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NUTRITION AND LIFESTYLE IN PREVENTING PREGNANCY COMPLICATIONS: A QUALITATIVE STUDY FROM PAKISTAN

Tajamal Latif[1], Iqra Amin[1], Hira Nasir[1], Shifa Gillani[1], and Dr Samina[2]
[1]Department of Public Health, BSPH Program, Health Services Academy, Islamabad, Pakistan. [2]Faculty of Public Health, Health Services Academy, Islamabad, Pakistan

Corresponding author: Tajamal Latif (tjkawish786@gmail.com)

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ABSTRACT

Background

Pregnancy complications remain a significant public health burden in Pakistan, where preventable maternal mortality is closely tied to nutritional deficiencies, lifestyle factors, and socio-structural barriers. Despite the well-documented scale of the problem, qualitative evidence exploring how women and healthcare providers experience and perceive these challenges particularly in underserved regions such as Balochistan remains scarce.

Methods

An exploratory qualitative study was conducted using purposive sampling across four provinces and territories of Pakistan (Balochistan, Punjab, Khyber Pakhtunkhwa, and Azad Jammu & Kashmir). Eight interviews were conducted remotely via a secure video-conferencing platform: four Key Informant Interviews (KIIs) with gynecologists and medical officers, and four In-Depth Interviews (IDIs) with pregnant or recently postpartum women. Data were analysed using Braun and Clarke's (2006) six-step reflexive thematic analysis framework. Trustworthiness was established through peer debriefing, reflexive journalling, and member checking.

Results

Four overarching themes emerged: (1) the critical role of nutrition and micronutrient adequacy; (2) lifestyle factors including physical activity, stress, sleep quality, and harmful substance use; (3) systemic and socio-cultural barriers including poverty, food taboos, health workforce shortages, and limited health literacy; and (4) community- and policy-level recommendations for improving maternal health. Healthcare providers identified

iron deficiency anaemia, intrauterine growth restriction (IUGR), and preeclampsia as the most prevalent nutrition-linked complications. Women described economic constraints, inadequate counselling, and cultural food beliefs as primary barriers to healthier practices.

Conclusions

Improving maternal nutrition and lifestyle in Pakistan requires multi-level, culturally sensitive strategies that simultaneously address financial barriers, health literacy gaps, and systemic weaknesses in antenatal care provision. The findings align with WHO antenatal care recommendations and the targets of Sustainable Development Goals 2 and 3, and have relevance for similar low- and middle-income country contexts in South and Southeast Asia.

INTRODUCTION

Maternal health remains a key global public health priority, yet preventable pregnancy complications continue to exact a disproportionate toll in low- and middle-income countries (LMICs). Pakistan's maternal mortality ratio was estimated at approximately 154 deaths per 100,000 live births in 2020 among the highest in South Asia and more than three times the global average with hypertensive disorders, obstetric haemorrhage, and sepsis collectively accounting for nearly 70% of all maternal deaths [1, 2]. These outcomes are closely associated with modifiable risk factors including malnutrition, anaemia, poor dietary diversity, inadequate physical activity, and psychosocial stress [3, 4].

Adequate nutrition during pregnancy is fundamental to both maternal and fetal well-being. Deficiencies in iron, folic acid, calcium, and vitamin D are particularly prevalent in Pakistan, where the burden of anaemia among pregnant women exceeds 50% in certain regions [4, 5]. Iron deficiency anaemia is a leading proximate cause of postpartum haemorrhage; folate insufficiency is associated with neural tube defects and early pregnancy loss; and calcium deficiency contributes to preeclampsia and intrauterine growth restriction (IUGR) [6, 7]. Despite WHO recommendations for universal iron-folic acid supplementation throughout pregnancy, adherence in Pakistan remains below 50%, owing to financial constraints, limited awareness of benefits, and persistent supply chain failures in government facilities [5, 8].

Beyond nutrition, lifestyle factors including physical activity levels, sleep quality, tobacco and hookah use, and psychosocial stress exert independent and interacting effects on pregnancy outcomes. WHO guidelines recommend at least 150 minutes of moderate-intensity physical activity per week for women with uncomplicated pregnancies [9], yet sedentary behaviour is prevalent among Pakistani women, often reinforced by cultural norms that associate bed rest with a safe pregnancy [10]. Tobacco and hookah use culturally normalised in parts of Balochistan have been shown to restrict fetal growth, impair neurological development, and increase the risk of preterm birth [11]. Psychological stress during pregnancy has been independently associated with low birth weight, preterm labour, and impaired postnatal bonding, yet mental health support is structurally absent from most maternal care pathways in Pakistan [12].

Socio-cultural factors further complicate the picture. Deeply embedded dietary belief systems particularly the 'hot' and 'cold' food classification widespread across South Asia frequently lead pregnant women to exclude nutritious foods including eggs, lentils, and meat from their diets [13]. These cultural taboos, combined with

poverty, gender inequity, low literacy, and an under-resourced health system, create compounded vulnerability for women across the reproductive life course [14, 15].

Despite the growing body of quantitative evidence on the nutritional determinants of maternal health in Pakistan, relatively few studies have used qualitative methods to explore how pregnant women and frontline healthcare providers themselves navigate, perceive, and experience these challenges within their specific socio-cultural and institutional contexts [5, 13]. This gap is significant: qualitative inquiry can surface the meanings, barriers, and context-specific dynamics that aggregate data tend to obscure, and can yield actionable, locally grounded recommendations that are more likely to be acceptable and effective [16, 17].

This study therefore aimed to: (1) explore how nutrition and lifestyle behaviours are perceived to influence pregnancy complications in Pakistan; (2) identify the key barriers that prevent women from adopting healthy practices during pregnancy; and (3) generate locally grounded, evidence-informed recommendations for maternal health policy and practice. The study contributes a qualitatively rich, multi-site Pakistani perspective that is largely absent from the existing literature, with particular attention to Balochistan one of the most nutritionally underserved provinces in the country and to the intersection of clinical, cultural, and structural determinants of maternal health.

METHODS

Study Design

This study employed an exploratory qualitative design to generate in-depth, context-specific understanding of how nutrition and lifestyle behaviours shape pregnancy outcomes in Pakistan. A qualitative approach was selected because the study sought to explore the perceptions, lived experiences, and contextual barriers of participants phenomena that are not adequately captured through quantitative instruments [16, 17]. The study did not aim to test pre-specified hypotheses but rather to generate theoretically grounded insights from participants' own accounts, consistent with the principles of inductive, naturalistic inquiry [18].

Study Setting

Data were collected from participants spanning four provinces and administrative territories of Pakistan: Balochistan (Quetta Bolan Medical Complex and Sunderman Provincial Hospital), Punjab (Chakwal district and Islamabad region), Khyber Pakhtunkhwa (Peshawar), and Azad Jammu & Kashmir. Healthcare providers were primarily based at government teaching hospitals in Quetta, Balochistan a province that bears a disproportionate burden of maternal and neonatal mortality relative to other parts of Pakistan, and where access to specialist antenatal care is particularly limited in rural and peri-urban areas [2]. All interviews were conducted remotely via a secure video-conferencing platform (Zoom), enabling geographically diverse sampling that would not have been feasible through in-person data collection alone, given the geographic spread of participants.

Participants and Sampling

Eight participants were recruited through purposive sampling a non-probability approach that selects participants on the basis of their ability to provide information-rich accounts relevant to the research question [18,

19]. Two purposively distinct participant groups were targeted: (1) healthcare providers (HCPs) with professional experience in maternal or antenatal care; and (2) pregnant or recently postpartum women with direct personal experience of pregnancy in Pakistan.

Inclusion criteria for healthcare providers were: (i) current employment in a clinical role with direct or indirect involvement in maternal, antenatal, or obstetric care; (ii) practice based in Pakistan; and (iii) willingness to participate. Inclusion criteria for pregnant and postpartum women were: (i) currently pregnant or within six months postpartum; (ii) resident in Pakistan; and (iii) willingness to participate. No exclusion criteria based on geographic location, socioeconomic status, educational attainment, or parity were applied, in order to maximise diversity of experience within each group.

Participant Characteristics

Table 1 summarises the characteristics of the eight participants enrolled in the study. Among healthcare providers, two were gynaecologists, one was a general medicine resident with clinical experience managing medical complications of pregnancy (including gestational hypertension and gestational diabetes), and one was a recently qualified medical officer. Women participants included three currently pregnant women in their second or third trimester, and one woman who was four months postpartum with no prior antenatal care history. This varied composition enabled triangulation of perspectives from both specialist and generalist clinical viewpoints, as well as from women with different parity, geographic, and socioeconomic backgrounds.

Table 1: Participant Characteristics

ID	Role	Designation	Setting	Location	Status / Experience
HCP-1	Healthcare Provider	Gynaecologist	Rural (Govt.)	Quetta, Balochistan	Senior; Bolan Medical Complex
HCP-2	Healthcare Provider	Gynaecologist, PhD (PGR)	Urban (Govt.)	Quetta, Balochistan	2.5 years; BMC Quetta
HCP-3	Healthcare Provider	General Medicine Resident (PGR)	Urban (Govt.)	Quetta, Balochistan	2 years; Sunderman Provincial Hospital
HCP-4	Healthcare Provider	Medical Officer (House Job)	Urban	Punjab	Recent graduate; primary care
PW-1	Pregnant Woman	3rd Gravida (G3P2)	Semi-urban	Chakwal, Punjab	7th month; prior C-section
PW-2	Pregnant Woman	Multigravida	Urban	Kashmir (AJK)	7th month; employed outside home
PW-3	Postpartum Woman	G2P1	Urban	Peshawar, KPK	4 months postpartum; no prior ANC history

ID	Role	Designation	Setting	Location	Status / Experience
PW-4	Pregnant Woman	3rd Gravida (G3P2)	Rural	Punjab	3rd trimester; self-employed tailor

HCP = Healthcare Provider; PW = Pregnant Woman; PGR = Post-Graduate Resident; ANC = Antenatal Care; AJK = Azad Jammu & Kashmir; KPK = Khyber Pakhtunkhwa.

Data Collection

Data were collected through semi-structured Key Informant Interviews (KIIs) with healthcare providers and In-Depth Interviews (IDIs) with pregnant and postpartum women — a distinction that reflects standard qualitative epidemiological practice, wherein KIIs engage professionals selected for their expert knowledge, while IDIs elicit the lived experience of individuals directly affected by the phenomenon under study [17]. This dual-method approach allowed for rich data capture from both systemic/clinical and personal/experiential vantage points.

Separate, pre-tested interview guides were developed for each participant group and refined through pilot testing prior to data collection. The HCP guide addressed: the perceived role of nutrition in pregnancy; dietary recommendations and supplementation practices; observed complications associated with nutritional deficiency; advice on physical activity; the prevalence and management of tobacco and substance use; institutional and social barriers to healthy lifestyle adoption; and systemic recommendations for improvement. The women's guide covered: dietary habits and changes during pregnancy; physical activity and daily routines; stress management and sleep quality; access to and experience of antenatal care; social influences on dietary decision-making; challenges to maintaining a healthy lifestyle; and perceived pregnancy complications.

All interviews were conducted by three trained interviewers from the research team Tajamal Latif, Hira Nasir, and Iqra Amin all public health graduate students enrolled in the Bachelor of Science in Public Health (BSPH) programme at Health Services Academy (HSA), Islamabad, under the academic supervision of Dr. Samina (Faculty of Public Health, HSA). Interviews were conducted in Urdu or English, according to participant preference, and lasted between 20 and 45 minutes. With the prior informed consent of each participant, all interviews were audio-recorded, transcribed verbatim, and translated into English where the original language was Urdu. Translations were reviewed for accuracy by bilingual members of the research team.

Data Analysis

Transcripts were analysed using Braun and Clarke's six-step reflexive thematic analysis framework [20], as follows:

Step 1 – Familiarisation: All team members independently read and re-read the full transcripts to develop deep familiarity with the data prior to any coding.

Step 2 – Initial coding: Meaning units were coded inductively across the full dataset, without a pre-existing coding framework, generating an initial list of codes capturing semantic and latent content.

Step 3 – Searching for themes: Codes were sorted and clustered into candidate themes representing patterns of shared meaning across the dataset.

Step 4 – Reviewing themes: Candidate themes were reviewed against both the coded extracts and the full transcripts to assess internal coherence and coverage of the data.

Step 5 – Defining and naming themes: Themes were refined, clearly defined in terms of their scope and central organizing concept, and named to reflect their analytical content.

Step 6 – Writing up: Themes were interpreted in relation to the research questions and situated within the broader empirical and theoretical literature.

Analysis was conducted manually by three team members. To enhance credibility, preliminary themes were discussed collectively, and coding decisions were reviewed and refined through structured peer debriefing sessions. Reflexive journalling was maintained throughout data collection and analysis to surface, document, and manage researcher assumptions and positionality.

Trustworthiness

Trustworthiness was established using the four criteria proposed by Lincoln and Guba [21]: (1) Credibility was supported through prolonged engagement with the data, peer debriefing among multiple researchers, and member checking with two participants who reviewed key themes for resonance with their experience; (2) Transferability was addressed through thick description of the study context, participant characteristics, and methodological procedures, enabling readers to assess applicability to similar settings; (3) Dependability was supported through documentation of the full analytical process and use of an established, well-validated thematic analysis framework; and (4) Confirmability was supported through researcher reflexivity and maintenance of an analytical audit trail.

Data Saturation

Although the sample comprised eight participants which is modest by some qualitative standards thematic saturation was monitored prospectively throughout the analytical process. By the sixth interview, no substantially new thematic content was emerging, and the final two interviews largely confirmed and extended existing themes. This pattern is consistent with evidence from the qualitative methods literature that saturation in purposive samples with distinct, internally homogeneous sub-groups can be achieved with fewer interviews than heterogeneous samples require, particularly when rich, contextually detailed data are generated [22]. The exploratory scope of the study further justifies this sample size as appropriate for theory generation rather than statistical representation.

Ethical Considerations

This study was conducted as part of a supervised academic research project within the BSPH programme at Health Services Academy (HSA), Islamabad, under the faculty supervision of Dr. Samina. All participation was entirely voluntary. Written or verbal informed consent according to participant preference was obtained from each participant prior to commencement of the interview. Participants were informed of the study's purpose, their right to withdraw at any time without consequence, and the confidentiality of all information provided. No personally identifiable information was reported; all participants are identified by pseudonymous codes.

The study involved no deception, no clinical procedures, no interventions, and no collection of sensitive biological data only voluntary, interview-based data collection with adults who engaged freely and with full information. Given these characteristics (a low-risk design, voluntary participation, informed consent, no deception, and faculty supervision), the study is consistent with the principles governing academic research exemption

from formal Institutional Review Board (IRB) oversight, as recognised by international frameworks including the U.S. Common Rule (Category 2 exemption for research involving interview procedures) and in line with guidance from Pakistan's National Bioethics Committee (NBC) on research involving minimal risk [23].

The authors acknowledge that the absence of formal IRB documentation represents a limitation, and strongly recommend that future qualitative studies of this nature even when conducted as academic coursework seek formal ethics committee review. This is particularly important for research involving vulnerable populations such as pregnant women.

RESULTS

Thematic analysis yielded four overarching themes: (1) the critical role of nutrition and micronutrient adequacy; (2) lifestyle factors and their impact on pregnancy outcomes; (3) systemic and socio-cultural barriers to healthy practices; and (4) recommendations for improvement. Representative participant quotations are presented throughout, identified by participant code.

Theme 1: The Critical Role of Nutrition and Micronutrient Adequacy

Healthcare providers consistently identified inadequate nutrition and particularly micronutrient deficiency as the primary proximate factor associated with adverse pregnancy outcomes. Iron, folic acid, calcium, and vitamin D were most frequently discussed, with iron deficiency anaemia characterised as the leading nutritional risk in the HCP sample.

> *"One of the most common causes of maternal mortality in our setup is postpartum haemorrhage because of iron deficiency anaemia."* (HCP-1)

> *"In Pakistan, we have neural tube defects the child's head has water in it, the child's head does not form, the child's bones do not form. All these diseases occur. To prevent them, we give folic acid-rich food and folic acid in the form of supplementation."* (HCP-1)

The nutritional complications observed were not limited to anaemia. Healthcare providers described a clinical picture in which poor maternal diet contributed to a cascade of adverse fetal and maternal outcomes, including IUGR, low birth weight, preterm labour, and impaired postpartum recovery:

> *"As I told you, low birth weight normal birth weight is 2.5 to 3.5 kg, but what we are seeing is 2 kg, 1.5 kg that is very common in Balochistan."* (HCP-3)

> *"Nutritional factors are the number one contributor to pregnancy complications. Pregnant women require special care for their dietary needs, yet currently receive only basic attention."* (HCP-2)

Women participants described their diets in largely unstructured terms, characterized by low diversity and limited access to the foods recommended by healthcare providers. Economic constraints were identified as a primary driver of poor dietary quality:

> *"High cost affects everything because my husband earns little money; we can only afford two meals a day."* (PW-1)

Cultural food beliefs emerged as a second major nutritional barrier. The 'hot' and 'cold' food classification system in which certain nutritious foods are considered harmful during pregnancy was identified as a pervasive and countervailing influence on dietary behaviour:

> *"There are numerous myths surrounding 'hot' and 'cold' foods during pregnancy. Patients frequently report receiving conflicting advice... This contradictory guidance ultimately deprives many women of essential nutritious foods they could otherwise benefit from."* (HCP-1)

Despite receiving dietary advice from healthcare providers, women's dietary practices remained largely unchanged. PW-3 had not attended any antenatal clinic until four months into her second pregnancy and reported receiving no dietary guidance. PW-2 noted food cost as a barrier to compliance, while PW-4 described how homemade traditional foods such as ghee and yakhni (bone broth) were provided in the postpartum period culturally valued but not necessarily calibrated to clinical nutritional needs.

Theme 2: Lifestyle Factors and Their Perceived Impact

Across both participant groups, physical activity, psychological stress, sleep quality, and tobacco/hookah use emerged as key lifestyle dimensions associated with pregnancy outcomes.

Physical Activity

Healthcare providers universally endorsed physical activity as beneficial during uncomplicated pregnancies, while also describing widespread cultural beliefs that bed rest is the safer approach. Women who remained active described easier deliveries, consistent with clinical evidence:

> *"The more active you are and the more you take a good diet during pregnancy, the better your recovery. Nowadays we say, 'If you are pregnant, you have to rest' but it is not like that."* (HCP-1)

> *"For a normal pregnancy with no complications, the WHO recommendation is that the pregnant woman has the same physical activity requirement as a normal adult at least five times a week for at least 30 minutes."* (HCP-3)

> *"Staying active and doing housework during pregnancy made delivery easier for me. The doctor advised me to avoid chores, but I didn't, and my last delivery was normal and smooth."* (PW-4)

Women participants' 'physical activity' largely comprised domestic labour rather than structured exercise, and for most, this was their sole form of activity during pregnancy. PW-1 and PW-2 reported no dedicated exercise, though both performed extensive household tasks. Cultural norms encouraging rest often reinforced by elders were cited as a barrier to more active behaviour.

Psychological Stress and Sleep

Psychosocial stress was identified as a cross-cutting concern by healthcare providers, with implications for nutrition, sleep, and fetal development:

> *"Stress has a very bad effect not only on the mother but also on the child. The mother, as happy as she is, will take a good diet, will take good rest, will sleep well and when her baby is born, the child will achieve his or her milestones."* (HCP-1)

> *"In our Balochistan, mentally, our females are very depressed. Those who are not mentally healthy take their physical health for granted."* (HCP-3)

Women participants described coping with stress primarily through continued engagement in household work rather than through deliberate stress-management strategies, reflecting both the absence of alternatives and their sense of duty:

> *"We have nothing to control our stress. We just keep ourselves busy with house chores or taking care of the kids nothing special."* (PW-1)

Sleep deprivation was a common experience, driven by the dual burden of domestic responsibilities and pregnancy-related discomfort. PW-1 reported managing on as few as four hours of sleep per night.

Tobacco and Substance Use

Healthcare providers in Balochistan identified hookah smoking as a normalised cultural practice among women, presenting particular challenges for cessation counselling during pregnancy:

> *"In our Balochistan, hookah smoking is a normal custom. Young females are doing that. Smoking again has very bad outcomes preterm birth, low birth weight, and babies not crying after birth. Such babies often have mental weaknesses."* (HCP-3)

> *"Some patients ask if they can resume smoking after pregnancy, we advise it is better to quit completely, but at minimum to avoid it during pregnancy."* (HCP-1)

The normalisation of hookah use and the absence of pharmacological cessation support in government facilities meant that many women continued smoking despite counselling. This was compounded by the social stigma associated with disclosing substance use to healthcare providers.

Theme 3: Systemic and Socio-Cultural Barriers

Participants described a multi-layered system of barriers operating at the individual, household, community, and health system levels.

Health System Weaknesses

The absence of nutritionists from government maternal health facilities was consistently cited as a structural gap that transferred an unmanageable burden of nutritional counselling onto already overstretched gynaecologists and general practitioners:

> *"There is no nutritionist in our setup no dedicated department or specialist in our hospital. We as gynaecologists have to manage all aspects."* (HCP-1)

> *"One doctor is looking after 100 or 120 outpatients daily he or she hardly has time to counsel their patients. Those who are privileged enough to attend private facilities get counselled. In a government setup or periphery, there is zero counselling."* (HCP-3)

> *"Currently unavailable only doctors provide nutritional counselling. We urgently need dedicated nutrition professionals and structured nutritional guidance programmes."* (HCP-2)

Late and Infrequent Antenatal Care

Late presentation to antenatal care was described as widespread, particularly in rural and peri-urban areas. PW-3 had received no antenatal care whatsoever during her first pregnancy, and did not attend a clinic until four months into her second only her first ever antenatal visit. Healthcare providers attributed this to a combination of low awareness, financial barriers, and cultural devaluation of preventive care:

> *"Rural women often present with severe complications like obstructed labour or uterine rupture due to unassisted delivery attempts critical knowledge gaps and lack of awareness about risks."* (HCP-2)

Socioeconomic and Educational Barriers

Poverty was identified as a pervasive structural barrier affecting dietary quality, supplement access, and antenatal care attendance. Multiparity common in the study population compounded financial strain and reduced the time and energy available for self-care:

> *"We have multigravida patients 8 or 10 children consecutively with no gap. They are supporting those children. So even if they conceive, they are not doing visits and they are not taking enough nutrients."* (HCP-3)

Low educational attainment was identified as both a direct barrier (limiting health literacy and uptake of medical advice) and an indirect one (through constraining economic independence and decision-making autonomy within households). Healthcare providers noted that educated women generally demonstrated better compliance and outcomes.

Theme 4: Recommendations for Improvement

All participants offered concrete recommendations for systemic and behavioural improvement. These were grounded in the barriers identified in the previous theme and were specific to the Pakistani context.

Free essential supplementation was the most consistently advocated systemic reform:

> *"I strongly believe basic supplements like iron, calcium, folic acid, and multivitamins should be provided free of cost in government setups at least for pregnant women. Antenatal visits are currently free, but patients must purchase medications themselves."* (HCP-1)

Mobile healthcare teams were recommended to close the urban-rural gap in antenatal service access:

> *"We urgently need dedicated mobile healthcare teams for rural home visits, comprehensive education programmes targeting rural populations, and training for rural birth attendants."* (HCP-2)

Mass media was endorsed as a scalable channel for public health education:

> *"Media is a good source. Through TV, we can educate women about diet and lifestyle not only in pregnancy but for a healthy generation."* (HCP-1)

Women expressed a desire for more attentive, patient-centred care from healthcare providers:

> *"Doctors should listen to us most doctors don't even listen to our problems. They should guide us on what to do while being pregnant regarding work, diet, and supplements."* (PW-1)

The strengthening of the Lady Health Worker (LHW) and Lady Health Visitor (LHV) programme was highlighted as a community-level priority, given its existing reach into rural and peri-urban households. One participant also called for the integration of nutritionists into district and tehsil hospitals a reform that would align government services with practices already standard in private-sector facilities.

Discussion

This exploratory qualitative study examined how nutrition and lifestyle behaviours influence pregnancy outcomes in Pakistan from the perspectives of both healthcare providers and women with lived pregnancy experience. Four key themes were identified, collectively highlighting the compounded and mutually reinforcing nature of nutritional, lifestyle, cultural, and systemic barriers to maternal health in Pakistan. The findings resonate strongly with existing literature while also contributing novel insights specific to the Balochistan context and the perspectives of frontline providers in under-resourced government settings.

The centrality of micronutrient deficiency particularly iron to adverse maternal outcomes observed by providers in this study is consistent with global evidence. Iron deficiency anaemia is estimated to affect over 40% of pregnant women globally, with some of the highest prevalence rates in South Asia [4, 6]. Postpartum haemorrhage, identified by participants as a leading cause of maternal mortality in their settings, is pathophysiologically linked to both iron deficiency anaemia and poor nutritional status more broadly [3]. Similarly, the folate deficiency-neural tube defect association identified by participants aligns with established epidemiological evidence, and reinforces the importance of pre-conception and early pregnancy supplementation an intervention that remains critically under-implemented in Pakistan [5, 8].

The 'hot' and 'cold' food belief system, identified as a significant cultural barrier to adequate nutrition in this study, has been documented across multiple South and Southeast Asian contexts [13, 24]. What is particularly notable in the present study is that this belief system was identified not only by women but also by highly trained gynaecologists as a pervasive and clinically consequential phenomenon suggesting that its influence operates even among populations in regular contact with biomedical advice. Addressing such deeply embedded cultural norms requires culturally adapted education strategies rather than purely biomedical messaging, as has been argued elsewhere [13].

The lifestyle findings particularly regarding physical activity reflect a tension between clinical guidelines and cultural norms that is common across South Asia. WHO recommends that uncomplicated pregnancies maintain the same physical activity levels as the general adult population [9], yet participants described a cultural default towards bed rest. Women who defied this norm and remained active (notably PW-4) reported better delivery outcomes consistent with evidence that moderate physical activity during pregnancy is associated with reduced risk of gestational diabetes, preeclampsia, and prolonged labour [10]. The smoking/hookah findings from Balochistan further highlight the importance of region-specific public health responses: cessation interventions need to account for the social normalisation of hookah use in specific communities, rather than applying a one-size-fits-all approach.

The mental health dimension of maternal wellbeing was consistently present across both participant groups, despite not being the primary focus of any interview guide. Stress, sleep deprivation, and emotional depletion emerged as pervasive features of women's pregnancy experience, often linked to domestic overburden, economic hardship, and lack of family support. This is consistent with evidence on the bi-directional relationship between maternal mental health and nutritional status [12], and with emerging calls to integrate mental health screening and support into routine antenatal care in LMICs.

At the systemic level, the study corroborates broader evidence on health system failures in Pakistan's maternal care pathway. The complete absence of nutritionists from government hospitals — and the consequent displacement of nutritional counselling onto clinicians with neither the time nor specialist training to provide it represents a critical structural gap [25]. Combined with overwhelming patient loads, late antenatal presentation, and inadequate supplement supply chains, these failures disproportionately affect the poorest and most rural populations precisely those at greatest nutritional risk [2, 14].

The findings align with two key global frameworks. The study's recommendations are consistent with WHO's 2016 Antenatal Care guidelines, which call for integrated nutritional counselling, iron-folic acid supplementation, and respectful care during pregnancy [8]. At the policy level, the findings speak directly to Sustainable Development Goal 3 (Good Health and Well-being, specifically Target 3.1: reducing the global maternal mortality ratio) and SDG 2 (Zero Hunger, specifically Target 2.2: ending all forms of malnutrition). The findings are also relevant to SDG 5 (Gender Equality), particularly Target 5.6 on universal access to sexual and reproductive healthcare.

In terms of transferability, the study's findings particularly the structural barriers relating to health workforce shortages, supplement supply chains, and rural-urban disparities are likely to resonate across other LMIC settings in South and Southeast Asia with similar maternal health burdens, including Afghanistan, Bangladesh, and parts of sub-Saharan Africa. The cultural specificities of the Balochistan context (notably hookah use norms and food taboo systems) may be less directly transferable but are illustrative of the broader principle that culturally tailored strategies are essential in any contextually diverse region. Future research should examine these dynamics in other Pakistani provinces to assess the generalisability of findings within the country.

Limitations and Future Research

This study should be interpreted in light of several limitations. First, the sample of eight participants is modest, and while thematic saturation was reached within the dataset, the study cannot claim representativeness. As an exploratory qualitative study, the aim was theory generation rather than statistical generalisation, and findings should be understood as context-specific insights rather than population-level conclusions. Future research should employ larger, more diverse samples potentially across multiple provinces to assess the generalisability of the themes identified here.

Second, and most critically, the study did not obtain formal Institutional Review Board (IRB) approval prior to data collection, as it was conducted as part of academic coursework at Health Services Academy. While all ethical principles (voluntary participation, informed consent, confidentiality, no harm) were adhered to, the absence of formal ethics committee oversight is a significant limitation that the authors acknowledge fully. Future research involving pregnant and postpartum women who constitute a vulnerable population must obtain formal ethical clearance from accredited institutional review bodies prior to data collection.

Third, data were collected exclusively via Zoom video-conferencing. While this enabled geographically diverse sampling, it may have introduced digital access barriers (excluding women without smartphones or reliable internet), may have limited the depth of rapport in some interviews, and precluded the collection of non-verbal contextual data that in-person ethnographic approaches would have captured.

Fourth, purposive sampling while appropriate for qualitative inquiry does not permit statistical inference. The women sampled were, by definition, willing to participate and able to access a video-conferencing platform, which may have introduced selection bias towards more socioeconomically advantaged or digitally literate participants than the general Pakistani maternal population.

Fifth, social desirability bias is possible, particularly in HCP interviews where providers may have overstated the completeness of the nutritional counselling they provide. Conversely, women participants may have underreported culturally stigmatised behaviours (such as tobacco use or deviation from medical advice).

Finally, limited demographic data were collected from women participants including age, parity history, and educational attainment which constrains the depth of participant characterisation possible in this report. Future studies should systematically collect these variables to enable more nuanced analysis of how sociodemographic factors interact with nutritional and lifestyle outcomes.

Future research should: (1) employ mixed-methods designs to triangulate qualitative insights with quantitative nutritional data; (2) explore the perspectives of Lady Health Workers and Lady Health Visitors as key intermediaries in Pakistan's maternal health system; (3) investigate the 'hot' and 'cold' food belief system more systematically across provinces; and (4) evaluate the impact of specific interventions (such as free supplementation programmes and mobile health teams) on maternal outcomes in Balochistan and similar underserved settings.

Conclusions

This exploratory qualitative study adds a contextually grounded, multi-site perspective to the growing literature on the nutritional and lifestyle determinants of pregnancy outcomes in Pakistan. The findings highlight that the barriers to healthy maternal nutrition and lifestyle are not merely individual but are deeply embedded in economic, cultural, and structural systems that require coordinated, multi-level responses. Clinically, the study reinforces the importance of iron, folic acid, calcium, and vitamin D supplementation, and the need to address the cultural food belief systems that interfere with their dietary uptake.

At the policy level, the findings support advocacy for free essential supplementation in government maternal health facilities, the integration of nutritionists into district-level maternal care, the strengthening of the Lady Health Worker programme, and the deployment of mobile healthcare teams in rural areas. These reforms align with the WHO Antenatal Care guidelines and with the SDG 3, SDG 2, and SDG 5 targets for maternal health, nutrition, and gender equity. The perspectives of the pregnant and postpartum women in this study — who called for more attentive, respectful, and practically useful engagement from healthcare providers — serve as an important reminder that technical reforms must be accompanied by a cultural shift towards person-centred maternal care.

Contributors

Tajamal Latif conceptualised the study, developed the interview guides, coordinated and conducted data collection, led thematic analysis, and drafted and revised the manuscript. Iqra Amin and Hira Nasir participated in

data collection, verbatim transcription, and thematic coding. Shifa Gillani assisted with data review and manuscript formatting. Dr. Samina provided academic supervision throughout the research process. All authors reviewed and approved the final manuscript.

Declaration of Interests

The authors declare no competing financial or personal interests.

Data Sharing

De-identified interview transcripts and thematic codebooks are available upon reasonable request to the corresponding author (tjkawish786@gmail.com).

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