio-demographic data on age, parity, civil status, and breastfeeding practice, when applicable. The family composition questionnaire gathered information on the gender, educational attainment, and occupation of each household member to determine the characteristics and size of the participants' households.

The three 24-hour food recalls were taken on two weekdays and one weekend and were collected in a span of one month. This was used to determine the usual food intake of the participants. Before the interview, the respondent was asked if the previous day's food intake typifies the usual diet. The participants were asked to identify and quantify (in terms of household servings) all the food items they consumed for the past 24 hours, including water or any beverage. To assist participants in estimating the actual portions or amounts consumed, participants were shown common household measuring utensils (e.g. cup, tablespoon, teaspoon, ruler, and thickness pads).

The calorie and nutrient content of the recalled food items was computed using the values on the Philippine Food Composition Table (FCT) published by the Department of Science and Technology, Food and Nutrition Research Institute (1997). The edible portions, in grams, of the food and drinks consumed were determined and these weights were used to calculate the nutrient content. The nutrients listed in the FCT are expressed per 100g edible portion. The nutrients computed included carbohydrates, protein, and fat, and micronutrients (i.e. calcium, phosphorus, iron, Vitamins A, B_1, B_2, B_3, and C). The average nutrient intakes of the participants for the three recalls were then used to represent the participant's usual intake. The average values obtained were then used as bases to calculate the % Philippine Dietary Reference Intakes (PDRI) met. Dietary Reference Intakes (DRIs) are reference values that are quantitative estimates of nutrient intakes to be used for planning and assessing diets for healthy people. They include both recommended intakes and tolerable upper intake level as reference values. The DRIs include the concept of Recommended Dietary Allowance (RDA) which reflect the average daily dietary intake level that is sufficient to meet the nutrient requirement of nearly all (97 to 98%) healthy individuals in a group (Institute of Medicine 1998).

Statistical Analysis

Descriptive statistics were used to summarize the socio-demographic characteristics, food habits, and nutrient intakes of the participants. Backward multiple linear regressions using IBM SPSS ver. 23 were conducted to determine which among the socio-demographic factors significantly affected the specific nutrient intake of the participants. The independent socio-demographic factors namely, age, parity, household size, frequency of eating out every month, and frequency of meals per day were correlated with the values of the participants' energy, macronutrients, and micronutrients intake.

Ethics Clearance

All participants involved in this study gave a written informed consent to the protocol which was approved by the Far Eastern University-Nicanor Reyes Memorial Foundation (FEU-NRMF) Institutional Ethics Review Committee, Diliman, Quezon City (Reference # FEU-NRMF IERC 2016-0114).

RESULTS

Table 1: Socio-demographic characteristics of selected Filipino women

Characteristics	All (n=73)
Age (years ±SD)	30.36 ±7.88
Household size (mean ±SD)	5.42 ±2.51
Female : Male ratio	2.79 : 2.62
Occupation	
Housewife	48 (65.75%)
Self-employed	6 (8.22%)
Employed (fulltime)	19 (26.03%)
Civil Status	
Married	33 (45.21%)
Cohabitation	37 (50.68%)
Single	3 (4.11%)
No. of children	
0	9 (12.33%)
1 – 3	51 (69.86%)
4 – 6	12 (16.44%)
>6	1 (1.40%)
Parity (years ±SD)	2.32 ±1.44
Pregnant participants	22 (30.14%)
Lactating participants	23 (31.51%)
Non-pregnant and non-lactating participants	28 (38.36%)

Study Population Profile

Table 1 shows the socio-demographic characteristics of all the participants and per physiological status. The mean age of the participants was 30.36 years while parity was 2.32 years. All participants have an average of 5 household members with comparable numbers of male and female in the household. Majority of the mothers were unemployed (65.75%) while some

were employed full-time (26.03%). Among the participants, 4.11% were single and the rest were living with their partners or husbands. Majority of the mothers have 1 to 3 children. There were twenty-two pregnant mothers in their third trimester (30.14%) and twenty-three lactating mothers (31.51%) who participated in the study, while the rest were non-pregnant, non-lactating healthy mothers.

Table 2 shows the result of the food habits questionnaire. All women, regardless of their physiological status eats out twice a month and eats an average of 4 meals per day. The usual cooking method used at home for all women is boiling or stewing.

Table 2: Food habit characteristics of selected Filipino women

Characteristics	All (n=73)
Frequency of eating out per month	2.33 ±1.71
Meal frequency per day	4.32 ±1.00
Usual cooking method at home	
Frying	9 (12.33%)
Sautéing	13 (17.81%)
Boiling	51 (69.86%)

Table 3: Energy and nutrient intake of selected Filipino women[1]

Nutrient	Pregnant (n = 22)	Lactating (n = 23)	Non-P/L women (n = 28)	All (n=73)
	Mean ±SD			
Energy (kcal)	2361.85 ±596.79[b]	3160.89 ±1227.35[a]	2252.33 ±867.15[b]	2577.64 ±1281.32
Protein (g)	74.35 ±19.86[b]	95.24 ±37.14[a]	67.20 ±27.36[b]	78.40 ±39.32
Fat (g)	63.77 ±27.01[b]	80.31 ± 39.52[a]	56.23 ±24.19[b]	66.27 ±49.34
Carbohydrates (g)	386.33 ±108.68[b]	514.19 ±196.21[a]	369.63 ±157.22[b]	421.12 ±209.83
Calcium (mg)	770.76 ±345.86[ab]	958.77 ±649.70[a]	625.12 ±395.88[b]	776.68 ±693.73
Phosphorus (mg)	1096.64 ±361.18[b]	1324.09 ±568.35[a]	925.01 ±403.26[b]	1105.65 ±608.02
Iron (mg)	18.62 ±15.69[ab]	21.19 ±10.12[a]	14.72 ±6.65[b]	17.99 ±17.55
Total Vitamin (RE) (µg)	1036.58 ±1733.35[a]	1000.86 ±1418.19[a]	645.60 ±560.61[a]	878.50 ±2107.87
Thiamin (mg)	1.23 ±1.23[c]	1.52 ±0.80[a]	0.88 ±0.37[b]	1.19 ±0.87
Riboflavin (mg)	1.78 ±1.44[a]	1.76 ±1.01[a]	0.99 ±0.43[b]	1.48 ±1.56
Niacin (mg)	20.47 ±5.43[a]	24.37 ±13.43[a]	22.17 ±23.86[a]	22.42 ±18.35
Ascorbic acid(mg)	67.01 ±64.59[a]	79.70 ±146.22[a]	65.09 ±65.43[a]	70.29 ±151.98

[1] Values are means of 3 24-hour food recalls.
[abc] Values in the same row bearing different letters are significantly different at $p \leq 0.05$

Nutrient Intakes of the Study Population

Table 3 shows the actual nutrient intake of the participants. Based on the 2015 Philippine Dietary Reference Intakes (PDRI) (FNRI-DOST 2015), the lactating participants were able to meet the recommended intakes except for Vitamin C and iron **(Table 4)**. For the pregnant participants, their intakes of protein, calcium, iron, and Vitamin C intakes failed to meet 100% of their recommended intakes based on the 2015 PDRI. Non-pregnant, non-lactating participants were also able to meet the recommended intakes except for iron. Comparing the nutrient intakes of the three groups, the table also shows significantly different caloric, protein, fat, carbohydrates, calcium, phosphorus, thiamin, and riboflavin intakes, with the lactating participants having higher nutrient intakes in terms of kilocalories and macronutrients compared to the non-lactating participants. Generally, all participants were able to meet their recommended nutrient intake except for iron, which was only at about 50% of the recommended intake.

Table 4: Actual energy and nutrient intake of selected women as percentage of Philippine Dietary Reference Intakes (%PDRI)

Nutrient	Pregnant (n = 22)	Lactating (n = 23)	Non-P/L women (n = 28)
	%PDRI		
Energy	105.87	130.08	116.70
Protein	85.46	107.01	108.39
Calcium	96.25	127.84	83.35
Phosphorus	156.57	189.14	132.14
Iron	49.00	70.63	52.57
Total Vitamin A	115.18	100.09	107.60
Thiamin	87.86	116.92	80.00
Riboflavin	98.89	103.53	90.00
Niacin	113.72	135.39	158.36
Ascorbic acid	95.73	83.89	108.48

Factors Affecting Nutrient Intakes of the Participants

Table 5 shows that among all the socio-economic factors investigated, only the frequency of eating outside of home (X_5) significantly affected energy, carbohydrate, and protein intake, while frequency of meals per day (X_4) negatively influences fat intake at 95% level of significance for the pregnant participants. This means that the more often a pregnant woman eats outside her home, her energy, carbohydrate, and protein intake also increases significantly, while increasing the frequency of meals per day decreases her fat intake significantly. For the lactating participants, frequency of meals per day positively affected energy, carbohydrates, and protein intake. Meanwhile, household size (X_2) had a negative correlation and significantly affected energy, carbohydrate, and protein intake, which means that as the household size increases, there is a significant decrease in the intake of the said nutrients. Non-pregnant, non-

Table 5: Factors influencing energy and macronutrients intake of selected Filipino women

Energy and Nutrients	Pregnant (n=22)		Lactating (n=23)		Non-P/L women (n=28)		All (n=73)	
	Regression Equation	P value	Regression Equation	P value	Regression Equation	P value	Regression Equation	P value
Kilocalories	$y = 185.522x_5 + 1855.883$	$X_5 = 0.010$	$y = -364.603x_2 + 675.338x_4 + 2016.489$	$X_2 = 0.015$, $X_4 = 0.004$	-	-	$y = 349.407x_4 + 1063.880$	$X_4 = 0.003$
Carbohydrates	$y = 28.725x_5 + 307.994$	$X_5 = 0.033$	$y = -62.064x_2 + 109.238x_4 + 345.992$	$X_2 = 0.009$, $X_4 = 0.003$	-	-	$y = 64.012x_4 + 143.994$	$X_4 = 0.001$
Protein	$y = 6.268x_5 + 57.254$	$X_5 = 0.009$	$y = -11.218x_2 + 16.896x_4 + 5.755x_5 + 63.830$	$X_2 = 0.008$, $X_4 = 0.012$, $X_5 = 0.043$	-	-	$y = 12.107x_4 + 25.946$	$X_4 = 0.001$
Fat	$y = -11.641x_4 + 112.977$	$X_4 = 0.067$	-	-	$y = -1.067x_1 + 93.941$	$X_1 = 0.056$	$y = -1.090x_1 + 99.173$	$X_1 = 0.021$

x_1 = age; x_2 = household size; x_3 = parity; x_4 = frequency of eating in a day; x_5 = frequency of eating out of home in a month

lactating participants' caloric and macronutrient intakes, on the other hand, were not significantly affected by the identified socio-demographic factors. Considering all the participants as a group, results showed that frequency of meals per day significantly affects energy, carbohydrates and protein intake positively, while fat is negatively affected by age (X_1).

In **Table 6,** the effect of the identified socio-demographic factors on the minerals namely Calcium, Phosphorus and Iron are shown. For the pregnant participants, age significantly increases Calcium intake, while frequency of eating outside of home significantly increases both Calcium and Phosphorus intake. Similarly, among the lactating participants, frequency of eating outside of home had a positive and significant ($p \leq 0.05$) effect on the Calcium, Phosphorus and Iron intake, while household size had negative and significant ($p \leq 0.05$) effect on the intake of these minerals. For the non-pregnant, non-lactating group, frequency of eating out is the sole factor with a positive significant ($p \leq 0.05$) effect specifically on the Calcium intake. Considering all participants as a group, frequency of eating out is the only factor with a positive significant ($p \leq 0.05$) effect on both Calcium and Phosphorus intake.

Table 7 shows the effect of the identified socio-demographic factors on the vitamins (A, B_1, B_2, B_3, and C) intake of the participants. For the pregnant participants, frequency of eating out significantly increases both Vitamins B_1 and B_3 at $p \leq 0.05$. Comparably, for the lactating participants, frequency of eating out significantly increases Vitamins B_1, B_3 and C intake. Also, frequency of meals per day significantly increases Vitamins A, B_2 and B_3 intake of lactating participants. In addition to the two factors, household size has a positive significant ($p \leq 0.05$) effect on the intake of Vitamin B_3. On the other hand, no socio-demographic factors identified in the study significantly affected the nutrient intake of non-pregnant, non-lactating participants. Considering all participants, age was found to significantly increase Vitamins B_1 and B_2 intake, frequency of meals per day, significantly increase Vitamin B_1, B_2 and B_3 intake, while frequency of eating out of home also significantly increases Vitamins A, B_1, and C.

DISCUSSION

The results of the present study showed that there were significant differences among the intakes of pregnant, lactating, and non-pregnant women. These can be attributed to different factors that affect their diet such as knowledge, culture, beliefs, socio-economic, and demographic factors. For this study, the researchers focused on the socio-economic and demographic factors and the effect on the intakes of women of different physiological state. The participants were relatively homogenous in terms of knowledge, culture, and beliefs as they all were from the low-to-medium income class, residing in similar urban areas, and other characteristics stated in Tables 1 and 2. In a study conducted by Shahid et al (2011), most pregnant women are knowledgeable that they need more food during pregnancy, however, most pregnant women also have food restrictions that they follow which leads to having limited food intake. According to Gluckman (2014), cultural beliefs and practices often influence dietary intake of women during pregnancy up to lactation. In a study conducted by Chakona and Shackleton (2019) 37% of the pregnant women who participated in their study reported one or more food practices shaped by local cultural taboos or beliefs. Another study noted that different levels of household wealth index and the changing seasons, affect nutrient intakes (Cheng et al. 2009). A similar study also found out that factors significantly related to healthy nutritional practices included above primary school education and being in the 5th quintile of income level (Oh H-K et al. 2019). A study in Northwestern Ethiopia conducted by Nana and Zema (2018) showed that the husband's income, ownership of radio, history of disease, and dietary knowledge have significant association with dietary practices of pregnant women. Additionally, a study by Acharya et al. (2018) observed that women in the underserved population, which is similar to the participants in this study, have poor knowledge and have strong

Table 6: Factors influencing mineral intake of selected Filipino women

Energy and Nutrients	Pregnant (n=22)		Lactating (n=23)		Non-P/L women (n=28)		All (n=73)	
	Regression Equation	P value	Regression Equation	P value	Regression Equation	P value	Regression Equation	P value
Calcium	$y = 26.269x_1 + 74.588x_5 - 133.570$	$X_1 = 0.049$, $X_5 = 0.088$	$y = -163.911x_2 + 253.120x_4 - 102.810x_5 + 424.376$	$X_2 = 0.037$, $X_4 = 0.044$, $X_5 = 0.059$	$y = 158.894x_4 - 27.483$	$X_4 = 0.035$	$y = 198.598x_4 - 82.830$	$X_4 < 0.001$
Phosphorus	$y = 29.828x_1 + 92.015x_5 + 49.815$	$X_1 = 0.027$, $X_5 = 0.038$	$y = -164.104x_2 + 255.799x_4 + 100.178x_5 + 784.812$	$X_2 = 0.008$, $X_4 = 0.010$, $X_5 = 0.019$	$y = 58.375x_1 + 624.793$	$X_1 = 0.080$	$y = 155.785x_4 + 47.516x_5 + 307.879$	$X_4 = 0.005$, $X_5 = 0.096$
Iron	-	-	$y = -2.513x_2 + 5.544x_4 + 1.342x_5 + 5.845$	$X_2 = 0.023$, $X_4 = 0.003$, $X_5 = 0.076$	$y = 0.986x_2 + 9.648$	$X_2 = 0.073$	$y = 2.515x_4 + 7.085$	$X_4 = 0.058$

x_1 = age; x_2 = household size; x_3 = parity; x_4 = frequency of eating in a day; x_5 = frequency of eating out of home in a month

cultural beliefs which serves as a barrier in their food and health-seeking behaviors. The study by Acharya et al. (2018) was similar to this current study as both observed the limitations in the capacity to provide more nutritionally adequate food to the members of the household considering the identified barriers.

Results of this study also showed that age significantly affects fat, Vitamin B_1, and Vitamin B_2 of women in general. Meanwhile, frequency of eating outside of home has a significant effect on Vitamin A, B_1, and C intakes, and meal frequency significantly affects a number of nutrients namely carbohydrate, protein, calcium, phosphorus, Vitamin B_1 and Vitamin B_3. More than 50% of the calculated nutrients, as listed in the 1997 Philippine Composition Table (FCT), are affected by frequency of meals. A study conducted by Zhu and Hollis (2016), found that adults with higher eating frequency in the United States of America had a healthier diet and that there was a positive association between eating frequency and energy intake. This is also supported by findings of a study conducted by Aljuraiban et al. (2015) which showed that American and British men and women aged 40 to 59 years old with lower BMI levels who, although frequent eaters, tended to have lower consumption of dietary energy but higher nutrient-quality foods. Similar results were observed in the nutrient intakes of the Filipino lactating participants. Energy intake and eight nutrients (i.e. carbohydrates, protein, calcium, phosphorus, iron, Vitamin A, B_2, and B_3) were affected by meal frequency. Consuming more food inevitably redounds to an increased caloric intake but may not ensure sufficient amounts of required nutrients. Eating more food does not necessarily equate to getting all the needed nutrients. In the case of the lactating participants, result suggests that their snacks or meals may have been a source of more nutrients in addition to calories. A study conducted by Kaliwile et al. (2019), also found that lactating women consumed more varied food items and had higher food intake compared to pregnant and non-lactating women. On the contrary, according to the FAO report (2013), the National Capital Region or Metro Manila is the 3rd region with the highest number of malnourished lactating women. This may be attributed to other contributing factors such as cultural beliefs. A study by Alonso (2014) stated that as culture dictates, there are more taboos and restrictions for pregnant and lactating women which result to poor nutrition. Similarly, a study by Ahlqvist and Wirfalt (2000) mentioned that postpartum diet is greatly affected by different beliefs such as the hot and cold values, satisfaction of cravings, survival of the mother, and quantity and quality of breast milk. It was found that in this study, the limitations brought about the identified factors resulted in relatively poor food choices which potentially may cause detrimental health consequences. In the current study, participants were aware that they need to consume more foods during pregnancy and lactation as they were told during the prenatal care in the local health centers, however, there are practices influenced by the beliefs of the elderly and more experienced mothers such as avoidance of certain food items and limitation on the intake of specific food items, thus creating narrower spectrum for the food choices of the participants.

As for this study, results revealed that household size significantly affects energy, carbohydrate, protein, phosphorus, and iron intake of lactating women; and frequency of eating out significantly affected protein, calcium, and phosphorus intake. A study conducted by Hundera et al. (2015) in Ethiopia noted that family size, income, and knowledge on foods also showed significant association with the nutritional status of lactating mothers. Another study by Pelto et al. (2000) explored on the effect of sociocultural adaptation on the nutritional intake and characteristics of household members which showed that as part of the cultural adaptation developed by people, people have improved in maximizing ways of acquiring food that are simply available to them. Comparable to the current study, the participants included in the current study belongs to a relatively large household and low-to-medium economic class. The capacity of the participants to access more nutritionally adequate food is significantly lower as they are staying in highly urbanized area where prices of commodities are significantly higher. A report in 2009 by the Asian Development Bank reported that poor families are usually the ones with more household members, and the rise in the urban poor is also apparent in the country. In this regard, the study was able to capture the urban poor community and based on the result of the nutrient intake analysis done, people in urban poor communities have difficulties in acquiring all recommended amounts of nutrients essential for optimum health. Consequently, with the higher nutritional requirements of pregnant and lactating women due to physiological changes, these women are most likely to be malnourished as there are many barriers in achieving their recommended nutrients intake.

In the case of pregnant participants, the frequency of eating meals outside the home significantly affected their energy, carbohydrate, protein, phosphorus and Vitamins B_1 and B_3

Table 7: Factors influencing vitamins intake of selected Filipino women

Energy and Nutrients	Pregnant (n=22)		Lactating (n=23)		Non-P/L women (n=28)		All (n=73)	
	Regression Equation	P value	Regression Equation	P value	Regression Equation	P value	Regression Equation	P value
Vitamin A	-	-	$y = 619.668x_4 - 1881.942$	$X_4 = 0.032$	-	-	$y = 170.941x_5 + 435.133$	$X_5 = 0.031$
Vitamin B_1	$y = 0.125x_5 + 0.891$	$X_5 = 0.029$	$y = 0.174x_5 + 1.092$	$X_5 = 0.014$	-	-	$y = -0.019x_1 + 0.139x_4 + 0.083x_5 + 0.963$	$X_1 = 0.025$, $X_4 = 0.049$, $X_5 = 0.026$
Vitamin B_2			$y = 0.464x_4 - 0.393$	$X_4 = 0.023$	-	-	$y = -0.032x_1 + 0.226x_4 + 1.479$	$X_1 = 0.039$, $X_4 = 0.066$
Vitamin B_3	$y = 1.854x_5 + 15.415$	$X_5 = 0.004$	$y = -3.313x_2 + 6.194x_4 + 2.222x_5 + 8.201$	$X_2 = 0.028$, $X_4 = 0.012$, $X_5 = 0.035$	-	-	$y = 4.558x_4 + 2.684$	$X_4 = 0.020$
Vitamin C	-	-	$y = 27.187x_5 + 12.321$	$X_5 = 0.040$	-	-	$y = 14.743x_5 + 32.303$	$X_5 = 0.013$

x_1 = age; x_2 = household size; x_3 = parity; x_4 = frequency of eating in a day; x_5 = frequency of eating out of home in a month

intake. This may be attributed to the established cravings of the mothers during their first trimester that continued throughout pregnancy. There are theories claiming that cravings are the body's way of telling the mother that she may be lacking in a certain nutrient (Bouchez 2008). In this present study, only energy, carbohydrates, protein, phosphorus, Vitamin B_1, and B_3 were affected by frequency of eating. According to the 8th National Nutrition Survey (DOST-FNRI 2013), 1 in every 4 pregnant women is still nutritionally-at-risk. Other factors that can be considered to affect the nutrient intake of women are culture and beliefs. The study by Ogechi and Hamdalat (2017) in Nigeria, showed that 82.2% of their respondents prohibit intake of certain food items during pregnancy. Other significant factors included husband's income, ownership of radio, history of disease and dietary knowledge, based on a study done in Ethiopia (Nana and Zema 2018).

In consideration of the results of the study, it is recommended that during screening of pregnant and/or lactating women for nutrition intervention at the barangay health centers, information about questions on the frequency of meals throughout the day and probably household size be included, in addition to the usual iron status and anthropometric measures, for a more holistic assessment of the possible influences on the client's nutrition. It is also recommended that Registered Nutritionist-Dietitians (RNDs) at the health centers automatically recommend the inclusion of one snack, whenever possible to the usual four meals of majority of the patients since the results show that there is a higher chance of meeting the recommended nutrient intake with more frequent meal consumption. It is also best to provide the mothers needed nutrition counseling about making good food choices, to get maximum nutrients from the available food choices given their limited food budget, moderation in eating high caloric snacks, and balancing their meals to meet their recommended nutrient intakes. In addition to nutrient supplements, providing supplementary feeding or food subsidy to low-income women will help ensure a healthy pregnancy and their newborns.

CONCLUSION

Results of this study showed that some socio-demographic factors (e.g. household size, frequency of meals) were significantly associated with the nutrient intake of urban living, low-to-medium income Filipino women. Frequency of meals per day significantly affected calorie, carbohydrate, protein, and some micronutrient intake of all women regardless of physiological status. The other factors considered (i.e. frequency of eating out, age, parity) did not show a consistent trend. Further studies are needed to verify this. The influence of cultural beliefs and practices and family income on nutrient intake of women especially during pregnancy and lactation merits future studies, specifically in the country as this may adversely affect consumption of needed nutrients during the critical period of gestation. Participants that were included in the study belong to urban poor community and it was observed that there were several limitations in their access to nutritionally adequate foods. One of the hindrances noted was the disproportion in the income of the household to the prices of commodities. As most of the household have only one working person who sustains the finances of the household, the earnings were not enough to accommodate the needs of the household especially with the large number of household members and the increased needs of pregnant and lactating women. Another hindrance observed was that the effect of the social environment on the women's food consumption. The participants were easily influenced by the people who they see as superior regarding the matter of pregnancy and lactation, and as result, there were various recommendations from their environment which leads to having fewer food options. A study which focuses on the cultural beliefs and practices on food intake of pregnant and lactating women may provide useful insights on their potential

effect on their nutrition and health of mothers and their infants during these critical periods.

The results of this study may be useful as basis for formulating guidelines for counselling mothers about the critical need for a nutritionally adequate diet especially during pregnancy and lactation. The potential inimical effects of dietary beliefs and practices, e.g. abstaining from certain foods, that may prevent the consumption of adequate energy and nutrients should also be pointed out. Adopting policies and programs to ensure food security or access to adequate food by women particularly in their reproductive years will help address the vicious inter-generational cycle of malnutrition in the country.

Replicating this study by increasing the sample size to strengthen the associations found and investigating other factors that may affect nutrient intake of women such as culture, belief, and their role in the household is recommended.

ACKNOWLEDGMENTS

This work was funded by the: (1) UP Emerging Interdisciplinary Research (EIDR-C08-007.1); (2) UP System Enhanced Creative Work and Research Grant (ECWRG 2016-2-082); (3) Philippine Council for Health Research and Development-Department of Science and Technology; and (4) Commission on Higher Education. The authors wish to thank Jethro Ian G. Belano, and Joelean Zephanie E. Escote for assisting in the data collection and the Nutrition Offices of Makati City, Mandaluyong City and Taguig City for their full support and assistance to the research team.

CONFLICT OF INTEREST

The authors whose names are listed above certify that they have NO affiliations and relationships with any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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