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Unveiling Rural Health Realities: The Case of Gorkha District, Nepal

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Abstract

Despite Nepal's progress in expanding healthcare services, significant healthcare access and quality disparities remain deeply rooted within rural communities such as Gorkha. These inequities extend beyond geographic remoteness, reflecting complex intersections of wealth, education, and social standing. Existing studies often overlook the experiences of frontline healthcare providers who directly confront these challenges. This study examines how doctors and nurses in Gorkha navigate and respond to socioeconomic inequalities in a decentralized health system.

Using a qualitative approach, in-depth semi-structured interviews were conducted with 18 healthcare professionals working in both urban centres and remote villages of Gorkha. Thematic analysis was guided by the Social Determinants of Health framework to interpret the data. Four central themes emerged. "The Two Gorkhas" reveals sharp disparities in healthcare shaped by wealth, caste, and education, which eat away at trust in the system. "Adaptive Resilience" shows providers using informal networks and community ties to overcome systemic gaps. "The Double-Edged Sword" highlights how technology both improves service delivery and deepens inequities. "Beyond the White Coat" captures providers' broader roles in addressing social and environmental health challenges.

The study shows that socioeconomic divides more than geography shape healthcare access and trust in rural Nepal. While providers display resilience, lasting progress demands policy reform, stronger local governance, and integrated approaches for equitable and sustainable rural healthcare.

Introduction

Health inequities in Nepal are profoundly shaped by complex socioeconomic stratification that extends deeply into rural districts such as Gorkha (Subedi, 2022; Wasti et al., 2023). While Nepal has made substantial progress in several national health indicators for instance, reducing child mortality from 138.8 to 27.3 per 1,000 live births between 1990 and 2020, and lowering maternal mortality to 239 per 100,000 live births (Ali et al., 2023; UNICEF, 2022). However, national averages conceal persistent disparities in healthcare access and utilization within and across rural communities (GC & Adhikari, 2023; Kc et al., 2020). Much of the existing literature has historically framed these inequities along a binary urban-rural divide; however, a growing body of evidence demonstrates that variables such as wealth, education, caste, and social status serve as far more decisive determinants of health outcomes, even within rural areas like Gorkha (Gc, 2023; Tang, 2024; Subedi, 2022).

Maternal health service utilisation particularly reflects these stratified patterns. Women from wealthier households are significantly more likely to access antenatal care, postnatal services, and institutional delivery compared to women from the poorest quintile (Ali et al., 2023; Banstola, 2017; USAID, 2022). However, these inequalities are not confined solely to maternal health. Populations with lower education levels, those belonging to marginalized castes and ethnic minorities, and individuals with limited financial resources face systemic disadvantages across nearly all health

domains (Subedi, 2022). In rural districts such as Gorkha, these disparities are further exacerbated by geographical isolation, inadequate transportation networks, and uneven distribution of healthcare resources (Joshi, 2023; Ishtiaque, 2017). Despite approximately 78% of Nepal's population residing in rural areas (World Bank Group, 2023), a proportion substantially higher than the South Asian average (World Bank Group, 2023). The healthcare systems in these regions continue to grapple with chronic shortages of skilled healthcare workers, weak physical infrastructure, and limited access to essential medicines and diagnostics (International Labor Organization, 2017; Lee et al., 2023; Wasti et al., 2023). In contrast, urban centres such as Kathmandu, Pokhara, and Bharatpur concentrate a disproportionate share of specialised healthcare professionals, advanced medical facilities, and institutional capacity, leaving remote districts like Gorkha and even more isolated areas such as Mugu in Karnali Province reliant on limited and often underskilled workforces (Ghimire, 2024; Pant, 2024; Sharma, 2022; Singh, 2024).

Policy efforts such as introducing the National Health Insurance (NHI) program in 2016 have sought to reduce financial barriers and improve health coverage for vulnerable populations (Khanal, 2023). However, systemic governance challenges, infrastructural deficits, and human resource constraints have limited the program's ability to reach marginalized groups in geographically isolated districts like Gorkha (Lee et al., 2023; Wasti et al., 2023). As a result, socioeconomic and geographic inequalities remain entrenched, even in the face of expanded policy frameworks to achieve universal health coverage.

In this context, frontline healthcare providers, doctors and nurses serve as critical intermediaries who operate as clinical service providers and as informal navigators of the social, economic, and logistical complexities that define rural healthcare delivery (Coombs, 2022). In Gorkha, these providers often assume roles that extend far beyond biomedical care, acting as community advocates, social workers, and cultural mediators who leverage local knowledge, informal networks, and interpersonal trust to fill institutional voids (Adhikari et al., 2022; Eriksen et al., 2024). However, despite their indispensable roles, these frontline professionals' voices and lived experiences remain underrepresented in the health systems literature globally and within Nepal (Al-Wawi et al., 2025; Das et al., 2024). The dominant research discourse continues to prioritize quantitative service delivery metrics, thereby overlooking the nuanced, on-the-ground realities faced by providers in low-resource and highly stratified rural contexts (Kandu, 2023).

Addressing this critical gap, the present study applies the Social Determinants of Health (SDOH) framework to explore how doctors and nurses in Gorkha perceive and navigate the multifaceted dimensions of socioeconomic inequities in their clinical practice. By capturing the adaptive strategies these frontline healthcare workers employ, this research seeks to illuminate the complex interplay between poverty, education, caste, and geography that shapes healthcare access, delivery, and trust in one of Nepal's rural districts. Specifically, the study addresses two central research questions: How do doctors and nurses in Gorkha perceive the impact of socioeconomic stratification on healthcare access, quality, and trust? And what strategies do they employ to mitigate these disparities in their everyday professional practice?

Methods

This study utilized a qualitative approach to investigate how healthcare providers in Gorkha District, Nepal, understand and manage socioeconomic inequalities within healthcare delivery. Qualitative inquiry was chosen to capture the complex realities of doctors and nurses operating within rural, resource-constrained settings where structural inequities are deeply embedded (Doyle et al., 2020; Rendle et al., 2019). The design combined both descriptive and exploratory elements to document providers' day-to-day experiences while uncovering the underlying sociocultural and systemic mechanisms shaping their adaptive practices (Doyle et al., 2020; Rendle et al., 2019). The study followed the Consolidated Criteria for Reporting Qualitative Research (COREQ), ensuring methodological rigor, transparency, and comprehensive reporting throughout the research process (Tong et al., 2007).

A purposive sampling strategy was initially employed to identify eligible participants who met predefined inclusion criteria: professional role (medical doctors or registered nurses), minimum of

five years' post-qualification clinical experience, and practice in both urban and rural healthcare settings. Given the goal of capturing diverse experiences across healthcare tiers, maximum variation sampling was incorporated to ensure representation from different professional roles, geographic locations, and years of clinical experience (Campbell et al., 2020;
Rapley, 2024). Snowball sampling further facilitated the recruitment of additional participants by leveraging professional networks, which proved particularly useful in identifying providers working in more remote rural facilities (Parker, 2019). This approach was critical for accessing participants across Gorkha's geographically challenging terrain, where healthcare workforce shortages and limited professional mobility present additional barriers to recruitment (Ghimire 2024).

In total, 18 healthcare professionals participated in the study, comprising 10 medical doctors and 8 registered nurses. Reflecting national gender patterns in Nepal's healthcare workforce where approximately 75% of physicians are male and nearly 100% of registered nurses are female the sample included nine male doctors and one female doctor, while all nurses were female. Although this distribution mirrors workforce realities, it also underscores the persistent gender imbalance within Nepal's clinical professions. Participants were drawn from both urban and rural healthcare settings within Gorkha District, capturing variation in practice contexts, resource availability, and institutional hierarchies. The urban site included a well-established government hospital in Gorkha Bazaar, which serves as a referral center for the district's peripheral health posts and smaller facilities. Rural participants were recruited from geographically isolated health posts and primary care centers across Gorkha's mountainous villages, where resource constraints are most acute.

Data collection was conducted through in-depth, face-to-face semi-structured interviews between October and December 2024. Interviews were scheduled at the participants' workplaces, with careful consideration to minimize disruptions to job responsibilities. No prior relationships existed between the researchers and participants. Each interview, lasting approximately 45 to 75 minutes, followed a semi-structured interview guide developed through extensive literature review, the Social Determinants of Health (SDOH) framework, and the first author's field experience in Nepal's healthcare system. The guide included questions on participants' perceptions of how poverty, education, caste, gender, cultural norms, geographic isolation, infrastructure, and resource allocation influence healthcare access and delivery. While the interview guide ensured consistency, the flexible format allowed for the exploration of emergent themes and deeper probing into unanticipated yet relevant issues. Participants were offered the option to converse in either Nepali or English to ensure clarity, accuracy, and comfort in sharing nuanced experiences. All interviews were audio-recorded with informed written consent and supplemented by detailed field notes capturing non-verbal cues, contextual observations, and researcher reflections.

Data analysis followed Braun and Clarke's six-phase thematic analysis approach, allowing for both systematic coding and iterative, inductive refinement of emerging patterns (Braun & Clarke, 2006). The lead investigator, a qualitative researcher with expertise in Nepal's healthcare system, led the coding process in collaboration with the second author, an expert in health policy and qualitative methods. Verbatim transcripts were first generated from the audio recordings; interviews conducted in Nepali were translated into English and cross-validated by bilingual team members to ensure linguistic and cultural fidelity (Braun & Clarke, 2006). The analysis began with an extensive familiarization phase, followed by initial coding that identified meaningful textual segments, including both deductively derived codes based on the SDOH framework (e.g., income, education, social support, geographic accessibility), and inductively generated codes that emerged organically from participants' narratives (e.g., informal networks, professional role strain, adaptive coping mechanisms) (Bingham, 2023; Thomas, 2006).These initial codes were aggregated through focused coding into broader conceptual categories that reflected intersections among socioeconomic stratification, institutional structures, and frontline healthcare practice. Themes were then constructed through an iterative refinement, synthesis, and critical examination of the relationship between codes, categories, and the study's guiding framework. The research team engaged in regular discussions to resolve coding discrepancies, test alternative thematic structures and ensure analytical consistency. Data saturation

was reached when no new codes or themes emerged from additional interviews, affirming the depth and comprehensiveness of the dataset (Rahimi & Khatooni, 2024).

Several rigour-enhancing strategies were employed to enhance the validity and trustworthiness of the findings (Forero et al., 2018). Credibility was established through prolonged field engagement, triangulation of perspectives between doctors and nurses, and member checking, wherein a summary of the emerging themes was shared with all 18 participants for verification. Dependability was supported through detailed documentation of the research process, analytic decisions, and audit trails. Confirmability was reinforced by collaborative coding among team members and the systematic integration of participant quotations directly into the analysis, ensuring that findings reflected participants' lived realities rather than researchers' preconceptions. Reflexivity was embedded throughout the study, with team members maintaining personal reflexive journals to critically reflect on their positionalities, assumptions, and potential biases during data collection, analysis, and interpretation.

Finally, transferability was strengthened by providing rich, contextual descriptions of Gorkha's health system, workforce composition, and the broader sociopolitical structures within which these providers operate (Ishtiaque, 2017; Joshi, 2023; World Bank Group, 2023). These contextual details enable readers to evaluate the applicability of the study's insights to other rural and socioeconomically stratified settings in Nepal.

The theoretical foundation guiding this study was the Social Determinants of Health (SDOH) framework which conceptualizes health outcomes as the product of multiple intersecting forces including economic status, education, employment, social capital, geography and cultural norms rather than as isolated clinical or biological processes (Braveman & Gottlieb, 2014; Marmot et al., 2008; WHO, 2025). The SDOH framework not only informed the design of the interview guide and initial coding structure. It also remained central throughout the entire analytical process, enabling the research team to situate healthcare providers' narratives within the broader structural forces that shape healthcare disparities in Gorkha. By emphasizing how frontline providers experience, perceive, and attempt to mitigate these determinants in their clinical practice, the SDOH framework allowed the study to reveal the complex adaptive strategies employed by healthcare workers in rural Nepal as they navigate deeply entrenched socioeconomic stratification.

Results

Thematic analysis of interviews with 18 healthcare providers, comprising 10 medical doctors and 8 registered nurses, revealed four interrelated themes that capture the multifaceted ways in which socioeconomic stratification shapes healthcare access, trust, and delivery in rural Nepal, particularly in Gorkha District. These themes reflect the participants' lived realities of navigating persistent inequities, institutional gaps, cultural complexities, and emerging systemic pressures.

Theme 1: Two Nepals: Growing Gap in Healthcare Access and Trust.

Participants overwhelmingly characterized Nepal's evolving healthcare system as increasingly divided into "Two Nepals." This metaphor described an escalating divergence in which socioeconomic status, rather than simply geography, now defines access to quality healthcare services. Providers observed that financial means, not physical location alone, increasingly determined whether patients could access timely, adequate, and comprehensive care both within and beyond Nepal's borders.

Doctors' Perspectives. Urban-based doctors frequently emphasized how affluent patients actively bypass local healthcare systems. Doctor D3, a pediatrician in an urban hospital, reported:

> *"Just last week, I had a patient fly to New Delhi for a routine surgery that we could have easily performed here. They said they didn't trust the quality of our equipment."*

Even within well-equipped urban settings, wealthier patients often expressed skepticism about domestic health facilities, further delegitimizing public confidence in Nepal's healthcare infrastructure. At the same time, physicians encountered patients from impoverished rural regions struggling to secure basic medications. As D3 further described:

> *"She came to ask if I could prescribe an alternative or cheaper brand of the same medication so that it would be within her budget."*

These narratives illustrate the professional disillusionment experienced by doctors who confront both extremes of privilege and deprivation within the same system.

Nurses' Perspectives. Rural-based nurses echoed similar accounts of deepening inequalities, often describing patients' financial desperation. Nurse N15 recounted:

> *"We see families selling their land, taking out loans, just to afford treatment for their loved ones. Some of them could be easily treated here, but there's a belief that anything serious needs to be taken to Kathmandu or even across the border to India."*

Frequent shortages of essential medicines, delayed supply chains, and unreliable emergency transport further intensified these burdens. As N15 further explained:

> *"What can we do when essential medicines are frequently out of stock and there are delays in receiving supplies from the province?"*

These compounding barriers result in catastrophic health expenditures for already marginalized families, perpetuating poverty cycles and health inequities.

Erosion of Trust and Brain Drain. Several doctors who had worked in rural settings described personal frustrations with systemic deficiencies, contributing to professional burnout and subsequent migration to urban practices. As D8 reflected:

> *"It's heartbreaking. Some patients in Kathmandu don't hesitate to book a flight to Singapore for a second opinion, while in rural posts I worked at, patients could barely afford the basic medications that were meant to be free. Seeing this day in and day out in my rural practice, I now only practice in an urban setting. I just couldn't take it anymore."*

These accounts underscore the rural health system's vulnerability to ongoing brain drain, as highly skilled professionals withdraw from underserved areas.

Additionally, the persistence of deeply rooted sociocultural beliefs further obstructed biomedical care utilization. Doctor D4 recalled:

> *"We had a patient with severe complications, and the family was initially hesitant to take her to the district hospital because they were worried about the cost and also believed that a local 'dhami' [shaman] could help. We had to sit down with them, explain the situation in a way they could understand, and also connect them with a local NGO that could help with some of the expenses."*

Theme 2: ***Adaptive Resilience: The Hidden Human Infrastructure Powering Rural Healthcare***

Providers demonstrated remarkable adaptive resilience despite overwhelming systemic deficiencies, innovating beyond institutional limitations to maintain care delivery. This "hidden human infrastructure" comprises interpersonal collaborations, informal resource networks, and community engagement that sustain service provision in environments of scarcity.

Doctors' Perspectives. Rural physicians described functioning as logistical negotiators, actively working around bureaucratic inefficiencies to procure necessary medical supplies. Doctor D5, a rural general practitioner, explained:

> "*When the medicine runs out or the equipment breaks down, we can't just wait for the next shipment. Sometimes, it means calling a colleague in another district for supplies; other times, it means convincing a local supplier to stock certain essential items."*

Resourcefulness demonstrates how providers frequently circumvent rigid procurement systems by leveraging professional and personal connections.

Doctor D4 elaborated on additional forms of adaptive collaboration involving partnerships with local NGOs:

> *"When a family can't afford treatment, we coordinate with a local NGO that can assist. It takes time and negotiation but can make a life-or-death difference."*

Nurses' Perspectives. Nurses further highlighted their integration within the community's social fabric, describing their collaboration with Female Community Health Volunteers (FCHVs) as essential intermediaries between formal healthcare services and local cultural norms. Nurse N14 emphasized:

> *"Patients often trust the FCHVs more than they trust us, especially for sensitive issues. They're the bridge between us and the community."*

FCHVs, embedded within local networks, help mitigate cultural barriers and promote care-seeking behavior. They often function as informal social prescribers who link patients to formal services.

Beyond clinical care, rural nurses described their expanded roles as community advocates, counselors, and political negotiators. Nurse N11 reflected:

> *"We're not just dispensing pills. We're confidantes, advocates, and sometimes mediators. We know their families, struggles, and even the local politics affecting care decisions."*

These narratives illustrate the complex relational labor nurses perform while navigating the intersection of health, family dynamics, and local governance.

Theme 3: *The Double-Edged Sword: Technology as a Fault Line in Nepal's Healthcare Landscape*

Technology emerged as a paradox in rural healthcare: while offering possibilities for expanded access, it simultaneously risks amplifying inequities when not appropriately contextualized.

Doctors' Perspectives. Doctors voiced both optimism and frustration toward telemedicine and digital health platforms. As rural physician D1 noted:

> *"When the internet works, it's like magic. We can quickly consult colleagues in Kathmandu for complex cases, show them images, and get advice."*

However, frequent technological failures rendered these systems unreliable. D1 added:

> *"We were given a new telemedicine system, but the internet is so unreliable here that we can barely use it. It's frustrating because we know it could be useful, but most of the time, it just sits there, useless. And even when it works, some patients are hesitant; they don't trust a diagnosis given over a screen."*

Urban-based Doctor D10 raised additional concerns about privacy breaches during remote consultations:

> *"During a telehealth session in a rural clinic, the patient felt uneasy. They had no private room just a makeshift corner in the waiting area. It raised concerns about confidentiality and patient comfort."*

Nurses' Perspectives. Nurses emphasized that digital health technologies risk excluding already marginalized patients who lack digital literacy. Nurse N14 cautiously stated:

> *"It helps us feel less isolated when we can quickly consult specialists."*

However, others, like N6, observed unintended consequences:

> *"Older patients got confused with the new mobile app for patient registration. Some felt embarrassed, so they stopped coming. We had to switch back to a paper system for them."*

These experiences underscore how poorly adapted technological interventions can inadvertently exacerbate rather than alleviate healthcare inequalities.

Theme 4: *Challenging Harmful Cultural Beliefs and Superstitions*

Many participants highlighted that traditional healing practices, such as reliance on *Dhami-Jhakri* (faith healers), spiritual explanations for illnesses, and food taboos during pregnancy and postpartum, frequently delay or prevent timely medical care. These beliefs often intersect with gender norms, leading to adverse health outcomes.

Nurse N5 reflected:

> *"We sometimes receive mothers who delayed coming to the health post because the family first took them to the Dhami-Jhakri. By the time they arrive, complications have worsened."*

Doctor D3 shared:

> *"Recently, a child with severe pneumonia was first treated by a faith healer for several days. When the child was finally brought here, his condition was critical. We see this frequently."*

Nurse N8 added:

> *"There are food restrictions for pregnant women some families stop women from eating eggs or meat, saying it will harm the baby or cause complications. We have to counsel them repeatedly."*

Doctor D6 emphasized:

> *"Some illnesses like epilepsy or mental health problems are still believed to be caused by evil spirits or past sins. Families hesitate to seek proper treatment."*

Nurse N11 commented:

"In some cases, postpartum women are isolated from the family, believing that their impurity can affect others. This causes emotional stress and poor nutrition."

Healthcare workers consistently find themselves mediating between scientific knowledge and entrenched traditional beliefs. Many described using patient-centred counselling and community education to build trust and change harmful practices over time.

Doctors as Advocates for Social Justice. In addition to clinical care, doctors described taking on advocacy roles, especially when women or marginalized groups face discrimination based on cultural norms.

Doctor D2 stated:

"I handled a case where a young mother was blamed for her newborn's illness, accused of not following certain rituals properly. We intervened medically and counseled the family to prevent further blame and stress."

Doctor D7 noted:

"Superstitions affect decision-making. When families trust us, we slowly educate them. Otherwise, they return to old practices and avoid modern care."

Doctor D1 shared:

"We have collaborated with local teachers and women's groups to conduct health education sessions. It's slow progress but necessary."

Theme 5: ***Cross Cutting Issues***

Confronting Climate-Driven Health Risks. Participants also expressed growing concern over how environmental changes compound health risks, particularly for vulnerable groups like mothers, children, and the elderly.

Nurse N9 explained:

"Because of unpredictable rainfall and landslides, food shortages are more common. Malnutrition is rising, especially among pregnant women and children."

Doctor D5 remarked:

"Waterborne diseases are increasing due to flooding. We face more cases of diarrhoea and skin infections during the monsoon."

Nurse N13 added:

"We are now advising families on safe drinking water, home hygiene, and even basic kitchen gardening to improve nutrition."

Doctor D4 stated:

"Climate change has made healthcare delivery even harder damaged roads delay patients from reaching facilities during emergencies."

Nurse N6 commented:

"We feel the burden growing clinical work, counseling, advocacy, and now responding to environmental threats. The system expects us to handle everything."

Healthcare providers in rural Gorkha are not only delivering clinical services but also serving as educators, negotiators, and advocates. They confront deeply rooted cultural superstitions and emerging climate-related health challenges. While committed to improving community health, participants also expressed feelings of being overextended, calling for better systemic support to address rural healthcare's complex, multi-sectoral nature.

Confronting Climate Impacts. Participants also emphasized the growing impact of environmental stressors. Nurse N12 reflected:

"Malnutrition is on the rise. We've started counseling families on climate-smart agriculture and distributing drought-resistant seeds. We also have support groups for mothers."

These accounts illustrate healthcare providers' increasing involvement in cross-sectoral partnerships with NGOs, agriculture experts, and community leaders to mitigate climate-driven health risks.

However, participants also described feeling overburdened by these expanding responsibilities. Doctor D1 lamented:

"We're expected to handle clinical duties, community outreach, advocacy work, and now climate change. The system isn't set up for this holistic approach."

Collectively, these findings reveal how healthcare providers in Gorkha District navigate a highly stratified healthcare system characterized by overlapping socioeconomic inequities, cultural complexities, institutional gaps, and emerging environmental vulnerabilities. Through adaptive resilience, community embeddedness, and an expanding professional scope, doctors and nurses function as pivotal agents in sustaining healthcare delivery under conditions of systemic constraint. Their experiences underscore the need for integrated, multisectoral policy frameworks that address healthcare infrastructure and the wider social, cultural, and environmental determinants that shape rural health inequities in Nepal.

Discussion

This study offers nuanced insights into how healthcare delivery in rural Nepal particularly within Gorkha District is shaped by intersecting socioeconomic, cultural, and environmental determinants. Healthcare providers operate in a system where clinical duties are intertwined with community engagement, advocacy, and adaptation to emerging threats, often without sufficient institutional support. Their narratives reflect how structural inequities, entrenched beliefs, and systemic limitations collectively shape healthcare access, trust, and outcomes.

Evolving Socioeconomic Stratification in Healthcare. Nepal's healthcare landscape increasingly mirrors broader socioeconomic divides rather than a simple urban–rural dichotomy. Consistent with earlier research (Bhattarai et al., 2020; Poudel et al., 2024; Shrestha et al., 2021), this study underscores the persistence of class-based inequalities, where affluent populations disproportionately benefit from private and international healthcare systems while low-income households rely on overstretched public facilities. These disparities, also noted in Bangladesh and Kenya (McCartney et al., 2019; Tama et al., 2020), reveal a pattern in which socioeconomic capital determines both the quality and continuity of care. In Nepal's federal structure, uneven governance capacities and resource distribution have further fragmented service delivery (Baral et al., 2022), echoing decentralization challenges observed in Ethiopia (Gadisa, 2022).

Socio-Cultural Dimensions and Health-Seeking Behavior. The study highlights that sociocultural norms remain a major determinant of when and how individuals seek healthcare. Reliance on Dhami-Jhakri (faith healers), spiritual explanations for illness, and food taboos during pregnancy and postpartum periods continue to delay biomedical care in Gorkha, aligning with national findings by Regmi et al. (2017) and Paudel & Upadhyay (2015). Such beliefs are not unique to Nepal; similar patterns exist in Uganda (Mbonye et al., 2014) and Cambodia (Kim et al., 2012), where traditional practices intersect with gender and class. Providers in this study actively engaged in culturally sensitive counseling and community education, strategies endorsed globally for improving trust and behavioral change (Bhutta et al., 2010; Nasreen et al., 2016).

Adaptive Strategies and Systemic Limitations. A key contribution of this research lies in demonstrating how frontline doctors and nurses act as adaptive agents within a constrained system. Their practices extend beyond formal job descriptions, encompassing informal collaboration, community-based problem-solving, and partnerships with local NGOs. These behaviors parallel patterns identified in Nepal (Tamang et al., 2020) and across LMICs such as Malawi, Sierra Leone, and India (Bradley et al., 2015; Sheikh et al., 2015), where relational and informal systems sustain healthcare under scarcity. The involvement of FCHVs remains indispensable, functioning as bridges between biomedical care and cultural realities (Phuyal, 2024; Kok et al., 2015). Nevertheless, dependence on informal mechanisms can inadvertently reinforce social hierarchies, echoing observations from India and Pakistan (Acharya, 2018; Hafeez et al., 2011). These insights reaffirm the need to institutionalize and resource these local networks rather than relying solely on their voluntary labor.

Digital Health in Unequal Contexts. The study adds depth to current debates on telemedicine and digital health in rural Nepal. While providers acknowledge the potential of technology to bridge geographic gaps, its uneven adoption reinforces existing inequities. Barriers such as unstable connectivity, limited digital literacy, and privacy concerns constrain its utility, confirming

earlier findings from Nepal (Adhikari et al., 2022; Dhimal et al., 2017) and similar experiences in Ghana and Tanzania (Boateng et al., 2020; Nyamtema et al., 2017). Importantly, this research demonstrates that technological trust is socially constructed: patients' willingness to engage with telemedicine depends not only on infrastructure but also on generational comfort, social status, and perceived legitimacy of virtual consultations. Addressing these challenges requires simultaneous investments in physical infrastructure, digital literacy, and ethical safeguards (WHO, 2022; Eysenbach, 2019).

Environmental and Climate-Linked Health Stressors. The narratives from Gorkha reflect the growing health impacts of climate variability ranging from food insecurity and malnutrition to increased incidence of waterborne diseases. These challenges disproportionately affect pregnant women, children, and the elderly, reinforcing findings from Aryal et al. (2020), Haines & Ebi (2019), and Mazhitova et al. (2021). The proactive engagement of providers in nutrition counseling, climate-smart agriculture promotion, and cross-sector collaboration with NGOs signals a shift toward localized "Health in All Policies" approaches (WHO, 2022; Global Lancet Countdown, 2022). Yet, participants' accounts also expose the emotional and logistical burden of expanding responsibilities without systemic backing, a concern echoed across LMICs where providers experience burnout and role strain (George et al., 2020; Lehmann et al., 2018).

Toward Integrated and Equitable Reform. The findings collectively underscore that equitable rural healthcare cannot be achieved through biomedical solutions alone. Health systems must acknowledge the multi-layered social realities that define providers' and patients' experiences. Strengthening Nepal's rural health system requires a threefold strategy: (1) formal recognition and adequate compensation for community-based networks such as FCHVs; (2) integration of social and digital equity considerations into policy and resource allocation; and (3) embedding interdisciplinary training within medical and nursing curricula to prepare professionals for culturally complex, climate-sensitive, and socially embedded healthcare.

Policy and Theoretical Implications. From a theoretical perspective, this study reinforces the relevance of the Social Determinants of Health (SDOH) framework in analyzing inequities within decentralized systems. The framework elucidates how intersecting economic, cultural, and environmental factors shape both access and the lived experience of care. In practice, it highlights that frontline providers function as social actors within broader systems of vulnerability, rather than passive agents of clinical delivery. Achieving sustainable health equity thus depends on institutionalizing their adaptive roles and addressing the underlying structural determinants that perpetuate inequality.

Conclusion

This study offers critical empirical insights into the complex realities of healthcare delivery in Nepal's rural district of Gorkha, where healthcare providers operate at the intersection of poverty, cultural norms, systemic inequities, and emerging environmental stressors. The evidence highlights that healthcare provision in such settings transcends the narrow boundaries of clinical care, encompassing social mediation, cultural negotiation, informal resource mobilization, and increasingly, climate adaptation efforts. Despite significant national progress in maternal and child health indicators, deeply embedded disparities persist, not merely along urban-rural lines but across multiple axes of socioeconomic stratification including income, education, caste, ethnicity, and geographic remoteness.

Healthcare providers serve as critical intermediaries in mitigating the consequences of these structural inequities, often compensating for systemic shortcomings through adaptive resilience, informal networks, and collaboration with trusted community-based actors such as Female Community Health Volunteers (FCHVs). However, while essential, these adaptive strategies risk masking the chronic under-resourcing and policy gaps perpetuating healthcare inequities. This study thus reinforces the growing body of literature positioning healthcare workers in low- and middle-income countries (LMICs) as pivotal social actors embedded within larger systems of vulnerability, inequality, and social transformation. The sustainability of equitable healthcare delivery in Nepal hinges upon the state's capacity to formally recognize, resource, and institutionalize these multi-dimensional roles while systematically addressing the structural drivers that produce and reproduce health inequities.

Recommendations

In light of these findings, several interlinked policy and programmatic actions are warranted to strengthen healthcare delivery and equity in Nepal's evolving federal context:

Formal Integration of Community Health Networks. The government should institutionalize and adequately fund community-based networks, such as FCHVs, recognizing their critical roles in health promotion, trust-building, and cultural mediation. Clear career pathways, formalized remuneration, and ongoing capacity-building programs would enhance their sustainability, professionalism, and effectiveness.

Equitable Digital Health Expansion. The scaling of telemedicine and digital health platforms should be guided by equity-sensitive frameworks such as a *Digital Equity Impact Assessment*, ensuring that digital innovation does not exacerbate existing exclusionary patterns based on literacy, age, income, or geography. Tailored digital literacy programs and user-centred design approaches must be embedded to facilitate inclusive adoption, particularly among marginalised and technologically underserved groups.

Resource Allocation Guided by Social Vulnerability Metrics. The deployment of tools such as a *Social Vulnerability Index* can facilitate more equitable allocation of financial and material resources, prioritizing areas and populations most exposed to systemic disadvantage, health shocks, and climate-related vulnerabilities.

Intersectoral Policy Integration. Health sector reforms should be embedded within a broader intersectoral framework, fostering collaboration between health, education, agriculture, social welfare, and environmental protection agencies. Such holistic coordination is essential for addressing the complex social determinants of health, enhancing climate resilience, and fostering long-term system-wide equity.

Workforce Development and Curricular Reform. Medical and nursing education should integrate interdisciplinary training on cultural competence, social medicine, climate change adaptation, and advocacy skills to prepare future healthcare providers for their expanding societal roles.

Limitations and Directions for Future Research

While this study provides rich, contextualized qualitative evidence from frontline healthcare providers, several limitations must be acknowledged. First, the study's geographic focus on a single rural district limits the generalizability of findings across Nepal's diverse ecological, cultural, and administrative regions. Variations in caste, ethnicity, local governance capacity, and economic development may yield different provider experiences and patient outcomes elsewhere. Second, while the study illuminates provider perspectives, it does not include direct input from patients, caregivers, community stakeholders, or policymakers whose voices are integral to constructing a more comprehensive understanding of healthcare access and equity.

Future research should adopt a broader geographic scope, integrating quantitative and qualitative methodologies to capture the intersecting dynamics of caste, class, gender, and geographic remoteness in shaping healthcare access and outcomes. Longitudinal studies would provide valuable insights into how healthcare delivery systems evolve under Nepal's federal governance and climate variability over time. Additionally, applying intersectionality frameworks and social network analysis would offer a more nuanced understanding of health service delivery's structural and relational dimensions. Exploring the mental health and emotional burden of healthcare providers coping with these multiple demands also represents a crucial, underexplored avenue for future investigation.

Authors' Contribution

GPD and SD contributed to the study's conception and design, including data collection and analysis. TRK and GPD interpreted the data, drafted the manuscript, and critically revised it. All authors agreed to submit the article in this form.

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Conflict of Interest

The authors declare that they have no conflicts of interest, whether financial or otherwise, related to this study.

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