

TITLE: Assessment of the status and its associated factors among lactating mothers taking services in an urban healthcare facility in Dhaka city: A cross-sectional study.

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List of Acronyms:

BMI: Body Mass Index

MNCH: Maternal, newborn, child health

ANC: Ante-natal Checkup

PNC: Post-natal checkup

EPI: Expanded Program on Immunization

FANTA: Food and Nutrition Technical Assistance Project

AOR: Adjusted Odds ratio

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Abstract:

Our study aims to determine the nutritional status of lactating mothers attending an urban MNCH facility in Dhaka, Bangladesh, and identify the associated factors. A cross-sectional study was conducted which analyzed socio-demographic data, dietary diversity, and body mass index (BMI). Among the participants, 39.7% were aged 21–25 years, and 40% held a bachelor's degree or higher. The majority (79.2%) were homemakers, with a median monthly income of 50,000 BDT. Nutritional assessment revealed a dual burden, with overweight and obesity prevalent in 64% of the lactating mothers and undernutrition observed in 10%. When regression analysis was done it highlighted that mothers aged more than 30 years had significantly higher the odds of being overweight or obese (AOR=9.98; $p=0.001$), emphasizing the impact of age on BMI. Attainment of education also influenced BMI significantly; mothers completing higher secondary education were more likely to have increased BMI (AOR=3.02; $p=0.026$), likely due to calorie-dense food choices, while those who had completed their education up to bachelors and above education appeared to mitigate this risk. Mothers coming from middle-income households were less likely to be overweight or obese (AOR=0.37; $p=0.023$), this indicated the impact of income on nutritional outcomes. Dietary factors also played a significant role; frequent consumption of sugary foods increased the likelihood of higher BMI (AOR=2.73; $p=0.001$), whereas sweets consumption showed an inverse association with overweight and obesity (AOR=0.40; $p=0.003$) which could be due to differential reporting or cultural practices. Thus interventions should focus on the enhancement of nutritional literacy particularly women of lactational phase and additionally, introduce policies that ensure access to affordable, nutrient-rich foods which could mitigate the rising burden of overweight and obesity. Future longitudinal studies are necessary to explore the long-term effects of these factors on maternal and child health in urban Bangladesh.

1. Introduction:

According to the World Health Organization (WHO) malnutrition can be defined as 'the cellular imbalance or mismatch between the supply of proper nutrients and energy into the body and the body's demand for them to ensure proper development, regulation, and particular functioning' (World Health Organization: WHO, 2019). It is a term that encompasses both excess and imbalance in calorie, protein, and/or other nutrient consumption as well as the conditions that arise from their deficiency. For each physiological system to function properly, a balanced supply of nutrients is very much required. Nutrition itself is a vital component of human existence and development throughout the course of a lifetime. Ensuring a balanced diet and eating the correct meals are essential for the survival, adequate physical growth, mental development, performance, productivity and overall well-being. (Seid & Cherie, 2022b). Dietary needs also fluctuate with age and during physiological transitions like pregnancy and lactation.

The nutritional status of a mother during her lactational phase is critical for both maternal and infant health. Adequate nutrition ensures a mother's proper recovery during her post-partum period and also enhances the quality and quantity of breastmilk for the infant. Lactation itself is a nutritionally demanding stage that frequently calls for an extra 500 calories of energy each day (Jouanne et al., 2021). The combined burden of malnutrition—which is both undernutrition and overweight/obesity—is becoming more common in urban areas, especially in low- and middle-income countries like Bangladesh. Lactating mothers are frequently at risk from a nutritional standpoint. During nursing a mother's diet is looked over to favor the newborn's nutritional requirements. Sociodemographic modifiers and unhealthy eating habits are also some of the reasons that contribute to mothers having nutritional deficiencies during their lactational stage.

If mothers have persistent malnutrition during their lactational period it imposes certain health risks for both the mother and the baby. Deficiency of essential vitamins and minerals weakens the mother's immune system and long-term malnutrition increases the mother's susceptibility to developing chronic health conditions in later life. Studies suggest that proper nutrition during the lactational phase brings about numerous benefits for both the mother and the child, such as quick recovery from childbirth, sufficient supply of breastmilk and improved infant health and developmental outcomes (Fekadu et al., 2024b).

Several factors contribute to overnourishment and undernourishment in lactating mothers of reproductive age, which includes biological, cultural, and socioeconomic factors. The increasing prevalence of overweight and obesity in the developing countries despite their history of malnutrition can be linked to changes in food consumption patterns, easy availability of processed foods, sedentary lifestyles, and rapid social transformations as a result of urbanization (Popkin & Ng, 2021). The lack of variety of nutritious food in the diet, high carbohydrate intake, and insufficient physical activity are some of the common causes of postpartum weight retention. This problem is again further aggravated by cultural customs and the false notions that nursing mothers need a far higher calorie intake. Obesity and overweight can also shorten the time span of successful breastfeeding and are connected to the occurrence of various chronic conditions.

So whether it be undernutrition or overnutrition both need to be looked at the same time when it comes to improving the nutritional status of lactating mothers (Tuoyire & Tampah-Naah, 2024).

On the other hand factors like poverty, food insecurity, and inadequate nutritional intake can be often linked with undernutrition among lactating mothers, especially in low-income and rural areas. Micronutrient deficits are caused in part by a lack of variety in the diet and a dependence on low-nutrient-dense staple foods. Things become even more complicated by cultural conventions that limit particular food categories during the postpartum period, as well as inadequate access to healthcare and nutritional information (Zerihun et al., 2016).

Although maternal nutrition is critically important for both mother and infant's health and development, there are knowledge gaps regarding the nutritional status of lactating mothers, particularly in urban settings like Dhaka City. There has been intense research on maternal nutrition during the pregnancy period, but less focus has been given to the postpartum stage especially during the lactational phase. Comprehensive studies focusing particularly on the lactational phase remain underemphasized. Given that there are differences in dietary habits, healthcare access and utilization, lifestyle etc. in urban areas, there is a limitation in studies that fully capture the specific needs and unique challenges faced by the women in urban settings compared to those coming from rural settlements. Our present study, therefore, aims to assess the nutritional status and the factors that are associated with it, attending a maternal neonatal child health (MNCH) care facility in Dhaka City, Bangladesh. Findings from this study can help to design appropriate nutritional interventions that can better target the needs of specific sub-groups of women, and over time will contribute to improved maternal and child health in Bangladesh and other similar settings. In the long run this will reduce the intergenerational cycle of malnutrition in Bangladesh, given the close association between maternal health and child health.

1.1 Research Question

What are the factors associated with the nutritional status of lactating mothers who are receiving services from an urban healthcare facility in Dhaka?

1.2 General Objective To determine the nutritional status of lactating mothers attending an urban MNCH facility in Dhaka city.

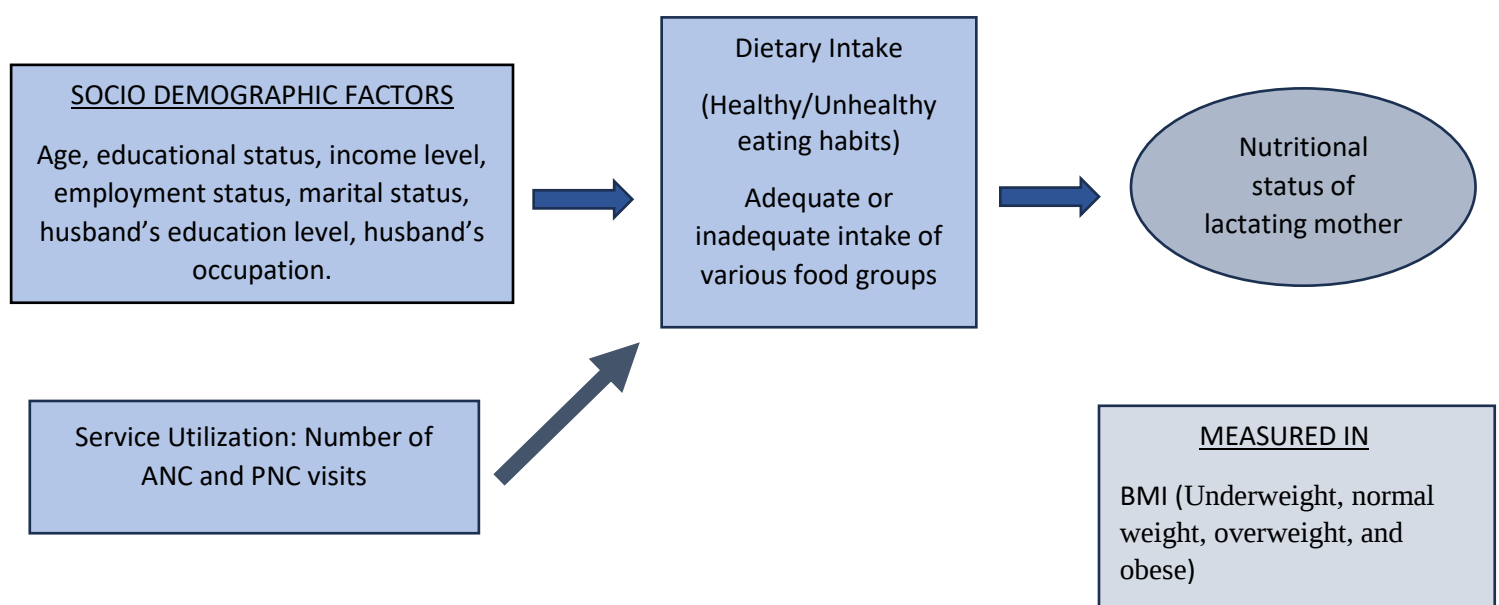
1.2.1 Specific Objectives

- To assess the prevalence of malnutrition (undernutrition or overnutrition) among lactating mothers who are receiving services from an urban MNCH facility in Dhaka city.
- To assess the factors associated with the nutritional status of lactating mothers who are receiving services from an urban MNCH facility in Dhaka city.

1.3 Conceptual framework

Various socio-demographic factors, dietary patterns, and lifestyle habits play a pivotal role in shaping the nutritional condition of lactating mothers. Lactating mothers age, educational attainment, income, and employment status are some of the key socio-demographic variables linked to maternal nutritional outcomes. Also partners education and economic status may influence a mother's dietary patterns ultimately influencing her BMI (Hasan et al., 2020). Mothers with higher education levels and having better socioeconomic conditions tend to have better access to nutritious food and healthcare, thereby maintaining a healthy BMI. Higher educational attainment provides them better knowledge regarding nutrition and health enabling them to make informed dietary choices that promote well-being. Additionally, improved socioeconomic status provides the financial means to afford a diverse and balanced diet, as well as access to quality healthcare services. This combination of knowledge and resources facilitates healthier lifestyle practices, reducing the risk of undernutrition or overnutrition (Hasan et al., 2020).

Dietary diversity is another important determinant of nutritional status when it comes to lactating mothers. Research has shown that lactating mothers who consume a diverse range of foods—especially those rich in protein, vitamins, and minerals—are more likely to maintain a proper and healthy weight and be in the normal range of BMI. But then again in contrast, mothers with limited access to nutritious foods often struggle with undernutrition or obesity, depending on their local food environment (Seid & Cherie, 2022e). If the antenatal and post-natal checkups taken up by the mother during and after her pregnancy include nutritional advice, they also may have an indirect effect on BMI. Thus, nutritional status of lactating mothers is influenced by a complex interplay of socio-demographic factors, dietary diversity and environmental conditions. These determinants will help us in understanding the variations in BMI categories—underweight, normal weight, overweight, and obese—in lactating mothers.



2. Methodology

2.1 Study design

A cross-sectional, facility-based study was conducted to assess the nutritional status of lactating mothers and its associated factors within an urban healthcare facility in Dhaka City

2.2 Study site

Radda Maternal and Child Health- Family Planning Centre, Mirpur-1 & 10, Dhaka Bangladesh.

2.3. Study Population

For the purpose of our study the study population comprised of lactating mothers over 18 years of age with infants aged 0-6 months who visited two Radda MCH-FP centers for PNC and EPI services. Inclusion criteria included lactating mothers with children aged 0-6 months attending their 2nd or subsequent PNC visits and had given informed written consent. Our exclusion criteria included lactating mothers who had chronic health condition, not lactating at the moment or maybe unable to communicate properly. Respondents also had the liberty to withdraw from the interview at any given time or skip any question as per their convenience.

2.4 Sample Size Calculation

We used the prevalence from BDHS data of 2022 for women falling in the category of being overweight between the ages of 20-49 in Dhaka city which was 32.7%%. The sample was calculated using the formula, $n = z^2pq/d^2$, with a 5% margin of error, 95% confidence interval. $n = Z^2 \times p \times (1-p) / e^2$.

Where:

- n = required sample size,
- Z = Z value (for 95% confidence level, the Z value is 1.96),
- p = the estimate prevalence (6.9% OR 0.069),
- e= the margin of error, usually set at 5% (0.05).

1. Initial Sample Size Without Non-Response Adjustment:

Substituting the values:

$$n = \frac{(1.96)^2 \times 0.327 \times (1-0.327)}{(0.05)^2}$$

Adjust for Non-Response Rate (10% or 0.10):

$$\frac{n}{1-0.10}$$

The initial sample size calculated is approximately **338**. After adjusting for a 10% non-response rate, the final required sample size is **375.74 or roughly 376** participants. However, due to time and resource constraints and also having a higher non response rate data could be collected from 342 participants.

2.5 Sampling Strategy

For the purpose of our study convenience sampling was done. Lactating mothers who had children under 6 months of age and were visiting the facility to take either PNC or EPI services for their child were approached and data was collected from those who were willing to participate in our study after giving written consent.

2.6 Data collection

Data was collected using a standard questionnaire with the help of Kobo toolbox, a digital platform for field data collection. A structured questionnaire was designated to collect socio-demographic, dietary, and other relevant information. For socio demographic data the variables of focus were: - age of the respondent, religion, education level of the respondent and her husband, occupation of the respondent and her husband , wealth quintile, family size, monthly income etc. Dietary adequacy was assessed by using a 24-hour dietary diversity recall, it focused on whether participants consumed food from at least five food groups and a specific emphasis was placed on the intake of sugary foods, sweets, and sweetened beverages to evaluate dietary patterns.

For nutritional status, measurements of the mother's height and weight were taken to calculate BMI using the formula: BMI = Weight (kg) / height (m²). All anthropometric measures were conducted in accordance with WHO recommendations and FANTA anthropometry guide.

2.7 Data Collection tools

The data collection tools were a portable electronic weight machine known as TANITA, Model UM-070 was used to measure the weight and the height was measured using a locally made height board.

2.8 Anthropometric Measurements

Weight measurement: Calibration was ensured on each day of data collection. While standing upright on the weighing scale, the individuals were instructed to take off their shoes and any

apparel that would alter their body weight. Measurements were made to the closest 0.1 kilogram.

Height measurement: Subjects stood upright on their bare feet while their height was measured using a portable height meter with a movable head piece. We took measurements to the closest 0.1 cm. Each subject's BMI was determined by dividing their weight (kg) by their height (m²).

2.9 Outcome variable

Outcomes Variable: For nutritional status, primary outcome variable was:

BMI: Underweight, normal weight, overweight, and obese. The BMI categorization in accordance to WHO is given below which will be applicable for our study as well (World Health Organization: WHO, 2010).

- **Underweight:** BMI less than 18.5
- **Normal weight:** BMI 18.5 to 24.9
- **Overweight:** BMI 25.0 to 29.9
- **Obesity:** More than or equal to 30

2.10 Data management

- Once all responses were received, responses were checked for completion and validity. Regular monitoring and data cleaning was ensured.
- Statistical software, Stata version -17 was used for data coding, entry, and cleaning including the identification and correction of missing and/or implausible values.

2.11 Quality control

Detailed and properly written standard operating procedures were ensured in each step of data collection to minimize variations across different data collectors. Regular calibration of the weight scales, height measuring tools were performed to ensure accuracy of our outcome variables. Thorough review of the collected data was performed to identify any outliers or inconsistencies.

2.12 Statistical Analysis

Statistical analysis was done using Stata version 17. Socio-demographic characteristics were summarized using frequencies and percentages. BMI categories were summarized using bar charts to visualize the distribution of participants into underweight, normal weight, overweight, and obese groups. Chi-square tests were used to look into the associations between categorical variables. A multivariate regression model was run with BMI as a continuous outcome variable and the predictor variables included were age, education, wealth quintile, occupation, husband's

education, and sugary food intake. Coefficients, 95% confidence intervals, and p-values were reported.

Logistic regression was conducted and adjusted odds ratios (AORs) was found with a 95% confidence interval to evaluate the likelihood of a respondent being overweight/obese based on socio-demographic factors and dietary patterns. 24-hour dietary diversity scores were categorized into adequate (≥ 5 food groups) and inadequate (< 5 food groups). The intake of sugary foods, sweets, and beverages was specifically looked into find if there is any association of these specific food groups with BMI.

2.13 Ethical Considerations

The study followed international research rules and applied for ethics approval from an Institutional Review Board (IRB). For the study, the IRB approval was obtained from BRAC James P Grant School of Public Health. This IRB approval ensured that our study met the rigorous ethical standards and safeguard the participant's rights and welfare. Obtainment of informed consent, maintenance of data confidentiality, and reducing participant hazards was also a part of our ethical consideration. The consent form was written in easy language that was thoroughly explained to the study participants.

3. Findings

3.1 Socio-Demographic information of the participants

Table 1 presents the frequency and percentage distribution of various socio-demographic characteristics among lactating mothers. It was observed that the mean age of the participants was approximately 26 years, with the majority (39.7%) in the age group of 21-25 years. Most of our participants (98.2%) were Muslims. Nearly half of the respondents (40%) studied up to Bachelor's degree or higher. Similarly, over half of the husbands of the respondents (52.3%) had a Bachelor's degree or higher. 46.4% of the husbands were job holders. Majority of our respondent's family size consisted of 4 members. The median monthly income was BDT 50,000, with an interquartile range of BDT 25,000 to 80,000. The wealth distribution is nearly even across different wealth quintiles, with each representing approximately 20%. Most of our participants were home makers which was about 79. Around 70% of the mothers had taken more than 4 ANC visits. Most of our respondents had for taken only 1 to 3 PNC services.

Table 1: Socio-Demographic information of the participants

Variables	Frequency (n)	Percentage (%)
Age of the lactating women		
18-20 years	39	11.4
21-25 years	136	39.7
26-30 years	121	35.3

>30 years	46	13.4
Mean age ($\pm$ SD)	25.98($\pm$...)	
Religion		
Islam	336	98.2
Others	6	1.7
Respondents Education level		
Primary	57	16.67
Secondary	63	18.4
Higher secondary	85	24.8
Bachelor's and above	137	40.0
Respondent's main occupation over the past 12 months		
Homemaker	271	79.2
Job Holder	71	20.76
Wealth quintile		
Lowest	69	20.1
Second	68	19.8
Middle	69	20.1
Fourth	68	19.8
Highest	68	19.8
Family size		
3	93	27.19
4	132	38.60
≥ 5	117	34.21
Husband's education		
Primary	52	15.1
Secondary	47	13.7
Higher secondary	64	18.7
Bachelor's and above	179	52.3
Husband's occupation		
Day laborer	38	11.11
Employer	204	59.65
Businessman	100	29.24
Husbands Age		
≤ 25 yrs	82	23.98
26-30 years	121	35.38
>30 years	139	40.64
Monthly income in BDT		

Median	50,000	
Q1	25,000	
Q3	80,000	
IQR	55,000	
Monthly income in BDT		
<50,000	146	45.34
50,000-100000	111	34.47
>=100000	65	20.19
ANC Visits		
<=4ANC	72	21.05
>4ANC	270	78.95
PNC Visits	Freq.	Percent
None	96	28.15
1-3	214	62.76
≥ 4	27	7.92
Don't know	4	1.17

3.2 Dietary Diversity of the lactating mothers

Looking into the dietary diversity it was seen that most participants (74.56%) consumed food from five or more food groups.

Table 2: Dietary Diversity of the lactating mothers

Dietary diversity		
Food groups ≥ 5	255	74.56
Food groups <5	87	25.44

3.3 Nutritional status of the lactating mothers

The mean BMI of our study participants is 25.86. The distribution of BMI in accordance to the WHO cutoffs showed a significantly higher prevalence of overweight and obesity. More than half of our study respondents were overweight (53%) or obese (11%). Only 3% were classified as underweight.

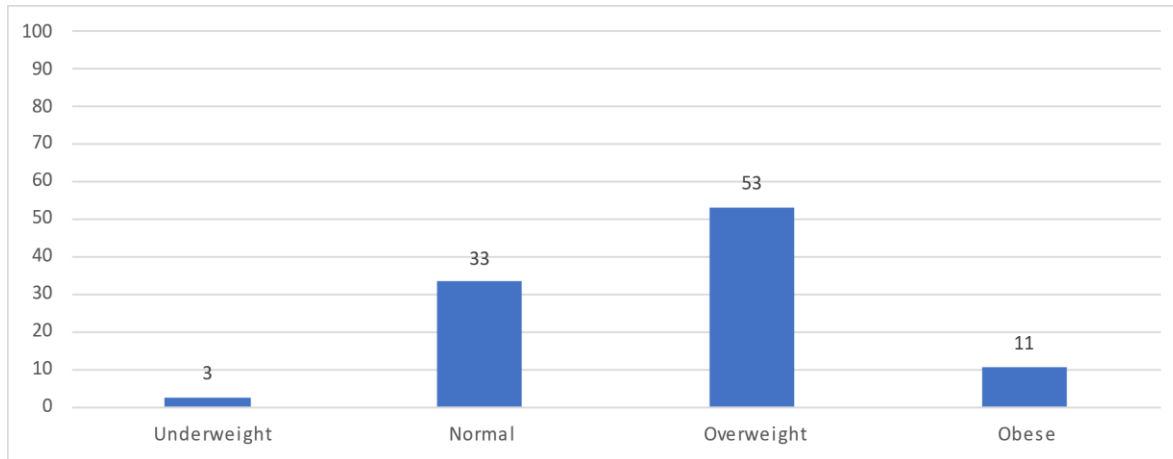


Figure 1 percent distribution of the nutritional status of lactating mothers

3.3.1 Factors associated with BMI of the lactating women

Table 3 uses BMI as a continuous outcome variable to assess its relationship with age, wealth, education, and other variables. BMI increased significantly with age. For women aged >30 years, the coefficient was 3.63 (95% CI [2.06, 5.19], $p < 0.001$), indicating a significant rise in BMI compared to the reference group of (18-20 years). When it came to the wealth index only the middle wealth quintile showed a negative association with BMI (coefficient = -1.37, 95% CI [-2.56, -0.19], $p = 0.024$). No significant effect was observed in other wealth categories. Women with higher secondary education had a significant positive association with BMI (coefficient = 1.47, 95% CI [0.07, 2.87], $p = 0.04$). Husbands with Bachelor's degrees positively influenced BMI (coefficient = 2.08, 95% CI [0.46, 3.69], $p = 0.012$). Sugary food consumption was positively associated with BMI (coefficient = 0.75, 95% CI [0.01, 1.48], $p = 0.046$). Consumption of sweetened beverages showed a borderline negative trend but were not statistically significant (coefficient = -0.73, $p = 0.088$).

Table 3: Factors associated with BMI

Variables	Coefficient (95%CI)	P-value
Age of the lactating mother		
18-20 years	Reference	
21-25 years	0.92[-0.33,2.17]	0.148
26-30 years	1.54[0.21,2.87]	0.024
>30 years	3.63[2.06,5.19]	<0.001
Wealth quintile		
First	Reference	
Second	-0.03[-1.2,1.13]	0.955
Middle	-1.37[-2.56, -0.19]	0.024

Fourth	0.58[-0.77,1.94]	0.399
Highest	0.24[-1.24,1.72]	0.752
Respondent's education level		
Primary	Reference	
SSC complete	-0.46[-1.76,0.84]	0.489
HSC complete	1.47[0.07,2.87]	0.04
Bachelor and above	0.51[-1.14,2.15]	0.546
Husbands Education		
Primary	Reference	
SSC complete	0.86[-0.59,2.31]	0.245
HSC complete	0.92[-0.53,2.38]	0.212
Bachelor and above	2.08[0.46,3.69]	0.012
Respondent's main occupation over the past 12 months		
Homemaker	Reference	
Job Holder	-0.43[-1.4,0.54]	0.387
Husbands Occupation		
Day laborer	Reference	
Employer	0.12[-1.16,1.4]	0.859
Businessman	0.61[-0.7,1.92]	0.36
Intake of sugary food, sweet and sweetened beverages		
Sugary Food		
No	Ref	
Yes	0.75[0.01,1.48]	0.046
sweets		
No	Ref	
Yes	-0.63[-1.43,0.17]	0.124
Sweetened Beverage		
No	Ref	
Yes	-0.73[-1.58,0.11]	0.088

3.3.2 BMI and income

The Pearson's correlation coefficient is 0.185 which indicates a weak correlation between BMI and monthly income of the respondents.

The slight upward slope of the red line suggests a weak positive correlation between income and BMI, which means higher income might be associated with slightly higher BMI on average.

Scatter and Variability: The blue dots are widely spread, indicating significant variability in BMI for any given income level. This suggests income alone is not a strong determinant of BMI.

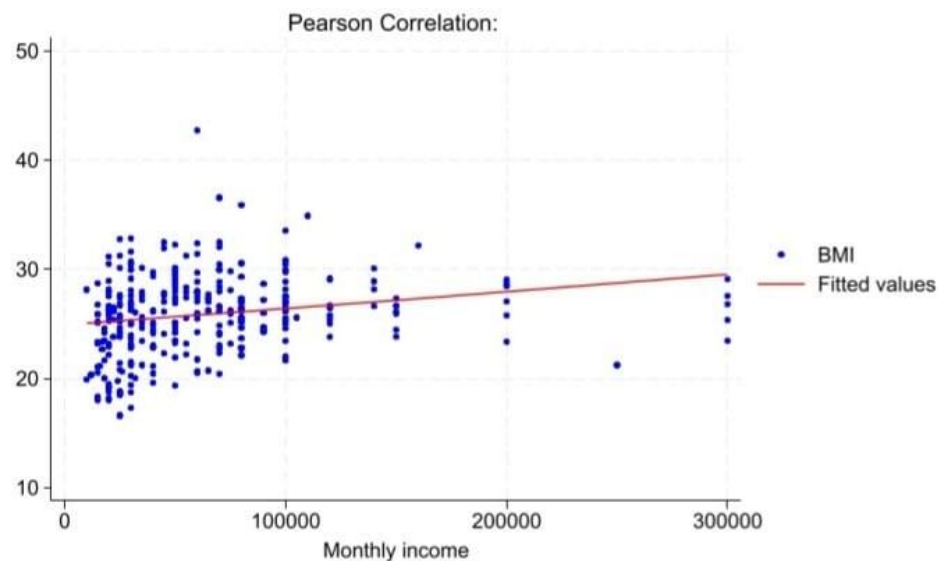


Figure 2 Scatter plot graph showing relationship between monthly income and BMI

3.3.3 Factors associated with the nutritional status of the lactating mothers

Table 4 examines the association between socio-demographic variables and BMI categories (underweight/normal, overweight, and obese) using chi-square analysis. A significant association of BMI was found ($p < 0.001$), with the age of the participants. The prevalence of overweight increased with age, peaking at 62.8% in the 26-30 years age group. Obesity was highest among women >30 years (30.4%), highlighting an age-related trend in higher BMI. The association with the wealth index was also statistically significant ($p < 0.001$). Women in the fourth wealth quintile had the highest prevalence of being overweight (69.1%), while obesity was slightly more common in the highest wealth quintile (7.4%). Women in lower wealth quintiles were predominantly in the underweight/normal category. The variable Family size was not statistically significant ($p = 0.104$). However, women with 4 members in the household showed a trend toward being overweight (60%). Respondent's main occupation over the past 12 months also showed statistical significance ($p = 0.039$). Job holders had a higher prevalence of being overweight

(66.2%) compared to homemakers (49.82%). Husband's educational status showed significant association ($p < 0.001$). Women whose husbands had educational attainment up to Bachelor's level were more likely to be overweight (66.48%). Husband's occupation also had a significant association ($p = 0.049$). Husbands who were employer, had partners with higher overweight prevalence (58.82%, $p=0.049$).

Table 4: Factors associated with the Nutritional Status of lactating mothers:

	BMI				
	Underweight and normal	Overweight	Obese	Chi ²	p-value
Age of the lactating mothers				44.9	<0.001
18-20yrs	66.7	25.6	7.7		
21-25yrs	40.4	52.2	7.4		
26-30yrs	28.9	62.8	8.3		
>30yrs	15.2	54.4	30.4		
Wealth quintile				52.1	<0.001
Lowest	52.2	40.6	7.3		
Second	42.7	39.7	17.7		
Middle	53.6	39.1	7.3		
Fourth	16.2	69.1	14.7		
Highest	14.7	77.9	7.4		
Respondent's education level				56.7	<0.001
Primary	58.0	31.6	10.5		
Secondary	63.5	30.2	6.6		
Higher secondary	29.4	55.3	15.3		
Bachelor's and above	18.6	71.5	10.2		
Family size				7.7	0.104

3 members	43.1	50.5	6.5		
4 members	28.0	60.0	12.9		
>=5	39.3	48.7	12.0		
Respondent's main occupation over the past 12 months				6.5	0.039
Homemaker	39.11	49.82	11.07		
Job Holder	23.94	66.20	9.86		
Husband's education level				43.69	<0.001
Primary	61.54	32.69	5.77		
Secondary	55.32	29.79	14.89		
Higher secondary	42.19	50.00	7.81		
Bachelor's and above	21.23	66.48	12.29		
Husbands Occupation				9.53	0.049
Day laborer	50.00	42.11	7.89		
Employer	32.35	58.82	8.82		
Businessman	38.00	46.00	16.00		

3.3.4 Logistic regression model of nutritional status of lactating mother by socio-demographic and dietary variables

Table 5 explores the odds of being overweight/obese compared to being underweight/normal based on socio-demographic and dietary variables. Age had a strong association with higher BMI. As the age increased, the likelihood of being overweight/obese increased. Women aged >30 years were nearly 10 times more likely to be overweight/obese compared to their counterparts aged 18-20 years (AOR = 9.98, 95% CI [2.72, 36.54], p = 0.001). In comparison to mothers who had attained only a primary level of education, mothers with a higher secondary education had 3.02 times more likelihood of being overweight or obese. When it came to attainment of education participants who had achieved a higher secondary level of education significantly increased the odds of being overweight/obese (AOR = 3.02, 95% CI [1.13, 8.02], p = 0.026).

Although my bachelor's degree showed a positive trend, it was not significant (AOR = 2.09, $p = 0.22$). Mothers belonging to the middle wealth quintile had 63% lower odds of being overweight or obese compared to those in the lowest quintile (AOR: 0.37; $p = 0.023$). Mothers who had the history of consuming sugary foods frequently had 2.73 times higher odds of being overweight or obese in comparison to those who didn't consume sugary foods. Surprisingly one counterintuitive finding was consumption of sweets (AOR: 0.40; $p = 0.003$) was associated with 60% lower odds of being overweight or obese.

Table 5: Logistic regression model of nutritional status of lactating mother by socio-demographic and dietary variables

Variables	Adjusted Odds Ratio(95%CI)	P-Value
Age of the lactating mothers		
18-20yrs	Reference	
21-25yrs	3.08[1.24,7.66]	0.016
26-30yrs	3.81[1.43,10.13]	0.007
>30yrs	9.98[2.72,36.54]	0.001
Respondent's education level		
Primary	Reference	
SSC complete	0.61[0.25,1.48]	0.276
HSC complete	3.02[1.13,8.02]	0.026
Bachelor and above	2.09[0.64,6.84]	0.22
Wealth Quintile		
Lowest	Reference	
Second	0.83[0.37,1.8]	0.66
Middle	0.37[0.16,0.87]	0.023
Fourth	2.14[0.78,5.88]	0.137
Highest	1.51[0.49,4.62]	0.473
Respondent's main occupation over the past 12 months		
Homemaker	Reference	
Job holder	0.97[0.45,2.05]	0.928
Husbands Education		
Primary	Reference	
SSC complete	1.34[0.49,3.63]	0.564
HSC complete	1.96[0.72,5.32]	0.189
Bachelor and above	2.73[0.85,8.74]	0.092
Husbands Occupation		
Day laborer	Reference	

Employer	0.63[0.26,1.51]	0.3
Businessman	0.73[0.29,1.79]	0.491
Intake of sugary food, sweet and sweetened beverages		
Sugary Food		
No	Ref	
Yes	2.73[1.53,4.89]	0.001
sweets		
No	Ref	
Yes	0.40[0.22,0.73]	0.003
Sweetened Beverage		
No	Ref	
Yes	0.56[0.30,1.05]	0.072

4. Discussion

The nutritional status of lactating mothers is a critical determinant of both maternal and child health outcomes. The facility-based cross-sectional study assessed the nutritional status of lactating women attending an urban MNCH facility in Dhaka City.

The study found that more than half of the women had BMI ≥ 25 (53% overweight and 11% obese) which is consistent with global trends showing an increasing incidence of overweight and obesity in urban populations (Ahmad et al., 2020b). In an analysis of Bangladesh Demographic and Health Survey (BDHS) data 2022 it was revealed that the combined prevalence of overweight and obesity among women of reproductive was 55.5%, with a much higher prevalence in urban areas (63.7%) in comparison with the rural areas(52.3%) (National Institute of Population Research and Training [NIPORT], Mitra and Associates, & ICF, 2022). Age, wealth, and education levels were all strongly linked to an increased chance of being overweight or obese (Ahmad et al., 2020) which is consistent with the current study findings.

In a study conducted in Dessie town, Ethiopia, 21% of lactating mothers had a mean body mass index (BMI) of 22.5 kg/m², which falls in the normal range of BMI(Seid & Cherie, 2022c). Similarly, a study conducted in Dire Dawa, Ethiopia, revealed that 26.9% of nursing mothers had undernutrition, with a mean BMI of 21 kg/m² (Tariku et al., 2022c). These figures contrast with our findings, where our mean BMI was 25.8 which falls in the overweight category, suggesting that urbanization and associated lifestyle changes in Dhaka may contribute to higher rates of overweight and obesity among lactating mothers.

Mothers who were over 30 years of age had a higher chance of being overweight or obese compared to mothers under 30 years of age ($p < 0.001$), indicating that age was a major factor influencing BMI. These results are consistent with research conducted in related settings, where

older mothers BMIs were higher as a result of metabolic alterations and lower physical activity (Khudri et al., 2024). A pooled study analyzing five national cross-sectional surveys reported that overweight and obesity rates among women aged 30 years and above have significantly increased in Bangladesh suggesting that older reproductive-aged women are more vulnerable to increasing BMI (Chowdhury et al., 2018) .

Another critical determinant of nutritional status was education level. Lactating mothers who had finished up to higher secondary level that is 12th standard showed a positive correlation with increased BMI ($p = 0.04$). Women who have studied only up to higher secondary level in comparison to those who have attained a bachelor's degree and above may not yet have advanced nutritional knowledge. There is a possibility that they might consume calorie-rich but less nutritious diets. This also aligns with the fact that an increased wealth index or better access to resources may not always correlate with healthy eating habits (M. A. Rahman et al., 2019).

Study conducted in Iraq and published in the Medical Journal of Babylon showed that women's education level attainment had a significant influence on family dietary intake and the status of overweight or obesity. Notably, women with higher education levels did not always make healthier dietary choices, indicating that education alone doesn't equate to nutritional awareness or intake to nutritious food (Ahmed & Hameed, 2021).

A significant correlation was seen between lactating mother's occupation and BMI ($p = 0.039$). Compared to those participants who were job holders, homemakers were more likely to be underweight, this could be as a result of differences in physical activity levels and also resource availability. However, regression analyses indicated no significant impact of occupation after adjusting for other variables, aligning with literature suggesting indirect effects of employment on nutritional status through income and autonomy (Oddo et al., 2017). Studies suggest that a woman's nutritional state may be indirectly impacted by her employment, which can increase her financial resources and decision-making authority. Increased autonomy from work may also improve women's nutrition, according to a Bangladeshi study that revealed maternal autonomy in family decisions was linked to improved nutrition outcomes for children (Rahman et al., 2015).

Husbands educational level had a positive correlation with mothers' BMI, particularly those with a bachelor's degree or above ($p = 0.012$). This illustrates the impact of socioeconomic dynamics inside the house, wherein partners with greater education may positively influence the nutritional status and food diversity of the mother. Similar trends were noted in earlier studies, highlighting the impact of spousal education on health outcomes.

In our study the consumption of food with high sugar content was a significant predictor of higher BMI among lactating mothers, with an odds ratio of 2.73 ($p = 0.001$) which indicated a strong association between sugary food intake and overweight or obesity. But conversely, sweets showed an inverse relationship with overweight status (AOR = 0.40; $p = 0.003$), this could be potentially due to differential reporting or influence of cultural dietary practices. Sweetened beverages did not exhibit a significant association with BMI. Rapid urbanization in metropolitan

cities like Dhaka has accelerated dietary transitions, with a notable rise in the availability and affordability of energy-dense but nutrient-poor foods. A study conducted in urban India reported that higher consumption of sugar-sweetened foods and beverages contributed significantly to obesity, particularly among women with higher disposable income and limited nutritional literacy (Mishra et al., 2020).

5.Limitations

Our study had some limitations first of all it was a hospital-based, which based solely on lactating mothers attending an urban MNCH facility and this may not fully represent the broader community perspective, including those without access to such healthcare facilities. Resource and time constraints also limited our scope of data collection thus preventing a more extensive sampling of diverse populations. Additionally, the cross-sectional design of our study only captured associations at a single point in time, restricting the ability to infer causal relationships between variables such as BMI, dietary habits, and socioeconomic factors.

6.Conclusion

Our study emphasizes the multifaceted factors affecting the nutritional status of lactating mothers putting into perspective the increasing prevalence of overweight and obesity, particularly among older mothers. Maternal education attainment seemed to be a significant driver, with higher secondary education linked to higher BMI, maybe as a result of less dietary understanding and knowledge regarding nutritious food consumption especially during the lactational period. Dietary patterns, particularly high sugary food intake, further exacerbated the risk of overweight and obesity. Additionally, indirect effects of socioeconomic factors, including wealth and educational attainment of the husband, were consistent with global findings, underscoring the role of household dynamics in shaping maternal health. All these findings call for targeted interventions addressing dietary practices, socioeconomic disparities, and education to improve the nutritional outcomes for lactating mothers in the rapidly changing context of urban settings.

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Annex:

Stata Do File: *****Data analysis SLP Nutrition*****Chohor-20*****

```
use "D:\IT_BaCKUp\Downloads\SLP_Nutrition_V1V2_20241215.dta",clear
```

```
*/
```

```
BMI <18.5: underweight
```

```
BMI 18.5-24.9: normal weight
```

```
BMI ≥25.0: overweight
```

```
BMI ≥30.0: obesity.
```

```
*/
```

```
**Height
```

```
gen wht = wawa_807a
```

```
**Weight
```

```
gen wewt = wawa_808a
```

```
gen wht_m = wht/100
```

```
*****
```

```
gen bmi = wewt/wht_m^2
```

```
gen bmi_cat=bmi  
replace bmi_cat=0 if bmi<18.50  
replace bmi_cat=1 if bmi>=18.50 & bmi<25  
replace bmi_cat=2 if bmi>=25 & bmi<30  
replace bmi_cat=3 if bmi>=30 & bmi!=.
```

```
lab var bmi_cat "Body Mass Index"  
label define bmi_cat 0 "Underweight" 1 "Normal" 2 "Overweight" 3 "Obese"  
label values bmi_cat bmi_cat  
tab bmi_cat
```

```
***** wealth index WB NNS panel data*****
```

```
*****Asset*****
```

```
**rename*,lower
```

```
gen wwi_elec=wse_112a==1  
gen wwi_sole=wse_112b==1  
gen wwi_radio=wse_112c==1  
gen wwi_tva= wse_112ca==1  
gen wwi_moph=wse_112d==1  
gen wwi_telph=wse_112da==1  
gen wwi_comp=wse_112db==1  
gen wwi_dvd=wse_112dc==1  
gen wwi_elfan=wse_112e==1  
gen wwi_khat=wse_112f==1  
gen wwi_alm=wse_112g==1  
gen wwi_ref=wse_112h==1  
gen wwi_air=wse_112ha==1  
gen wwi_tabl=wse_112i==1  
gen wwi_wat=wse_112j==1  
gen wwi_bic=wse_112k==1  
gen wwi_moto=wse_112l==1  
gen wwi_auto=wse_112la==1  
gen wwi_ani=wse_112m==1  
gen wwi_car=wse_112n==1  
gen wwi_boat=wse_112o==1  
gen wwi_ingi=wse_112p==1  
gen wwi_rick=wse_112q==1  
gen wwi_pow=wse_112r==1  
gen wwi_watp=wse_112s==1  
gen wwi_plow=wse_112t==1
```

```

gen wwi_ips=wse_112u==1
gen wwi_net=wse_112v==1

/// *Type of wall material*

tab wse_113
tab wse_113,nolabel

gen wwi_playw=wse_113==6
gen wwi_cardbod=wse_113==7
gen wwi_tin=wse_113==8
gen wwi_cement=wse_113==9

gen wwi_woodp=wse_113==11

*****Type of roof material*
tab wse_114

tab wse_114,nolabel

**replace wse_114=13 if wse_114t==""

gen wwi_woodplan=wse_114==4
gen wwi_tinroof=wse_114==6
gen wwi_cemeroof=wse_114==9

*****Type of floor material*
tab wse_115
tab wse_115,nolabel

gen wwi_earflo=wse_115==1
gen wwi_woodflo=wse_115==2

gen wwi_cermtflo=wse_115==4
gen wwi_bricfloo=wse_115==5
gen wwi_mojfloo=wse_115==6

*****Cooking fuel use in household*****
tab wse_110
tab wse_110,nolabel
gen wwi_elecfu=wse_110==1
gen wwi_lpfu=wse_110==2 | wse_110==3
gen wwi_woodfu=wse_110==7
gen wwi_strawfu=wse_110==8

```

```

***** Drinking water- main source*
tab wwh_201
tab wwh_201,nolabel
tab wwh_201t
replace wwh_201=16 if wwh_201t=="Boiled Water"
replace wwh_201=16 if wwh_201t=="Filtered Water"
replace wwh_201=14 if wwh_201t=="WASA"

gen wwi_pipwe=wwh_201==1 | wwh_201==2 | wwh_201==3
gen wwi_shardw=wwh_201==4
gen wwi_hhw=wwh_201==5
gen wwi_watank=wwh_201==10
gen wwi_samtank=wwh_201==14
gen wwi_bott=wwh_201==15
gen wwi_filter=wwh_201==16

tab wwh_205
tab wwh_205,nolabel

*****

tab wwh_205
gen wimp_sani=0 if wwh_205==1 | wwh_205==2
replace wimp_sani=1 if wwh_205==4
tab wimp_sani

label var wimp_sani "Sanitation"
label define wimp_sani 0"Improved" 1"Not Improved"
label values wimp_sani wimp_sani
***Type of latrine*
gen wwi_pipswla=wwh_205==1
gen wwi_septla=wwh_205==2
gen wwi_ringsla= wwh_205==4

*****Share latrine*
gen wwi_room=waw_110c/wse_116

factor wwi_*, pcf
rotate
predict wwealth

```

```

xtile wquint=wwealth , n(5)
la def wquint 1 lowest 2 second 3 middle 4 fourth 5 highest

la val wquint wquint

tab wquint
*****Age Categorization of the respindents *****
tab wse_103a
sum wse_103a,d
gen age_cat=1 if wse_103a<=20
replace age_cat=2 if wse_103a>20 & wse_103a<26
replace age_cat=3 if wse_103a>25 & wse_103a<31
replace age_cat=4 if wse_103a>30 & wse_103a!=.

tab age_cat

lab var age_cat "Age of the respondents"
lab define age_cat 1"18-20yrs" 2"21-25yrs" 3"26-30yrs" 4">30yrs"
lab values age_cat age_cat
tab age_cat

*****Mean age of mother*****

tabstat wse_103a,stat(mean p50 sd p25 p75 iqr)

*****Educational attainment of the respondents*****

tab waw_105

gen edu_cat=0 if waw_105<=5
replace edu_cat=1 if waw_105==10
replace edu_cat=2 if waw_105==12
replace edu_cat=3 if waw_105>12
tab edu_cat

lab var edu_cat "Education"
lab define edu_cat 0"Primary" 1"SSC complete" 2"HSC complete" 3"Bachelor and above"
lab values edu_cat edu_cat

tab edu_cat

*****Monthly Income*****

tab wse_122

```

```
tabstat wse_122,stat(mean p50 sd p25 p75 iqr)
```

```
*****Categorization of the occupation of the respondents*****8
```

```
tab waw_106
```

```
tab waw_106,nolabel
```

```
gen occu_cat=1 if waw_106==19
```

```
replace occu_cat=2 if waw_106!=19
```

```
tab occu_cat
```

```
lab var occu_cat "Occupation"
```

```
lab define occu_cat 1"Homemaker" 2"Job holder"
```

```
lab values occu_cat occu_cat
```

```
tab occu_cat
```

```
****Husbands age categorization*****
```

```
*****Age *****
```

```
tab waw_109
```

```
sum waw_109,d
```

```
gen age_cath=1 if waw_109<=25
```

```
replace age_cath=2 if waw_109>25 & waw_109<31
```

```
replace age_cath=3 if waw_109>30 & waw_109!=.
```

```
tab age_cath
```

```
lab var age_cath "Age of the husbands"
```

```
lab define age_cath 1"<=25yrs" 2"26-30yrs" 3">30yrs"
```

```
lab values age_cath age_cath
```

```
tab age_cath
```

```
*****Husbands education ****
```

```
gen edu_cath=0 if waw_110a<=5
```

```
replace edu_cath=1 if waw_110a==10
```

```
replace edu_cath=2 if waw_110a==12
```

```
replace edu_cath=3 if waw_110a>12
```

```
tab edu_cath
```

```
lab var edu_cath "Husband education"
```

```
lab define edu_cath 0"Primary" 1"SSC complete" 2"HSC complete" 3"Bachelor and above"
```

```
lab values edu_cath edu_cath
```

```
tab edu_cath
```

*****Occupation categorization of the husband*****

tab waw_110b

tab waw_110b,nolabel

gen occu_cath=1 if waw_110b==5

replace occu_cath=1 if waw_110b==6

replace occu_cath=1 if waw_110b==14

replace occu_cath=1 if waw_110b==20

replace occu_cath=1 if waw_110bt=="Foreign workers"

replace occu_cath=2 if waw_110b==8

replace occu_cath=2 if waw_110b==9

replace occu_cath=2 if waw_110bt=="Freelancer"

replace occu_cath=2 if waw_110bt=="Dentist"

replace occu_cath=3 if waw_110b==10

replace occu_cath=3 if waw_110b==11

replace occu_cath=3 if waw_110bt=="Owner of computer (printing,photocopy and stationary)
shop"

tab occu_cath

lab var occu_cath "Husband occupation"

lab define occu_cath 1"Day labor" 2"Employer" 3"Businessman"

tab occu_cath

tab waw_110c

*****Family Size*****

gen family_size=1 if waw_110c==3

replace family_size=2 if waw_110c==4

replace family_size=3 if waw_110c>=5

lab var family_size "Family size"

lab define family_size 1"3" 2"4" 3">=5"

lab values family_size family_size

tab family_size

*****ANC visits categorization*****

tab mc_013

gen anc_cat=1 if mc_013<5

replace anc_cat=2 if mc_013>4

```
lab var anc_cat "ANC"
lab define anc_cat 1 "<=4ANC" 2 ">4ANC"
lab values anc_cat anc_cat
```

```
tab anc_cat
```

```
*****sugars*****
```

```
tab wawd_220a
tab wawd_220aa
gen sugarcats=0 if wawd_220a==2 | wawd_220aa==2
replace sugarcats=1 if wawd_220a==1 | wawd_220aa==1
```

```
lab var sugarcats "Savoury and fried snacks"
lab def sugarcats 0 "No" 1 "Yes"
lab val sugarcats sugarcats
tab sugarcats
```

```
*****Sweets*****
```

```
gen sweetscats=0 if wawd_221a==2 | wawd_221aa==2 | wawd_221ba==2
replace sweetscats=1 if wawd_221a==1 | wawd_221aa==1 | wawd_221ba==1
```

```
lab var sweetscats "Sweet food"
lab def sweetscats 0 "No" 1 "Yes"
lab val sweetscats sweetscats
tab sweetscats
```

```
*****drinks*****
```

```
tab wawd_222a
gen drinkscats=0 if wawd_222a==2 | wawd_222aa==2 | wawd_222ba==2 | wawd_222ca==2 |
wawd_222da==2
replace drinkscats=1 if wawd_222a==1 | wawd_222aa==1 | wawd_222ba==1 | wawd_222ca==1
| wawd_222da==1
```

```
lab var drinkscats "Sugar sweetened beverage"
lab def drinkscats 0 "No" 1 "Yes"
lab val drinkscats drinkscats
tab drinkscats
```

```
*****PNC Visits*****
```

```
br mc_131 mc_132
tab mc_132
gen pnc_cat=1 if mc_131 == 2
replace pnc_cat=2 if mc_132>=1 & mc_132<4
```

```

replace pnc_cat=3 if mc_132>=4 & mc_132!=.
replace pnc_cat=4 if mc_131==77
lab var pnc_cat "PNC Visits"
lab define pnc_cat 1"None" 2"1-3" 3"≥ 4" 4"Don't know"
lab values pnc_cat pnc_cat

```

```

tab pnc_cat

```

```

*****

```

```

tab bmi_cat age_cat,col nofreq

```

```

tab bmi_cat age_cat,col nofreq chi2

```

```

*****BMI 3 categories combining normal and underweight*****

```

```

gen bmi_cat3=0 if bmi_cat<=1
replace bmi_cat3=1 if bmi_cat>1 & bmi_cat<3
replace bmi_cat3=2 if bmi_cat==3
tab bmi_cat3

```

```

lab var bmi_cat3 "BMI categories"
la def bmi_cat3 0 "Underweight and normal" 1 "Overweight" 2"Obese"
la val bmi_cat3 bmi_cat3

```

```

tab bmi_cat3
tab bmi_cat3 age_cat,col nofreq
tab age_cat bmi_cat3,col nofreq
tab wquint bmi_cat3,col nofreq
tab family_size bmi_cat3,col nofreq
tab edu_cat bmi_cat3,col nofreq
tab occu_cat bmi_cat3,col nofreq
*****Chi-square tests*****

```

```

tab bmi_cat3 age_cat,col nofreq chi2
tab bmi_cat3 edu_cat,col nofreq chi2
tab bmi_cat3 family_size,col nofreq chi2
tab bmi_cat3 wquint,col nofreq chi2
tab bmi_cat3 occu_cat,col nofreq chi2
tab age_cat bmi_cat3,row nofreq chi2
tab edu_cat bmi_cat3,row nofreq chi2
tab occu_cat bmi_cat3,row nofreq chi2
*****BMI dichotomous categorization*****

```

```
gen bmi_cat2=0 if bmi_cat<=1
replace bmi_cat2=1 if bmi_cat>1
```

```
tab bmi_cat2
```

```
*****Regression having BMI as a continuous variable*****
```

```
regress bmi i.age_cat
regress bmi i.wquint
regress bmi i.family_size
regress bmi i.occu_cat
regress bmi i.edu_cat
regress bmi i.occu_cath
regress bmi i.edu_cath
mvreg bmi = i.age_cat i.wquint i.edu_cat i.family_size i.occu_cat i.occu_cath
tab bmi_cat2
```

```
logistic bmi_cat2 i.age_cat
logistic bmi_cat2 i.edu_cat
logistic bmi_cat2 i.wquint
logistic bmi_cat2 i.occu_cat
logistic bmi_cat2 i.occu_cath
logistic bmi_cat2 i.edu_cath
logistic bmi_cat2 sugarcath
logistic bmi_cat2 sweetscat
logistic bmi_cat2 drinkscat
```

```
logistic bmi_cat2 i.age_cat i.edu_cat i.wquint i.occu_cat i.edu_cath i.occu_cath sugarcath
sweetscat drinkscat
```

```
***Dierary diverstiy
```

```
*****
```

```
*****Dierary diverstiy *****
```

```
gen wawd10_starch=wawd_201a==1 | wawd_202a==1
gen wawd10_bepepuls=wawd_203a==1
gen wawd10_nutsle=wawd_204a==1
gen wawd10_dglv=wawd_205a==1
gen wawd10_vitafuveg=wawd_206a==1 | wawd_207a==1
gen wawd10_othfru=wawd_208a==1 | wawd_211a==1
gen wawd10_othveg=wawd_209a==1 | wawd_210a==1
gen wawd10_eggs=wawd_212a==1
gen wawd10_flesh=wawd_213a==1 | wawd_214a==1 | wawd_214aa==1 | wawd_215a==1 |
wawd_216a==1 | wawd_218a==1
```

```
gen wawd10_dairy=wawd_217a==1 | wawd_217aa==1
```

```
egen wawd10_score=rsum(wawd10_starch wawd10_bepepuls wawd10_nutsle wawd10_dglv  
wawd10_vitafuveg wawd10_othfru wawd10_othveg wawd10_eggs wawd10_flesh  
wawd10_dairy),missing
```

```
tab wawd10_score
```

```
gen insuf_dd = 0 if wawd10_score>=5 & wawd10_score!=.  
replace insuf_dd = 1 if wawd10_score < 5  
lab var insuf_dd "Dietary diversity"  
lab def insuf_dd 1 "Food groups <5" 0 "Food groups >= 5"  
lab val insuf_dd insuf_dd  
tab insuf_dd
```

```
*****Pearson correlation coefficient*****  
twoway (scatter income bmi, msymbol(o) mcolor(blue)) ///  
      (lfit income bmi, lcolor(red)), ///  
      title("Scatterplot of BMI vs Income") ///  
      subtitle("Pearson Correlation: `r(rho)'"') ///  
      xlabel(, grid) ylabel(, grid)  
pworth bmi income, sig
```

Consent Form:

Informed Consent Form for Study Participants

Protocol Title: Dietary Diversity, Nutritional Status, Infant and Young Child Feeding (IYCF) Knowledge and Practices among Lactating Mothers attending an Urban Health Care Facility in Dhaka, Bangladesh

Principal Investigators names: Fabliha Raidha, Tasbiha Tabassum, Umama Binte Delwar

Organization's name: BRAC JAMES P Grant School of Public Health

Funding: BRAC JAMES P Grant School of Public Health

Introduction:

Assalamu Alaikum/Adab, my name is Fabliha/Tasbiha/Umama, and I come from the BRACJames P Grant School of Public Health. We are conducting a study to assess the dietary diversity, nutritional Status, and Infant and Young Child Feeding (IYCF) related knowledge, practices, and barriers among lactating mothers of infants aged 0-6 Months in Radda MCH/FP in Mirpur, Dhaka, Bangladesh: a Cross-sectional study, funded by BRAC JPGSPH.

Purpose of the Study:

The purpose of this study is to assess the knowledge, practice and factors associated with dietary diversity, IYCF and nutritional status of lactating mothers with children aged 0-6 months.

Your Role as a Participant in this Study:

We are conducting a research study, and your participation involves a one-to-one interview. The interview will take approximately 45-60 minutes to complete. During this time, we will ask you questions related to dietary diversity, nutritional status, and knowledge and practices related to IYCF where the barriers will also be assessed. We will ask you questions on 24 hour recall of dietary intake and breastfeeding related knowledge and practices. We will assess your nutritional status by measuring Body Mass Index (BMI). This will involve recording your weight and height using a weighing scale that will be used for weight measurement and tape for height measurement. Please be assured that these measurements are completely non-invasive and will not cause any harm or discomfort. Your participation will help us gain valuable insights into maternal nutrition and health, which would be beneficial for mothers like you in the future.

Potential risks:

You don't have any risk of being physically or mentally harmed if you participate in this study. We may ask you some sensitive questions, which may make you a bit uncomfortable. However, if you wish not to answer any such sensitive or personal question, please let us know, and we will respect your decision.

Potential benefits:

There is no direct benefit from participating in this study. However, the data collected from the study will help to establish insightful findings that will help to design interventions promoting better health outcomes for lactating mothers residing in urban settings.

If you decide not to participate in this study:

Your participation in this research is voluntary. You have the right to know about the procedures, risks, and benefits of the study. You may choose not to participate or withdraw from the study at any time without any consequences.

Confidentiality:

All information collected in this study will be coded with a number and kept confidential. It will be stored in an encrypted file accessible only to authorized students and research staff. Your name or any other identifying information will not appear in any publications or results from the study. The Institutional Review Board (IRB) of BRAC James P Grant School of Public Health, BRAC University in Bangladesh has the authority to access all research records. If there is a need for future use of the collected data, only de-identified data will be provided to ensure your privacy, anonymity, and confidentiality.

Compensation or reimbursement policy:

We will not provide you any compensation in the form of money/food for participating in the study. The participation will be totally voluntary.

Right to withdraw from this study:

You may withdraw your consent at any time during the study without penalty or compensation.

Contact person for answering your questions about the study:

To learn about your rights as a research respondent or if you believe you have been harmed by participating in this research, you can contact the following people, Fabliha Raidha (Mobile number: +880168513053), Tasbiha Tabassum (Mobile number: +8801886244038), Umama Binte Delwar (Mobile number: +8801780612060). For ethical concerns, you can contact the Institutional Review Board: +880 1993-379512. Email: irb-jpgsph@bracu.ac.bd.

Voluntary agreement:

I have read the above information (or it has been read to me). I have had the opportunity to ask questions and have received satisfactory answers. I understand that my participation is voluntary and that I can withdraw at any time. I consent to participate in this study.

Photo consent:

I need to take your picture for our study purpose, however we can assure you it will not be shared with any unauthorized source, and your face will be blurred during display. If you agree, kindly provide your signature/thumb impression below.

Signature / Thumb Impression of Participant: _____

Thank you for your cooperation.

Signature / Thumb Impression of Participant: _____

Respondents ID: |__|__|__|__|__|__|__|__|

Contact Information (Respondent): _____

Name of Data Collectors: _____

Signature of Data Collectors: _____

Date: / /2024

Questionnaire:

Section 1A: Interview Related Information

- What is your name? (With nickname)
- What is your date of birth?

Section 1B: General Information (Lactating Mother's)

- What is your marital status?
- How many years of education have you completed?
- What was your main occupation over the last 12 months?
- Monthly income of the respondent
- Religion
- Remittance
- Wealth quintile related specific questions

Section 1C: General Information (Husband and Household)

- What is the name of your husband?
- What is the date of birth of your husband?
- What is your husband's main occupation over the last 12 months?
- What is your family size?
- What is the total monthly income of your household?
- What is the type of your family?

Section 2: Dietary Diversity

- Yesterday during the day or night, did you consume cereals (grain foods)?
- Did you consume starchy root and tubers?
- Did you consume pulses (beans, peas, chickpeas)?
- Did you consume nuts and oilseeds?
- Did you consume dark green leafy vegetables?
- Did you consume red/orange/yellow vegetables?
- Did you consume red/orange/yellow fruits?
- Did you consume vitamin C rich fruits?
- Did you consume vitamin C rich vegetables?
- Did you consume other vegetables?
- Did you consume other fruits?
- Did you consume eggs?
- Did you consume organ meat?
- Did you consume meat (e.g., chicken, duck, goat)?
- Did you consume small fish?
- Did you consume large fish/seafood?

- Did you consume milk and other dairy products (without sugar)?
- Did you consume sugary milk and dairy sweets?
- Did you consume oily and fatty foods?
- Did you consume savory and fried snacks?
- Did you consume sweet foods or candies?
- Did you consume sugar-sweetened beverages?
- Did you consume alcohol, soup, or other unlisted foods or drinks?

Section 3A: Information on ANC Visits

- Can you tell me how many times a pregnant woman should receive a medical check-up during pregnancy?
- When should the first ANC check-up take place?
- How or from which source/sources did you learn about ANC?
- Did you see (consult) anyone for antenatal care while pregnant with your child?
- How many times did you take ANC care during your last pregnancy?
- When did you take your first ANC visit during your last pregnancy?
- Where did you seek your first ANC visit?

Section 3B: Information on PNC Visits

- Did a healthcare provider or a traditional birth attendant check on your health after the delivery?
- How many times was a PNC checkup performed after delivery?
- Who provided the PNC checkup?
- From where did you seek the PNC checkup?