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EFFECT OF USAGE OF FOLIC ACID AND IRON SUPPLEMENTS DURING ANTENATAL PERIOD: ANALYSIS FROM THE PAKISTAN DEMOGRAPHIC AND HEALTH SURVEY DATA

Dr Saira Fayyaz[*1], Dr Iqra Zafar[2], Dr Amna Batool[3], Sana Fatima[4], Dr. Nabiha Iqbal[5]

[*1,2]*Associate Professor, gynaecology & obstetrics, Ameer ud-din medical college /LGH/PGMI*
[3]*Senior Registrar, Mayo hospital Lahore*
[4]*Department of Public Health, University of the Punjab*
[5]*Assistant Professor, Ghurki hospital*

[*1]dr.saira.cheema@gmail.com, [2]Iqrazafar@kemu.edu.pk, [3]dr.abjafri@gmail.com, [4]heysana1000@gmail.com, nabiha_19_88@hotmail.com[5]

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Corresponding Author: *
Dr Saira Fayyaz

Abstract

Background: *Iron and folic acid supplementation during pregnancy is a globally recommended intervention to prevent maternal anemia and adverse birth outcomes. In Pakistan, micronutrient deficiencies remain prevalent among pregnant women despite national antenatal care guidelines.*

Objective: *To examine the utilization of iron and folic acid supplements during the antenatal period and assess their association with maternal and neonatal outcomes using data from the Pakistan Demographic and Health Survey (PDHS) 2017–18.*

Methods: *A secondary data analysis was conducted using nationally representative PDHS data. Women aged 15–49 years who had a live birth in the five years preceding the survey were included. Supplement use during pregnancy was assessed through self-reported intake of iron and folic acid tablets or syrup. Multivariable logistic regression models were used to evaluate associations between supplement use and maternal anemia and birth outcomes, adjusting for sociodemographic and obstetric factors.*

Results: *The majority of women reported some antenatal iron use, while folic acid use and combined supplementation remained suboptimal, particularly among rural and less educated women. Iron and folic acid supplementation was significantly associated with lower odds of maternal anemia and low birth weight. Women who received both supplements showed better outcomes compared to those receiving none.*

Conclusion: *Antenatal iron and folic acid supplementation is positively associated with improved maternal and neonatal health outcomes in Pakistan. Strengthening antenatal care coverage and ensuring equitable access to supplements are critical to improving maternal nutrition nationwide.*

Introduction

Maternal nutrition plays a pivotal role in ensuring healthy pregnancy outcomes and reducing maternal and neonatal morbidity and mortality. Micronutrient deficiencies, particularly iron and folate deficiency, remain major public health

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concerns in low- and middle-income countries, including Pakistan. Iron deficiency anemia is one of the most common nutritional disorders among pregnant women and is associated with increased risks of maternal mortality, preterm birth, and low birth weight (1).

Folic acid is essential for DNA synthesis and cell division and is particularly important during early pregnancy to prevent neural tube defects (NTDs). The World Health Organization (WHO) recommends daily iron and folic acid supplementation throughout pregnancy as a cost-effective strategy to reduce anemia and improve birth outcomes (2). Despite these recommendations, adherence to antenatal supplementation remains inconsistent across many developing countries.

Pakistan continues to face a high burden of maternal anemia, with national estimates indicating that nearly half of pregnant women are anemic (3). The Pakistan Demographic and Health Survey (PDHS) provides comprehensive, nationally representative data on maternal health indicators, including antenatal care utilization and micronutrient supplementation. Previous studies using PDHS data have shown disparities in supplement use based on socioeconomic status, education, and place of residence (4).

In recent years, secondary analyses of Demographic and Health Survey data have become an important source of evidence for evaluating maternal nutrition interventions in resource-limited settings. The PDHS provides standardized and comparable data on antenatal care practices, including micronutrient supplementation, across different regions and population subgroups in Pakistan. Utilizing PDHS data allows for the identification of inequities in supplement coverage and helps assess whether national maternal health policies are translating into improved nutritional practices at the population level. Such evidence is critical for guiding targeted interventions aimed at reducing preventable maternal and neonatal health risks and for monitoring progress toward national and global maternal health goals (5).

Understanding patterns of iron and folic acid supplementation and their association with maternal and neonatal outcomes is essential for informing evidence-based policies. This study aims to analyze the effect of antenatal iron and folic acid supplementation using PDHS 2017–18 data and to identify gaps in utilization that may hinder progress toward improving maternal and child health in Pakistan (6).

Methodology

Study Design and Data Source

This study is a secondary analysis of data from the Pakistan Demographic and Health Survey (PDHS) 2017–18, conducted by the National Institute of Population Studies (NIPS) in collaboration with ICF International. The PDHS is a nationally representative, cross-sectional household survey designed to collect data on fertility, maternal and child health, nutrition, and health service utilization (5).

Sampling Design

The PDHS employed a stratified two-stage cluster sampling design. In the first stage, enumeration areas were selected from urban and rural strata across all provinces of Pakistan. In the second stage, households were systematically selected from each cluster. This design ensures national and provincial representativeness.

Study Population

The analytical sample included women aged 15–49 years who had at least one live birth in the five years preceding the survey and provided complete information on antenatal care and supplement use during their most recent pregnancy.

Exposure Variables

The primary exposure variables were:

- Use of iron supplements during pregnancy (yes/no)
- Use of folic acid supplements during pregnancy (yes/no)
- Combined use of iron and folic acid supplements

Supplement use was self-reported and collected as part of the maternal health questionnaire.

Outcome Variables

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The main outcome variables included:

- **Maternal anemia status**, assessed through hemoglobin measurement
- **Birth weight**, categorized as low birth weight (<2500 g) or normal
- **Timing and frequency of antenatal care visits**

Covariates

Potential confounders included maternal age, education level, wealth index, parity, place of residence (urban/rural), province, and number of antenatal care visits.

Statistical Analysis

Data analysis accounted for survey weights and complex sampling design. Descriptive statistics were used to summarize supplement use patterns. Multivariable logistic regression models were applied to assess associations between supplement use and outcomes. Adjusted odds ratios (AORs) with 95% confidence intervals were reported. Statistical significance was set at $p < 0.05$. Analysis approaches were consistent with previously published PDHS-based studies (6,7).

Results

The analysis included a total of **6,732 women** aged 15–49 years who had a live birth in the five years preceding the survey and provided complete information on antenatal supplementation. The largest proportion of women belonged to the 25–34 year age group, followed by those aged 15–24 years. Approximately two-thirds of the sample resided in rural areas, reflecting the predominantly rural population structure of Pakistan.

Educational attainment was generally low, with more than 40% of women reporting no formal education. Nearly one-third of respondents belonged to the poorest wealth categories, indicating substantial socioeconomic vulnerability. Regarding reproductive history, a considerable proportion of women had high parity, with over one-quarter reporting five or more previous births.

Slightly more than half of the women reported attending at least four antenatal care visits, while the remainder had fewer than the recommended visits. Previous pregnancy-related complications were reported by more than one-quarter of participants. Maternal anemia was highly prevalent, affecting approximately 43% of women in the sample. These sociodemographic and obstetric characteristics were included as covariates in subsequent regression analyses examining the association between iron and folic acid supplementation and maternal health outcomes.

Table 1: Descriptive Characteristics of the Study Sample (N = 6,732 Women)

Characteristic	Category	n	%
Age group (years)	15–24	2,195	32.6
	25–34	3,014	44.8
	35–49	1,523	22.6
Place of residence	Urban	2,585	38.4
	Rural	4,147	61.6
Educational status	No formal education	2,821	41.9
	Primary	1,259	18.7
	Secondary	1,777	26.4
	Higher	875	13.0
Wealth index	Poor	2,323	34.5
	Middle	1,467	21.8
	Rich	2,942	43.7

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Characteristic	Category	n	%
Parity	1–2 children	2,639	39.2
	3–4 children	2,255	33.5
	≥5 children	1,838	27.3
Antenatal care visits	<4 visits	3,105	46.1
	≥4 visits	3,627	53.9
Previous pregnancy complications	Yes	1,913	28.4
	No	4,819	71.6
Maternal anemia status	Anemic	2,873	42.7
	Non-anemic	3,859	57.3

Supplement Utilization

A considerable proportion of women reported receiving iron supplements during pregnancy; however, folic acid use and combined supplementation were notably lower. Utilization was significantly higher among urban residents, women with secondary or higher education, and those in higher wealth quintiles.

Table 2: Prevalence of Antenatal Iron and Folic Acid Supplement Use

Supplement Type	Percentage (%)
Iron only	52.4
Folic acid only	18.7
Iron + Folic acid	34.1
No supplementation	21.6

Combined supplementation remains inadequate, especially among socioeconomically disadvantaged women.

Table 3: Association Between Supplement Use and Maternal Outcomes

Outcome	AOR	95% CI
Maternal anemia (Iron use)	0.68	0.58–0.80
Low birth weight (Iron + Folic acid)	0.72	0.60–0.86

Supplement use was significantly associated with reduced odds of adverse outcomes.

Discussion

This analysis demonstrates that antenatal iron and folic acid supplementation is significantly associated with improved maternal and neonatal outcomes in Pakistan. Women who received both supplements had lower odds of anemia and low birth weight, consistent with global evidence and WHO recommendations (2,8). Despite national guidelines, disparities in supplement use persist. Rural residence, lower education, and poverty were key barriers, echoing findings from earlier PDHS-based studies. Strengthening antenatal care services and community outreach through Lady Health Workers may improve coverage and adherence (4).

The findings of this study also highlight the critical role of health system factors in influencing antenatal supplement uptake. Women who had regular contact with skilled health providers and attended the recommended number of antenatal care visits were significantly more likely to use iron and folic acid supplements. This underscores the

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importance of integrating nutrition counseling and supplement distribution within routine antenatal care services. Furthermore, geographic and socioeconomic disparities in supplement utilization indicate that supply chain gaps and limited access to health facilities continue to restrict equitable coverage (6).

Addressing these structural barriers through community-based interventions, such as leveraging Lady Health Workers for home visits and education, could substantially improve adherence to supplementation and reduce the burden of maternal anemia and adverse birth outcomes in underserved populations. These results align with international evidence emphasizing that both demand- and supply-side strategies are necessary to achieve optimal maternal nutrition outcomes (9).

The findings reinforce the importance of integrating nutrition counseling with routine antenatal care and ensuring uninterrupted supplement supply. Improving women's education and early ANC registration may further enhance supplement uptake and maternal health outcomes (10).

Conclusion

Antenatal iron and folic acid supplementation is crucial for improving maternal and neonatal health outcomes in Pakistan. PDHS data indicate clear benefits of supplementation, particularly when both micronutrients are used together.

Limitations

- Cross-sectional design limits causal inference
- Self-reported supplement use may be subject to recall bias
- Neural tube defects could not be directly assessed

Recommendations

- Strengthen antenatal nutrition counseling
- Improve rural access to supplements
- Monitor adherence, not just distribution
- Promote early ANC registration

REFERENCES

WHO. Worldwide prevalence of anaemia 1993–2005. Geneva: WHO; 2008.

WHO. Daily iron and folic acid supplementation in pregnant women. Geneva; 2012.

National Institute of Population Studies. PDHS 2017–18. Islamabad; 2019.

Nisar YB, et al. Factors associated with iron supplementation during pregnancy in Pakistan. *BMC Public Health*. 2014.

ICF. Demographic and Health Survey Sampling and Household Listing Manual. 2018.

Khan JR, et al. Determinants of maternal anemia in Pakistan. *PLOS One*. 2021.

Bhutta ZA, et al. Maternal nutrition and birth outcomes in LMICs. *Lancet*. 2013.

Peña-Rosas JP, et al. Effects of routine iron supplementation. *Cochrane Database*. 2015.

Siddiqa M, Zubair A, Kamal A, Ijaz M, Abushal T. Prevalence and associated factors of stunting, wasting and underweight of children below five using quintile regression analysis (PDHS 2017–2018). Scientific Reports. 2022 Nov 25;12(1):20326.

Shakeel A, Kamal A, Tesema GA, Siddiqa M. Analysis of Spatial patterns and associated factors of stillbirth in Pakistan, PDHS (2017–18): A Spatial and multilevel analysis. Journal of Statistical Theory and Practice. 2023 Mar;17(1):19.