

Barriers to Essential Neonatal Care in Pakistan: A Structured Review of Access, Quality, and System Failures

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ABSTRACT

Background: Neonatal mortality remains a major public-health challenge in Pakistan, particularly in rural and underserved populations where failures in household care-seeking, early postnatal follow-up, referral, facility readiness, financing, and governance restrict access to effective care. **Objective:** To synthesize evidence concerning multilevel barriers to essential neonatal care in Pakistan and use the findings to inform an integrated community-to-facility conceptual framework. **Methods:** A structured narrative review was conducted using PubMed, Scopus, Google Scholar, institutional repositories, international agency reports, and Pakistan Demographic and Health Survey data. English-language sources published between 2000 and 2025 were considered. Evidence from Pakistan was prioritized, while regional and global studies were used for contextual and implementation comparison. Findings were synthesized across household, sociocultural, financial, geographical, workforce, facility, referral, financing, information-system, and governance domains. **Results:** Barriers operated cumulatively across the neonatal-care pathway. Major findings included limited recognition of danger signs, restricted maternal decision-making, harmful newborn-care practices, inadequate early postnatal contact, financial and transport barriers, variable community-worker competency, insufficient facility readiness, fragmented referral systems, and weak accountability. Regional intervention studies reported reductions in neonatal mortality under intensively supported community-based models, but transferability depended on supervision, supplies, referral capacity, and quality of facility care. **Conclusion:** Neonatal survival in Pakistan requires coordinated strengthening of household recognition, early postnatal assessment, community-provider competency, safe referral, facility quality, financial protection, information systems, and governance. The Naya Zindagi Framework should be evaluated through co-design, costing, feasibility testing, and prospective research before wider implementation. **Keywords:** Essential neonatal care; neonatal mortality; newborn health; postnatal care; healthcare access; community health workers; facility readiness; referral systems; Pakistan.

INTRODUCTION

The neonatal period, comprising the first 28 completed days after birth, represents the most vulnerable stage of childhood. Approximately 2.3 million neonatal deaths occur globally each year, and deaths during this period account for nearly half of all mortality among children younger than five years (1,2). The burden is disproportionately concentrated in low- and middle-income countries, where inequities in skilled birth attendance, timely postnatal assessment, essential medicines, referral services, and facility readiness continue to limit neonatal survival (2,3). The principal causes of neonatal mortality include complications of prematurity, intrapartum-related events, neonatal infections, and congenital conditions, many of which can be prevented or effectively managed through timely, evidence-based interventions delivered across the continuum of maternal and newborn care (4,5).

Pakistan continues to experience one of the highest neonatal mortality burdens in South Asia. National and international estimates consistently demonstrate that neonatal mortality has declined more slowly than mortality in older infants and children, indicating persistent deficiencies in care during childbirth and the early postnatal period (1–3). The burden is also distributed inequitably within the country. Rural communities and socioeconomically disadvantaged populations, particularly those in Balochistan, rural Sindh, and other underserved areas, experience poorer access to skilled providers, adequately equipped health facilities, emergency transportation, and timely postnatal care than urban populations (8). These differences indicate that neonatal mortality is shaped not only by household poverty or underlying clinical risk but also by modifiable failures in healthcare access, service quality, infrastructure, referral coordination, financing, and governance.

Essential neonatal care comprises a coordinated package of interventions provided immediately after birth and throughout the early neonatal period. Core components include prompt drying and thermal protection, skin-to-skin contact, hygienic cord care, early initiation and support of breastfeeding, assessment of breathing, neonatal resuscitation when required, prevention and treatment of infection, recognition of danger signs, Kangaroo Mother Care for preterm or low-birth-weight neonates, and timely referral for complications (5–7). When these interventions are implemented at sufficient coverage and quality, they can substantially reduce deaths associated with prematurity, intrapartum complications, infection, and hypothermia (5,7). Their effectiveness, however, depends on continuity between household practices, community-based care, primary healthcare facilities, referral services, and hospitals capable of managing neonatal emergencies.

Several points in Pakistan's reproductive, maternal, newborn, and child health continuum remain weak. Coverage of antenatal care, skilled birth attendance, and facility delivery has improved, but substantial urban–rural and provincial inequalities persist (8). Postnatal care remains particularly inadequate because many mothers and newborns do not receive an assessment during the first 24–48 hours after birth, when the risk of death is highest and early signs of feeding difficulty, respiratory distress, hypothermia, jaundice, sepsis, or complications of prematurity may first become apparent (8). Increased contact with health services has therefore not always translated into effective neonatal protection because access may be delayed, essential interventions may not be delivered consistently, and referral facilities may lack the staff, medicines, equipment, or organizational capacity required to provide appropriate care.

Pakistan's Lady Health Worker programme provides the country's largest community-based platform for maternal and child health services and has contributed to improvements in antenatal contact, health education, breastfeeding support, and linkage with formal services (9). Nevertheless, the programme operates under substantial constraints, including high caseloads, inconsistent supplies, limited supervision, variable neonatal-care competencies, and restricted capacity to assess or manage acutely ill newborns (9,10). Consequently, the presence of community health workers alone may be insufficient to reduce neonatal mortality unless their training, equipment, supervision, referral authority, and integration with functional health facilities are strengthened.

Household and sociocultural conditions further influence whether newborns receive timely and appropriate care. Maternal education, family recognition of neonatal danger signs, household financial resources, geographical accessibility, and women's authority to make healthcare decisions can determine whether formal care is sought (11–14). In many communities, decisions regarding expenditure and travel are controlled by husbands or senior relatives, which may delay referral even when the mother recognizes that the newborn is unwell. Traditional practices, including prelacteal feeding, delayed breastfeeding, inappropriate thermal care, and the application of potentially contaminated substances to the umbilical stump, may also increase the risk of infection, hypothermia, and feeding-related complications (15,16). Traditional birth attendants remain influential in rural communities and may

represent either a barrier or an important referral partner, depending on their ability to recognize danger signs and their relationship with community and facility-based providers.

Facility-level barriers compound these demand-side constraints. Primary and secondary healthcare facilities may lack functional resuscitation equipment, thermal-care resources, essential neonatal medicines, oxygen support, trained staff, standardized clinical protocols, and reliable referral arrangements (7,9). Even where institutional delivery has increased, deficiencies in immediate newborn assessment, thermal protection, breastfeeding support, resuscitation competency, stabilization, and communication between referring and receiving facilities may limit the survival benefit of facility-based childbirth. Repeated referrals between inadequately prepared facilities can further delay definitive care, increase household expenditure, and expose critically ill neonates to unsafe transportation.

International and regional evidence demonstrates that neonatal mortality can be reduced through integrated community and facility-based strategies rather than isolated interventions. Community-based newborn-care programmes in Bangladesh, India, Nepal, and Pakistan have improved hygienic care, breastfeeding, thermal protection, danger-sign recognition, postnatal visitation, referral, and treatment access, with several controlled studies reporting meaningful reductions in neonatal mortality under well-supported implementation conditions (5,17–21). However, the transferability of these effects depends on implementation fidelity, sustained financing, adequate supervision, functioning referral facilities, and adaptation to local health-system and sociocultural conditions. Increased service coverage without corresponding improvements in quality may therefore produce limited gains in survival.

Existing literature concerning neonatal health in Pakistan is distributed across epidemiological studies, intervention trials, qualitative research, national surveys, programme evaluations, policy analyses, and international reports. Although individual studies have examined specific barriers, the evidence has not always been integrated across the complete pathway from household recognition and decision-making to community assessment, transportation, facility readiness, clinical quality, financing, and governance. A multilevel synthesis is therefore required to identify where the continuum of essential neonatal care fails, how barriers interact, and which components should be prioritized when developing contextually appropriate interventions.

This structured narrative review aimed to synthesize evidence on the household, sociocultural, geographical, financial, service-delivery, workforce, referral, policy, and governance barriers that restrict access to and quality of essential neonatal care in Pakistan. Regional and global evidence was incorporated where it provided relevant contextual or implementation lessons. The review also used the identified barriers to inform the conceptual development of the *Nayi Zindagi* Framework, a proposed community-to-facility model intended to strengthen neonatal care pathways in rural and underserved areas of Pakistan.

MATERIALS AND METHODS

A structured narrative review was undertaken to examine barriers affecting access to, utilization of, and quality of essential neonatal care in Pakistan. This review design was selected because the evidence base encompassed heterogeneous sources, including quantitative and qualitative primary studies, intervention trials, systematic and narrative reviews, national surveys, programme evaluations, policy analyses, and reports from governmental and international organizations. The review was intended to provide an integrated interpretation of barriers across household, community, healthcare-facility, workforce, financing, referral, and governance levels rather than to generate a pooled quantitative effect estimate.

The review focused on neonates during the first 28 completed days after birth and on healthcare practices and services directly relevant to neonatal survival. Essential neonatal care was operationally considered to include immediate drying and warming, skin-to-skin contact, hygienic cord care, early and

exclusive breastfeeding support, assessment of breathing, neonatal resuscitation, prevention and management of hypothermia, Kangaroo Mother Care, recognition and management of neonatal infection, identification of danger signs, postnatal assessment, stabilization, referral, and access to higher-level neonatal care. Evidence concerning maternal services was considered when it directly affected neonatal care, including antenatal preparation, skilled attendance at birth, place of delivery, postnatal follow-up, household decision-making, transportation, and continuity between maternal and newborn services.

Relevant literature was identified through searches of PubMed, Scopus, and Google Scholar. Institutional and grey-literature sources were also examined, including publications and data repositories of the World Health Organization, United Nations Children's Fund, World Bank, and Pakistan Demographic and Health Survey. Reference lists of relevant articles and reports were reviewed to identify additional sources that were not captured through the initial searches.

The search strategy combined terms relating to the neonatal population, essential care, health-service barriers, and geographical context. Search concepts included "neonatal mortality," "newborn health," "essential neonatal care," "essential newborn care," "neonatal care barriers," "postnatal care," "Kangaroo Mother Care," "community-based newborn care," "neonatal survival," "health-system barriers," "healthcare access," "facility readiness," "referral," "Pakistan," "South Asia," and "low- and middle-income countries." Boolean operators were used to combine population, service, barrier, and location terms. Representative combinations included "neonatal mortality" AND "Pakistan," "essential neonatal care" AND "Pakistan," "postnatal care" AND "Pakistan," "community-based newborn care" AND "South Asia," and "health-system barriers" AND "neonatal survival."

Sources published in English between 2000 and 2025 were considered eligible. Primary emphasis was placed on evidence generated in Pakistan. Evidence from other South Asian countries and comparable low- and middle-income settings was included when it described interventions, implementation experiences, or health-system barriers with clear relevance to Pakistan. Eligible sources addressed neonatal mortality, morbidity, essential newborn care, access to neonatal services, care-seeking, postnatal care, quality of care, facility readiness, health-worker competency, referral systems, transportation, financial protection, sociocultural practices, programme implementation, or neonatal-health governance. Quantitative, qualitative, and mixed-methods studies, controlled intervention studies, evidence syntheses, national surveys, policy documents, and reports from recognized governmental or international organizations were eligible.

Sources were excluded when they addressed maternal or general child health without a direct and interpretable relationship to neonatal care or outcomes. Editorials, opinion pieces, conference abstracts, duplicate publications, sources without accessible full text, and documents that did not provide sufficient evidence concerning barriers to neonatal service access, utilization, quality, or delivery were not retained. Studies from outside Pakistan were used for contextual comparison and intervention learning rather than as direct evidence of the prevalence or magnitude of barriers within Pakistan.

Information extracted from eligible sources included the author or issuing organization, publication year, country and setting, study design or document type, population, relevant neonatal-care component, principal barrier or intervention, and key findings. Particular attention was given to whether the evidence concerned household knowledge and decision-making, sociocultural practices, geographical or financial access, community-health-worker capacity, postnatal coverage, facility readiness, provider competency, referral and transportation, health financing, information systems, or governance. Findings derived from Pakistani studies were distinguished conceptually from regional and global evidence used to provide comparative or implementation context.

The extracted evidence was synthesized thematically. Initial categories were informed by the observed pathway through which families recognize neonatal illness, decide to seek assistance, reach an

appropriate provider, and receive effective care. Related findings were grouped into household and community barriers, sociocultural barriers, financial and geographical barriers, health-workforce barriers, facility and service-delivery limitations, referral and transportation barriers, and policy, financing, information-system, and governance constraints. Overlapping findings were considered across more than one category when they operated at multiple levels of the care pathway. Evidence was compared across settings and study designs to identify recurrent themes, context-dependent differences, implementation constraints, and areas in which direct Pakistani evidence remained limited.

Because of substantial heterogeneity in study designs, populations, interventions, outcome definitions, and reporting formats, a statistical meta-analysis was not undertaken. Findings from individual intervention studies were interpreted within their original settings and were not pooled or assumed to be directly transferable to Pakistan. Numerical estimates were used only when they were reported in the source material and were interpreted alongside the design and context from which they originated.

The thematic synthesis was subsequently used to inform the conceptual architecture of the Naya Zindagi Framework. Barrier domains identified through the review were mapped to potential responses at the community, primary-care, referral, and district-hospital levels. The framework was developed as a proposed model for future co-design, feasibility assessment, costing, pilot implementation, and formal evaluation rather than as an established or validated intervention. Its components were therefore treated as evidence-informed programme proposals requiring adaptation to provincial policies, professional scopes of practice, clinical safety standards, resource availability, data-governance requirements, and local community preferences.

As the review used information available in published studies, publicly accessible reports, and institutional data sources and did not involve direct interaction with human participants or access to identifiable individual-level information, institutional ethical approval and participant consent were not required.

RESULTS

The evidence identified several interdependent barriers affecting the delivery and uptake of essential neonatal care in Pakistan. These barriers operated across the entire care pathway, beginning with household recognition of neonatal illness and decision-making, continuing through community-based assessment and transportation, and extending to facility readiness, clinical quality, referral coordination, financing, and governance. Direct evidence from Pakistan was supplemented by evidence from Bangladesh, India, Nepal, Afghanistan, and other low- and middle-income settings when it provided relevant implementation lessons. Because the included evidence differed substantially in design, population, setting, intervention, and outcome reporting, the findings were synthesized thematically rather than statistically pooled.

Table 1. Principal Barriers to Essential Neonatal Care in Pakistan

Barrier domain	Reported manifestations	Effect on the neonatal-care pathway	Supporting evidence
Recognition of neonatal illness	Limited caregiver recognition of poor feeding, respiratory difficulty, hypothermia, fever, jaundice, convulsions, and other danger signs	Delayed decision to seek care and presentation after clinical deterioration	Pakistani community and programme evidence; comparable evidence from low-resource settings (9,10,13)
Household decision-making	Dependence on husbands, fathers, mothers-in-law, or other senior relatives for permission, expenditure, and transportation	Delayed or prevented access to formal care despite maternal concern	Qualitative evidence from Pakistan and comparable settings (11,12,14)
Sociocultural newborn-care practices	Prelacteal feeding, delayed initiation of breastfeeding, inappropriate thermal care, unsterile cord practices, and use of potentially harmful substances on the cord stump	Increased risk of infection, hypothermia, feeding difficulty, and delayed recognition of illness	Evidence from Pakistan and South Asia (15,16)
Financial barriers	Out-of-pocket expenditure for consultation, medicines, transport, investigations, and hospital admission	Delayed care-seeking, refusal of referral, interrupted treatment, and catastrophic household expenditure	Pakistani health-system and regional evidence (22–24)
Geographical and transportation barriers	Long travel distances, limited rural transport, poor road access, absence of dedicated neonatal transport, and repeated transfers	Prolonged time to definitive care and clinical deterioration during transfer	Pakistani qualitative and health-system evidence; regional transport evidence (22,25)

Barrier domain	Reported manifestations	Effect on the neonatal-care pathway	Supporting evidence
Inadequate early postnatal care	Low coverage of newborn assessment within the first 24–48 hours and inconsistent follow-up of home births and high-risk neonates	Missed opportunities to identify feeding problems, sepsis, hypothermia, jaundice, respiratory distress, and prematurity-related complications	National survey and programme evidence (8–10)
Community-health-worker limitations	High caseloads, restricted neonatal emergency competencies, inconsistent supplies, limited supervision, and weak referral authority	Incomplete assessment, counselling, stabilization, and referral of sick neonates	Pakistani programme and observational evidence (9,10)
Traditional birth-attendant limitations	Variable knowledge of danger signs, delayed referral, limited clinical competency, and informal separation from the formal health system	Delayed escalation from home-based care to appropriately equipped facilities	Qualitative and health-system evidence from Pakistan (14,15,23)
Facility-readiness deficits	Shortages of resuscitation equipment, thermal-care resources, oxygen support, weighing equipment, medicines, infection-control materials, and functioning neonatal units	Failure to provide essential care, stabilization, or definitive treatment after arrival	Pakistani and broader health-system evidence (7,9,26)
Provider competency gaps	Inconsistent performance of immediate newborn assessment, thermal protection, breastfeeding support, resuscitation, infection management, and referral stabilization	Reduced effectiveness of institutional delivery and increased risk of preventable deterioration	Pakistani programme and facility evidence (9,22)
Referral-system dysfunction	Lack of standardized referral criteria, pre-referral stabilization, communication with receiving facilities, written documentation, and appropriately supported transport	Multiple referrals, duplication of assessment, treatment delays, loss of clinical information, and unsafe transfer	Pakistani qualitative and service-delivery evidence (22)
Health financing constraints	Low public-sector investment, dependence on household expenditure, inconsistent medicine procurement, and insufficient recurrent funding	Persistent shortages of staff, medicines, equipment, supervision, and maintenance	Pakistani and international health-system evidence (23,24,27)
Governance and accountability gaps	Unequal provincial capacity, fragmented post-devolution responsibilities, weak performance monitoring, and limited neonatal-specific accountability	Inconsistent implementation and widening provincial and district inequalities	Pakistani policy and programme evidence (23,28)
Weak health-information systems	Dependence on periodic national surveys and incomplete routine reporting of timing, location, and cause of neonatal deaths	Delayed identification of high-risk districts and limited evaluation of programme performance	National survey and policy evidence (8,23)

Household, Community, and Sociocultural Barriers

Care-seeking for sick neonates was commonly restricted by poor recognition of illness, limited maternal autonomy, dependence on household decision-makers, financial constraints, and culturally embedded newborn-care practices. Caregivers did not always recognize poor feeding, rapid or difficult breathing, abnormal temperature, jaundice, convulsions, or reduced activity as indications for urgent assessment. The resulting first delay was compounded when mothers required permission or financial support from husbands or other family members before travelling to a health facility (11–14).

Traditional practices remained influential during delivery and the early postnatal period. Reported practices included prelacteal feeding, delayed initiation of breastfeeding, inappropriate thermal care, and the application of substances to the umbilical stump. Although these practices were often understood within families as protective, cleansing, nutritional, or spiritually beneficial, they could interfere with early breastfeeding, hygienic cord care, temperature regulation, and timely recognition of infection (15,16). Traditional birth attendants frequently remained the first source of advice following home delivery, especially in rural communities. Their community acceptance represented a potential resource, but variable neonatal-care knowledge and weak integration with formal referral systems could contribute to delayed escalation of care.

Access, Financial, and Transportation Barriers

The cost of consultation, medicines, diagnostic services, transportation, and hospital admission influenced whether and when families sought neonatal care. These financial pressures were most consequential among rural and low-income households, particularly when newborns required repeated referrals or prolonged inpatient treatment. Existing financial-protection mechanisms did not consistently address the full cost of neonatal emergencies, intensive care, outpatient treatment, or transportation, leaving families exposed to substantial out-of-pocket expenditure (23,24).

Geographical distance and transportation constraints further delayed access. Families in remote communities could encounter poor road conditions, limited transport availability, high travel costs, and uncertainty regarding which facility could provide appropriate neonatal care. Neonates were sometimes

transferred between multiple facilities because the first facility lacked equipment, medicines, trained personnel, or inpatient neonatal capacity. Such transfers consumed time and household resources and could expose critically ill newborns to deterioration during transport. Regional evidence concerning dedicated emergency transport systems indicated that organized referral transport could reduce delays, but equivalent neonatal-specific systems were not consistently available across rural Pakistan (22,25).

Postnatal-Care and Community-Service Gaps

Early postnatal assessment represented one of the weakest components of the maternal and newborn continuum. National evidence indicated that only a minority of mothers and newborns received a postnatal assessment within 48 hours, with lower coverage in rural and underserved regions (8). This gap reduced opportunities to identify feeding problems, hypothermia, infection, respiratory distress, jaundice, and complications of prematurity during the period of greatest neonatal vulnerability.

The Lady Health Worker programme provided an established platform for antenatal counselling, breastfeeding promotion, household contact, and referral. However, the effect of the programme on neonatal outcomes was limited by high caseloads, inconsistent postnatal visitation, shortages of supplies, variable supervision, and restricted capacity to assess or manage neonatal emergencies (9,10). Evidence suggested that community contact could improve the uptake of some maternal and child health services, but programme coverage alone did not guarantee a reduction in neonatal mortality when clinical competency, referral coordination, and facility readiness remained inadequate.

Facility Readiness and Quality of Care

Health-facility limitations were evident across primary, secondary, and referral levels. Reported deficiencies included inconsistent availability of bag-and-mask devices, thermal-care resources, oxygen support, weighing equipment, essential neonatal medicines, functioning incubators, phototherapy, and neonatal intensive-care capacity. These constraints reduced the ability of facilities to provide immediate essential care, stabilize sick neonates, manage complications of prematurity, or treat severe infection (7,9,26).

Increased facility delivery did not consistently ensure that newborns received all recommended interventions. Evidence indicated variable performance of immediate drying and warming, skin-to-skin care, breastfeeding initiation, assessment of breathing, delayed cord clamping, resuscitation, and referral stabilization. Provider knowledge without demonstrated clinical competency was insufficient, particularly for low-frequency, high-risk procedures such as neonatal resuscitation. Inadequate staffing, limited in-service training, weak supervision, equipment shortages, and high workloads interacted to reduce the quality of care provided at birth and during the early postnatal period (9,22).

Referral pathways were frequently fragmented. Standardized criteria for referral, pre-referral treatment, communication with receiving facilities, written clinical documentation, and transport accompanied by appropriately trained personnel were not consistently implemented. Consequently, newborns could arrive at referral facilities without prior notification, adequate stabilization, or complete clinical information. Repeated transfer between facilities further reduced the probability of timely definitive treatment (22).

Financing, Governance, and Information-System Barriers

Health financing influenced nearly every identified service-delivery constraint. Limited and inconsistently distributed public resources affected recruitment and retention of skilled personnel, medicine procurement, equipment maintenance, facility upgrading, transport services, training, supervision, and data systems. Dependence on out-of-pocket payment shifted a substantial portion of the cost of neonatal illness to households least able to bear it (23,24,27).

Governance arrangements following the devolution of health responsibilities contributed to variation in provincial planning, technical capacity, financing, monitoring, and accountability. Provinces and districts with the greatest neonatal-health burden often had the weakest infrastructure and the most severe workforce shortages. The absence of consistently enforced minimum standards for neonatal readiness, postnatal follow-up, referral, and mortality review limited the ability of federal and provincial authorities to identify and correct underperformance (23,28).

Routine neonatal-health information was also insufficiently developed. National demographic surveys provided important population-level estimates but were conducted periodically and could not substitute for timely district-level surveillance. Incomplete routine reporting of neonatal deaths by timing, cause, location, birth setting, referral pathway, and contributing health-system factors restricted targeted resource allocation and programme evaluation.

Table 2. Evidence from Community-Based and Health-System Interventions Relevant to Pakistan

Intervention or programme	Setting and design	Reported outcome	Interpretation for Pakistan
Community-based newborn-care package delivered through community health workers	Cluster-randomized trial, Sylhet, Bangladesh	Approximately 34% lower neonatal mortality under one community-based service-delivery strategy	Demonstrated potential effectiveness when community workers received defined tasks, supervision, and referral support (17)
Home-based neonatal care and sepsis management	Field trial, rural India	Approximately 62% reduction in neonatal mortality in the intervention area	High effect was achieved under an intensive research-supported model and should not be assumed under routine implementation (18)
Integrated Management of Neonatal and Childhood Illness	Cluster-randomized trial, India	Reduction in neonatal and infant mortality following strengthened home visits and service delivery	Supported integration of household counselling, postnatal contact, illness recognition, and health-system linkage (19)
Community-based perinatal and newborn preventive care	Pilot and community-based studies, rural Pakistan	Improved uptake of preventive newborn-care practices and reductions in perinatal or neonatal mortality under supported implementation conditions	Provided direct evidence that community packages can be effective in Pakistan when supervision and referral systems function (20,21)
Lady Health Worker contact across the continuum of care	National cross-sectional analysis, Pakistan	Improved uptake of selected maternal and child health services, without a clearly demonstrated independent reduction in neonatal mortality	Suggested that contact coverage must be accompanied by neonatal competency, supplies, supervision, and facility readiness (10)
Conditional cash transfer for institutional delivery	National programme evaluation, India	Increased facility delivery, with limited evidence that utilization alone improved neonatal survival	Indicated that financial incentives require concurrent improvements in quality of childbirth and newborn care (29)
Dedicated emergency ambulance services	Service-system analysis, India	Improved organized transport for obstetric emergencies	Supported the potential value of coordinated maternal and neonatal transport, although neonatal-specific effectiveness requires evaluation (25)
Simplified management of neonatal infection	Multicountry evidence and Pakistani research context	Reduced mortality from serious neonatal infection where referral was not feasible under structured protocols	Potentially relevant to remote areas but requires national clinical authorization, weight-based protocols, competency assessment, supervision, and safety monitoring (30)
Kangaroo Mother Care and essential newborn-care packages	Global and LMIC evidence syntheses	Reduced mortality and morbidity among preterm and low-birth-weight newborns	Supported systematic implementation at facilities with appropriate clinical assessment, feeding support, monitoring, and referral (5,7)

Intervention Evidence and Transferability

Community-integrated neonatal-care interventions demonstrated that important improvements were achievable when household counselling, early postnatal visits, danger-sign recognition, basic newborn care, treatment pathways, supervision, and referral support were delivered as a coordinated package. In Bangladesh, a cluster-randomized trial reported an approximately 34% reduction in neonatal mortality under a community-based delivery strategy (17). A field trial in rural India reported a larger reduction following intensive home-based neonatal care and management of infection (18), while integrated neonatal and childhood illness programmes also demonstrated benefits when household-level activities were linked to strengthened health services (19).

Evidence from Pakistan similarly indicated that community-based perinatal and newborn-care packages could improve preventive practices and neonatal outcomes under supported research or programme conditions (20,21). These effects could not, however, be interpreted as guaranteed outcomes of national scale-up. The successful interventions generally included clearly defined worker responsibilities, repeated household contact, standardized training, supplies, supervision, referral support, and

functioning clinical services. Their effectiveness was therefore dependent on implementation fidelity and health-system readiness rather than on community contact alone.

The evidence also showed that increased service use did not necessarily improve survival when care quality remained poor. Conditional incentives for facility delivery increased institutional births in India, but the neonatal effect was constrained where facilities did not provide consistently effective childbirth and newborn care (29). Similarly, national evidence from Pakistan suggested that Lady Health Worker contact improved the uptake of selected services without independently overcoming deficiencies in neonatal emergency competency, facility readiness, or referral coordination (10).

Table 3. Evidence-Informed Priorities Derived from the Thematic Synthesis

Priority area	Evidence-supported need	Required implementation safeguards	Appropriate outcome indicators
Early postnatal contact	Assessment during the first 24–48 hours and follow-up of high-risk neonates	Birth notification, manageable workloads, visit documentation, supervision, and referral access	Newborns assessed within 24 and 48 hours; referral completion; early neonatal deaths
Caregiver danger-sign education	Improved recognition of feeding difficulty, respiratory distress, abnormal temperature, convulsions, jaundice, and reduced activity	Locally validated pictorial and audio materials; inclusion of fathers and senior family decision-makers	Caregiver knowledge; time from symptom recognition to care-seeking
LHW neonatal competency	Strengthened assessment, counselling, thermal care, breastfeeding support, and referral	Competency-based training, defined scope of practice, supplies, recertification, supervision, and clinical escalation protocols	Competency scores; completed postnatal visits; correct referrals
TBA referral integration	Earlier recognition and communication following home births	Clear non-clinical referral role, rapid direct contact with formal providers, monitoring, and avoidance of payment-related distortions	Referral time; completed referrals; proportion of home births notified
Facility readiness	Reliable resuscitation, thermal care, oxygen, infection treatment, KMC, and stabilization	Standard equipment lists, preventive maintenance, medicine stock monitoring, staff competency, and routine readiness audits	Facility-readiness score; stock-out days; resuscitation competency
Referral and transport	Reduced delay between recognition and definitive care	Pre-referral stabilization, receiving-facility notification, written documentation, trained transport personnel, and neonatal thermal protection	Referral interval; number of facilities visited; adverse events during transfer
Financial protection	Reduced household expenditure barriers	Explicit neonatal benefits, transparent eligibility, coverage of transport and essential treatment, and claims monitoring	Out-of-pocket expenditure; delayed or refused referral due to cost
Neonatal information systems	Timely district-level identification of deaths and service gaps	Standard definitions, routine reporting, confidentiality, audit, and integration with provincial systems	Completeness and timeliness of reporting; reviewed neonatal deaths
Governance and accountability	Consistent minimum standards across provinces and districts	Defined institutional responsibilities, dedicated budgets, public performance indicators, and corrective-action mechanisms	District target attainment; readiness compliance; budget execution

Evidence-Informed Priorities

The thematic synthesis supported prioritization of early postnatal assessment, caregiver education, community-provider competency, facility readiness, referral coordination, financial protection, and district-level accountability. These priorities were interdependent. Improving household knowledge without providing accessible and functional facilities could increase demand without improving outcomes, whereas upgrading facilities without strengthening recognition, transport, and referral could leave high-risk newborns unable to reach those services.

Early postnatal contact emerged as a central opportunity because it linked household education, clinical assessment, breastfeeding support, thermal care, identification of prematurity, and referral. However, a postnatal-visit protocol would require reliable notification of births, manageable community-worker workloads, standardized assessment procedures, supervisory verification, and access to functioning referral facilities.

Integration of traditional birth attendants could be beneficial when their role was limited to birth notification, immediate safe-care messages, danger-sign recognition, and rapid referral. The evidence did not support assigning independent clinical treatment responsibilities to unregulated providers. Similarly, expansion of community-health-worker roles required competency-based training, explicit scope-of-practice rules, continuing supervision, supplies, and patient-safety monitoring.

Facility strengthening required more than one-time equipment distribution. Sustainable readiness depended on functioning equipment, preventive maintenance, uninterrupted medicines and consumables, trained staff, standard clinical protocols, competency reassessment, and routine audit. Referral improvement similarly required a coordinated pathway incorporating pre-referral stabilization, direct communication with receiving facilities, written clinical information, transport adapted for neonates, and monitoring of referral completion.

Overall, the evidence indicated that neonatal mortality in Pakistan was associated with cumulative failures across multiple levels rather than with a single dominant barrier. The findings supported an integrated community-to-facility response but did not establish the effectiveness of any newly proposed national framework. The Nayi Zindagi Framework should therefore be treated as an evidence-informed conceptual model requiring stakeholder co-design, economic evaluation, clinical and ethical review, pilot testing, and prospective assessment before wider implementation.

DISCUSSION

This structured narrative review identified neonatal-care barriers in Pakistan as interconnected failures across household decision-making, sociocultural practices, geographical and financial access, early postnatal follow-up, community-health-worker capacity, facility readiness, referral coordination, health financing, information systems, and governance. The evidence indicated that neonatal outcomes were unlikely to improve through a single intervention because failures at one level frequently reduced the effectiveness of improvements introduced elsewhere. Increased awareness of neonatal danger signs, for example, could not improve survival when families lacked decision-making authority, transport, financial resources, or access to a facility capable of delivering appropriate care. Similarly, increased facility delivery could provide limited benefit when immediate newborn care, resuscitation, stabilization, medicines, equipment, and referral systems remained inconsistent.

The findings supported the importance of early recognition and timely care-seeking for neonatal illness. Families frequently encountered difficulty identifying feeding problems, abnormal temperature, respiratory distress, jaundice, convulsions, and reduced activity as signs requiring urgent assessment. Comparable studies from low-resource settings have shown that decisions to seek care are shaped by symptom recognition, perceived severity, distance, cost, previous experience with healthcare services, and the authority of household decision-makers (11–14). Within Pakistan, these barriers were compounded by restricted maternal autonomy and dependence on husbands or senior family members for permission, expenditure, and transportation. Neonatal-health interventions should therefore extend beyond maternal education and include fathers, mothers-in-law, traditional birth attendants, community leaders, and other individuals who influence household decisions.

Sociocultural newborn-care practices represented another important barrier, although they should not be interpreted solely as parental ignorance or resistance to medical care. Practices such as prelacteal feeding, delayed breastfeeding, inappropriate thermal care, and application of substances to the umbilical stump may be embedded within family beliefs concerning protection, purification, nutrition, or spiritual wellbeing (15,16). Programmes that simply prohibit such practices without engaging their cultural meaning may have limited acceptability. Community education should instead use respectful, locally adapted communication to explain the relationship between early breastfeeding, thermal protection, hygienic cord care, infection prevention, and neonatal survival. The involvement of trusted female community workers, traditional birth attendants, religious leaders, and local-language media may increase the credibility and reach of these messages.

The weak coverage of postnatal assessment during the first 24–48 hours emerged as a critical discontinuity in the care pathway. Many life-threatening neonatal conditions become apparent after the mother and newborn have left the delivery setting or following an unattended home birth. National survey evidence has shown that timely postnatal care remains substantially less accessible in rural and

socioeconomically disadvantaged populations (8). A structured early postnatal-contact strategy could provide opportunities to assess feeding, temperature, breathing, jaundice, cord condition, prematurity, and maternal wellbeing. However, a mandatory visit schedule would be effective only if births were rapidly notified, community-worker caseloads were manageable, visits were clinically structured, supervision was reliable, and referral facilities were functional.

The Lady Health Worker programme provides an important foundation for strengthening neonatal care because it already connects communities with Pakistan's public primary-healthcare system. Evidence suggests that LHW contact can improve selected maternal and child health practices, but programme coverage alone has not consistently translated into lower neonatal mortality (9,10). This difference is clinically and programmatically important. Contact frequency is not equivalent to quality of care, and health education is not equivalent to emergency assessment or treatment. Strengthening the LHW contribution to neonatal survival would require a clearly defined scope of practice, competency-based training, standardized assessment tools, essential supplies, regular supervision, recertification, and rapid access to higher-level clinical support.

Any expansion of community-health-worker responsibilities should be implemented cautiously. Skills such as neonatal resuscitation and management of serious infection involve substantial patient-safety considerations. Research has demonstrated that simplified infection-management strategies can reduce neonatal mortality where referral is not feasible, but these interventions were implemented using structured protocols, clinical training, dose-specific treatment regimens, supervision, and monitoring (30). Such evidence should not be interpreted as support for unsupervised antibiotic administration or unrestricted extension of clinical tasks. Any community-based treatment strategy in Pakistan would require authorization by national and provincial health authorities, alignment with professional scope-of-practice regulations, weight-based dosing protocols, medicine-safety systems, competency assessment, referral criteria, adverse-event monitoring, and antimicrobial-stewardship safeguards.

Traditional birth attendants remained influential in many rural communities and were often present during home births or consulted during the early postnatal period. Attempts to exclude them entirely from maternal and newborn programmes may be impractical where they retain substantial community trust. A more feasible strategy may be to define a limited, non-clinical role involving birth notification, promotion of thermal protection and breastfeeding, recognition of danger signs, and immediate communication with a trained health worker. Financial incentives for completed referrals should be evaluated carefully because they may create unintended effects, including unnecessary referral, distorted documentation, or delay while intermediaries are contacted. Referral arrangements should ensure that a critically ill neonate can be transferred directly to an appropriate facility without avoidable procedural steps.

The review also demonstrated that community-level interventions could not compensate for inadequate facility readiness. Reported deficiencies in resuscitation equipment, oxygen support, thermal care, essential medicines, phototherapy, neonatal intensive-care capacity, infection-control supplies, and trained personnel limited the ability of facilities to provide effective care (7,9,22,26). Provision of equipment alone would not resolve these problems. Sustainable readiness requires procurement systems, consumable supplies, preventive maintenance, staff competency, standard operating procedures, supportive supervision, and routine performance auditing. Facilities accepting deliveries or neonatal referrals should meet defined minimum readiness standards and should have clear escalation arrangements when advanced care is unavailable.

The difference between access and quality was particularly evident in relation to institutional delivery. Regional evidence from conditional cash-transfer programmes showed that financial incentives could increase facility births without necessarily producing proportional improvements in neonatal survival when the quality of childbirth and newborn care remained inadequate (29). The same principle applies in Pakistan. Skilled attendance should be evaluated not only by the presence of a designated provider

but also by whether recommended actions are performed correctly and promptly. Drying, thermal protection, assessment of breathing, breastfeeding support, resuscitation, infection prevention, recognition of complications, stabilization, and referral should therefore be included in competency assessment and quality monitoring.

Referral-system dysfunction contributed to avoidable delay after families had already entered the formal health system. Neonates could be transferred between several facilities because the initial facility lacked staff, equipment, medicines, or specialist services. Poor pre-referral stabilization, absence of communication with receiving facilities, incomplete clinical documentation, and unsuitable transport could further increase risk during transfer (22). Regional experience with organized emergency transport indicates that coordinated ambulance systems can improve access to obstetric emergency services, although neonatal-specific effectiveness requires separate evaluation (25). A neonatal referral pathway should include clinical criteria for transfer, stabilization before departure, thermal protection during transport, prior communication with the receiving facility, written documentation, appropriately trained transport personnel, and monitoring of referral completion and outcomes.

Financial barriers affected both the decision to seek care and the ability to complete treatment. Out-of-pocket payment for transport, medicines, investigations, admission, and intensive care can be prohibitive for low-income households. Health-insurance or social-protection programmes may increase access only when neonatal services are explicitly included, participating facilities are geographically accessible, essential medicines and procedures are covered, and families are protected from informal or uncovered costs (23,24). Financial protection should therefore encompass emergency transport, stabilization, inpatient neonatal care, essential medicines, and follow-up rather than focusing solely on facility admission.

The review further indicated that health financing and governance failures were upstream determinants of many service-level deficiencies. Limited and inconsistently distributed resources affected staffing, training, equipment maintenance, medicine availability, supervision, referral systems, and data infrastructure. International evidence has shown that poor-quality health systems contribute substantially to preventable mortality even when nominal service coverage expands (27). Within Pakistan, devolution has created opportunities for provincial adaptation but has also produced variation in planning capacity, financing, implementation, and accountability (28). National coordination remains necessary to establish minimum neonatal-care standards, while provincial and district authorities require sufficient authority, financing, technical capacity, and accountability to implement them.

Routine health-information weaknesses limited the ability to identify where and why neonatal deaths occurred. Periodic demographic surveys remain essential for national estimates but cannot provide continuous district-level intelligence concerning place of birth, timing and cause of death, referral history, facility readiness, or failures in care. Strengthening routine neonatal surveillance, birth notification, facility-based mortality review, and confidential examination of preventable factors could improve resource targeting and corrective action. These systems should be designed to support learning and accountability rather than punitive reporting.

Regional intervention evidence demonstrated that substantial neonatal-health improvements were possible in South Asia. Community-based newborn-care programmes in Bangladesh, India, Nepal, and Pakistan reported reductions in neonatal mortality under well-supported implementation conditions (17–21). These interventions generally combined repeated household contact, counselling, standardized newborn-care practices, danger-sign recognition, supervision, treatment pathways, and referral support. Their effects should not be interpreted as directly transferable to routine national implementation because research-supported programmes often operate with greater resources, training intensity, supervision, and monitoring than existing public systems. Scale-up should therefore be preceded by assessment of feasibility, acceptability, implementation fidelity, cost, equity, and health-system readiness.

The Nayi Zindagi Framework was developed from the multilevel barrier pattern identified in this review. Its principal value lies in integrating community recognition, early postnatal contact, referral coordination, facility readiness, family engagement, information systems, and accountability within a single care pathway. However, it should be regarded as a conceptual and evidence-informed model rather than a validated intervention. The framework requires stakeholder co-design involving families, community health workers, traditional birth attendants, nurses, midwives, physicians, emergency-transport personnel, district managers, policymakers, and provincial regulators. Its clinical components require professional and ethical review, while its digital elements require assessment of data protection, consent, language accessibility, device availability, connectivity, maintenance, and recurrent operating costs.

A phased evaluation would be more appropriate than immediate large-scale implementation. Initial work should assess contextual acceptability, intervention logic, workforce implications, clinical safety, resource requirements, and implementation feasibility. A pilot study could subsequently examine coverage of early postnatal visits, recognition of danger signs, referral intervals, facility readiness, referral completion, treatment initiation, household expenditure, and adverse events. Effects on neonatal mortality should be evaluated only after the intervention has demonstrated feasible and reliable implementation, using an appropriately controlled design and sufficient sample size.

This review had several strengths. It integrated evidence across household, community, facility, referral, financing, and governance levels rather than treating neonatal mortality as an isolated clinical problem. It also distinguished direct evidence from Pakistan from regional and global evidence used to provide implementation context. The synthesis linked identified barriers with practical intervention domains while avoiding statistical pooling of highly heterogeneous studies.

The findings should nevertheless be interpreted in light of important limitations. The review used a structured narrative design and did not document a fully reproducible systematic-review selection process, formal risk-of-bias assessment, or quantitative meta-analysis. The evidence base included diverse study designs and document types, and the methodological strength of individual sources was variable. English-language restriction may have excluded relevant local reports, and reliance on published literature may have introduced publication bias. Some evidence concerning household decision-making, transport, and service access was derived from maternal or broader child-health studies and was applied to neonatal care only where the pathway was directly relevant. Regional studies provided useful lessons but could not establish the prevalence or magnitude of barriers in Pakistan. National estimates were also drawn from sources published in different years, limiting direct comparison. The review therefore identified recurrent patterns and intervention priorities but did not estimate pooled effects or establish causal relationships.

Despite these limitations, the synthesis indicated that neonatal survival in Pakistan depends on continuity across the entire care pathway. Sustainable improvement requires families who can recognize illness and seek help, community providers who can assess and refer appropriately, transport systems capable of moving sick neonates safely, facilities prepared to deliver effective care, financial protection that prevents treatment delay, and governance systems that monitor performance and correct failure. Isolated improvements are unlikely to achieve their full effect unless these components are strengthened concurrently.

CONCLUSION

Barriers to essential neonatal care in Pakistan operate cumulatively across household decision-making, sociocultural practices, financial and geographical access, early postnatal follow-up, community-provider competency, facility readiness, referral coordination, health financing, information systems, and governance. The evidence supports an integrated community-to-facility strategy that strengthens timely postnatal assessment, danger-sign recognition, safe referral, clinical quality, financial protection,

and accountability. The proposed Nayi Zindagi Framework provides an evidence-informed structure for organizing these components but should undergo stakeholder co-design, clinical and ethical review, costing, feasibility testing, and prospective evaluation before wider implementation.

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