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Household Food-Related Hardship and Maternal Anaemia among Women Delivering at Tertiary Care Hospitals in Multan, Pakistan

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Abstract

Climate Maternal anaemia and household food-related hardship are important considerations in maternal and newborn health. The current hospital based cross-sectional study included socioeconomic status and assessment of anaemia, iron availability and the food available to mothers who gave birth to children at two tertiary care hospitals in Multan, Pakistan. There were 270 mothers who were recruited using consecutive sampling. A structured questionnaire was used for the collection of data and were analysed using descriptive data frequency, percentage, mean and median. The mean maternal age was 27.81 ± 5.07 years, and 142 mothers (52.6%) lived in rural areas. The monthly income of the participants was less than PKR 20,000 for 58 (21.5%) individuals. It was noted that 98 mothers (36.3%) had been recorded as having anaemia during pregnancy and 91 mothers (33.7%) were recorded with a pregnancy complication. Haemoglobin level was recorded in 257 mothers (95.2%) with the concentration of haemoglobin as 11.54 ± 1.34 g/dL. Furthermore, 170 mothers (63.0%) reported taking iron supplements, with 125 (46.3% of total mothers) taking iron daily. For 85 mothers (31.5%) ferritin testing was available, and 31.8% (8) of these had a recorded diagnosis of iron deficiency. Out of the 98 mothers who reported sometimes or often that they were unable to afford balanced meals, 65 (24.1%) reported that they were eating less due to financial limitation. Moreover, 124 mothers (45.9%) reported their level of access as not consistent. The findings reflect nutrition-related indicators of mothers in the sample recruited at the hospital and food-related hardship of these mothers.

Keywords: Food-related hardship; iron supplementation; maternal anaemia; maternal nutrition; Multan; socioeconomic factors.

1. Introduction

Low birth weight (LBW) defined as weighing less than 2,500 g at birth, is still a significant public health problem as it is indicative of poor maternal health, fetal growth and newborn care. LBW is reported to continue to be a significant morbidity during birth on a global level, especially in South Asian countries, which has a large population of LBW newborns (Okwaraji et al., 2024). The prevalence of LBW and its associated factors is different in different populations and health services and therefore local evidence can be useful in understanding the needs of the mother and the baby.

Maternal nutritional status is a critical determinant of pregnancy progression and birth outcomes. When

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investigating adverse perinatal results, maternal iron deficiency anaemia (IDA) stands out as a primary risk factor that severely compromises a mother's physiological capacity to support fetal growth, frequently leading to low birth weight (LBW) and other complications (Putra & Sulastri, 2024). Belete et al. (2025) conducted a systematic review and conducted a systematic meta-analysis of the studies from sub-Saharan African countries; they found that women who suffered from anaemia had greater chances of experiencing LBW. A study in Pakistan also emphasizes on the significance of clinical and nutritional characteristics of the mother. Bajwa et al. (2024) conducted a study in a tertiary healthcare centre in Lahore and found anaemia from mother as one of the factors associated with LBW. These findings cast light on the issue of assessing anaemia and related indicators in the health status of mothers, during deliveries in Pakistan's hospitals.

Some nutritional problems should be identified and addressed, while partially relying on access to the right antenatal services. The assessment of Haemoglobin and supplementary Fe feeding presents opportunities for detection and management of anaemia, but the utilization of services does not necessarily mean that care is timely, complete and consistent (Arora et al., 2022). Neupane et al. (2023) highlighted in their South Asian analysis the importance of not only the number, but the quality of antenatal care in preventing LBW. A brief review of the use of testing and supplementation can therefore be used to help shape a better picture of maternal care and better acknowledge that 'reliance on testing and supplementation cannot make some claim about the effectiveness of maternal care (Bourassa et al., 2019).

This should also be considered that limited financial resources and social conditions directly control a household's food security, maternal nutrition, and healthcare (Levy & Perez-Velazco, 2025). To date, socioeconomic factors have been linked to LBW; however, with varied measures and groups in studies conducted in different parts of Punjab (Bajwa et al., 2024; Iftikhar et al., 2025). Complementing this picture of food-related hardship may be provided additional information on experiences which can't be captured when focusing only on income categories.

Even with evidence available of Lahore and Faisalabad, the research provided to this study demonstrates the need for developing evidence in Multan and southern Punjab with particular focus on maternal nutritional indicators that need to be considered in light of the household food access (Bajwa et al., 2024; Iftikhar et al., 2025). The present study addresses this need by describing socioeconomic characteristics, recorded anaemia, haemoglobin and ferritin assessment, iron supplementation, and food-related hardship among mothers recruited at two tertiary care hospitals in Multan. Its contribution is that the following clinical and household indicators have been located with each other within one hospital-based sample. However, findings can guide continuing investigations and planning of maternal health resources but cannot be used to determine if the food-related hardship influences either LBW or anaemia.

2. Research Methodology

A hospital-based cross-sectional study was conducted at Nishtar Hospital and Ibn-e-Sina Hospital in Multan, Pakistan. The study duration was four months including eight weeks of data collection. Selection of hospitals was based on accessibility, willingness to participate and access to volume of deliveries.

The study sample included all mothers aged 18-45 years, who had given birth to a live singleton infant at the selected hospitals. The population was recruited in the sequence until the sample size was achieved. Mothers were eligible if they gave informed written consent, and their medical records had necessary key variables. Multiple pregnancies, stillbirths, deaths at birth, and poor birth records/counting and serious underlying medical complications unrelated to pregnancy were not included.

To decide on the minimum required sample size, number of LBW cases was calculated using the formula for the estimation of a single proportion at a 95% confidence level, 5% margin of error and the expected prevalence of LBW 20.1% (Government of Pakistan & UNICEF, 2019). The minimum calculated was about 247 participants, with a target setting increased to 270 mother–newborn pairs, to allow for non-responses.

The data was gathered using a structured questionnaire to be filled out in person during a structured face-to-face interview and supplemented with a review of medical records. The survey included questions on maternal sociodemographic data, nutrition status, and neonatal outcomes. Standardized procedure was used for birth weight and anthropometric characteristics of the mother.

The main outcome was infants with LBW (< 2,500 g). The sociodemographic, clinical, nutritional and lifestyle / environmental factors among the mothers were considered for analysis, such as age, anaemia, BMI (body mass index), chronic illness, parity, gestational age at delivery, antenatal care visits, nutrition and lifestyle / environmental

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factors.

Data were entered and analysed using SPSS (Version 26). Frequencies and percentages were used to summarise categorical variables and means and standard deviations were used for those that were continuous where appropriate. The Institutional Review Board of the TIMES University, Multan gave ethical approval to conduct the study. Hospital administrative permission and written informed consent were obtained before data collection. Participants were briefed that they were participating voluntarily, you do not have anything to lose; observations are kept confidential and that you may withdraw at any time. Data were recorded and kept in password protected records for access by the research team. Additional support was provided to mothers who were identified as needing this through the referral pathway for appropriate hospital services.

3. Results

Table 1 shows the socio-economic and household situation of the participants. Of the total number of mothers the majority, 206 (76.3%) were housewives, 36 (13.3%) were working, 26 (9.6%) were self-employed or belonged to other occupational groups and two (0.7%) had no occupation reviewed. Daily wage earners were the most frequent occupation among husbands, with 122 (45.2%); thereafter, business followed, accounting for 64 (23.7%), the professional group (48, 17.8%), the unemployed (20, 7.4%) and other occupations (16, 5.9%). More specifically, these distributions reflect factors related to the place of work, but they do not capture measures of job security or household assets.

Table 1. Maternal and husband occupations household income and household circumstances among mothers of liveborn newborns at selected tertiary care hospitals in Multan (n=270)

Variable	Category or statistic	n (%)
Maternal age (years)	Mean ± SD	27.81 ± 5.07
Maternal education	No formal education	66 (24.4)
	Primary	74 (27.4)
	Secondary	74 (27.4)
	Higher	56 (20.7)
Maternal occupation	Employed	36 (13.3)
	Housewife	206 (76.3)
	Other	2 (0.7)
	Self-employed	26 (9.6)
Husband occupation	Business	64 (23.7)
	Daily wage	122 (45.2)
	Other	16 (5.9)
	Professional	48 (17.8)
	Unemployed	20 (7.4)
Monthly household income (PKR)	< 20,000	58 (21.5)
	20,000 - 50,000	127 (47.0)
	50,001 - 100,000	63 (23.3)
	> 100,000	22 (8.1)
Household type	Joint	147 (54.4)
	Nuclear	123 (45.6)
Household members (n)	Median	6.50 (5.00 to 8.00)
Residence	Rural	142 (52.6)
	Urban	128 (47.4)

The most frequent answer for monthly household income fell in between PKR 20,000 and 50,000 reported by 127 households (47.0%). Another 58 (21.5%) reported income below PKR 20,000, 63 (23.3%) reported PKR 50,001–100,000 and 22 (8.1%) reported more than PKR 100,000. Joint households had a smaller proportion than nuclear households with 45.6% and 54.4% respectively. Median people per household: 6.50, middle 50% range: 5-8 people. A fractional median occurs due to the even number of observations in the sample, and is not a fractional household member. A larger number of people were in rural areas (142, 52.6%) than in urban areas (128, 47.4%).

Recorded pregnancy complications were observed in 91 (33.7%) of the mothers and 179 (66.3%) did not have a recorded pregnancy complication (Table 2). Of the 91 mothers with complications, most of them (32, 35.2%) had hypertension as a complication, followed by preterm labour (24, 26.4%), gestatational diabetes (19, 20.9%) and other

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complication (16, 17.6%). These percentages are only for mothers that have complications and not all 270 mothers (Table 2).

Twenty-five mothers (9.3%) reported having a history of a chronic illness; 245 mothers (90.7%) reported no history of chronic illness. Pregnant women were also recorded to be anaemic, (98) 36.3% of them were confirmed to be anaemic while (172) 63.7% were not anaemic. Mean pre-pregnancy body mass index (BMI) was 23.37 ± 3.68 kg/m², compared with 26.72 ± 3.93 kg/m² during pregnancy. The difference between these sample means was 3.35 kg/m².

Table 2. Pregnancy complications chronic illness anaemia and maternal body mass among mothers of liveborn newborns at selected tertiary care hospitals in Multan

Variable	Category or statistic	n (%)	Available n
Pregnancy complications	No	179 (66.3)	270
	Yes	91 (33.7)	
Type of pregnancy complication	Gestational diabetes	19 (20.9)	91
	Hypertension	32 (35.2)	
	Others	16 (17.6)	
	Preterm labour	24 (26.4)	
Chronic illness history	No	245 (90.7)	270
	Yes	25 (9.3)	
Anaemia diagnosed during pregnancy	No	172 (63.7)	270
	Yes	98 (36.3)	
Pre-pregnancy BMI (kg/m²)	Mean ± SD	23.37 ± 3.68	270
BMI during pregnancy (kg/m²)	Mean ± SD	26.72 ± 3.93	270

There were 257 mothers (95.2%) who had haemoglobin recorded for them and 13 (4.8%) who did not have a haemoglobin test recorded. The mean value of haemoglobin in mothers was 11.54 ± 1.34 g/dL among those tested. The recorded anaemia categories were mild in 64 mothers (24.9%), moderate in 29 (11.3%) and not applicable in 164 (63.8%). Of the 257 tested mothers, 93 (36.2%) were in the mild and moderate groups (Table 3). Moreover, 63% (170/270) of mothers reported receiving iron. Among these 170 users, 125 (73.5%) reported daily use, 37 (21.8%) occasional use and eight (4.7%) rare use. The percentages are therefore only for supplementation users and apply to the whole of the sample, of which 46.3% (125 women) were using supplements daily. Non-users are represented by the 100 frequency entries that aren't available.

Table 3. Maternal haemoglobin assessment anaemia categories and iron supplementation among mothers of liveborn newborns at selected tertiary care hospitals in Multan

Variable	Category or statistic	n (%)	Available n
Haemoglobin test performed	No	13 (4.8)	270
	Yes	257 (95.2)	
Haemoglobin (g/dL)	Mean ± SD	11.54 ± 1.34	257
Recorded anaemia category	Mild	64 (24.9)	257
	Moderate	29 (11.3)	
	Not applicable	164 (63.8)	
Iron supplementation	No	100 (37.0)	270
	Yes	170 (63.0)	
Iron supplementation frequency	Daily	125 (73.5)	170
	Occasionally	37 (21.8)	
	Rarely	8 (4.7)	

Data on haematocrit, ferritin and characteristics of iron parameters are presented in Table 4. The number of mothers who were tested for haematocrit was 227 (84.1%) while 43 (15.9%) were not tested. The mean haematocrit concentration of the tested mothers was 34.73 ± 4.09%. If haematocrit was performed, then 83 of these mothers (36.6%) had notepads stating anaemia, while 144 (63.4%) of these mothers did not have such notepads. Fewer mothers (31.5%) had a ferritin test. The median concentration of ferritin was in the middle range of 24.90 ng/mL (12.50–42.40), with a wide central distribution of the values measured. In this subgroup, 27 women (31.8%) had a diagnosis of iron deficiency, and 29 women (34.1%) received iron therapy. These counts do not have to match, since

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diagnosis and treatment are two different variables that are recorded. For the remaining 185 mothers, no data on ferritin is provided so assumptions should not be made about their iron stores. Of the full sample, weekly intake was the most reported category for iron-rich-food items, reported by 122 (45.2%) and daily intake by 106 (39.3%) women, while 42 (15.6%) reported that it was never eaten.

Table 4. Maternal haematocrit ferritin and iron-related characteristics among mothers of liveborn newborns at selected tertiary care hospitals in Multan

Variable	Category or statistic	n (%)	Available n
Haematocrit test performed	No	43 (15.9)	270
	Yes	227 (84.1)	
Haematocrit (%)	Mean ± SD	34.73 ± 4.09	227
Doctor-noted anaemia after HCT	No	144 (63.4)	227
	Yes	83 (36.6)	
Ferritin test performed	No	185 (68.5)	270
	Yes	85 (31.5)	
Ferritin (ng/mL)	Median	24.90 (12.50 to 42.40)	85
Iron deficiency diagnosed	No	58 (68.2)	85
	Yes	27 (31.8)	
Iron therapy received	No	56 (65.9)	85
	Yes	29 (34.1)	
Iron-rich food intake	Daily	106 (39.3)	270
	Rarely	42 (15.6)	
	Weekly	122 (45.2)	

Table 5 details indicators about house food insecurity and financial constraints to obtain food at the individual household level. 65 mothers reported sometimes true and 26 often true and 179 mothers reported never to have worried that food would run out. For 63 (23.3%) and 29 (10.7%) people, food did not last because of financial concerns. 63 (23.3%) sometimes and 35 (13.0%) often could not afford a balanced meal. The somewhat and often categories are added into each item for a percentage total of 33.7%, 34.1 % and 36.3 % respectively. The proportions are item-specific, and any aggregation should not be used for estimates of the number of households affected.

Table 5. Maternal reports of household food insecurity and food-related hardship among mothers of liveborn newborns at selected tertiary care hospitals in Multan

Variable	Category or statistic	n (%)	Available n
Worried that food would run out	Never true	179 (66.3)	270
	Often true	26 (9.6)	
	Sometimes true	65 (24.1)	
Food did not last due to financial constraints	Never true	178 (65.9)	270
	Often true	29 (10.7)	
	Sometimes true	63 (23.3)	
Unable to afford balanced meals	Never true	172 (63.7)	270
	Often true	35 (13.0)	
	Sometimes true	63 (23.3)	
Reduced or skipped meals due to financial constraints	No	223 (82.6)	270
	Yes	47 (17.4)	
Frequency of skipped meals	Almost every month	20 (42.6)	47
	Only 1-2 months	7 (14.9)	
	Some months	20 (42.6)	
Ate less due to financial constraints	No	205 (75.9)	270
	Yes	65 (24.1)	
Hungry but did not eat due to financial constraints	No	250 (92.6)	270
	Yes	20 (7.4)	
Weight loss due to lack of food	No	254 (94.1)	270
	Yes	16 (5.9)	

Forty-seven mothers (17.4%) said that they reduce their meal intake or don't eat what they want because of money. Among these 47, 20 (42.6%) reported doing so almost every month, 20 (42.6%) in some months and seven (14.9%)

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in only one or two months. There were 223 other observations structurally off this follow-up question. Sixty-five mothers (24.1%) reported a reduced intake of food and drinks because of cost, twenty (7.4%) reported becoming hungry but not eating and weight loss from not being able to eat by 16 (5.9%). Difficulty with eating a balanced meal and cutting down on food consumption were reported more often than being hungry or losing weight, suggesting that these experiences may be a more frequent occurrence than more severe ones of hunger or losing weight.

Table 6. Maternal food access reliance on low-cost foods and food assistance among mothers of liveborn newborns at selected tertiary care hospitals in Multan (n=270)

Variable	Category or statistic	n (%)
Reliance on low-cost foods	No	136 (50.4)
	Yes	134 (49.6)
Access to nutritious food	Always	146 (54.1)
	Rarely	21 (7.8)
	Sometimes	103 (38.1)
Food assistance received	No	246 (91.1)
	Yes	24 (8.9)

As presented in Table 6, of the total 134 mothers (49.6%) reported that they were using low-cost foods, and 136 (50.4%) mothers were not using low-cost foods. The near balance observed is something that was common in the sample, however, low cost does not constitute poor nutritional quality. 146 mothers reported having always available nutritious food, 103 mothers reported they sometimes had, and 21 mothers reported they rarely had access to nutritious food. Hence, 124 mothers (45.9%) reported inconsistent access towards a nutritious food. Twenty-four of the mothers (8.9%) received food assistance and 246 (91.1%) did not receive food assistance.

4. Discussion

Low birth weight has been a significant public health issue in the world. The combined data of the UNICEF and the World Health Organization reveal that there are about 15-20 percent of low-birth-weight newborns among all the live births per year around the globe and exceed 20 million newborns (UNICEF & WHO, 2019). It was found in this study that 36.3% of the respondent mothers were anaemic and those who underwent test with mean concentration of haemoglobin were 11.54 ± 1.34 g/dL. This finding is pertinent in the context of maternal and newborn health because the findings of Belete et al. (2025) from their systematic review and meta-analysis showed the association between maternal anaemia and LBW in sub-Saharan Africa. Further, a study on factors associated with LBW in tertiary hospital Lahore by Bajwa et al (2024) also showed that maternal anaemia was one of the factors associated with LBW. The information gathered from these studies gives context to the current results but cannot help determining if there was a relationship between born weight and anaemia in the Multan sample.

Furthermore, 63.0% of mothers reported that they intake iron supplementation and 46.3% of them reported using iron daily. The difference is remarkable to consider that the frequency of iron use should be equally studied with reports on supplementation. World Health Organization (2016) states that during pregnancy, women should take iron/folic acid supplements throughout they are pregnant. However, in the current data, no information exists regarding the dosages or duration of supplements, or whether the women maintained their supplementation and if so, for how long; and these data cannot provide information on whether supplementation prevented anaemia in the women studied.

Moreover, 31.5% patients' ferritin level was tested and 31.8% of patients showed a ferritin level. This proportion pertains only to the test group and should not be applied to all mothers. In addition, the difference between the number diagnosed with anaemia and number coded as an anaemia category must also be clarified prior to combining these and treating them as equivalent. Another significant finding was regarding food-related hardship. One-third of the mothers indicated that sometimes or often they were unable to buy a balanced meal and 24.1 percent said that sometimes or often the inability to buy a balanced meal resulted in their eating less food. The results are consistent with the findings of Hashmi et al. (2021) which has highlighted concerns and issues of food insecurity and dietary diversity in Pakistani households.

The socioeconomic status of the sample was found to be diversified with 21.5% earning PKR 20,000 or less per month and a total of 24.4% mothers not having taken any formal education. Some studies have been conducted in India, which have shown a gradient in LBW by socioeconomic status, such as across each household's socioeconomic

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positioning (Ghose, 2023). The information in the present descriptive distributions is not sufficient to determine the relationship between income or education and LBW among the recruited mothers. The overall findings suggest that maternal care attention is required in the assessment of anaemia, maternal nutrition supply and intake of energy food which might cause low body weight of neonates.

5. Conclusion

Results demonstrate that nearly one third of the respondents had been diagnosed with anaemia during pregnancy and over one third recorded that it was hard to always be able to buy balanced meals. Almost a fourth said they reduced their consumption because of limited finances. The findings indicate what needs to be put under the spotlight when conducting an in-service assessment of the health and nutritional condition of women who seek maternity-related services. Haemoglobin testing was observed for the majority, but ferritin testing was not as common. Similarly, fewer than half reported daily iron supplements, although almost two thirds indicated iron supplementation. The information available does not demonstrate adherence to the supplements, supplement duration, or the dose of supplements, and does not include documentation of prevention of anaemia.

The household findings must be analysed with great care as well. Individual responses are indicative of certain food-related hardships and should not be lumped together into an overall food-insecurity category without using a suitable scoring procedure. Support for maternal care can include screening for anaemia, provision of appropriate supplementation and addressing challenges to eating a healthy diet. It is important to analyse verified individual-level data in this population to test the hypothesis that food related hardship and other maternal characteristics are associated with anaemia or birth weight in this population.

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