EXPLORING DIETARY SUPPLEMENT INTAKE DURING PREGNANCY: A CROSS-SECTIONAL STUDY OF PREGNANT WOMEN IN RANGPUR CITY

A PROJECT REPORT

BY

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Submitted to the Department of Nutrition and Food Engineering in the partial fulfilment of B.Sc. in Nutrition and Food Engineering

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APPROVAL

This Project titled "**Exploring Dietary Supplement Intake during Pregnancy: A Cross-Sectional Study of Pregnant Women in Rangpur City**", submitted by **Satara-E-Jannat**

the Department of Nutrition and Food Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfilment of the requirements for the degree of B.Sc. in Nutrition and Food Engineering and approved as to its style and contents.

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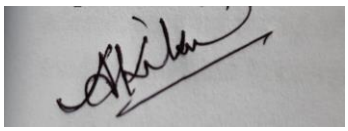

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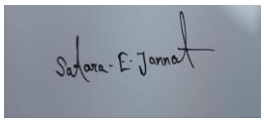

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ABSTRACT

Adequate nutrition during pregnancy is required to fulfil the growing demands of both maternal physiological alterations and fatal development. The current study sought to examine the types of dietary supplements consumed by pregnant women over the course of three trimesters by socio-demographic characteristics. The study was conducted across Rangpur, Bangladesh. This study's sample size is approximately 400 individuals. An interviewer administered a standardized questionnaire to collect data, and the findings were evaluated. Social support, as well as other socio-demographic and obstetric data, were gathered. Trimester-specific dietary supplement (DS) consumption and related characteristics were investigated; each patient consented to participate in the study. According to the statistics, all of the chosen women used supplements while pregnant. The most frequently used single nutrients were folic acid (17.6%), vitamin B (17.4%) Zinc (30.8%), calcium (72.5%), iron (72.9%), vitamin c (47.1%) multivitamin (31.1%). Throughout the first, second, and third trimesters of pregnancy, supplement intake fluctuated. In the third trimester, there was a larger use of calcium (14.1%), iron (39.8%) p-value <.000, and zinc (39.8%) p-value <.000 supplements. The usage of dietary supplements by maternal women residing in Rangpur city is consistent with the recommended daily use of various nutritional supplements. While 72.9%, 72.5%, 47.1%, and 3.8% utilized iron, calcium, vitamin C, and zinc, respectively. More efforts are needed to educate pregnant women and promote awareness about the necessity of supplement consumption, especially in defiant situations, in order to minimize maternal and fatal complications.

Keywords: Adequate nutrition; Dietary supplements; Pregnancy; Trimester; Maternal & Fatal complications.

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CHAPTER 1

INTRODUCTION

1.1 Background

In the human life cycle, pregnancy is a vital period. Nutritional requirements rise throughout pregnancy as the foetus grows, as do maternal tissues that support foetal growth. These rapid growth and development are facilitated by the nutrients that the mother's diet provides. A routine diet reduces the prevalence of several micronutrients, resulting in malnutrition and micronutrient deficiencies. A diverse diet therefore boosts the availability of nutrients necessary for healthy growth and development. It is possible to evaluate dietary variety on both an individual and household level. Household Dietary Diversity (HDD) is a proxy measure for household food access, whereas Individual Dietary Diversity (IDD) reflects nutritional adequacy of the diet. Numerous studies have confirmed that the individual dietary variety score is a reliable measure of the macro and micronutrient sufficiency of a diet. It has also been shown that pregnant women's food quality is linked to their weight increase during pregnancy and pregnancy outcomes. The current study sought to investigate the dietary diversity of pregnant women in Rangpur, Bangladesh. There have been very few research on the nutrition of pregnant women in Bangladesh (Ahmed E et al., 2019).

Likewise, dietary needs for healthy women may be increased according to the embryonic phase. (Morrison JL et al., 2016; Adelo et al., 2023). The use of food supplements is recognized as a significant nutrient resource essential for maintaining optimal health, even though balanced diets can meet the rise in nutrition demand associated with pregnancy. Pregnant women who may be at risk for dietary deficiencies in various essential minerals, including calcium, iron, folic acid, and vitamin D, are a growing issue. A considerable amount of studies has identified a link connecting insufficient nutrition for mothers and unfavorable newborn outcomes, poor infant survival, congenital malformations, the likelihood of chronic conditions, and later-life neurological difficulties (Adelo et al., 2023).

Based on the WHO, the cumulative total of prematurely and underweight infants borne is approximately 15 million and 20 million, accordingly (WHO, 2015; Gebremedhin et al., 2012). Due to insufficient consumption of fruits, vegetables, animal products, and fortified foods, women in nations with low or middle incomes endure several micronutrient deficiencies (WHO, 2004). As a result, over 95% of low birth weight babies are born in these countries (Koletzko et al., 2013). To reduce the incidence of preeclampsia, the WHO currently recommends adding calcium supplements as part of prenatal care for women who do not consume enough calcium in their diet. As far as we are aware, very few research have examined the overall amount of calcium consumed each day via food and supplements. A short survey revealed that 89% of gynaecologists and 10% of midwives advise their patients on calcium supplements. The majority of counselling (74%) was given to expectant Dutch mothers who were at high risk of developing preeclampsia. (Wilhelmse et al., 2020). In accordance to a recent US study, a

sizable portion of expectant mothers are not getting enough of many nutrients from their diet and supplements. For pregnant women in underdeveloped nations,

those with known iron insufficiency, and those with limited incomes, a more cautious approach suggests iron supplementation.

According to our findings, the most often utilized single nutrients were folic acid (17.6%), vitamin B (17.4%), zinc (30.8%), calcium (72.5%), iron (72.9%), vitamin C (47.1%), and multivitamins (31.1%). Supplement intake varied across the three pregnant trimesters. Calcium (14.1%), iron (39.8%), and zinc (39.8%)-containing supplements were used more often in the third trimester. In a recent study, 240 pregnant Jordanian women were asked about their usage of supplements. The findings revealed that 57.9% of them used multivitamins. In addition, 55.8% and 93.8% utilized iron and folic acid, respectively (Fida F et al., 2019). Women in nations with low or middle incomes suffer from multiple micronutrient deficiencies as a result of insufficient consumption of meat and dairy products, greens, fruit, and supplemented meals; as a result, these nations comprise over 95% of all low-birth-weight babies (Koletzko et al., 2013). Furthermore, research indicates deficits of DS during pregnancy are therefore frequently associated with low socioeconomic position, deteriorated health conditions, and nutritional consumption (Baytekus A et al., 2019).

Nevertheless increased food supplements usage, the health risks and efficacy of currently marketed mothering DS goods are still not adequately investigated. As a result, our present study analyzed the types of dietary supplements taken by pregnant women throughout the course of three trimesters based on socio-demographic variables. While earlier research about DS applications throughout conception have mostly emphasized upon the incidence, retention, and associated characteristics of vitamin B-12 and iron supplement usage throughout conception (Zema et al., 2018).

1.2 Study objectives

1.2.1 General Objective: To explore the dietary intake of supplements during pregnancy in Rangpur City.

1.2.2 The specific aims of this research are as follows:

1. To evaluate the nutritional consumption of pregnant women.
2. To find out dietary supplements intake of pregnant women intake.
3. To check the frequency of taking dietary supplements during pregnancy.
4. Investigating how socioeconomic variables influence what people eat.
5. Determine the issues that make it difficult to acquire a nutritious lunch and provide solutions to address them.

CHAPTER 2

LITERATURE REVIEW

2.1 Vitamin D

In terms of nutrition, pregnancy is difficult as the development of the foetal organs and the mother's health are impacted by the micronutrients consumed both before and during pregnancy. Inadequate food or nutrition during pregnancy can cause an assortment of deficiencies particularly iron deficiency, as well as disrupt placental function and contribute to miscarriage, intrauterine growth restriction, premature birth, and preeclampsia (Milman N et al., 2016). Relating maternity daily vitamin D level throughout pregnancy to maternity, foetal, and postpartum results, Milman N et al., observed that 26–98% of pregnant women from the US, Australia, the Middle East, and South Asia were vitamin D-deficient at or near term, while 66–100% were inadequate. Future well-designed intervention studies are in high demand. Pregnant women should be encouraged to get enough nutrition, which is best done by eating a healthy balanced diet (Milman N et al., 2016).

2.2 Iron

Another research discovered that iron is required by nearly all living creatures. Iron performs several key roles in the body, the most important of which is to produce the oxygenation-binding component of haemoglobin (Hb), which delivers oxygen from the lungs to the tissues. Iron can also be present in myoglobin, the oxygen-binding protein in muscle fibres. Demuth IR et al. discovered that iron consumption ranged from 5 to 200 mg/day, with supplementation lasting two weeks or throughout pregnancy. While 19.7% of women without iron deficit or anaemia still took supplements of iron (ranging from 7 to 80 mg/day), 6% of those participating women did not take any supplements while having a diagnosis of iron deficiency or anaemia (Demuth IR et al., 2018).

Furthermore, a research discovered that the average consumption of iron in all developed nations falls short of dietary guidelines. ID is the most prevalent nutritionally deficient condition in the globe, especially in developing nations. In the United States, an estimated 18% of pregnant women (28.4% in the third trimester) have ID. Milman N et al. advocate folic acid supplementation for all women of reproductive age. The use of folic acid during pregnancy to prevent preeclampsia is also supported by evidence. Women at high risk for folate deficiency (e.g., those who have had a previous child with an NTD or who are using anticonvulsants that have been linked to the development of NTD) should get supplementary folic acid at a dose of 4.5 mg/day (Milman N et al., 2016).

2.3 Calcium

Another study found that maternal calcium homeostasis is critical for foetal bone health and development throughout pregnancy. It is at present suggested that pregnant women intake more than 1000 mg of calcium to accommodate increasing calcium needs for foetuses. Hypocalciuria (low calcium levels in the urine) has been linked to pre-eclampsia, and measuring the kidneys calcareous to creatinine concentration in first

trimester is regarded as accurate indicator of pre-eclampsia. Calcium supplementation is advised as a form of, preventive intervention for pre-eclampsia, especially among women who eschew dairy products (Rebecca L et al., 2018).

2.4 Zinc

Rebecca L et al. state that zinc is essential for a variety of antimicrobial enzymes, metal-enzymes, zn-binding elements, as well as zn carriers. Zinc supplementation during conception, as opposed to no therapy or placebo, lowered the incidence of early delivery, but had no effect on low birth weight delivery or preeclampsia. Selenium, like zinc, is an antioxidant that helps boost immunological function and reduce cellular stress. Although the inclusion of selenium in conception supplements, there are currently limited trials on selenium supplementation during pregnancy, thus while selenium dietary supplementation increases the pregnancy results is unknown (Rebecca L et al., 2018).

2.5 Vitatim C

In addition, a research looked at hypothetical particular micronutrient inadequacy; many women use complex conception vitamin supplements. Despite being widely used and heavily marketed and promoted, there is no proof that taking multivitamins or supplements with many micronutrients on a regular basis before or during pregnancy improves the outcome of the pregnancy. In many circumstances, taking such multivitamins may supply more vitamins and minerals than are required. Such supplements may not be 100% harmless. For example, while supplementing with vitamin C alone does not appear to be advantageous, supplementing with vitamins C and E from 12 to 18 weeks gestation has been proven to rise the possibility of foetal loss or perinatal mortality. Moreover, vitamin A is a teratogen, and excessive consumption throughout conception is linked to a raised possibility of congenital abnormalities. As a result, it is recommended that pregnant women minimize daily intake of vitamins. There aren't enough big, high-quality, randomized controlled studies, which makes it very difficult to assess the advantages—or possible risks—of regular vitamin and mineral supplementation throughout pregnancy. Therefore, significant caution should be exercised when considering extensive regular supplementing procedures (Rebecca L et al, 2018).

CHAPTER 3

MATERIALS AND METHODS

3.1 Study setting and sample size: (Calculation of Sample Size)

The research was conducted out in Bangladesh's Rangpur district. This research has a sample size of approximately 400 people. The age target was <18 to >35 demographics. The information was gathered in the Rangpur medical hospital, Bangladesh. Each patient gave consent for participation in research. The number of participants was obtained applying the corresponding algorithm:

$$n = \frac{Z^2 pq}{e^2}$$

n = Desire Sample Size

p = Anticipated population proportion, 50% = 0.5

So, q = (1-p) 1-0.5 = 0.5

At confidence level 95%, z value will be = 1.96

$$\text{Now, } n = \frac{(1.96)^2 \times 0.5 \times 0.5}{0.05^2}$$

$$=384$$

e is the margin of error which is 5% (0.05) interval.

Therefore, the desired sample size is 384.

3.2 Data collection methods and questionnaire development:

A systematic face-to-face interview with the participants was done using a questionnaire containing demographic and anthropometric information. Data about age, gender, weight, height, education, employment, family member, number of child, diseases like as (anaemia, diabetes, hypothyroidism) ,supplements using time, supplements (folic acid, calcium, iron, zinc, vitamin D, vitamin c, multivitamin and marital status were included in this viewpoint. A weight measuring machine and a height measuring scale were used to determine weight and height. Body mass index (BMI) was computed by dividing weight (in kilograms) by standing height (in meters squared), and BMI categorization was determined using Asian BMI standards.

3.3 Study Period

April 2023 to January 2024.

3.4 Data Collection Period

August 2023 to September 2023

3.5 Data Analysis Method:

SPSS software was used to analyse the data. It is simple to use; it includes powerful statistical analysis, a large library of machine learning algorithms, text analysis, open-source extensibility, big data integration, and seamless deployment into apps.

CHAPTER 4

RESULTS & DISCUSSION

4. Results

Table 4.1: Socio-Demographic characteristics of respondents

Age of the respondent	**Number**	**Percentage (%)**
<18	22	5.2
18-24	199	46.8
25-34	162	38.1
>35	17	4.0
Family Income	**Number**	**Percentage (%)**
<15 k	85	20.0
15-30 k	202	47.5
>30 k	113	26.6
Education Level	**Number**	**Percentage (%)**
Primary	78	18.4
Secondary	101	23.8
Bachelor	162	38.1
Masters	59	13.9
Employment Status	**Number**	**Percentage (%)**
Housewife	306	72.0
Government employee	29	6.8
Privet employee	34	8.0
Business	31	7.3

From the (Table 4.1) we can see that the survey divides respondents into four age categories, indicating that the majority (46.8%) are between the ages of 18 and 24. The

age distribution is as follows: less than 18 years (5.2%, n=22), 18-24 years (46.8%, n=199), 25-34 years (38.1%, n=162), and more than 35 years (4.0%, n=17). The respondents' socioeconomic position was determined based on their family income, educational level, and work status. In terms of family income, the statistics show that 20.0% of participants (n=85) make less than 15,000, 47.5% (n=202) earn between 15,000 and 30,000. 46.6% (n=113) earn more than $30,000. In terms of education, 18.4% of respondents have completed elementary school (n=78), 23.8% secondary school (n=108), 38.1% have a bachelor's degree (n=162), and 13.9% have a master's degree (n=59). Furthermore, work status influences supplement consumption, with the majority of individuals identifying as housewives (72.0%, n=306). Other employment types represented include government employees (6.8%, n = 29), private employees (8.0%, n = 34), and company owners (7.3%, n = 31). This study examines the relationship between demographic and socioeconomic characteristics and dietary supplement usage in pregnant women, giving important insights for public health initiatives and nutritional guidance.

Table 4.2: Nutritional status of the respondent during pregnancy

Nutritional status of the respondent	Number	Percentage (%)
Under Weight	65	15.3
Normal	314	73.9
Over Weight	21	4.9

Table 4.2 indicates the nutritional condition of those interviewed along with the frequency of women who use dietary supplements while pregnant. The components were classified into three groups: underweight, normal weight, and overweight, with frequencies of 15.3%, 73.9%, and 4.9%, respectively. This means that the majority of them were normal weight, a small fraction were underweight, less than normal, and larger than overweight, and very few responses were overweight, less than normal, or underweight.

Table 4.3: **Level of the pregnancy of the trimester**

Level of the pregnancy of the trimester	Number	Percentage (%)

1st (less than 14 weeks)	79	18.6
2nd (14 to 26 weeks)	159	37.4
3rd (27 to 36 weeks)	162	38.1

Table 4.3 indicates the level of pregnancy in each trimester, as well as the percentage of women who intake nutritional supplements during the pregnancy. Here, the variables are separated into three categories: 1st, 2nd, and 3rd, with percentages of 18.6%, 37.4%, and 38.1%. The first group included the first trimester (less than 14 weeks), when the lowest proportion was recorded. The second group was the second trimester (14 to 26 weeks), and the bulk of the findings were greater than the first. The third category (27 to 36 weeks) had a higher percentage than the previous two.

Table 4.4: Frequency of taking dietary supplements relative to percentage

How often take dietary supplements	Number	Percentage (%)
< 3 months	91	21.4
>3 months	309	72.7

Table 4.4 indicates the frequency of taking dietary supplements relative to month of the respondent's consumption of dietary supplements during their pregnancy. The variables were separated into two categories: < 3 months and > 3 months. The percentages were 21.4% and 72.7%, respectively. In the first group (< 3 months), 91 people were detected, with a rate of 21.4%.The second category range was >3 months, and 309 people were detected, with a rate of 72.7%.

Table 4.5: Specific Supplements intake patterns among pregnant women

Supplements	Number		Percentage (%)	
	Yes	No	Yes	No
Folic acid	75	325	17.6	76.5
Vitamin B	74	326	17.4	76.7
Zinc	131	269	30.8	63.3

Calcium	308	92	72.5	21.2
Iron	310	90	72.9	21.5
Vitamin C	200	200	47.1	47.1
Multivitamin	132	268	31.1	63.1

Table 4.5 shows the dietary supplements consumed by pregnant women. The factors are divided into seven categories: folate, vitamin B, zinc, calcium, iron, and vitamin C. The multivitamin percentages were 17.6%. Folic acid supplementation accounts for 17.6%. Vitamin B has a rate 17.4% lower than folic acid. Zinc is essential throughout pregnancy; supplement at a dose of 30.8%. Calcium supplementation at a dose of 72.5% is also a vital vitamin during pregnancy. While iron is the most often used supplement, it is consumed at a rate 72.9% higher than the other categories. Vitamin C consumption was 47.1%, whereas multivitamin use was 31.1%.

Table 4.6: Relations between age and level of the pregnancy of the trimester

Age of the respondent	Pregnancy trimester			P value
	1st	2nd	3rd	
<18	5	13	4	.000
18-24	51	78	70	
25-34	20	67	75	
>35	3	1	13	

Significantly related according to the (Table 4.6) demonstrates the relationships between the ages of women who take dietary supplements during pregnancy. The variables are separated into four categories: <18, 18-24, 25-34, and >35, with the first, second, and third trimesters. Respondents in the first group (range <18) were in the first trimester, followed by the second, the third, and the fourth. Respondent person 1st 51, 2nd 78, and 3rd 70 were discovered to be in the second trimester of 18-24. Respondent person 1st 20, 2nd 67, and 3rd 75 fell within the third category range of 25-34. Respondent person 1st 3, 2nd 1, and 3rd 13 were determined to be in the fourth category range (>35). Data were judged statistically significant at P <.000.

Table 4.7: Relations between intake of supplements and nutritional status during pregnancy

Supplements Intake of the respondent	pregnancy of the respondent						P value
	Under Weight		Normal		Over Weight		
	Yes	No	Yes	No	Yes	No	
Folic acid	12	53	61	253	2	19	.530
Vitamin B	12	53	60	254	2	19	.549
Zinc	8	57	110	204	13	8	.000
Calcium	50	15	240	74	18	3	.620
Iron	51	14	241	73	18	3	.623
Vitamin C	26	39	159	155	15	6	.039
Multivitamin	15	50	108	206	9	12	.129

Table 4.7 depicts the association between supplement use during pregnancy and the nutritional condition of respondents classified as underweight, normal, or overweight. Lists seven different forms of nutritional supplements: folic acid, vitamin B, zinc, calcium, iron, vitamin C, and multivitamins. Zinc and vitamin C stand out among the supplements studied because they have statistically significant associations with nutritional status. The Zinc data showed that 8 respondents were underweight, 110 were normal, and 13 were overweight, with a very significant p-value of <.000. This implies a substantial link between zinc supplementation and better nutritional status in subjects. Similarly, vitamin C revealed a significant connection with nutritional status, with 26 underweight, 159 normal, and 15 overweight participants. This association became statistically significant at p <.03, indicating that vitamin C may play a crucial role in nutritional health during the pre-pregnancy phase. Other supplements, such as folic acid, vitamin B, calcium, iron, and multivitamins, did not show significant correlations with nutritional status, with p-values better than.05 for folic acid, vitamin B, calcium, and iron, and p <.1 for multivitamins. For example, folic acid exhibited 12 underweight, 61 normal, and 2 overweight responders, but calcium showed 50 underweight, 240 normal, and 18 overweight, both of which were deemed statistically irrelevant. These findings highlight the need of prioritizing zinc and vitamin C supplementation throughout the pre-pregnancy period, since they appear to considerably improve nutritional outcomes. This emphasizes

the need of providing tailored dietary recommendations to women considering pregnancy in order to improve their own and their children's health.

Table 4.8: Relations between intake of supplements and level of the pregnancy of the trimester

Supplements	Pregnancy trimester			P value
	1st	2nd	3rd	
Folic acid	73	0	2	.000
Vitamin B	73	0	1	.000
Zinc	20	57	54	.259
Calcium	3	152	153	.000
Iron	5	152	153	.000
Vitamin C	3	189	8	.000
Multivitamins	13	71	48	.000

Table 4.8 shows the association between respondents' supplement consumption and their pregnant trimester are significant; with categories including Folic Acid, Vitamin B, Zinc, Calcium, Iron, Vitamin C, and Multivitamins. Zinc has a substantial link with pregnant trimesters, with 20 responses in the 1st trimester, 57 in the 2nd trimester, and 54 in the 3rd trimester (p-value <.2). In comparison, some supplements reveal substantial connections. In the 1st trimester, 73 respondents reported using folic acid and vitamin B, with no reported use in the 2nd trimester and low usage in the 3rd trimester (p-values <.000). Calcium and iron were mostly utilized in the 2nd and 3rd trimesters, with significant results (p <.000). Vitamin C and multivitamins showed comparable trends, mostly used in the 2nd trimester, with significant p-values <.000. While zinc is non-significant than other supplements, its existence across all trimesters emphasizes its importance in prenatal nutrition. This shows that, whereas other supplements may have stronger connections with various trimesters, zinc is an essential vitamin throughout pregnancy.

4.2 Discussions

The findings of this study indicate that the majority of the women chosen consumed supplements while pregnant. The most often utilised single nutrients were folic acid (17.6%), vitamin B (17.4%), zinc (30.8%), calcium (72.5%), iron (72.9%), vitamin C (47.1%), and multivitamin (31.1%). During the 1st, 2nd, and 3rd trimesters of pregnancy, supplement intake fluctuated. In the third trimester, participants reported an increased intake of supplements such as calcium (14.1%) p-value <.259, iron (39.8%) p-value <.000, and zinc (39.8%) p-value <.000. This was especially true for city-dwelling women of high socioeconomic position and education level. A study of pregnant women in Malawi found that only 37% of the patients reported using nutritional supplements during their pregnancy. (Ramírez-Vélez et al., 2018).

A recent research looked at the different types and quantities of supplements that pregnant women used over the three pregnancy trimesters. Our findings revealed that almost all pregnant women living in metropolitan the city of Rangpur adopted various dietary supplements through their period of pregnancy (the most often used single nutrients were folic acid (17.6%), vitamin B (17.4%), zinc (30.8%), calcium (72.5%), iron (72.9%), vitamin C (47.1%), and multivitamin (31.1%). This percentage was significantly higher than that revealed in a previous survey from northern Jordan, when 57.8% of pregnant women utilised supplements (Fida F. et al., 2019). Another study indicated that 51% of pregnant women get anaemic, yet only 44% utilise prenatal iron-folic acid (IFA) supplements. There is little evidence available on the perspective and impediments to the use of IFA supplements during pregnancy in Pakistan (Nisar YB et al., 2014).

Our findings indicate that the proportion of respondents taking dietary supplements are firmly better; (the usage of dietary supplements by pregnant women living in Rangpur city is in accordance with the recommended daily consumption of specific nutritional supplements). While 72.9%, 72.5%, 47.1%, and 3.8% used Iron, Calcium, Vitamin C, and Zinc respectively) than reported in a previous study (66.4%), conducted in China in 2009, but is close to the results of another recent study (2019), conducted on 7931 first-trimester pregnant women (93.7%) in China, which is almost similar to the prevalence in several Western countries. Furthermore, it is a typical observation that most pregnant women are not restricted to a single type of supplement among was the case in one study, which found that over 30% of pregnant women used more than four nutritional supplements at the same time. According to the BDHS from 2011, 49.6% of pregnant women and 47.8% of breastfeeding mothers are anaemic. Another study from 2002 indicated that the majority of pregnant women in Bangladesh were zinc and vitamin B12 deficient, and a minority were folate deficient (NIPORT/Bangladesh, 2013).

According to current data, important micronutrients have increasing needs as pregnancy progresses, supporting the specific significance of DS as shown by recent findings. In the USA, more than ninety percent of pregnant women are advised to intake DS as part of their pregnancy care regimen; however, only sixty-seven percent of African-American and eighty-four percent of Caucasian women followed this recommendation. Aside from these DS, some scientists feel that certain nutrition compositions might benefit pregnant

women with particular needs. Particularly, the minerals iron and vitamin B-12 (folate) have long been supervised or prescribed during fertilisation due to their beneficial impacts in avoiding or alleviating particular maternity-related illnesses (Adelo ES et al., 2023).

CHAPTER 5

CONCLUSION

5.1 Conclusion

In conclusion, this study shows the compliance rates of mineral supplement intake among pregnant Bangladeshi women in Rangpur City, demonstrating a relatively acceptable level of adherence, particularly for iron (72.9%), calcium (72.5%), vitamin C (47.1%), and zinc (30.8%). The findings, however, highlight the need for focused educational efforts to raise knowledge about the necessity of nutritional supplementation, particularly in situations of insufficiency, in order to decrease maternal and foetal problems. According to the statistics, age, socioeconomic position, education level, work status, and pregnant trimester all impact supplement compliance. Notably, the majority of supplement users (46.8%) were between the ages of 18 and 24, with a normal pre-pregnancy BMI (73.9%), suggesting that younger and healthier women are more likely to follow suggested supplement usage. Moreover, substantial relationships were found between supplement intake and pregnant trimester, as well as between individual supplements (iron, calcium, vitamin C, and multivitamins) and both trimester and BMI status, with some of these associations statistically significant. These findings highlight the need of health initiatives with the goal of stimulating education and availability of important nutrients for pregnant women, particularly in resource-limited settings. Further study is needed to investigate additional socio-cultural factors influencing supplement adherence and to design more targeted, community-based nutritional programs that address these aspects in order to enhance maternal and child health outcomes. This research demonstrates how a lack of education, poverty, as well as physically demanding employment affect pregnant women's diets in Rangpur. Enhancing nutritional knowledge and resources may contribute to healthier pregnancies, improved birth outcomes, and overall mother health.

5.2 Recommendations

Implementation of health education programs can be aimed at improving awareness of supplement related knowledge, related health issues, among the adolescent pregnant women.

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APPENDICES

Appendix 1: Questionnaires

Exploring Dietary Supplement Intake during Pregnancy: A Cross Sectional Study of Pregnant Women in Rangpur City

1. Patient Age: ❑< 18 ❑ 18-24 ❑ 25-34 ❑ >35

2. Patient Height (cm): ❑ <150 ❑ 151-160 ❑ 161-170 ❑ 171-180

3. Patient Weight (kg):❑ 40-49kg ❑ 50-59kg ❑ 60-69kg ❑ 70-79kg

4. Disease like: ❑ Anaemia ❑ Hypothyroidism ❑ Diabetes ❑ others

5. Does she follow any pre pregnancy diet chart?

❑ Yes ❑ No

6. Pre-pregnancy BMI Category: ❑ Underweight (< 18.5 kg/m2) ❑ Normal (18.5–24.9 kg/m2)

❑ Overweight (25–29.9 kg/m2) ❑ Obese (> 30 kg/m2)

7. Pregnancy Trimester: ❑ First ❑ Second ❑ Third

8. Number of Children (living): ❑ 0 ❑ 1–2 ❑ >3

9. Number of deliveries: ❑ 0 ❑ 1–2 ❑ >3

10. Number of family members in the household: ❑ Less than 4 ❑ 4 ❑ More than 4

11. Family income: ❑ <20k ❑ <20-30K ❑ >30K

12. Education level:

❑ Primary education ❑ Secondary education ❑ Bachelor ❑ Master's and ❑ others

13. Social support: ❑ Low ❑Medium ❑ High

14. Employment status: ❑ Housewife ❑ Government employee ❑ Privet employee ❑ Business

❑ Others

15. In which trimester which kind of supplements she taken

❑ Folic acid ❑ Calcium ❑ Vitamin D ❑ Omega 3 ❑ Multivitamin

❑ Vitamin c ❑ Iodine ❑ Iron ❑ Zinc

16. How often do you take the dietary supplement?

❑ Daily ❑ Few days/week ❑ Few days/month

17. How long have you been taking the dietary supplement?

❑ Less than three month's ❑ Three months and more

18. What kind of side effect: ❑ Bad test ❑ GI irritation ❑ Agitation

19. Amount of daily water intake: ❑ > 8-12 cup ❑ < 8-12 cup

Appendix 2: Synopsis

Exploring Dietary Supplement Intake during Pregnancy: A Cross Sectional Study of Pregnant Women in Rangpur City

Introduction:

Balanced nutrition during pregnancy is necessary to meet the increasing demands of both maternal physiological changes and fatal growth. The present study aimed to investigate types of dietary supplements used by pregnant women living in Rangpur during the three pregnancy trimesters compared by socio-demographic factors and improve their overall well-being.

Statement of the Problem:

The research seeks to answer several key questions:

- What are the supplements they use and which trimester?
- What nutritional gaps exist in their diets, and what are the potential health implications?
- How do socio-economic factors, such as income, job and education, influence their dietary choices?
- What barriers hinder access to a balanced diet, and what solutions can be proposed to overcome these obstacles?

Objective:

The exact goals of this study are the following:

• To evaluate the knowledge of pregnant women adolescents in Rangpur regarding supplements.

• To determine if there are demographic or socio-economic factors influencing knowledge levels.

Methodology:

A cross-sectional study will be conducted involving a representative sample of pregnant women adolescents aged 18 to 35 years in Rangpur city. Data will be collected through structured questionnaires and interviews. The questionnaire will cover topics such as sociodemographic information and dietary supplements related questions.

Sampling Calculation:

There is 400 data about use of dietary knowledge among pregnant women of Rangpur city and they were of different age, trimester, education level, employee status and income.

$$n = \frac{Z^2 pq}{e^2}$$

n = Desire Sample Size

p = Anticipated population proportion, 50% = 0.5

So, q = (1-p) 1-0.5 = 0.5

At confidence level 95%, z value will be = 1.96

$$\text{Now, } n = \frac{(1.96)^2 \times 0.5 \times 0.5}{0.05^2}$$

$$=384$$

e is the margin of error which is 5% (0.05) interval.

Therefore, the desired sample size is 384.

Expected outcome:

The expected outcome of this research is to gain a comprehensive understanding of the dietary supplements and socio-demographic factors influencing pregnant women of Rangpur city. The study aims to identify nutritional gaps, potential health risks and barriers to accessing a balanced diet. Ultimately, the research is expected to provide valuable insights for the development of evidence-based programs and policies aimed at improving the health and nutrition of pregnant women of Rangpur city, enhancing their overall well-being and addressing the unique challenges they face in maintaining a healthy diet.

Socio-economic Impact:

- In my project socioeconomic status can encompass quality of life attributes as well as the opportunities and privileges afforded to people within society. Poverty, specifically, is not a single factor but rather is characterized by multiple physical and psychosocial stress.

- Respectively, more efforts are required to educate pregnant women and raise the awareness about the importance of supplement intake particularly in defiance cases in order to avoid maternal and fetal complications. For effective treatments and policy development Nutritional camps should be organized and knowledge and awareness of pregnant women should be increased regarding nutrition.

Task	Activities by Months or Days (Starts to Ends)											
	1	2	3	4	5	6	7	8	9	10	11	12
Literature research												
Study protocol and questionnaire development												
Ethical approval												
Training of anyone (if needed)												
Pretesting of study protocols, questionnaire												
Data and sample collection phase												
Laboratory analysis (if needed)												
Data analysis and report writing												
Report Submission and article publication												

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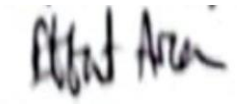
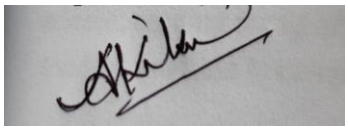
Signature of the Supervisor	Signature of the Co-Supervisor
	

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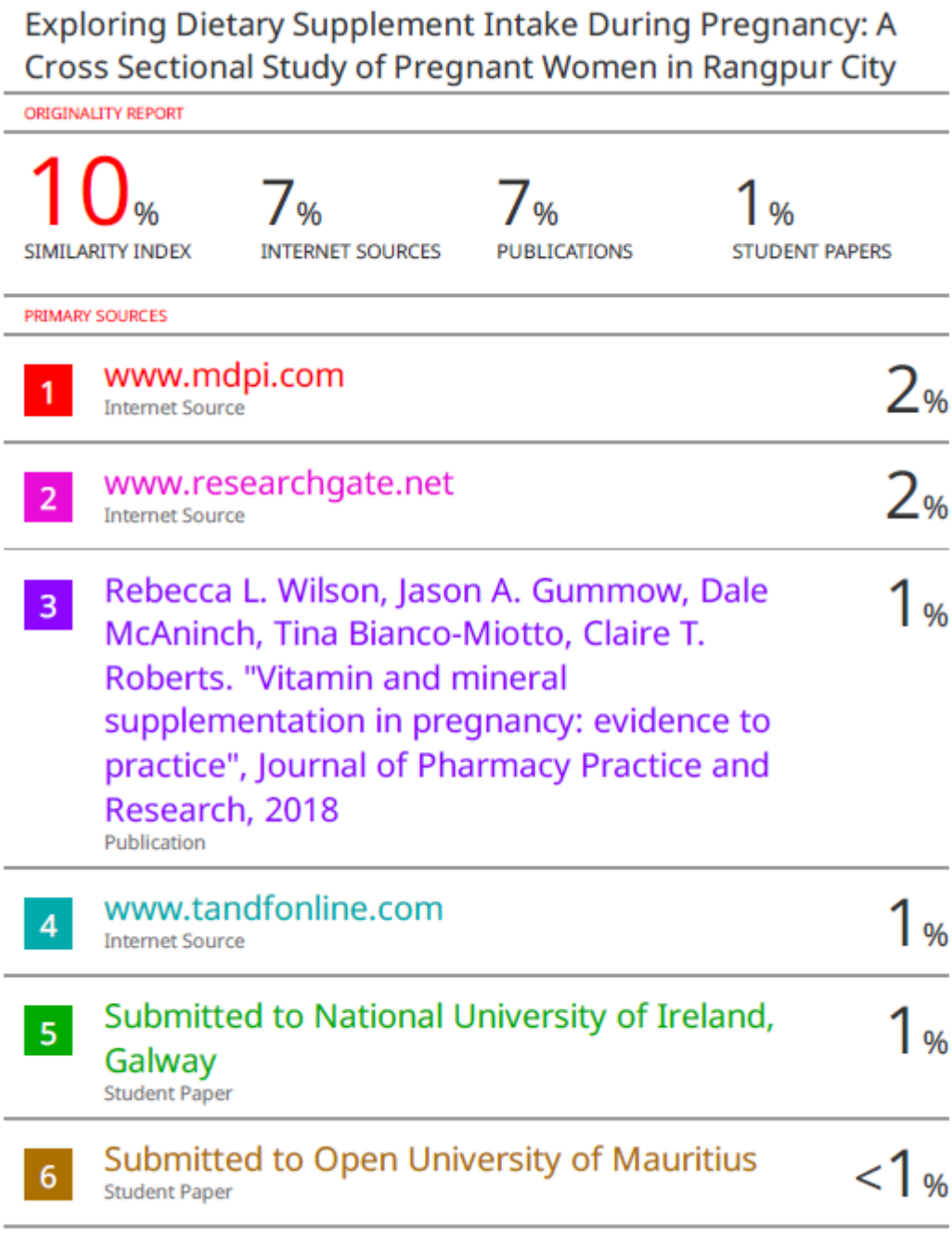

Exploring Dietary Supplement Intake During Pregnancy: A Cross Sectional Study of Pregnant Women in Rangpur City

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