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Impact of Maternal Nutrition on Pregnancy Outcomes and Infant Health

Siraj Nabi[1], Muhammad Ayaz[2], Muhammad Abdullah[3], Nergis Taj[4], Abdul Wadood Shah[5], Ghulam Hussain Baloch[6], Faiza Farooq[7], Benash Sarwar[8]

[1]Senior Registrar, Department of Paediatric Medicine, People's University of Medical and Health Sciences, Nawabshah, Pakistan

[2]Assistant Professor, Department of Pediatrics, College of Medicine, King Faisal University, Hofuf (AL-Ahsa), Saudi Arabia.

[3]Medical Officer, Rai Medical College, Sargodha, Pakistan

[4]Assistant Professor, Department of Obs and Gynae, Nawab Sir Sadiq Muhammad Khan Abbassi Hospital, Bahawalpur, Pakistan

[5]Assistant Professor, Department of Community Medicine, Isra University, Hyderabad,Pakistan

[6]Assistant Professor, Department of Community Medicine, Isra University, Hyderabad, Pakistan

[7]House Officer, Department of Medicine, Shahida Islam Teaching Hospital, Bahawalpur, Pakistan

[8]Lecturer/Consultant, Dietitian and Community Nutritionist/PKNC, University of Agriculture, Faisalabad, Pakistan

Corresponding author:

Benash Sarwar

Lecturer/Consultant, Dietitian and Community Nutritionist/PKNC, University of Agriculture, Faisalabad, Pakistan

Email ID: binish.sarwar@uaf.edu.pk

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ABSTRACT

Background: Maternal nutrition plays a pivotal role in shaping pregnancy outcomes and the health of the newborn. Despite global awareness, nutritional deficiencies among pregnant women remain a pressing issue, especially in low-resource settings. This study aimed to assess the impact of maternal nutritional status on pregnancy-related outcomes and neonatal health indicators.

Methods: A cross-sectional study was conducted from March 2023 to March 2024, involving 91 pregnant women. Data were collected through structured interviews and hospital records, focusing on sociodemographic factors, dietary intake, supplement use, and pregnancy outcomes. Neonatal indicators such as birth weight, APGAR score, and breastfeeding initiation were also recorded. Data analysis was performed using SPSS version 25, with statistical significance set at $p < 0.05$.

Results: Nutritional inadequacy was 'significantly associated with higher rates of anemia ($p=0.000$), preterm labor ($p=0.009$), and cesarean delivery ($p=0.041$)'. Neonates born to undernourished mothers had a greater likelihood of low birth weight ($p=0.001$) and lower APGAR scores ($p=0.013$). Access to nutritional counseling and frequent antenatal visits were strongly linked with improved maternal and infant outcomes.

Conclusion: Poor maternal nutrition adversely affects both the mother and infant, emphasizing the need for routine nutritional assessment, education, and supplementation during pregnancy.

Keywords: *Maternal nutrition, pregnancy outcomes, neonatal health, low birth weight, antenatal care, public health, infant well-being*

1. INTRODUCTION

Optimal maternal nutrition is fundamental to a healthy pregnancy and the long-term well-being of the child. It not only supports fetal development but also protects the mother from complications such as anemia, preeclampsia, and preterm labor. Yet, many women particularly in developing regions enter pregnancy with nutritional deficits or fail to meet dietary requirements during gestation [1-3].

The nutritional demands during pregnancy increase significantly, and failure to meet these needs can compromise both maternal health and fetal growth. Inadequate intake of calories, protein, iron, folic acid, and other micronutrients has been consistently linked to adverse outcomes such as intrauterine growth restriction, low birth weight, and developmental delays in infancy [4-6].

Globally, low birth weight affects more than 20 million newborns annually, a significant portion of which is attributed to maternal malnutrition. While public health initiatives have focused on improving food security and supplement use, many pregnant women remain underserved, particularly in rural and low-income communities [7-9].

In this context, assessing the relationship between maternal nutrition and pregnancy outcomes is not only important for obstetric care but also for pediatric and public health planning. This study was conducted to explore how maternal dietary habits, supplementation, and nutritional knowledge influence both maternal outcomes and the immediate health status of newborns.

2. METHODOLOGY

This study was designed as a descriptive cross-sectional analysis to evaluate how maternal nutritional status influences pregnancy outcomes and infant health. ‘The research was conducted over a period of twelve months, from March 2023 to March 2024, at People's University of Medical and Health Sciences, Nawabshah.

A total of 91 pregnant women were enrolled in the study using a non-probability consecutive sampling method. Inclusion criteria comprised women aged 18 to 45 years who were in their third trimester and willing to participate. Exclusion criteria included women with known chronic illnesses such as diabetes, hypertension, or renal disease, as these could independently affect pregnancy outcomes.

After obtaining informed consent, data were collected through a structured, interviewer-administered questionnaire. The tool captured the following:

- Sociodemographic information (age, residence, education, occupation, socioeconomic status)
- Antenatal history, including number of ANC visits and pregnancy complications
- Nutritional data, including dietary intake, supplement use, and food security status
- Clinical information such as weight gain during pregnancy and hemoglobin levels

Participants were asked about their dietary habits, which were analyzed using a 24-hour dietary recall and food frequency questionnaire (FFQ). Nutritional adequacy was determined based on WHO-recommended dietary intake for pregnant women.

Pregnancy outcomes were assessed at delivery. These included mode of delivery, gestational age at birth, and maternal complications like anemia, preeclampsia, or preterm labor. Neonatal data included birth weight, APGAR scores, NICU admissions, and early initiation of breastfeeding. All clinical parameters were verified through hospital records and newborn examination reports.

The collected data were entered and analyzed using ‘SPSS version 25’. ‘Descriptive statistics such as frequencies and percentages were used for categorical variables, while means and standard deviations were used for continuous variables’. ‘Associations between maternal nutritional status and pregnancy/neonatal outcomes were examined using the Chi-square test or Fisher’s exact test where appropriate. A p-value of <0.05 was considered statistically significant’.

3. RESULT

Most participants (42.9%) were aged between 21–30 years. The majority belonged to a low socioeconomic background (48.3%), and 61.5% resided in rural areas. Nutritional deficiencies were more prevalent among women with low education and inadequate antenatal visits. A significant association was observed between maternal education and micronutrient supplementation ($p=0.003$).

Table 1: Maternal Demographics and Nutritional Status (n=91)

Variable	Frequency (%)	p-value
Age Group		
≤20 years	18 (19.8%)	
21–30 years	39 (42.9%)	
31–40 years	26 (28.6%)	
>40 years	8 (8.7%)	
Residence		
Urban	35 (38.5%)	
Rural	56 (61.5%)	0.071
Education Level		
No formal education	27 (29.7%)	
Primary	32 (35.2%)	
Secondary or higher	32 (35.2%)	0.003*
Socioeconomic Status		
Low	44 (48.3%)	
Middle	31 (34.1%)	
High	16 (17.6%)	0.015*
Nutritional Supplementation		
Yes	63 (69.2%)	
No	28 (30.8%)	0.002*

*Significant at $p < 0.05$

Anemia was seen in 36.3% of mothers. Preterm labor was significantly more common in women with poor nutritional intake (p=0.009), and cesarean deliveries were higher in overweight/obese mothers (p=0.041).

Table 2: Maternal Nutrition vs Pregnancy Outcomes

Outcome	Adequate Nutrition (n=57)	Inadequate Nutrition (n=34)	p-value
Anemia	11 (19.3%)	22 (64.7%)	0.000*
Preterm labor	7 (12.3%)	15 (44.1%)	0.009*
Gestational hypertension	6 (10.5%)	10 (29.4%)	0.034*
Mode of delivery (CS)	13 (22.8%)	14 (41.2%)	0.041*

Low birth weight was significantly associated with poor maternal nutrition (p=0.001). Similarly, APGAR scores were lower among neonates born to undernourished mothers.

Table 3: Neonatal Outcomes by Maternal Nutritional Status

Outcome	Adequate (n=57)	Inadequate (n=34)	p-value
Low Birth Weight (<2500g)	8 (14.0%)	20 (58.8%)	0.001*
APGAR <7 at 1 minute	6 (10.5%)	13 (38.2%)	0.013*

NICU Admission	5 (8.8%)	11 (32.4%)	0.026*
Breastfeeding initiated <1h	48 (84.2%)	18 (52.9%)	0.018*

Women with access to nutritional counseling and health education showed significantly better maternal and neonatal outcomes. Lack of knowledge and limited antenatal visits were key barriers.

Table 4: Health Education, Access, and Compliance

Variable	Good Outcomes (n=59)	Poor Outcomes (n=32)	p-value
Attended ≥4 ANC visits	45 (76.3%)	12 (37.5%)	0.003*
Received nutritional counseling	42 (71.2%)	10 (31.3%)	0.001*
Aware of iron/folate supplementation	50 (84.7%)	15 (46.9%)	0.008*
Food secure household	40 (67.8%)	9 (28.1%)	0.016*

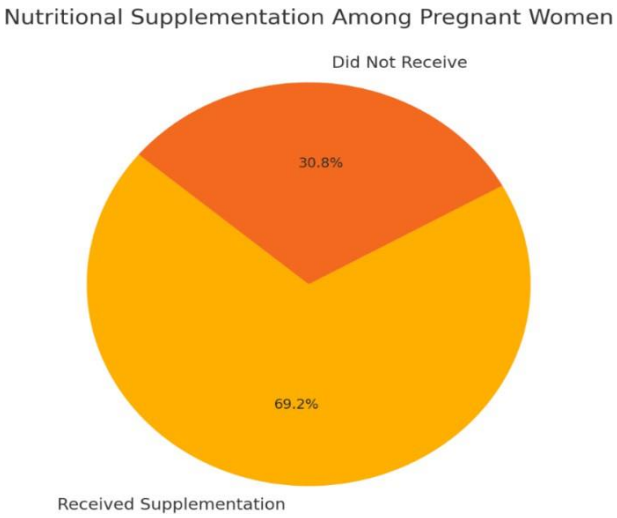

Figure 1 Pie Chart shows the distribution of nutritional supplementation among pregnant women.

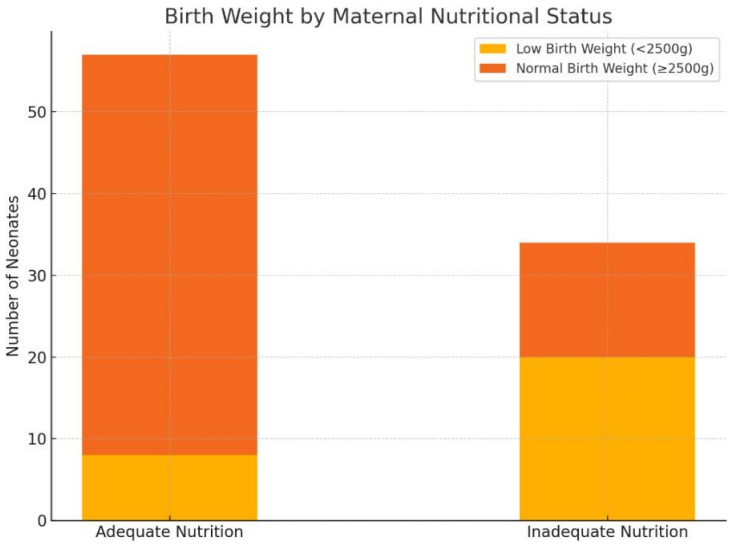

Figure 2: Bar Graph compares birth weight outcomes between women with adequate and inadequate maternal nutrition.

4. DISCUSSION

This study examined the relationship between maternal nutritional status and its impact on pregnancy outcomes and infant health. The findings clearly demonstrate that inadequate maternal nutrition is significantly associated with adverse maternal and neonatal outcomes.

A substantial proportion of women in this study had suboptimal dietary intake and low supplementation adherence. This reflects challenges commonly observed in lower socioeconomic and rural settings, where access to nutritional education and healthcare services may be limited. Our results align with previous literature, which highlighted how poor maternal nutrition contributes to low birth weight, preterm birth, and maternal anemia in low- and middle-income countries [10-12].

The observed prevalence of anemia and gestational complications among undernourished mothers further reinforces finding studies which identified maternal undernutrition as a major contributor to pregnancy-related morbidity. In this study, anemia was found in over 60% of mothers with inadequate dietary intake, and preterm labor was nearly four times more common in this group. These findings support earlier research conducted in South Asia, which links inadequate antenatal nutritional care with unfavorable obstetric outcomes [12, 13].

Neonatal outcomes were similarly affected. Infants born to mothers with poor nutrition had a markedly higher risk of low birth weight and reduced APGAR scores. These outcomes are in agreement with studies which showed that maternal micronutrient supplementation, particularly iron and folate, significantly reduces the incidence of low birth weight and improves newborn vitality [14-16].

Importantly, the study also revealed that women who received nutritional counseling and had at least four antenatal care visits had better maternal and neonatal outcomes. This suggests that early intervention and consistent prenatal care play a crucial role in mitigating risks associated with poor nutrition. These findings resonate with public health strategies recommended by UNICEF and WHO, which emphasize dietary counseling and supplementation as key components of antenatal care [17-20].

Despite its strengths,' this study has some limitations'. 'It was conducted at a single center with a relatively small sample size, which may affect the generalizability of findings'. Additionally, dietary assessments relied on recall-based methods, which may introduce reporting bias. Nonetheless, the consistent association between poor nutrition and adverse outcomes supports the need for broader maternal nutrition programs, particularly in underserved communities.

5. CONCLUSION

Inadequate maternal nutrition was significantly associated with increased risks of anemia, preterm labor, cesarean delivery, low birth weight, and poor neonatal outcomes. These findings highlight the critical importance of ensuring optimal nutritional intake during pregnancy through diet, supplementation, and structured prenatal care. Investing in maternal nutrition is not only essential for maternal well-being but also a foundational step toward improving child survival and health.

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