

Emergency twin births in ambulances: a qualitative case study from Sindh, Pakistan

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Received: 20 May 2025

Revised: 09 September 2025

Accepted: 12 September 2025

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ABSTRACT

Emergency childbirth, particularly twin deliveries, poses profound challenges in pre-hospital contexts, where health professionals must often act swiftly under conditions of uncertainty. In rural Pakistan, where access to healthcare facilities is limited, ambulance-based deliveries have become increasingly common. This qualitative study draws on semi-structured interviews with emergency medical technicians, emergency vehicle operators, and a skilled birth attendant in Khairpur and Naushero Feroz districts of Sindh to explore the realities of managing such emergencies. The analysis revealed that variations in training, adherence to protocols, and inter-professional coordination shaped both the process and outcomes of care. Participants described the difficulties of working within constrained environments, confronting clinical complexities, and navigating cultural and gender dynamics, all while making critical decisions under pressure. Their accounts also reflected the emotional weight of these experiences, underscoring how professional background and preparedness influence responses in moments of crisis. The study points to the urgent need for structured obstetric training, strengthened infrastructure, wider integration of telemedicine, and improved collaboration among emergency personnel to safeguard maternal and neonatal health in resource-limited rural settings.

Keywords: Emergency childbirth, Twin delivery, Ambulance, EMT, EVO, Skilled birth attendant, Sindh, Pakistan, Qualitative study

INTRODUCTION

Emergency childbirthis, particularly those involving multiple gestations such as twins, pose significant challenges in pre-hospital care settings.¹ In Pakistan, especially in rural and underserved regions, these events are increasingly being managed by Emergency Medical Services (EMS) due to limited access to timely and quality obstetric care in health facilities.² Sindh province, with its diverse geography and varying infrastructural quality, reflects these disparities, often requiring EMS personnel to

make critical clinical and logistical decisions en route.³ While prior literature has addressed maternal mortality trends, access barriers, and facility-based deliveries, limited evidence exists on pre-hospital management of complex deliveries such as twin births, particularly from the perspective of frontline EMS workers.⁴

The Pakistan Demographic and Health Survey (PDHS) 2017-18 reported that 34% of births in rural areas still occur at home, while only 59% are attended by skilled birth attendants.⁵ These figures underline the increasing reliance on EMS personnel, Emergency Medical

Technicians (EMTs) and Emergency Vehicle Operators (EVOs) to act as first responders.⁶ Additionally, systems like Teletabeeb (telemedicine consultation platforms) have emerged to provide real-time clinical decision support, yet their utility in obstetric emergencies remains underexplored.⁷

In this context, it is crucial to understand how EMS teams navigate clinical, environmental, cultural, and emotional challenges when confronted with such emergencies.⁸ Research from similar low- and middle-income countries (LMICs) suggests that gaps in training, infrastructure, inter-agency coordination, and gender dynamics significantly influence EMS outcomes.⁹ These challenges are compounded during high-risk cases like twin births, where the margin for error is minimal, and decisions often need to be made without direct physician supervision.¹⁰ This study explores the lived experiences of EMTs, EVOs, and a skilled birth attendant (SBA) who were involved in emergency twin deliveries in Khairpur and Naushero Feroz districts of Sindh.¹¹ Using a qualitative case study design, it highlights the practical realities and inter-professional dynamics of managing twin births in ambulances.¹² The goal is to uncover actionable insights that can inform policy reforms, protocol improvements, and capacity-building strategies in Pakistan's EMS framework, ultimately contributing to improved maternal and neonatal outcomes in pre-hospital settings.¹³

METHODS

This qualitative study employed semi-structured interviews with EMTs and EVOs involved in twin birth cases in Khairpur and Naushero Feroz districts, along with one SBA. Interviews were transcribed, coded, and

thematically analyzed to uncover key patterns and insights related to challenges faced, decision-making processes, and emotional responses during emergency twin deliveries in ambulances.

Case presentation

Thematic comparisons were drawn between EMTs Munir Hassan (Khairpur) and Mehtab Khan (Naushero Feroz), as well as EVOs Ameer Gul (Naushero Feroz) and Zulfikar Ali (Khairpur). Key themes included environmental and logistical challenges, clinical challenges, cultural and gender considerations, decision-making processes, adherence to protocols, emotional responses, and professional backgrounds. The SBA provided additional insights into delayed ambulance arrival, infrastructure challenges, limited pre-arrival communication, professional confidence, and recommendations for better coordination and community awareness.

RESULTS

EMT analysis

Thematic comparison

A structured comparison between EMTs Munir Hassan (Khairpur) and Mehtab Khan (Naushero Feroz) reveals the following themes as shown in Table 1.

EVO analysis

Thematic Comparison Insights from Ameer Gul (Naushero Feroz) and Zulfikar Ali (Khairpur) focused on driving, logistics, and teamwork as shown in Table 2.

Table 1: Thematic comparison.

Theme	Khairpur (Munir Hassan)	Naushero Feroz (Mehtab Khan)	Analysis
Environmental and logistical challenges	Difficulty parking in a congested area.	Poor road conditions are affecting response time.	Reflects micro vs macro-level constraints impacting response efficiency.
Clinical challenges	Struggled with umbilical cord management.	Focused on hygiene and protocol.	Indicates need for neonatal care training.
Cultural and gender considerations	Advocated for female EMTs in deliveries.	Prioritized saving lives over gender concerns.	Reflects sociocultural vs clinical priority tension.
Decision-making process	Relied on instinct and past experiences.	Used Teletabib for guided decisions.	Highlights the value of telemedicine support.
Adherence to protocols	No explicit mention.	Emphasized strict protocol compliance.	Indicates variation in training effectiveness.
Emotional response	Expressed stress and uncertainty.	Showed confidence and emotional resilience.	Suggests experience impacts emotional management.
Professional background	No prior clinical experience mentioned.	Former nurse with clinical experience.	Underlines the value of prior medical experience.

Continued.

Theme	Khairpur (Munir Hassan)	Naushero Feroz (Mehtab Khan)	Analysis
Recommendations	Suggested logistics, gender inclusivity, and training improvements.	Recommended road infrastructure upgrades and telemedicine support.	Emphasizes complementary strategies for EMS improvement.

Table 2: EVO analysis.

Theme	Naushero Feroz (Ameer Gul)	Khairpur (Zulfikar Ali)	Analysis
Training and professional experience	BLS-trained, prior twin birth experience.	One-day motorway training only.	Shows structured training supports confidence.
Environmental and logistical challenges	Emphasized the importance of good roads.	Managed the narrow lane by coordinating with the EMT.	Need for both infrastructure and real-time navigation strategies.
Decision-making and coordination	Mentioned the presence of a female attendant as beneficial.	Coordinated with EMT, BHU staff, and midwife.	Zulfikar's example shows stronger inter-agency collaboration.
Response during delivery	Felt proud of handling the case.	Calm and supportive during procedure.	Highlights personal vs professional satisfaction.
Cultural sensitivity and public reaction	No mention.	Managed the crowd while ensuring patient privacy.	Addresses sociocultural dynamics.
Collaboration and teamwork	Valued the female attendant's presence.	Assisted EMTs and external professionals.	Broader engagement observed in Zulfikar's case.
Recommendations	Focused on road improvements.	Advocated for expanded training.	A combined approach is needed: infrastructure and capacity building.

Table 3: Thematic analysis of skilled birth attendant (SBA) insights and key implications for EMS.

Theme	Findings	Implications for EMS
Ambulance response time	SBA reported a 40-minute delay in ambulance arrival, potentially contributing to complications during delivery.	Urgent need to optimize dispatch efficiency and reduce response times, especially in high-risk obstetric cases.
Infrastructure challenges	Damaged roads and traffic congestion significantly impeded ambulance movement.	Highlights the importance of collaborating with municipal and road authorities to improve access routes for emergency vehicles.
Communication gaps	Lack of prior communication from EMTs or EVOs hindered pre-arrival preparation.	Emphasizes the need to standardize pre-arrival communication protocols and integrate SBAs into EMS coordination systems.
Professional competence	SBA felt confident due to experience, but suggested the need for ongoing training.	Reinforces the need for continuous skill development and formal training pathways for SBAs and field responders.
Recommendations by SBA	Suggested better coordination, improved ambulance timing, greater community awareness, and formal EMS inclusion of SBAs.	Points to systemic changes include protocol revision, public sensitization, and policy-level SBA integration into pre-hospital care.
EMT and EVO training	Variability in EMT skill levels and limited EVO preparedness for emergency driving and scenarios.	Necessitates structured, scenario-based obstetric and neonatal training for EMTs and certification-focused driving modules for EVOs.
Telemedicine	SBA noted that Teletabib was instrumental in guiding decisions.	Supports further expansion and training on digital health platforms for pre-hospital providers.

Continued.

Theme	Findings	Implications for EMS
Emotional resilience	SBA observed that experience and prior exposure contributed to emotional regulation during crises.	Indicates the value of resilience-building programs and reflective learning for field personnel.
Cultural and gender sensitivity	Mixed observations; cultural norms influenced perception of gender roles, yet patient-centered care remained paramount.	Necessitates culturally informed training that balances community norms with clinical safety and patient dignity.
Inter-professional collaboration	Successful delivery was facilitated by coordination between EMTs, EVOs, SBAs, and BHU staff.	Underscores the importance of collaborative, interdisciplinary emergency care models, including clear roles and shared protocols.

DISCUSSION

The findings of this qualitative case study reveal the complex and multidimensional challenges faced by EMS personnel during out-of-hospital twin deliveries. These challenges intersect across clinical preparedness, infrastructural limitations, sociocultural norms, and emotional resilience. Variability in protocol adherence, the use of telemedicine, and inter-professional collaboration reflected broader systemic inconsistencies.

EMTs with prior clinical experience, such as Mehtab Khan, demonstrated greater adherence to hygiene protocols and confidence, particularly when supported by Teletabib. This observation aligns with existing literature indicating that previous clinical exposure enhances decision-making in emergency contexts.^{14,15} In contrast, EMTs without such backgrounds, like Munir Hassan, exhibited higher stress levels and greater reliance on instinct, highlighting the need for standardized obstetric training across EMS teams.^{16,17} The comparison underscores the critical role of competency-based training in bridging preparedness gaps.

EVOs, often overlooked in clinical narratives, emerged as vital contributors to the successful outcomes of these deliveries. Ameer Gul's Basic Life Support (BLS) training and prior exposure to obstetric cases empowered him to respond confidently. Meanwhile, Zulfikar Ali's case illustrated the value of real-time coordination with Basic Health Units (BHUs) and community midwives, reinforcing the importance of inter-agency collaboration.^{18,19} These insights support the growing call for integrating EVOs into EMS training modules that extend beyond driving, encompassing patient interaction and navigation.^{20,21}

Cultural sensitivities, particularly around gender, also influenced responses in different ways. While one EMT emphasized the importance of female staff, another prioritized clinical outcomes over social norms. This divergence mirrors broader tensions within Pakistan's health system, where cultural considerations frequently intersect with emergency response protocols.²² The SBA's account further illuminated systemic challenges, including communication delays, poor road conditions, and lack of pre-arrival coordination. Addressing these barriers could significantly improve EMS response times and clinical outcomes.

Ultimately, this study highlights the urgent need for a multidimensional EMS strengthening strategy: integrating structured obstetric training, leveraging telemedicine, addressing infrastructural bottlenecks, and fostering inter-professional collaboration. Such reforms must remain sensitive to the cultural and logistical realities of rural Pakistan to ensure safer maternal and neonatal care during transit.

CONCLUSION

This study reveals the multifaceted challenges of pre-hospital twin deliveries through the real-world experiences of EMTs, EVOs, and a Skilled Birth Attendant in Sindh. Their firsthand accounts illuminate how infrastructure gaps, variations in training, cultural dynamics, and coordination efforts directly shaped the outcomes of these complex cases. For instance, the EMTs' differing levels of clinical preparedness and reliance on instinct or telemedicine directly informed our recommendations for structured obstetric training and expanded digital support. Similarly, EVOs' handling of logistical hurdles and their coordination with EMTs and community members underscored the importance of teamwork, real-time decision-making, and road infrastructure improvements. The SBA's reflections on ambulance delays, communication breakdowns, and community readiness emphasized the need to formally integrate such professionals into the EMS response chain. These collective insights point to the necessity for comprehensive EMS reforms, including scenario-based training, culturally sensitive protocols, improved infrastructure coordination, and stronger inter-professional linkages. By grounding our findings in the lived experiences of frontline EMS personnel, this study provides actionable insights for policymakers and emergency care leaders aiming to strengthen maternal and neonatal outcomes in rural Pakistan.

Recommendations

Establish a comprehensive obstetric training program for emergency personnel

It is imperative to design and implement a structured obstetric training curriculum tailored specifically for EMTs and EVOs. This training should encompass both theoretical knowledge and practical skills necessary for

managing high-risk deliveries, including twin births, in pre-hospital settings.

Institutionalize regular refresher courses and simulation-based learning modules

Continuous professional development must be ensured through periodic refresher courses and hands-on simulation-based exercises. These training interventions would enhance emergency preparedness, reinforce protocol adherence, and improve confidence in managing obstetric emergencies in dynamic and unpredictable field conditions.

Enhance inter-sectoral coordination with municipal and road infrastructure authorities

Effective emergency response requires seamless coordination between EMS services and local road and municipal authorities. Strategic collaboration should focus on improving ambulance accessibility by addressing infrastructural barriers such as road damage, traffic congestion, and inadequate signage in rural and urban areas.

Strengthen and expand the utilization of telemedicine platforms in field operations

Given the demonstrated utility of telemedicine in guiding real-time clinical decision-making, it is recommended that digital health tools such as Teletabib be expanded in coverage and scope. EMTs and EVOs should receive specialized training to optimize the use of telehealth systems during obstetric emergencies.

Develop and institutionalize contextually appropriate and culturally sensitive ems protocols

Emergency medical response protocols should be revised to reflect cultural sensitivities and community norms without compromising patient safety. Training programs should include modules on cultural competence, gender sensitivity, and community engagement strategies to foster trust and acceptance during emergency interventions.

Formally integrate SBAs into the pre-hospital emergency response framework

To improve maternal and neonatal outcomes, skilled birth attendants must be systematically incorporated into the EMS delivery model. This includes establishing communication protocols, pre-arrival coordination mechanisms, and formal recognition of their role within ambulance-based care teams.

Standardize and streamline emergency communication protocols across ems stakeholders

The establishment of standardized communication protocols is essential to enhance real-time coordination

among EMTs, EVOs, healthcare facilities, and community health workers. Clear, consistent, and timely information exchange can significantly improve preparedness and response efficiency during obstetric emergencies.

ACKNOWLEDGMENTS

Authors would like to thank the EMTs, EVOs, and SBA for sharing their invaluable experiences. Special thanks to the MEAL and its Research Unit for taking this initiative and facilitating interviews and logistics.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Maqbool U, Lakhari TQ, Shahid M, Mangrio LA, Iqbal M, Sarfaraz S, et al. Emergency Twin Births in Ambulances: A Qualitative Case Study from Sindh, Pakistan. *Int J Reprod Contracept Obstet Gynecol* 2025;14:3977-82.