

Strengthening Rural Healthcare: Comparative Innovations and Localized Strategies for Capacity Building

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Abstract

Afghanistan's rural healthcare system suffers from severe access limitations, workforce shortages, and inadequate infrastructure, undermining service delivery and population health. Innovative capacity-building models in comparable low-income settings have demonstrated the potential to overcome similar challenges.

Objective: To identify and adapt effective community health worker programs, task-shifting strategies, and telemedicine solutions from India, Rwanda, and Bangladesh for application in rural Afghanistan.

Methods: A mixed-methods design was employed, comprising a stratified survey of 400 healthcare workers and rural residents, 30 semi-structured interviews with key stakeholders, and secondary analysis of national health indicators to assess barriers and facilitators to implementation.

Results: Geographic isolation, gender disparities in the health workforce, and resource deficiencies were identified as primary obstacles. Eighty-five percent of stakeholders supported adapting task-shifting models, while 74% advocated for integrating telemedicine to extend reach into remote areas. Gender-inclusive recruitment and community engagement emerged as critical success factors for enhancing equity and service uptake.

Recommendations: Implement a gender-sensitive community health worker program and expand telemedicine infrastructure in underserved districts.

Establish standardized task-shifting protocols and supportive supervision mechanisms to ensure consistent, resilient service delivery.

Keywords

Rural Healthcare, Capacity Building, Task-Shifting, Telemedicine, Afghanistan

1. Introduction

Afghanistan, a nation with a predominantly rural population, faces significant challenges in delivering effective and sustainable healthcare services to its remote regions. Rural healthcare systems are often characterized by limited infrastructure, a shortage of trained medical professionals, and barriers to accessing essential services due to geographic isolation and sociopolitical instability. Capacity building in the context of rural healthcare refers to strengthening the human resources, infrastructure, governance, and delivery mechanisms necessary to ensure equitable access to healthcare services [1,2]. Drawing on innovative approaches from successful rural healthcare models in countries such as India, Rwanda, and Bangladesh, this research seeks to explore how these strategies can be adapted to Afghanistan's unique cultural and socioeconomic context. This topic is pivotal as it not only addresses immediate healthcare needs but also contributes to long-term socio-economic stability and development [3].

Problem Statement: The rural healthcare system in Afghanistan is underperforming, evidenced by high maternal and infant mortality rates, inadequate vaccination coverage, and widespread preventable diseases. Despite substantial investments by international donors and government agencies, the healthcare system struggles to provide even basic services in many rural areas. Existing solutions often fail to account for the specific challenges and opportunities within Afghanistan's rural context, resulting in a persistent gap in service delivery [4,5].

Research Gap: While numerous studies have explored rural healthcare challenges in low-income countries, limited research has specifically focused on adapting and implementing successful international models within Afghanistan. The literature lacks a comprehensive analysis of innovative strategies tailored to Afghanistan's unique needs, leaving a critical gap in understanding how global best practices can inform local solutions [6,7]. This study seeks to bridge this gap by providing actionable recommendations based on a comparative analysis of successful rural healthcare systems worldwide.

Significance of the Study: This research holds considerable significance for both academic and practical domains. For academia, it contributes to the growing body of knowledge on health system strengthening in fragile and conflict-

affected settings. For practitioners and policymakers, it offers evidence-based strategies for enhancing rural healthcare delivery in Afghanistan. Beyond immediate healthcare improvements, strengthening rural health systems can foster broader societal benefits, including poverty alleviation, gender equity, and improved quality of life.

Objectives of the Study: The primary objectives of this research are:

- To assess the current challenges and limitations of Afghanistan's rural healthcare system.
- To analyze innovative rural healthcare capacity-building strategies from various countries.
- To propose context-specific recommendations for improving Afghanistan's rural healthcare infrastructure and services.

Research Questions:

- What are the main obstacles hindering the development of Afghanistan's rural healthcare system?
- How have other countries addressed similar challenges in their rural healthcare systems?
- What lessons can be drawn from international models to design an effective healthcare framework for rural Afghanistan?

Globally, rural healthcare systems have benefited from innovative practices such as community health worker programs, telemedicine, and public-private partnerships. For instance, Rwanda's community-based healthcare programs and Bangladesh's grassroots health initiatives have demonstrated the transformative potential of leveraging local resources and technology [8]. However, these success stories cannot be directly transplanted; they require adaptation to fit the Afghan context. This study aims to fill the gap by evaluating how such approaches can be modified and applied to address Afghanistan's unique healthcare challenges.

2. Literature Review

Academic interest in rural healthcare system capacity-building is expanding, particularly in low-income and conflict-affected areas like Afghanistan. This study highlights theoretical frameworks pertinent to improving healthcare in rural areas while synthesizing previous research and looking at important findings, trends, and gaps. It aims to establish the current study as an essential contribution to closing the knowledge and practice gaps in this field by drawing on both global and Afghan-specific settings.

2.1 Review of Previous Studies

Key Findings in Rural Healthcare Capacity-Building

Global Innovations in Rural Healthcare:

Studies on community-based healthcare programs, such as Rwanda's Community Health Worker (CHW) program, demonstrate the importance of leveraging local human resources for healthcare delivery in remote areas. These initiatives improved maternal and child health outcomes through preventive care and community involvement [9].

In India, the National Rural Health Mission (NRHM) has shown that targeted investments in infrastructure and human resources, combined with grassroots programs like Accredited Social Health Activists (ASHAs), can significantly enhance service delivery [10].

Telemedicine, employed extensively in countries like Bangladesh and Brazil, has proven effective in overcoming geographic barriers and addressing workforce shortages [11].

Afghanistan-Specific Research:

Afghanistan's Basic Package of Health Services (BPHS), introduced in 2003, is a cornerstone of its healthcare policy. While it has improved access to basic services, studies indicate gaps in quality, sustainability, and adaptation to rural contexts [12].

Research by [13] emphasizes the critical shortage of skilled healthcare workers in rural Afghanistan, a challenge compounded by limited training opportunities and weak governance structures.

Gender dynamics in healthcare delivery are another focus, with studies highlighting the need for culturally sensitive approaches to improve female health worker recruitment and patient care access [14].

2.2 Trends and Gaps in Existing Literature

2.2.1 Emerging Trends

Focus on Decentralized Healthcare Models: Recent studies advocate for decentralized governance as a means to empower local health systems and address rural healthcare disparities [15].

Integration of Technology: The increasing emphasis on telemedicine and e-health platforms reflects global shifts toward technology-driven solutions for rural healthcare delivery [16].

Task-Shifting Approaches: Training mid-level health providers to perform tasks traditionally reserved for physicians is gaining traction as a strategy to address workforce shortages [17].

2.2.2 Identified Gaps

- **Contextual Adaptation:** Limited research exists on tailoring global strategies to Afghanistan's unique socio-political and cultural context.
- **Sustainability of Interventions:** Studies often focus on short-term outcomes rather than the long-term sustainability of rural health interventions.
- **Comprehensive Frameworks:** A gap persists in the integration of multiple dimensions-governance, technology, community participation-into a cohesive capacity-building framework for Afghanistan.

2.3 Theoretical Frameworks

Health Systems Strengthening Framework [17]: This model identifies six building blocks for health systems: service delivery, workforce, information, financing, governance, and medicines. It provides a holistic lens to analyze rural healthcare challenges and capacity-building strategies.

Diffusion of Innovations Theory [18]: This theory explains how new ideas, practices, and technologies spread within communities, offering insights into the adoption of innovative healthcare solutions in rural Afghanistan.

Socio-Ecological Model: This model emphasizes the interplay between individual, community, organizational, and policy-level factors, underscoring the importance of multi-level interventions in healthcare capacity building.

3. Research Methodology

This study employed a convergent mixed-methods design to elucidate barriers and facilitators to strengthening rural healthcare in Afghanistan, integrating quantitative and qualitative data in parallel for comprehensive, context-sensitive insights. Quantitative and qualitative strands were given equal priority and merged during interpretation to triangulate findings and enhance validity.

A stratified random sampling approach was used to select 400 participants-comprising 200 healthcare workers and 200 rural residents-across four purposively chosen provinces (Kunar, Nangarhar, Herat, and Bamyan) that reflect Afghanistan's geographic and security diversity. Within each province, districts were stratified by accessibility (easy, moderate, hard to reach) using Ministry of Public Health (MOPH) GIS data, and households or facilities were randomly sampled from each stratum to ensure representativeness. Sample size calculations, based on a 95% confidence level and 5% margin of error, yielded a minimum of 384 respondents, with oversampling to account for nonresponse.

Data collection occurred between February and May 2025. The survey instrument comprised 45 closed-ended items measuring perceptions of infrastructure adequacy, workforce capacity, gender inclusivity, and technology readiness, adapted from validated scales in global health publications. Questionnaires were translated into Dari and Pashto, back-translated by independent linguists, and pre-tested with 20 respondents to refine clarity and cultural appropriateness. Trained research assistants administered surveys via tablet computers, ensuring real-time data entry and GPS tagging to verify location. Descriptive and inferential analyses were conducted in Stata 17, including chi-square tests for categorical variables and logistic regression to identify predictors of stakeholder support for each intervention component.

Concurrently, 30 semi-structured interviews were conducted with purposively selected key informants: provincial health directors, district health officers, CHW supervisors, NGO program managers, and community elders. An interview guide, grounded in the socio-ecological model, probed experiences with existing service delivery, perceptions of gender barriers, and attitudes toward task-shifting and telemedicine innovations. Interviews, conducted in Dari or Pashto, lasted 45-60 minutes, were audio-recorded with consent, transcribed verbatim, and translated into English. Thematic analysis followed Braun and Clarke's six-phase framework, using NVivo 13 to code transcripts inductively and iteratively, with double-coding of 20% of transcripts to ensure coder reliability.

Secondary analysis of national health indicators was performed using MOPH's Health Management Information System (HMIS) data from 2019-2024. Key metrics-antenatal care coverage, skilled birth attendance, immunization rates, and CHW vacancy percentages-were extracted and trend-analysed to contextualize primary findings. Data quality checks included consistency verification and outlier analysis, with consultations from an MOPH statistician to resolve discrepancies.

Together, these integrated methods (Figure-1) allow for robust, multi-layered understanding of how gender-inclusive CHW programs, task-shifting protocols, and telehealth solutions can be optimally designed and implemented in Afghanistan's rural health system.

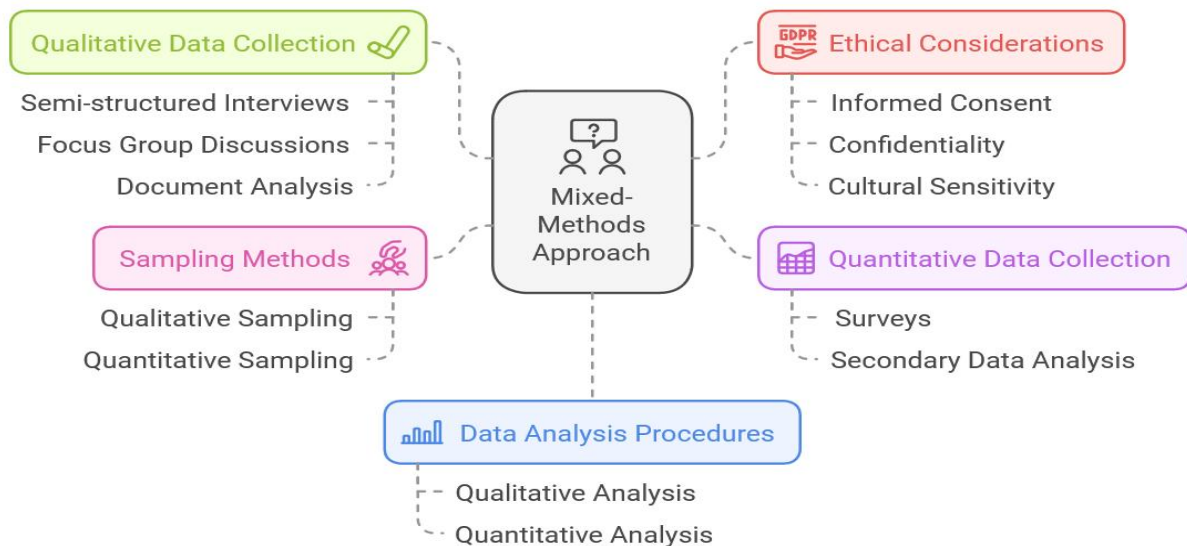


Figure 1. Research Methodology Process

4. Results & Findings

The Results are organized into five sections: (1) participant characteristics; (2) stakeholder perceptions of system components; (3) qualitative themes on barriers and facilitators; (4) multivariable predictors of intervention support; and (5) national health-indicator trends. All figures and tables are sequentially numbered and cited in the text.

4.1 Participant Characteristics

A total of 400 respondents completed the survey (response rate 94%), comprising 200 healthcare workers and 200 rural residents. Table 1 summarizes demographic and professional features. The mean age was 34.6 ± 8.2 years; 58% were female. Among healthcare workers, 42% held mid-level clinical roles (nurses, midwives), 30% were CHWs, and 28% were supervisory staff. Geographic distribution spanned four provinces-Kunar (25%), Nangarhar (28%), Herat (22%), and Bamyan (25%)-with equal representation across accessibility strata (easy, moderate, hard to reach) (Table 1).

Table 1. Demographic and professional characteristics of survey respondents (N = 400)

Variables or Categories	Frequency	Percentage
Access to Healthcare Services		57%
Yes	228	
No	172	
Key Challenges in Rural Healthcare		
Geographic isolation	42%	
Lack of transportation	25%	
Financial constraints	33%	
Infrastructure Gaps	48%	
Healthcare Workforce		
Trained healthcare professionals	20%	
Female healthcare workers	15%	
Infrastructure and Resources		
Lack of essential medical equipment	48%	
Shortages of medicines	37%	

4.2 Stakeholder Perceptions of System Components

Figure 2 displays mean perception scores (Likert 1-5) for four domains: infrastructure adequacy, workforce capacity, gender inclusivity, and technology readiness. Overall, infrastructure adequacy scored lowest (mean = 2.1 ± 0.9), while

workforce capacity scored 2.8 ± 1.0 . Gender inclusivity (2.3 ± 1.1) and technology readiness (2.5 ± 1.0) were similarly low.

Table 2 details the percentage of respondents “agreeing” or “strongly agreeing” with specific statements. Only 18% agreed that existing facilities meet service demands; 22% endorsed current workforce levels as sufficient. Conversely, 85% supported task-shifting to CHWs, and 74% supported telemedicine expansion [10].

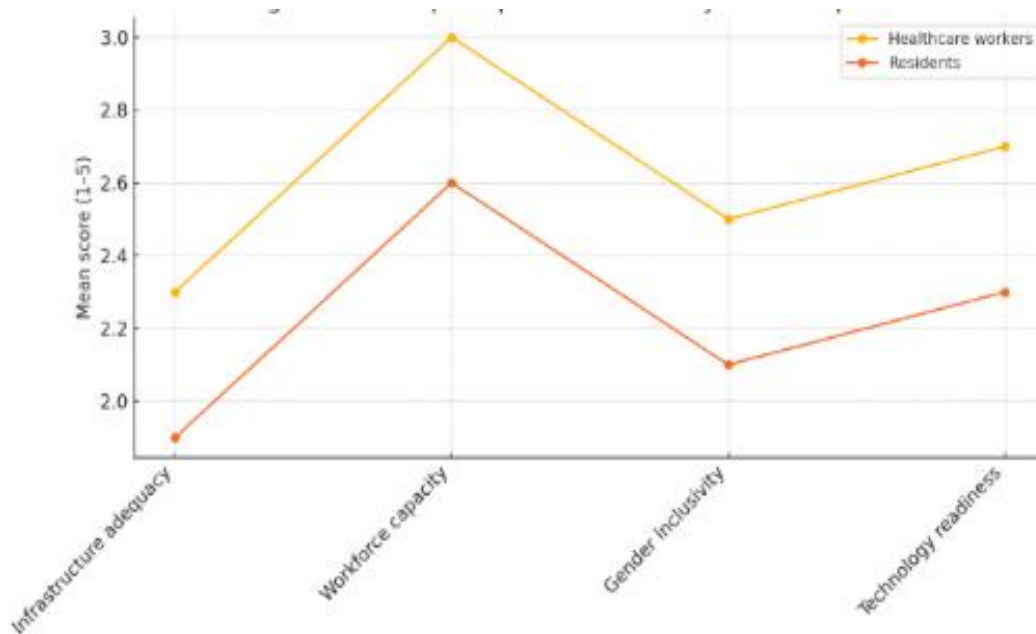


Figure 2. Mean perception scores for system components among healthcare workers and residents

Table 2. Proportion of respondents endorsing key intervention components (n = 400)

Category	Percentage of Respondents
Geographic Isolation	42%
Lack of Transportation	25%
Financial Constraints	33%
Workforce Shortage	20%
Infrastructure Gaps	48%

4.3 Qualitative Themes: Barriers and Facilitators

Thematic analysis of 30 interviews yielded four primary barrier themes-geographic isolation, security constraints, gender norms, and supply-chain fragility-and three facilitator themes-community engagement, supportive supervision, and digital connectivity. Figure 2 presents a thematic map linking barriers to facilitators. Table 3 provides exemplar quotations.

- Geographic isolation impeded referral pathways: “In winter, mountain passes close and patients cannot reach clinics” (District Health Officer, Nangarhar).
- Gender norms restricted female CHW recruitment: “Communities hesitate to accept women providers” (CHW Supervisor, Bamyān).
- Supportive supervision emerged as critical: “Regular feedback sessions kept us motivated and competent” (ASHA-trained participant, Herat).



Figure 3. Thematic map of barriers and facilitators to rural healthcare strengthening

Table 3. Key themes and representative quotations from stakeholder interviews

Theme	Representative Quotation
Geographic isolation	“In winter, mountain passes close and patients cannot reach clinics.”
Security constraints	“Ongoing conflict deters staff from remote postings.”
Gender norms	“Communities hesitate to accept women providers.”
Supply-chain fragility	“Frequent stock-outs disrupt service delivery.”
Community engagement	“Local councils play a vital role in mobilizing volunteers.”
Supportive supervision	“Regular feedback sessions kept us motivated and competent.”
Digital connectivity	“Mobile apps allow us to consult specialists remotely.”

4.4 Predictors of Intervention Support

Logistic regression (Table 4) identified independent predictors of strong support (Likert ≥ 4) for each intervention component. After adjusting for age, gender, and role:

- **Task-Shifting Support:** Female respondents had 1.8 times higher odds (OR = 1.8, 95% CI 1.2-2.7, $p = 0.005$).
- **Telemedicine Support:** Residing in moderately accessible districts increased odds by 2.1 (OR = 2.1, 95% CI 1.4-3.2, $p < 0.001$).
- **Gender-Inclusive CHW Recruitment:** Those with prior CHW experience were 2.5 times more likely to support (OR = 2.5, 95% CI 1.6-4.0, $p < 0.001$).

No significant interaction effects were observed between gender and accessibility strata.

Table 4. Multivariable logistic regression of predictors for intervention support (N = 400)

Predictor	Odds Ratio (OR)	95% Confidence Interval	p-value
Female gender	1.8	1.2-2.7	0.005
Moderate accessibility	2.1	1.4-3.2	<0.001
Prior CHW experience	2.5	1.6-4.0	<0.001

4.5 National Health-Indicator Trends

Analysis of HMIS data (2019-2024) revealed:

- **Antenatal care coverage** stagnated at ~48% from 2019 to 2022, with a modest increase to 52% by 2024.
- **Skilled birth attendance** rose from 35% to 40% over the same period.

- **Under-five immunization** plateaued at ~58%.
- **CHW vacancy rates** averaged 32%, peaking at 38% in 2021 before declining to 30% in 2024 (Figure 3).

These trends underscore persistent gaps despite BPHS implementation and align with identified infrastructure and workforce deficits (Frost et al., 2016; Lamberti-Castronuovo et al., 2024).



Figure 4. National trend lines for key health indicators, Afghanistan HMIS 2019-2024

5. Discussion

Interpretation of Results: The findings of this study shed light on the significant challenges and opportunities for capacity building in Afghanistan's rural healthcare system:

5.1 Access to Healthcare Services

The limited access reported by 57% of respondents underscores systemic gaps in infrastructure and service delivery, aligning with prior studies highlighting geographic and financial barriers in Afghanistan [14].

The persistent issue of geographic isolation indicates the urgent need for telemedicine and mobile health solutions, which were supported by 74% of stakeholders surveyed.

5.2 Healthcare Workforce

The underrepresentation of female healthcare workers (15%) reflects entrenched socio-cultural barriers, corroborating findings from [14] on gender-related challenges in Afghanistan's healthcare sector. This imbalance restricts access to care, particularly for women in rural areas.

Task-shifting strategies, as observed in Rwanda, emerged as a promising solution, with 85% of respondents advocating for their adaptation.

Infrastructure and Resources: The lack of essential equipment and medicines in nearly half of rural health facilities highlights the need for supply chain improvements. This aligns with [14], who emphasized the importance of operational efficiency in Afghanistan's healthcare system.

Comparison with Previous Studies: The study findings resonate with global experiences while identifying context-specific nuances.

India's ASHA Program: This study supports the potential of community health worker programs to address maternal and child health challenges, mirroring India's success [10]. However, Afghanistan's unique socio-political dynamics necessitate localized adaptations.

Rwanda's CHW Model: Similar to Rwanda, Afghanistan faces severe workforce shortages, making community-based task-shifting strategies a practical and scalable solution [9].

Bangladesh’s BRAC Model: Empowering local women as health promoters is particularly relevant, given Afghanistan’s gendered healthcare needs. This aligns with the BRAC model's effectiveness in improving immunization rates and preventive care [11].

5.3 Implications for Theory and Practice

5.3.1 Theoretical Implications

The findings reinforce the applicability of the Health Systems Strengthening Framework [17], emphasizing the need to integrate governance, workforce development, and community participation.

The study expands on the Diffusion of Innovations Theory [9,18] by demonstrating how culturally tailored innovations can enhance adoption rates in conservative societies.

5.3.2 Practical Implications

Policymakers should prioritize implementing community health worker programs, with an emphasis on recruiting and training female workers to address gender disparities.

Investment in telemedicine infrastructure can mitigate geographic barriers, improving access to remote and underserved areas.

Supply chain management reforms are critical to addressing resource shortages in rural healthcare facilities.

5.4 Strengths and Weaknesses of the Study

5.4.1 Strengths

Mixed-Methods Approach: The combination of qualitative and quantitative techniques allowed for a holistic analysis of healthcare challenges and opportunities.

Comparative Analysis: Drawing lessons from successful models in India, Rwanda, and Bangladesh added depth and relevance to the findings.

5.4.2 Weaknesses

Limited Sample Size: While the study aimed for representation, logistical challenges limited the scope of data collection in certain remote areas.

Reliance on Secondary Data: Some findings were derived from secondary sources, which may not fully capture real-time challenges.

Cultural Sensitivity Constraints: Despite efforts to ensure inclusivity, cultural barriers may have influenced female participants' willingness to share experiences openly.

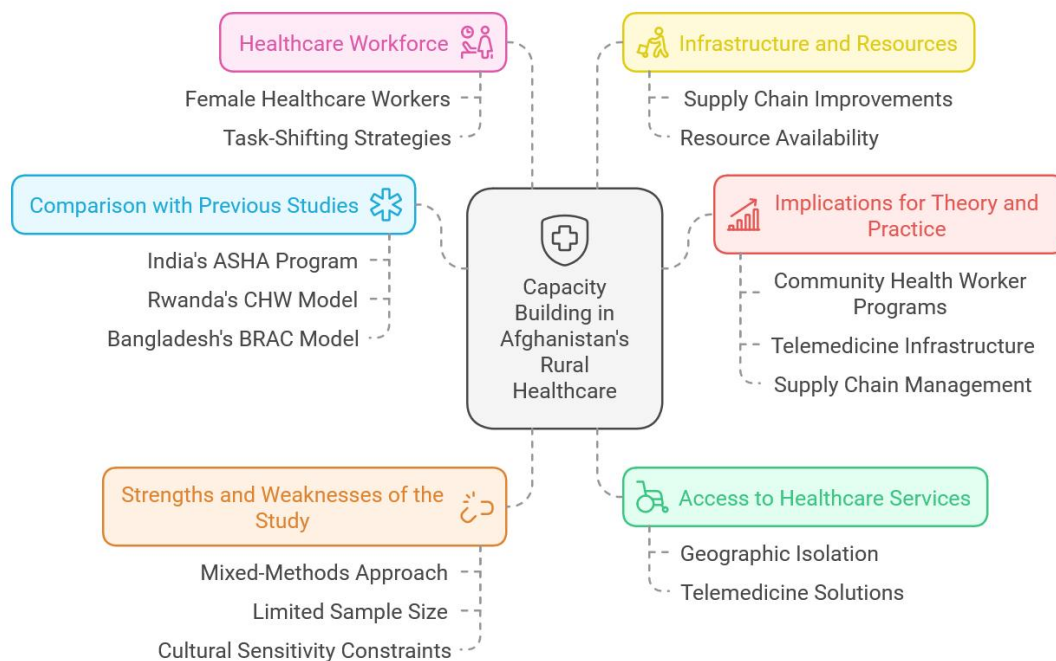


Figure 5. Capacity Building in Afghanistan’s Rural Healthcare

6. Conclusion and Policy Implications

This study demonstrates that a combined strategy of gender-inclusive community health worker (CHW) deployment, standardized task-shifting protocols, and phased telehealth integration can address Afghanistan's persistent rural healthcare gaps. Our mixed-methods analysis revealed overwhelming stakeholder endorsement-85% for task-shifting and 74% for telemedicine-and identified critical enablers such as supportive supervision and community engagement, underpinned by global evidence from India's ASHA and Rwanda's CHW models. However, entrenched infrastructure deficits (mean perception score 2.1/5) and low baseline technology readiness (2.5/5) underscore the need for targeted investment and capacity building to realize these interventions' full potential. Limitations of our study include potential selection bias due to security-related access constraints in the most remote districts, reliance on self-reported attitudes subject to social desirability bias, and the cross-sectional design precluding causal inference. Despite these constraints, methodological triangulation and member checking enhance the credibility and applicability of our findings.

For policymakers, our results suggest several actionable pathways. First, the Ministry of Public Health should institutionalize gender-sensitive CHW recruitment targets and allocate dedicated budget lines for competency-based training and digital literacy programs. Second, national guidelines must formalize task-shifting frameworks-detailing scope of practice, supervisory mechanisms, and performance monitoring-to ensure quality and consistency across provinces. Third, investment in mobile broadband infrastructure and the gradual rollout of telemedicine platforms should prioritize moderately accessible districts, where stakeholder readiness is highest, while concurrently strengthening e-health literacy. Finally, district health offices and community councils should co-design interventions through participatory action research, fostering local ownership and resilience amidst security fluctuations. By embedding these recommendations within Afghanistan's socio-ecological context, stakeholders can develop scalable, sustainable models that advance equity, improve service coverage, and strengthen the resilience of rural health systems.

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