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Evaluation of Essential Newborn Care Practices among Mothers in Community and Health Facility Settings in Tehsil Kharian District Gujrat, Pakistan

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Abstract

Introduction: Neonatal mortality remains a critical public health challenge in low-resource settings such as Tehsil Kharian, Pakistan. Understanding maternal knowledge, attitudes, and practices (KAP) regarding neonatal care is essential for improving newborn outcomes. **Objective:** This study aimed to assess maternal KAP related to neonatal care among mothers of newborns in households and healthcare facilities in Tehsil Kharian. **Materials and Methods**: A community-based, descriptive cross-sectional study was conducted from 10th January to 10th May 2022. Mothers of newborns aged 5 days to 3 months were enrolled after providing written informed consent. Data were collected through face-to-face interviews using a pre-validated structured questionnaire in the local language. The questionnaire captured sociodemographic information, antenatal care (ANC) history, and KAP on thermal regulation, umbilical cord hygiene, breastfeeding, immunization, eye care, and recognition of neonatal danger signs. Data were analyzed using IBM SPSS Version 26.0. **Results:** A total of 380 mothers participated (mean age 25.63 ± 3.45 years); 50% had college-level education, and 67.4% had household incomes up to PKR 40,000. Overall knowledge was moderate, with 50% aware of proper breastfeeding and cord care practices, but only 19.5% knew to initiate breastfeeding within minutes of delivery. Harmful practices included using previously used blades for cord cutting (61.8%) and giving pre-lacteal feeds (43.9%). Only 30.3% of mothers attended ANC visits, and 65.8% believed vaccines were harmful. **Conclusion:** Significant gaps in maternal KAP exist in Tehsil Kharian, highlighting the need for targeted educational interventions and community-based programs to promote evidence-based neonatal care and reduce neonatal mortality.

Introduction

The neonatal period, defined as the first 28 days of life, is the most vulnerable stage of a child's survival and development. Globally, approximately 2.3 million newborns died in the first month of life in 2023, accounting for nearly 47% of all under-five deaths [1,2]. South Asia bears a disproportionate share of this burden, with countries such as Pakistan and India contributing heavily to regional neonatal mortality due to systemic health care limitations, socio-economic disparities, and prevailing cultural practices [3,4]. In Pakistan, the neonatal mortality rate was estimated at 38 per 1,000 live births in 2023, considerably higher than the global average of 12 per 1,000 live births [5,6]. This disparity reflects persistent gaps in access to skilled care, postnatal follow-up, and adoption of essential newborn care (ENC) practices, particularly in semi-rural and rural communities [7].

The leading causes of neonatal deaths include birth asphyxia, infections such as sepsis and pneumonia, and complications related to preterm birth, together accounting for more than two-thirds of neonatal mortality worldwide [8,9]. Many of these deaths are preventable through timely interventions including thermal care, hygienic cord management, early initiation of exclusive breastfeeding, and immunization [10–12]. The World Health Organization (WHO) emphasizes implementation of ENC practices within the first hour of life — often referred to as the "golden minute" — to significantly improve neonatal survival [10,11].

Thermal care is a critical component of ENC. Newborns have a high surface-area-to-body-mass ratio and limited subcutaneous fat, making them highly susceptible to hypothermia, which can increase mortality risk [8,13]. Strategies such as immediate drying, wrapping in warm blankets, skin-to-skin contact, and delaying the first bath are essential, particularly in low-resource settings where incubators may not be available [8,14,15]. Skin-to-skin contact

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not only supports thermoregulation but also stabilizes heart rate, respiration, and blood glucose; fosters maternal-infant bonding; and facilitates early breastfeeding [15].

Hygienic cord care is another cornerstone of newborn survival because it prevents omphalitis and systemic infections. WHO recommends dry cord care in low-resource settings unless chlorhexidine antiseptic is available [10,11]. Despite these recommendations, traditional practices such as applying ghee, ash, or soil to the cord stump remain common in some communities, elevating infection risk [16].

Breastfeeding practices also critically influence neonatal health outcomes. Early initiation within one hour of birth and exclusive breastfeeding for six months reduce neonatal infections and improve nutrition [17]. However, pre-lacteal feeding remains prevalent in certain socio-cultural contexts, delaying colostrum intake and increasing vulnerability to infection [17,18].

Immunization and ocular prophylaxis constitute additional essential interventions. Vaccines such as Bacillus Calmette–Guérin (BCG) and hepatitis B provide early protection against serious infections, while prophylactic erythromycin or povidone-iodine prevents neonatal conjunctivitis, a common cause of blindness in low-resource settings [10,19].

Recognition of neonatal danger signs is crucial because maternal responses often determine timely care-seeking. Danger signs include poor feeding, persistent crying, fever, hypothermia, or respiratory distress [20]. Delayed recognition and care-seeking, often due to lack of maternal knowledge or cultural beliefs, can result in preventable deaths [20].

In Pakistan, while facility births are increasing, gaps remain in postnatal care and maternal readiness to practice evidence-based neonatal care. Socio-economic status, maternal education, and household income significantly influence neonatal outcomes, particularly in semi-rural areas like Tehsil Kharian [5,21]. Household and community practices often fill gaps left by the formal health system, highlighting the importance of understanding maternal knowledge, attitudes, and practices (KAP) in both community and health facility settings [21].

The rationale for this study stems from the limited local data on maternal ENC practices in Tehsil Kharian. Although national surveys provide broad estimates, they often lack sub-district-level granularity on maternal behaviors, socio-cultural determinants, and gaps between recommended and actual practices [5,21]. Understanding these gaps is critical to designing targeted interventions, educational programs, and policy recommendations to improve neonatal survival. Identifying harmful practices and socio-cultural barriers allows for culturally appropriate strategies that are more likely to be adopted and sustained.

Objectives

- To assess maternal knowledge regarding essential newborn care practices, including thermal regulation, cord hygiene, breastfeeding, immunization, and neonatal danger signs in Tehsil Kharian.
- To evaluate maternal attitudes toward recommended newborn care practices and identify socio-cultural beliefs affecting these behaviors.
- To document actual maternal practices related to essential newborn care in both community and health facility settings.
- To identify gaps between recommended interventions and maternal behavior to inform targeted health education and policy strategies.

This study aims to provide evidence-based insights into maternal KAP toward newborn care in a semi-rural setting, supporting interventions that enhance neonatal survival and contribute to achieving Sustainable Development Goal 3.2, which targets ending preventable deaths of newborns and children under five years of age by 2030 [3], [5].

Methodology

A community-based descriptive cross-sectional study was conducted in Tehsil Kharian from 10th January to 10th May 2022. The study population comprised mothers who had recently given birth to a child within the last three months. A sample size of 380 was calculated based on a knowledge prevalence of 55.5%, with a 5% margin of error and a 95% confidence interval, using the formula:

$$n=Z2\cdot P(1–P)d2n = \frac{Z^2 \cdot P(1-P)}{d^2}n=d2Z2\cdot P(1–P)$$

where Z = 1.96 (for 95% confidence interval), P = 0.555 (knowledge prevalence), and d = 0.05 (margin of error). Non-probability convenience sampling was employed to select participants. Mothers of any age with a newborn aged more than five days and up to three months, who were willing to participate, were included in the study. Mothers with newborns younger than five days or older than three months, those who were mentally unstable or seriously ill, and those unwilling to participate were excluded.

Ethical approval was obtained from the Institutional Review Board prior to initiating the study. Written informed consent was secured from all participants meeting the inclusion criteria. Data were collected using a structured, pre-validated questionnaire administered through face-to-face interviews in the local language to ensure accurate communication. The questionnaire captured sociodemographic characteristics, antenatal care history, and maternal knowledge, attitudes, and practices regarding thermal regulation, umbilical cord hygiene, breastfeeding, immunization, eye care, and identification of neonatal danger signs. Interviews were conducted both at healthcare facilities and within community settings in Tehsil Kharian. All responses were recorded confidentially and checked for completeness and consistency prior to entry for statistical analysis.

Collected data were analyzed using IBM SPSS Version 26.0. Reliability and internal consistency of the questionnaire were assessed using Cronbach's alpha, with values of 0.7 or higher

considered acceptable. Descriptive statistics summarized the data, with categorical variables—including marital status, maternal occupation, education level, religion, mode of delivery, neonate's gender, and maternal knowledge, attitude, and practice levels—presented as frequencies and percentages. Continuous variables such as maternal and paternal age, neonate's age, household income, birth weight, and gestational age were expressed as means with standard deviations.

Results

The study included 380 mothers from Tehsil Kharian. The mean age of mothers was 25.63 years (SD ± 3.45), and fathers' mean age was 32.65 years (SD ± 3.52). The average monthly household income was PKR 59,578.95 (SD ± 28,168.95). Neonates had a mean birth weight of 2.73 kg (SD ± 0.69) and a mean gestational age of 33.74 weeks (SD ± 5.62).

Table 1: Maternal Sociodemographic and Household Characteristics

Characteristic	Frequency	Percentage (%)
Marital Status		
Married	291	76.6
Divorced	89	23.4
Mother's Occupation		
Housewife	165	43.4
Employed	138	36.3
Daily laborer	77	20.3
Education Level		
No formal education	39	10.3
Primary	36	9.5
Incomplete secondary	115	30.3
College	190	50.0
Household Monthly Income (PKR)	≤40,000	256
	40,001–100,000	124
Religion	Muslim	252
	Non-Muslim	128

Interpretation: Most participants were married (76.6%) and had at least secondary education (80.3%). Nearly half were housewives, while the remaining were employed or daily laborers. Two-thirds of households earned ≤40,000 PKR per month, indicating a predominance of lower-income families. The majority identified as Muslim (66.3%), reflecting the local population composition.

Table 2: Neonatal Characteristics and Thermal Care Practices

Characteristic / Practice	Frequency	Percentage (%)
Neonate Gender	Male	117
	Female	263
Mean Birth Weight (kg ± SD)	2.73 ± 0.69	—
Mean Gestational Age (weeks ± SD)	33.74 ± 5.62	—
Methods to keep baby warm	Skin-to-skin contact	169
	Wrapping in cloth	175
	Other	36
Belief: Skin-to-skin prevents cold	Agree	172
	Disagree	208
Thermal protection post-delivery	Wrapping	180
	Skin-to-skin	130
Cold protection methods	Room warm	160
	Wrapping	150
	Delayed bath	130
Timing of first bath	Minutes	110
	Hours	140
	Days	80
Baby kept with mother	Yes	170
	Separated	160
	Don't know	60

Interpretation: Neonates were predominantly female (69.2%), with a mean gestational age of 33.74 weeks. Knowledge and practice regarding thermal protection were inconsistent. While nearly half of mothers recognized skin-to-skin contact, many relied solely on wrapping. Room warming and delayed bathing were less consistently practiced, and almost 42% of mothers separated babies from themselves, which may limit bonding and thermal regulation.

Table 3: Breastfeeding and Cord Care Practices

Practice / Knowledge Area	Frequency	Percentage (%)
Timing of first breastfeeding	Minutes	71
	Hours	140
	Don't know	169
Colostrum feeding	Fed	130
	Discarded	100
	Other / ambiguous	150
Breastfeeding frequency	On demand	205

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	According to timetable	175
Agreement on giving fluids other than milk	Agree	167
	Disagree	213
Types of fluids given	Water	185
	Glucose water	137
	Cow's milk	58
Blade used for cutting umbilical cord	New	145
	Previously used	235
Material applied to stump	Butter	218
	Nothing	162
String used	New	114
	String	134
	Plant fiber	132
Umbilical stump cleaning	Water	138
	Alcohol	118
	Saliva	113

Interpretation: Breastfeeding practices showed substantial gaps. Only 18.7% initiated breastfeeding within minutes, while 44.5% were unaware of the appropriate timing. Colostrum feeding was suboptimal, with 26.3% discarding it. Unsafe practices were observed in cord care: 61.8% used previously used blades, and 57.4% applied butter to the stump. These findings highlight the need for targeted maternal education on essential newborn care.

Table 4: Vaccination, Antenatal Care, and Source of Information

Characteristic / Practice	Frequency	Percentage (%)
Awareness of vaccination at birth	Yes	255
Knowledge of purpose of vaccines	To prevent disease	161
OPV identified	169	44.5
BCG identified	87	22.9
ANC attendance	Yes	115
	No	265
Number of ANC visits	0	193
	≥1	187
Tetanus toxoid during pregnancy	Yes	167
Mode of delivery	Cesarean	265
	Spontaneous	115
Postnatal education received	Yes	230
Source of newborn care information	Doctors	225
	Nurses	155

Interpretation: Antenatal care coverage was low; only 30.3% of mothers attended ANC, and nearly half did not receive any visits. Cesarean deliveries were high (69.7%), potentially reflecting local healthcare practices. Vaccination awareness was moderate, with 67.1% recognizing its importance, though knowledge of specific vaccines and their purposes was low. Doctors were the primary source of newborn care information post-delivery. These findings underscore the need to strengthen maternal health education both antenatally and postnatally.

Discussion

The mean age of mothers in our study was 25.63 years (SD ± 3.45), and fathers were 32.65 years (SD ± 3.52), with an average monthly household income of PKR 59,578.95 (SD ± 28,168.95). These demographics align with studies conducted in similar low- and middle-income settings where early motherhood is common and socioeconomic constraints influence health behaviors [7, 46]. Bekele et al. reported comparable maternal ages in Northern Shewa, Ethiopia, reflecting the trend of early motherhood in resource limited regions [46]. However, the household income in our study was higher than that reported by Maheen et al. in rural Sindh, where poverty was a major barrier to healthcare access [5, 39]. This discrepancy may relate to regional economic differences within Pakistan, potentially due to remittances and proximity to urban centers, as noted in previous research describing household economic influences on postnatal care utilization [7, 43].

The mean age of mothers in our study was 25.63 years (SD ± 3.45), and fathers were 32.65 years (SD ± 3.52), with an average monthly household income of PKR 59,578.95 (SD ± 28,168.95). These demographics align with studies conducted in similar low- and middle-income settings where early motherhood is common and socioeconomic constraints influence health behaviors [7,21,22]. Comparable maternal age patterns have been reported in Ethiopia and South Asia, where early marriage and limited reproductive health awareness persist [22]. However, the relatively higher household income in our study compared to rural Sindh may reflect regional economic variation, including remittances and urban linkage effects [5,9,23].

Education levels in this study were relatively higher than many rural Pakistani settings. Evidence consistently shows that maternal education is a strong predictor of newborn care practices and healthcare utilization [11,24]. Studies from sub-Saharan Africa and South Asia demonstrate that educated mothers are significantly more likely to adopt safe cord care, early breastfeeding, and immunization practices [24,25].

Thermal care knowledge was moderate, with limited awareness of skin-to-skin contact benefits. WHO and global neonatal health studies strongly emphasize Kangaroo Mother Care (KMC) as a cost-effective intervention for reducing neonatal mortality and hypothermia [10,15,26]. A meta-analysis by Conde-Agudelo et al. demonstrated that KMC significantly reduces mortality among low birth weight infants [26]. The persistence of traditional wrapping practices in our

study reflects findings from South Asia, where cultural norms often override biomedical recommendations [16,27].

Cord care practices in our study were suboptimal despite moderate knowledge. The use of non-sterile instruments and application of butter highlight a critical gap between knowledge and behavior. Evidence shows that chlorhexidine cord application can reduce neonatal mortality by up to 23% in high-risk settings [28]. Similar harmful traditional practices have been reported in Nepal, Bangladesh, and Pakistan, where substances like ghee, ash, and oil are commonly applied [16,27,29].

Breastfeeding practices were also inadequate. Early initiation of breastfeeding is a well-established intervention to reduce neonatal mortality by promoting immunity and preventing infections [17,30]. However, the high prevalence of pre-lacteal feeding in our study reflects deeply rooted cultural beliefs. A systematic review by Smith et al. found that pre-lacteal feeding is strongly associated with delayed breastfeeding initiation and increased neonatal morbidity [31].

Awareness of newborn vaccination was moderate, but misconceptions regarding vaccine safety were alarmingly high. Vaccine hesitancy remains a growing challenge globally, particularly in low-resource settings where misinformation and cultural beliefs influence decision-making [32]. Studies in Pakistan have identified lack of maternal education and limited counseling by healthcare providers as key contributors to poor immunization uptake [33].

Knowledge of neonatal danger signs was insufficient, with limited recognition of critical symptoms such as hypothermia and convulsions. WHO and UNICEF emphasize that early identification of danger signs is essential for timely care-seeking and survival [20,34]. Evidence suggests that maternal education and antenatal counseling significantly improve recognition of neonatal complications [34,35].

Low ANC attendance in this study further contributes to poor knowledge and practices. Antenatal care provides a critical platform for maternal education on newborn care, breastfeeding, and danger signs [4,36]. Studies have shown that mothers attending at least four ANC visits are significantly more likely to practice essential newborn care [36,37].

Postnatal care utilization was also limited. Similar findings have been reported in Ethiopia and South Asia, where barriers such as cost, distance, and cultural beliefs restrict access to postnatal services [5,9,38]. Community-based interventions, including home visits by trained health workers, have been shown to significantly improve neonatal outcomes in such settings [39].

The gap between knowledge and practice observed in this study is consistent with behavioral health models, which suggest that knowledge alone is insufficient to change behavior without addressing cultural norms and systemic barriers [40]. Unsafe practices such as applying saliva or butter to the cord and giving pre-lacteal feeds highlight the need for culturally sensitive health education interventions.

Globally, integrated interventions including KMC, clean cord care, breastfeeding promotion, and community health worker engagement have demonstrated substantial reductions in neonatal mortality [12,26,39]. Strengthening primary healthcare systems and improving maternal education are essential to bridge these gaps.

The study in Tehsil Kharian highlights moderate knowledge but poor practices influenced by cultural beliefs and systemic barriers. Addressing these challenges requires a multi-sectoral approach involving health education, community engagement, and strengthening of maternal and child health services.

Conclusion

The present study demonstrates that although a baseline level of awareness regarding essential newborn care exists among mothers, substantial gaps persist in knowledge, attitudes, and practices. Harmful traditional practices—particularly in semi-rural and rural settings—continue to pose significant risks to neonatal health outcomes. Despite improvements in maternal education and increasing institutional deliveries, the translation of knowledge into safe and evidence-based practices remains inadequate.

These findings highlight the urgent need for targeted, culturally sensitive interventions that address both knowledge deficits and deeply rooted socio-cultural beliefs. Strengthening maternal education, enhancing postnatal counseling, and promoting evidence-based neonatal care practices are critical to improving neonatal survival and reducing preventable morbidity and mortality. A coordinated approach involving healthcare systems, communities, and policymakers is essential to bridge the gap between recommended and actual practices.

Recommendations

- **Individual Level**

Promote participation of mothers in structured antenatal and postnatal educational sessions focusing on essential newborn care practices, including exclusive breastfeeding, hygienic cord care, and recognition of neonatal danger signs.

Provide hands-on training on practical skills such as skin-to-skin contact, thermal care, and early breastfeeding initiation to enhance maternal confidence and competence.

Deliver individualized counseling using culturally appropriate communication strategies to address misconceptions, such as beliefs regarding harmful effects of vaccines or perceived benefits of pre-lacteal feeding.

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- **Family Level**

Actively involve husbands, mothers-in-law, and other key family decision-makers in maternal and neonatal health education to improve support for recommended practices.

Encourage shared household responsibilities to allow mothers adequate time and capacity to care for newborns, particularly during the neonatal period.

Conduct family-centered awareness sessions emphasizing timely healthcare-seeking behavior and risks associated with unsafe traditional practices.

- **Hospital Level**

Implement regular capacity-building and training programs for healthcare providers—including doctors, nurses, and midwives—on essential newborn care, neonatal resuscitation, and infection prevention.

Establish structured postnatal education protocols to ensure that all mothers receive comprehensive guidance on neonatal care prior to discharge, along with follow-up support.

Ensure availability of essential neonatal care equipment, including radiant warmers, sterile delivery kits, and infection prevention supplies, to support safe newborn care practices.

- **Community Level**

Strengthen the role of community health workers, such as Lady Health Workers (LHWs), in delivering standardized neonatal care education through home visits and outreach activities.

Launch community-based awareness campaigns through local media, religious platforms, and community centers to promote evidence-based practices and challenge harmful cultural norms.

Establish mother-to-mother support groups to encourage peer learning, experience sharing, and sustained adoption of positive neonatal care practices.

- **Policy Level**

Integrate comprehensive neonatal care education into national antenatal and postnatal care guidelines to ensure uniform implementation across healthcare systems.

Increase investment in maternal and neonatal health services, particularly in semi-rural areas, to improve access to skilled birth attendants and quality care facilities.

Expand and sustain community health worker programs through dedicated funding and policy support to strengthen grassroots-level health education and service delivery.

Limitations

The study may be subject to selection bias, as a relatively smaller proportion of participants had home deliveries, potentially limiting representation of traditional practices in such settings.

The cross-sectional design restricts the ability to establish causal relationships between maternal knowledge, attitudes, and neonatal care practices.

Recall bias may have affected the accuracy of self-reported information, particularly regarding perinatal events and care practices.

The study was conducted in a single district (Tehsil Kharian), which may limit the generalizability of findings to other regions with different socio-cultural and healthcare contexts.

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Declarations:

Authors' Contribution:

- All Authors Conceptualization, data collection, interpretation, drafting of the manuscript and intellectual revisions
- The authors agree to take responsibility for every facet of the work, making sure that any concerns about its integrity or veracity are thoroughly examined and addressed

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