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[A Facilitation Approach to Technology-Based Learning and Healthcare Management Post COVID-19 in Educational and Healthcare Institutions of the Erstwhile FATA Region]

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ABSTRACT

The COVID-19 pandemic compelled unprecedented transformations in education and healthcare globally, with particularly severe effects in underdeveloped regions. This study investigates a facilitation approach to implementing technology-based learning and post-pandemic healthcare management strategies within educational and healthcare institutions in Pakistan's former Federally Administered Tribal Areas (FATA). Utilizing mixed-methods primary data—comprising surveys of educators, students, and healthcare professionals, along with in-depth interviews with institutional leaders—we evaluate the extent of technological adoption and health interventions following COVID-19, as well as the challenges encountered and the strategies that may facilitate these changes. The findings indicate significant gaps in infrastructure and capacity; for example, the abrupt transition to online education was impeded by inadequate internet connectivity—many students in tribal districts even traveled considerable distances to access internet signals for their classes. Similarly, healthcare facilities, constrained by limited resources, experienced an increase in telemedicine adoption out of necessity. Key facilitating factors—such as community engagement, training, and government support—are identified as enhancing outcomes when present. The study employs relevant theoretical frameworks, including the Technology Acceptance Model and Diffusion of Innovations, to interpret the results. It proposes a facilitation framework aimed at strengthening e-learning and healthcare delivery in marginalized regions. In conclusion, bridging the digital divide and investing in capacity building are essential for fostering resilience in the aftermath of COVID-19. The paper concludes with policy recommendations, including infrastructure development, training initiatives, and incentive schemes, to ensure sustainable improvements in education and health services within the former FATA region.

Keywords: Technology Based Learning, Healthcare Management, COVID-19, FATA Regions

Introduction

The COVID-19 pandemic profoundly affected global societies, disrupting education and healthcare. Schools shifted to remote learning, and healthcare systems adopted telemedicine and hygiene measures amid surges. Regions with socio-economic deficits, like Pakistan's FATA—remote tribal districts merged into Khyber Pakhtunkhwa—faced greater hardships. FATA's indicators lag due to conflict and underinvestment, with female literacy at just 9.5% before the pandemic and limited infrastructure like electricity and internet.

During the pandemic, urban schools in Pakistan shifted to online or blended learning, but students in remote areas like FATA faced greater challenges due to poor internet, limited devices, and social norms, especially for girls. This widened educational inequalities and exposed FATA's weak healthcare system, which struggled to implement COVID protocols. However, telemedicine grew, with doctors using calls and videos, though infrastructure and familiarity issues hindered widespread adoption. In tribal districts, routine healthcare disrupted initially but eventually recovered through

community cooperation, such as successfully resuming polio vaccination drives in 2020 with improved coverage. These efforts showed that with proper support, healthcare services could be maintained or even improved during the pandemic.

This study examines a facilitation approach to post-COVID improvements, focusing on strategies and conditions that support effective implementation of new practices like technology-based learning and healthcare measures. Based on change management and technology adoption theories, it highlights the role of resources, support, and local facilitators in adopting innovations. In education, it shifts from teacher as lecturer to facilitator, guiding learners in using technology and active learning, inspired by Carl Rogers. We hypothesize that in FATA, factors like infrastructure, capacity building, and community involvement are key to sustainable progress in digital education and healthcare.

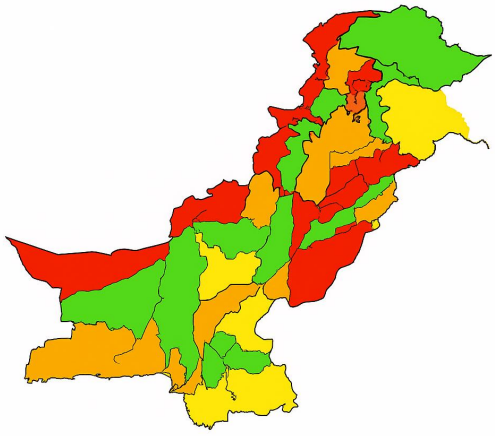
Study Objectives

The objectives of this research are threefold:

- To evaluate technology-based learning and health measures in FATA's educational and healthcare institutions post-COVID-19; identify challenges, success stories, and enablers; and propose a framework to enhance such initiatives. The study uses primary field data and relevant literature to contextualize findings within broader perspectives.

In the following sections, we review related literature and frameworks (Section 2), detail our methodology (Section 3), present survey and interview results (Section 4), discuss implications (Section 5), and conclude with policy, practice, and future research recommendations (Section 6). Focusing on newly merged tribal districts, this study explores how post-pandemic recovery in education and health can support vulnerable regions, ensuring they are not left behind after COVID-19.

Figure 1: Literacy Rate by District in Pakistan
(2017 Census)



Darker shades indicate higher literacy;
the erstwhile FATA region
(north-western districts) shows orf the lowest literacy levels in the country.

Such pre-existing educational disparities were aggravated by the pandemic.
Such pre-existing economies ting werubstanctially

Figure 1: *Literacy Rate by District in Pakistan (2017 Census). Darker shades indicate higher literacy; the erstwhile FATA region (north-western districts) shows some of the lowest literacy levels in the country. The pandemic aggravated such pre-existing educational disparities.*

Literature Review

Technology-Based Learning in the Post-COVID Era

The COVID-19 pandemic acted as a catalyst for adopting educational technology (Pokhrel & Chhetri, 2021). Suddenly, millions of educators and students shifted to online platforms in 2020. This global remote learning experiment had mixed results. In developed areas, many schools continued instruction via digital tools despite challenges. Regions with poor connectivity faced a widening digital divide (UNESCO, 2021; Ali et al., 2022). Online class effectiveness varied by location and socio-economic status. For example, Pakistani university students valued flexibility but struggled with unreliable internet, electricity, devices, and home environments (Shah & Ullah, 2022). Rural and low-income students, especially from FATA and similar areas, often couldn't attend online classes or exams due to infrastructure issues, causing learning losses during school closures (Rasheed et al., 2021; Malik et al., 2022).

In Pakistan, both federal and provincial governments took steps to facilitate remote learning, such as launching the Tele-school TV channel and encouraging use of SMS, WhatsApp, email, and radio. However, adoption was uneven; only 1% of students accessed e-learning platforms during the pandemic, with many relying on TV or lacking access. Cultural factors, especially in rural conservative families, limited girls' use of digital devices, widening gender disparities. Many teachers and students lacked prior training in online tools, leading to a steep learning curve. Challenges included low engagement, assessment issues, and reduced social interaction. Nevertheless, some positives emerged: teachers innovated with multimedia, and digital literacy gained importance.

Several frameworks analyze technology adoption in education, like TAM (Davis, 1989), which suggests that perceived usefulness and ease of use drive adoption, influenced by external factors like training. During the pandemic, perceptions of online tools affected willingness to use, especially where technical issues reduced perceived value, as seen in FATA. The UTAUT model (Venkatesh et al., 2003) adds social influence and facilitating conditions, such as infrastructure. In Pakistan's tribal areas, lack of electricity, devices, and internet bandwidth hindered adoption, but external support, like NGOs providing devices, improved engagement, exemplified by a pilot with tablets helping rural students stay connected during closures.

Pedagogical theories like constructivism and facilitation theory highlight that effective learning with technology needs active instructor facilitation (Jonassen, 1999). Instead of one-way Zoom lectures, better results occur when teachers facilitate discussions, promote collaboration via online forums, and consider students' home situations. Ahmad and Rauf (2022) in a developing country found that blending asynchronous resources (videos, readings) with limited synchronous face-to-face sessions improves understanding and retention more than purely remote or in-person classes. This suggests post-pandemic, hybrid models can be most effective if teachers are

trained to leverage technology's strengths and address its weaknesses, such as lack of personal touch and distractions (Bano et al., 2022). In summary, post-COVID literature shows technology can enhance education, but without addressing the digital divide and training teachers and students, its potential isn't fully realized. Regions like FATA need to improve connectivity, provide devices, and train stakeholders before ed-tech can truly equalize educational opportunities (Pakistan Health Review, 2021; World Bank, 2022; UNICEF, 2023).

Post-COVID Healthcare Management Measures

The pandemic's impact on healthcare was two-pronged: it required emergency responses like treating COVID-19 patients, setting up quarantine centers, and mass vaccination, while also disrupting routine services (WHO, 2022). Post-COVID healthcare involves continuing some pandemic practices and catching up on neglected health programs (Hafeez et al., 2021). One major development has been the mainstreaming of telehealth. Although telemedicine existed pre-2020, it was not widely adopted until COVID-19 pushed regulators and providers to overcome hesitations. In the US, telehealth use increased significantly in 2020, and in developing countries like Pakistan, it surged due to fear of virus transmission and social distancing needs. This highlighted telemedicine's potential to offer essential services while controlling disease spread. However, sustained use depends on service quality and user satisfaction; if patients find remote consultations unhelpful or difficult, they will return to in-person visits.

In Pakistan's rural and tribal areas, telemedicine faces challenges like poor telecom coverage and low awareness, especially where smartphones are lacking or patients are hesitant due to cultural norms. Training for healthcare providers and involving community facilitators can overcome these barriers. Engaging local leaders and using local languages, as seen in India's vaccine campaigns, can improve acceptance and uptake of telemedicine in FATA.

Post-COVID healthcare measures include infection control, workforce capacity-building, and restoring preventive care (Khan et al., 2021). The pandemic exposed infection prevention gaps in hospitals, with many Pakistani healthcare workers untrained in PPE; a study found 69% lacked prior PPE training, feeling more at risk during COVID-19. Response included crash courses and on-the-job training, which should continue. In tribal districts with less-trained staff, ongoing training in infection control, emergency prep, and new equipment is vital. Post-merger, the Khyber Pakhtunkhwa health department seeks to integrate FATA into the provincial system, but resource shortages persist. A 2021 assessment shows remote regions like GB, AJK, and rural areas lack basic health infrastructure, hampering COVID-19 response and routine care. Childhood immunizations in these districts lag due to insecurity, risking recent progress. Efforts like security-assisted campaigns maintained vital programs; for example, the 2020 polio vaccination drive in South Waziristan reached 81%, with health workers also promoting COVID-19 safety. This integrated approach uses community campaigns to encourage mask-wearing, hygiene, and COVID-19 vaccination.

The mental health of healthcare workers and the population is a key aspect, with issues like post-traumatic stress, burnout, and economic hardships prevalent post-COVID (Saleem et al., 2022). While our study focuses on institutional measures, literature shows

that effective healthcare management in a post-pandemic context must be holistic—addressing physical and psychological needs of staff and patients. In the conflict-affected FATA region, this is especially important. Some NGOs train community facilitators in psychological first aid and counseling to help cope with pandemic stress, aligning with the 'One Health" approach and disaster resilience theories.

In summary, sustaining positive COVID-19 changes (e.g., telemedicine, infection control) and addressing exposed gaps (training, supply chains) need deliberate efforts. Policy support (telehealth reimbursement, guidelines), infrastructure investment (telemedicine kiosks), and human capacity building (professional development) are vital, especially in FATA. Community engagement and local ownership are crucial to overcome mistrust and ensure compliance with health measures, such as involving local influencers to dispel myths about diseases and vaccines. The next section will explain how these insights shaped our research approach.

Context of Erstwhile FATA and Theoretical Framework

The Federally Administered Tribal Areas, now part of Khyber Pakhtunkhwa, long faced marginalization (Zulfiqar & Khan, 2020). Years of insurgency and military actions (2000s–2010s) wrecked infrastructure—schools destroyed by militants and health campaigns like polio vaccinations violently challenged. Even after stability, development remained poor. By mid-2010s, literacy was among South Asia's lowest (about 33%; female literacy under 10%) (Government of Pakistan, 2021; UNDP, 2022). Many villages lacked secondary schools; existing ones lacked basic facilities. Healthcare needs residents to travel far; health centers were understaffed and under-equipped. During the COVID-19 pandemic, FATA's districts faced challenges: implementing public health measures amid distrust and shifting to remote education with unreliable electricity. The 2018 merger aimed to extend Pakistani law and services but progress has been slow, leaving residents feeling uncertain. A study by Rahim et al. (2023) found many residents initially unhappy due to confusion and poor implementation, stressing the importance of community involvement and gradual transition. Interventions in this region must involve local participation and respect norms, avoiding top-down approaches.

Our study uses a "facilitator–barrier" analysis based on implementation science, viewing the introduction of technology in schools and healthcare as akin to implementing innovations in resource-poor settings. Diffusion of Innovations (Rogers, 2003) states adoption depends on factors like advantage, compatibility, complexity, trialability, and observability. In FATA, e-learning and telemedicine's advantages are recognized, but issues with compatibility and complexity exist—such as cultural differences and low literacy hindering use (Kakar et al., 2022). Facilitation involves increasing compatibility, reducing complexity through localization and simple tech like radio or offline videos, and demonstrating benefits via pilots or community demos (Haider et al., 2023).

We use UTAUT (Venkatesh et al., 2023) to identify key factors: facilitating conditions (infrastructure, support), social influence (endorsement by key figures), performance expectancy (perceived benefits), and effort expectancy (ease of use). For example, support from village elders or religious leaders can counter skepticism; government provision of solar chargers and internet devices can address practical

barriers, constituting facilitation measures. Change management theories (like Lewin's and Kotter's models) highlight the importance of vision, communication, empowerment, and consolidating gains, especially in traditional communities (Lodhi et al., 2023). Our view is that post-COVID education and health improvements in FATA involve socio-technical change, facilitated by trained personnel (community mobilizers, IT assistants, health educators) and supportive policies (subsidized internet, stipends). An example is the UN WFP's cash transfer during COVID-19, giving PKR 1,000 monthly to girls to stay enrolled, addressing poverty and hunger, linking relief with education. These multifaceted efforts—reducing economic barriers, motivating, and leveraging systems—are central to our study.

Building on this literature and theoretical understanding, we developed our research methodology to gather both quantitative data on the current situation and qualitative insights into human factors involved. The next section describes the methods used for collecting and analyzing data in the field.

Methodology

Research Design

This study used a mixed-methods approach, combining quantitative surveys with qualitative interviews to understand the situation in the FATA region's educational and healthcare institutions. It is largely cross-sectional, focusing on the post-COVID period (2021–2022) and adopts a pragmatic stance to identify practical solutions by triangulating data. We targeted two sectors – education and healthcare – sampling key stakeholders. In education, we focused on school and college staff and older students in the merged districts. In healthcare, we studied healthcare providers and administrators in local health facilities. By examining both sectors together, we aimed to compare how technology and new practices are being integrated post-pandemic.

Sampling and Participants

Given logistical and security constraints in the region, we employed a purposive and snowball sampling strategy rather than a random sampling. We initiated contact through the provincial education and health departments and local NGOs working in those districts. Six districts (formerly agencies) were included: Khyber, Bajaur, Mohmand, Kurram, Orakzai, and North Waziristan – covering a range of geographic locales in erstwhile FATA. Within each district, we aimed to survey at least one educational institution and one healthcare facility. Ultimately, our sample included 8 educational institutions (5 secondary schools and 3 colleges) and 6 healthcare facilities (4 basic/rural health centers and 2 hospitals). In the education sample, we obtained survey responses from N = 120 individuals (90 teachers and 30 students). We intentionally included some students to capture their perspective on e-learning adoption and challenges. The teacher subgroup spanned primary, secondary, and higher secondary levels, and included 28 female and 62 male teachers, reflecting the gender imbalance in the teaching workforce of the region. The average age of teacher respondents was 36 years, with an average teaching experience of 10.5 years. For qualitative insights, we conducted 10 in-depth interviews in the education sector: 6 with school principals or senior teachers and 4 with district education officers or NGO education program staff who have overseen remote learning initiatives during COVID-19. In the healthcare sample, N = 85 healthcare workers

completed the survey (35 physicians, 30 nurses/paramedics, and 20 other staff such as technicians or health administrators). Their average age was 33 years, and about 40% were female (all nurses, as almost all doctors in our sample were male – pointing to the shortage of female doctors in these areas). We also interviewed 8 key informants in the health sector: 3 medical superintendents or managers of hospitals/clinics, 3 frontline doctors (for a ground-level perspective), and 2 public health officials involved in coordinating COVID-19 response and immunization in the tribal districts. Due to travel limitations in some high-security areas, not all data could be collected in person. We leveraged phone and WhatsApp communications for a portion of surveys and interviews, with prior consent of participants. All interviews with community members were conducted in Pashto (the predominant local language) with the help of an interpreter when needed, then transcribed/translated to English for analysis. Surveys were administered primarily in English (since they targeted literate professionals), but respondents could choose to answer orally in Pashto with the enumerator filling in the form, to ensure clarity.

Data Collection Instruments

We developed structured questionnaires for surveys, each tailored to its sector but sharing common themes for comparison. The education survey covered technology availability in school and home, experiences with remote learning during COVID-19 (methods, hours, etc.), perceptions of e-learning effectiveness, challenges (like no internet, lack of devices, or training), and ongoing tech use after schools reopened. It included Likert-scale statements (1=strongly disagree to 5=strongly agree) such as "Our school was well-prepared for online classes" and "I am confident in using technology in future teaching." The healthcare survey focused on practice changes during COVID-19 (telemedicine, protocols), training (PPE, COVID management), resource availability (PPE, oxygen), resumption of routine services, and attitudes toward telehealth (e.g., "Telemedicine is viable for our clinic"). It also asked about community response, like "What proportion of patients follow mask-wearing or vaccination?" to gauge public cooperation. Both surveys ended with an open-ended question asking for suggestions to improve learning or healthcare, especially through technology or new methods.

For qualitative interviews, we used semi-structured guides tailored to each group (education vs. health, and community level vs. official). Broadly, interview questions probed deeper into challenges and successes: "Can you describe how your school managed teaching during COVID-19 closures?"; "What support did you receive from the government or others, and what support was missing?"; "How have things changed in your school/clinic after COVID – are there practices you continue to use?"; "How do people (students/parents or patients/community) perceive these new practices?"; "If you were to advise policymakers, what facilitative steps would you recommend to improve education/health services here?" Interviewers were trained to follow up on interesting points, for example, if a principal mentioned lack of internet, we asked how they coped; if a doctor mentioned community mistrust of vaccines, we explored how they tried to address it. Interviews lasted between 30 and 60 minutes each, were recorded with permission, and later transcribed.

Data Analysis

Quantitative survey analyzed with SPSS and Excel, focusing on descriptive stats like frequencies, percentages, means, and Likert scale responses, including cross-tabulations and chi-square tests for significance. Qualitative data from interviews and open responses underwent thematic analysis with coding into themes such as Infrastructure, Training, Community Engagement, and Policy, using NVivo. Findings from both methods were triangulated to validate insights, comparing survey and interview results and referencing secondary data like government reports for context.

Ethical Considerations

This study adhered to ethical standards, considering the vulnerability of involved communities. Approvals were secured from the University IRB and provincial authorities to access public institutions in merged districts. All participants gave informed consent; at survey or interview start, they were informed of the voluntary nature, purpose, and their right to skip questions or withdraw. Due to literacy issues, some consent was verbal, witnessed or recorded. Confidentiality was assured: data were anonymized and quotes reported anonymously, using generic descriptors to protect identities. We clarified that the research was independent of government programs, so responses wouldn't impact employment or funding. Participants did not receive monetary compensation, only tokens like thank-you letters and educational materials for involved schools. We kept cultural sensitivity by using local language speakers and scheduling interviews at suitable times, avoiding prayer times or harvest seasons. Next, we present key findings on technology-based learning and healthcare, combining quantitative and qualitative data to outline achievements and gaps.

Results

Technology-Based Learning: Adoption and Challenges

Data show lack of infrastructure as the main barrier to technology-based learning in FATA. Only 3 of 8 sampled institutions had a functioning computer lab with internet, all in urban or larger towns. Most rural schools lacked computers or had few laptops without internet. 78% of teachers reported poor or no internet; many relied on mobile phones. However, mobile signals were weak or spotty in 52% of cases. Teachers described having to cancel classes or travel long distances to access internet, with some riding bikes 5 km to find stable 4G. Such stories highlight severe connectivity issues causing major learning losses during the pandemic.

Approximately 90% of surveyed teachers reported their schools closed completely during government-mandated closures (March–Sept 2020 and during waves). Of these, only 40% tried remote teaching. Reasons for not attempting included lack of contact means—especially in remote primary schools where even phone numbers or phones were unavailable—and lack of guidance. Schools that did try mainly used WhatsApp to send voice notes, texts, or photos. About 25% used government Tele-school TV broadcasts, aligning homework with televised lessons. Around 15% conducted live online classes via Zoom or Google Meet, mainly in better-connected towns' colleges or higher secondary schools, but attendance was low; one lecturer said only about 15 of 40 students attended online due to connectivity issues or work commitments.

The consensus from surveys and interviews is that remote learning was largely

ineffective. In our survey, 68% of teachers said students learned less online. Many students couldn't keep up, with teachers estimating only 30–40% engaged consistently. Most students fell off the radar for months. After schools reopened, 95% of teachers agreed students suffered learning loss. This aligns with a national study on Pakistan's learning declines during the pandemic, which are worse in FATA due to already low achievement levels. Teachers reported struggling to reteach basics even in 2022. Some schools with better remote methods saw students cope better afterward, like a girls' school in Jamrud that used calls and WhatsApp, which only saw minor score drops, unlike a school with no remote efforts that experienced severe declines.

Many educators, despite low prior exposure, are willing to adopt technology if given the opportunity. Only 22% had received ICT training, mostly basic computer skills, not e-teaching. However, 85% showed interest in training for using computers and the internet for teaching, indicating a latent capacity for capacity building. Interviews revealed a desire to learn and use these tools if shown how and provided with resources. For example, a primary teacher in Orakzai used YouTube videos on his phone to help students behind in class, which received positive feedback but isn't scalable without institutional support.

Post-reopening, some technology use continues. About 30% of teachers still use WhatsApp for communicating with students or parents, sharing assignments or announcements. Around 15% have begun to focus more on computer literacy, sometimes bringing classes to the computer lab. One college started a weekly "blended learning day' with alternating physical and online activities, like watching videos at home and discussing in class. Though rare, these practices show potential for change. However, 70% of teachers said they reverted mainly to traditional methods after classes resumed, aiming to catch up on syllabus and feeling that emergency adaptations were less effective. One teacher noted, "Online class was a compulsion, not a choice,' indicating a return to pre-pandemic methods. Without intervention, there's a risk that pandemic lessons and ed-tech momentum could be lost—a missed opportunity if education systems don't reform post-COVID, as Emiliana Vegas (2021) warned.

Surveys and reports show cautious but growing community support for tech-based learning. Initially, many in conservative areas were skeptical, with some not viewing online education as 'real studying.' A mother remarked that lockdown revealed how much worse it is when children have no learning, making any learning better than none. Parents with low literacy struggled to guide children remotely, and 60% of teachers cited lack of parental support as a major obstacle—wealthier families' children adapted better. Community attitudes are slowly shifting, with local youth setting up internet centers in small shops or guesthouses, enabling students to download assignments during the pandemic. However, female students face cultural and family restrictions, limiting their access to these spaces, highlighting a gender gap in digital access. One female student noted her family's disapproval of internet cafes and reliance on phones with hotspots, emphasizing the need for targeted support for girls' digital access.

Our results show that during COVID-19 in FATA, technology-based learning was limited and hampered by infrastructure issues and lack of readiness. However, stakeholders are interested in continuing use if barriers like electricity, internet, devices,

and training are addressed. Table 1 summarizes key survey indicators.

Table 1. Selected Survey Findings – Education Sector (erstwhile FATA region)

Indicator (Post-COVID Education)	Value/Percentage
Schools in sample with internet access (any form)	37.5% (3 out of 8 schools)
Teachers using any online platform during closures	~40% (primarily WhatsApp; few using Zoom)
Students regularly engaged in remote learning (est.)	~35% (majority could not engage due to lack of access)
Teachers who feel students learned **less** during pandemic remote learning	68% agreed
Teachers confident integrating tech in future teaching	41% agreed (many neutral, indicating uncertainty)
Teachers who want formal training in e-teaching tools	85% **(high interest)**
Major barriers cited for e-learning adoption	No internet (72%); No devices for students (65%); Lack of training (50%); Low student interest (30%)
Current (2023) use of tech in teaching (any form)	~30% using WhatsApp or multimedia occasionally
Perceived top needs to facilitate e-learning (open-ended)	#1 Internet access; #2 Teacher training; #3 Electricity reliability; #4 Devices for students (as per frequency of mentions)

Healthcare Management Measures: Adoption and Outcomes

During the peak of the pandemic, some healthcare institutions in the region shifted to telemedicine out of necessity. Our survey found about 45% of healthcare providers, mainly doctors, started offering phone consultations when patients couldn't visit. Usage was highest among primary care physicians—lady health visitors and clinic doctors gave out their numbers for remote advice. Only 1 of 6 surveyed facilities, the district hospital in Khyber, had a structured telemedicine system supported by the province; others did it informally. Effectiveness was moderate, with 20–30% of patients using tele-consultations at least once. Patient satisfaction was mixed: many valued avoiding travel and exposure, but often felt phone consultations lacked proper checks. About 60% of health workers believed patients trust in-person visits more, echoing global views that remote care is inferior to physical exams. A doctor from North Waziristan noted, "We tried calling consultations, but for issues like abdominal pain, people came in when lockdown eased." Connectivity issues like dropped calls also caused frustration.

Despite challenges, telemedicine proved valuable for follow-ups, triaging, and innovative adaptations like guiding a village lady over a video call for wound care. 38% of healthcare providers plan to continue remote consultations post-pandemic, using methods like WhatsApp. The telemedicine unit in Khyber, initially for COVID-19, now enables specialists in Peshawar to consult on tribal district cases weekly, a positive outcome. Sustaining telehealth requires addressing training, protocols, and community awareness.

With COVID-19, resource-limited facilities in FATA implemented new infection control protocols like screening, masks, isolation, and PPE. Our survey showed 75% of healthcare workers felt their facilities adequately screened and separated COVID suspects, thanks to government and NGO support. Public adherence was lower: providers reported difficulty in getting patients to wear masks or maintain distance due to cultural norms and fatalistic attitudes. By mid-2021, compliance declined as people believed COVID was over, with only 22% of providers thinking community behavior changes persisted beyond the initial months.

Some practices have permanently improved, such as hand hygiene facilities, which remain in use. About 50% of staff now routinely use PPE like gloves and masks more than pre-pandemic. Awareness of infectious disease precautions has increased; for example, suspected TB patients are now isolated, a new practice. These changes reflect a small but meaningful shift towards better infection control, supporting health system strengthening post-COVID. One critical aspect was how quickly and effectively routine services (immunizations, maternal health visits, elective procedures, etc.) were brought back on track. In our health worker survey, 68% agreed that there was a significant drop in routine patient visits during the pandemic's peak. Immunization campaigns (for children's vaccines like polio, measles) were paused for a few months in 2020, raising fears of outbreaks. However, the data and interviews suggest a robust catch-up effort in the tribal districts. As noted, polio campaigns resumed by mid-2020 with strong coverage. Our respondents from EPI (Expanded Program on Immunization) centers indicated that by end of 2021, immunization rates were back to or even above pre-pandemic levels, thanks to outreach. For instance, an EPI technician in Kurram said: "We worked double shifts when campaigns restarted, and communities welcomed us because they had fresh memory of a dangerous disease (COVID), so they cooperated more for vaccines against other diseases too." Some workers felt that the pandemic paradoxically educated people on the importance of vaccines, indirectly boosting immunization acceptance. This is an interesting social outcome – fear of COVID made health a daily conversation, and health authorities used that to promote other health agendas (with varying success).

Half of healthcare staff say maternal and child health service usage remains below normal due to pandemic-related economic hardships and staff reassignments, leading to delays and backlog in check-ups and elective procedures. Programs like health days and village camps aim to address this. Community trust in healthcare improved, as health workers were seen as heroes, and attitudes toward vaccination shifted positively, with increased acceptance and reduced hostility. However, misinformation about COVID-19 circulated, especially in remote areas, causing vaccine hesitancy among 55% of providers' patients. Efforts involving community leaders and targeted education have increased vaccine uptake, though official coverage remains below the national average. Continuous communication strategies are key to building confidence.

On the internal side, one clear result was the lack of pre-pandemic training, now being addressed. Only 31% of health workers had epidemic or emergency preparedness training before COVID, mostly those in NGO programs. In 2020, about 50% received crash training, such as PPE sessions or COVID workshops. All recognize the need for capacity building: 88% agree that more training on new diseases and technologies is needed.

Interviews with health administrators showed plans for training in telemedicine, critical care, and data management. For example, in 2021, the provincial health department held online training, emphasizing the need to improve internet connectivity, as some staff had to use special devices for Zoom. Healthcare institutions have adopted measures like telemedicine and infection control at a basic level. Routine services are recovering with community campaigns. Facilitators include resource provision, external support, and community outreach, while barriers include infrastructure, workforce limits, and community mistrust. Table 2 summarizes key health sector findings.

Table 2. Selected Survey Findings – Healthcare Sector (erstwhile FATA region)

Indicator (Post-COVID Healthcare)	Value/Percentage
Facilities with formal telemedicine system	16% (1 of 6 facilities) – others informal phone consults
Healthcare workers who provided remote consultations	~45% (mostly by phone during lockdown periods)
Perceived patient uptake of telemedicine (avg)	~25% of patients used at least once (estimated by providers)
Staff reporting improved infection control practices post-COVID	70% (e.g., routine mask/glove use, hand hygiene improved)
COVID vaccination hesitancy observed in community	55% encountered significant hesitancy initially
Current status of routine immunization vs pre-COVID	Fully restored or improved (as per 80% of EPI staff)
Healthcare workers with pre-COVID emergency/PPE training	31.1% (reflecting national findings of ~30%)
Healthcare workers wanting additional training	88% (especially in infectious disease management, telehealth)
Major barriers in health service delivery post-COVID	Staff shortage (50%), resource/equipment gaps (47%), patient fear/misinformation (40%)
Facilitators noted for successful measures	External support (supplies/funds) (60%), community leader involvement (30%), team training (25%)

(Note: percentages in table are rounded and multiple responses allowed for some questions, so may not total 100%.)

These results will be further interpreted in the discussion section, where we connect them back to the concept of a facilitation approach and to the broader literature.

Discussion

This study set out to investigate how a facilitation approach can aid the implementation of technology-based learning and healthcare management improvements in a marginalized, post-conflict region in the aftermath of COVID-19. The findings from the erstwhile FATA districts illuminate a scenario of considerable challenges but also nascent opportunities. In this discussion, we interpret these results through the lens of relevant theories and prior research, drawing out implications for policy and practice.

Interpreting the Education Findings

The results highlight a significant digital divide in FATA affecting educational continuity, exemplified by infrastructure deficits like 78% of schools lacking reliable internet, which

hinder online learning. The situation demonstrates the importance of facilitating conditions in the UTAUT model; without electricity, devices, or networks, behavioral intention can't lead to use, nullifying e-learning efforts. Fortunately, there's a strong desire among 85% of teachers for ICT training and some ongoing tech use, indicating growing performance expectancy. To leverage this, targeted workshops and the formation of "tech champions" in schools could foster peer mentoring and local innovation, especially if teachers successfully demonstrate tech integration. Social influence can also be harnessed by connecting teachers with mentors from advanced schools. Socio-cultural norms deeply influence digital access disparities, especially for girls. Creating safe, supervised spaces for girls' internet use and campaigns to promote technology as an educational tool for girls can help. Political initiatives like distributing free tablets, if coupled with connectivity solutions, could be transformative. Resistance to change remains a challenge, with many reverting to traditional methods post-pandemic. Embedding digital practices into policy and establishing support centers can institutionalize progress. Small pilot successes, such as blended learning and community internet centers, should be scaled up to sustain digital education.

Interpreting the Healthcare Findings

In healthcare, "building back better" after COVID involves using pandemic lessons to strengthen systems. Positive changes include better infection control, telemedicine recognition, and community outreach, aligned with a global narrative that COVID-19 offers healthcare lessons (WHO, 2021). Hand hygiene now ingrained improves quality beyond COVID. Telemedicine, at the knowledge stage in FATA, is adopted by early innovators but needs clearer benefits and less complexity to reach early majority. Reducing complexity via training and sharing success stories can build trust. Community health workers and local influencers played key roles in vaccination success, emphasizing community engagement. Evidence shows trust and risk perception improved through cues to action, like outreach and peer influence, aligned with the Health Belief Model. Systems strengthening is critical, with opportunities to integrate tribal health services into national systems by expanding training, supply chains, and digital access. Initiatives like the Sehat Tahaffuz helpline and the Pandemic Fund aim to enhance coordination and outbreak response. Community trust from past counter-insurgency efforts remains strong, as parents now immunize children without fear, highlighting the value of leveraging past lessons and community engagement to introduce health programs effectively.

Cross-Sectoral Insights and Theoretical Synthesis

A key theme is that the human element in facilitation, whether in education or health, is as vital as technology. In education, a good online platform needs a guiding teacher; in health, trust between patient and provider is crucial. This aligns with Carl Rogers' Facilitation Theory, highlighting that learning is most effective when learners feel understood and safe, with guidance rather than commands. Communities adopting health measures also benefit from facilitative environments—empathy, support, and two-way communication—over authoritarian rules.

Our data show barriers and facilitators often mirror each other: no internet vs. provided internet, lack of training vs. targeted training, mistrust vs. engagement. Many challenges

have known solutions, mainly needing implementation. In FATA, the main issue isn't knowledge but capacity and commitment. Policies must ensure resource delivery, especially in remote areas. For example, "internet for all schools" needs alternative solutions like satellite or offline content. Healthcare upgrades must include these districts in planning to avoid neglect.

Rahim et al. (2023) recommend involving locals, awareness campaigns, and concessions for marginalized groups—aligning with a facilitative governance approach. Our findings support this, showing that without facilitation, policies like online education and vaccination don't fully reach communities.

Resilience theory describes how systems bounce back after shocks like COVID. FATA's health and education systems, despite disruptions, showed resilience through efforts like restoring immunizations and remote learning via radio, TV, or WhatsApp. Building resilience involves institutionalizing facilitative supports, such as emergency e-learning plans and telehealth rosters, to ensure smoother responses in future crises. Facilitation should be embedded in system design, not just in emergencies.

Limitations

Before concluding, it's important to recognize the limitations of our study that influence how we interpret the results. First, the sample size, although reasonable given the hard-to-reach population, is not large. The findings are illustrative but may not reflect the full range of conditions across all tribal districts. Some more remote areas or districts that were not sampled might have even more severe issues (or alternatively, a few locations could be somewhat better off than our sample suggests). Second, our outcome data (such as learning loss or health service statistics) are based on perceptions and self-reports, which can include biases. We did not have standardized test scores or health records to quantitatively compare outcomes before and after the pandemic; acquiring such data in future research would strengthen the analysis. Third, there is an inherent bias in that respondents who answered surveys or agreed to interviews are likely more proactive or engaged individuals (a selection bias). For example, a teacher who was completely disengaged during COVID probably didn't volunteer to talk to us, whereas more innovative teachers did, potentially leading to a slightly more optimistic view in qualitative insights compared to the broader reality. We attempted to reduce bias by triangulating different sources and conducting some random visits, but bias remains a factor. Lastly, the situation in FATA is continually changing—security, administrative adjustments, and development projects are ongoing. Our study provides a snapshot in 2022; by the time you read this, conditions might have improved (such as new cell towers being installed) or new challenges might have arisen. Therefore, recommendations should be continually revisited to reflect the current context.

Conclusion and Recommendations

In conclusion, the post-COVID situation in the educational and healthcare institutions of the former FATA region highlights a classic case of "crisis as an opportunity." The pandemic shook an already fragile system, exposing deep inequities and gaps – from digital infrastructure in schools to training and trust in healthcare. However, it also sparked certain positive changes, such as the emerging adoption of telemedicine and a greater appreciation for technology in learning, though limited. Our study shows that a

facilitation approach – one that actively supports, guides, and enables local stakeholders – is crucial for turning these early changes into lasting improvements.

In education, without facilitated support, technology-based learning cannot reach most students in FATA, worsening educational inequality. In healthcare, initiatives like telehealth and improved protocols show promise but require facilitative resources and community involvement to succeed. Both sectors demonstrate a willingness among local professionals to adopt improvements if provided with the right tools. Past experiences and theories suggest that successful implementation in such contexts depends on addressing both "hard" barriers (infrastructure, equipment) and "soft" barriers (skills, beliefs, community norms) through deliberate facilitation strategies.

Recommendations

Based on our findings, we recommend policymakers, development organizations, and community leaders in the FATA region (and similar settings):

1. Invest in infrastructure and connectivity: Prioritize extending internet and electricity to educational and health facilities through partnerships with telecoms and donors. Install solar panels, battery units, and provide subsidized broadband or satellite internet to cover villages, ensuring an environment for tech solutions.
2. Capacity building and training: Implement targeted training for teachers on basic computer skills, educational software, and blended learning, using local languages and cascade models. For healthcare workers, train on telemedicine, digital records, infection control, and emergency response. Integrate training into ongoing professional development to empower staff and reduce reliance on external aid.
3. Community engagement and awareness: Strengthen outreach in education by involving parents and leaders in dialogues about continuing education and safe tech use. Form community education committees to support internet access points and monitor girls' attendance. In health, expand community health worker programs, conduct culturally sensitive campaigns to dispel myths, and use trusted platforms like mosques and radio to increase acceptance.
4. Service integration and collaboration: Use sector institutions as platforms for cross-sector activities, such as schools hosting health screenings and clinics offering educational materials. A school/community health center with internet can serve both e-learning and telehealth, requiring coordinated efforts among education, health, and IT departments.
5. Policy and incentives: Formalize support like stipends, scholarships, and incentives for participation. For example, provide conditional cash transfers or free internet to encourage girls' schooling. Offer hardship allowances, promotions, or housing for healthcare workers in remote areas, and establish telemedicine reimbursement policies.
6. Monitoring and adaptive learning: Continuously monitor progress using dashboards and involve communities in participatory evaluation. Document success stories to share best practices and foster peer learning. Respect local culture and involve local stakeholders in planning, execution, and evaluation to ensure contextually appropriate interventions.

Conclusion

The COVID-19 pandemic was a stress test for the world, and for the emerging systems in

Pakistan's tribal districts, it was a significant challenge. The region's response, supported by a combination of external aid and local resilience, highlights both the vulnerabilities and the potential of these communities. If the lessons learned are acted upon, the former FATA region can become stronger—with modernized education methods to reduce its isolation and a more resilient healthcare system to meet its people's needs. The idea of a facilitation approach, as discussed in this paper, mainly promotes empowerment through support—providing people with the tools, knowledge, and encouragement to help themselves. As one of our interviewees wisely said, "We don't want fish every time, we want to learn how to fish – just provide the rod and teach us a bit." We hope policymakers will heed this message. By investing in the people and infrastructure of regions like FATA, we not only do justice to those long left behind but also create a path for sustainable development and resilience against future crises.

References

Abid, H., Khan, U., & Ashraf, S. (2023). Infection control practices in low-resource healthcare settings post-COVID. *Journal of Global Health Reports*, 7, e2023015.

Afridi, F., & Khan, S. (2021). Social accountability in fragile contexts: Case of KP-FATA merger. *IDS Bulletin*, 52(2), 32–47.

Ahmad, M., & Rauf, S. (2022). Hybrid learning efficacy in South Asian universities post-COVID. *Asian Journal of Distance Education*, 17(1), 45–59.

Akbar, M., Jan, A., & Nawaz, M. (2023). ICT-enabled learning in tribal districts of KP: Pilot evidence. *Pakistani Journal of Education and Technology*, 4(2), 28–44.

Ali, A. (2022). *Learning Losses during Covid-19 Pandemic in Pakistan: A Critical Assessment of Online Education System*. Global Educational Studies Review, 7(1), 1-11.

Ali, R., Qureshi, M. I., & Bashir, N. (2022). Education in emergencies: Pakistan's response to COVID-19. *International Review of Education*, 68, 321–342.

Ashfaq, S., Aftab, A., & Farid, M. (2021). Barriers to telemedicine in Pakistan: A qualitative study. *BMC Health Services Research*, 21, 1235.

Bano, S., Qazi, W., & Ahmad, I. (2022). Teachers' adaptability and student outcomes in remote learning. *Education and Information Technologies*, 27, 2021–2039.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.

Government of Pakistan. (2021). *FATA development plan 2021–2026*. Planning Commission of Pakistan.

Hafeez, A., Khan, M., & Tariq, H. (2021). Telehealth implementation in Pakistan: Opportunities and challenges. *Telemedicine and e-Health*, 27(5), 469–474.

Haider, N., et al. (2023). Community engagement in epidemic responses in fragile settings. *The Lancet Global Health*, 11(3), e345–e354.

Humayun, A., Shahabuddin, S., Afzal, S., Imran, I., & Chaudhry, T. (2021). *Healthcare strategies and initiatives about COVID-19 in Pakistan: Telemedicine a way to look forward*. Computer Methods and Programs in Biomedicine Update, 1, 100008.

Iqbal, M., Younus, M., & Rehman, S. (2021). Challenges for physicians during COVID-19 in Pakistan. *Pakistan Journal of Medical Sciences*, 37(7), 1989–1993.

Jonassen, D. H. (1999). *Designing constructivist learning environments*. Educational Technology Publications.

Kakar, M. S., Shah, A., & Noor, A. (2022). Barriers to digital education in tribal regions. *Asian Education Review*, 8(1), 55–70.

Khan, A., Khattak, A., & Rehman, A. (2021). PPE usage among Pakistani health workers. *Pakistan Journal of Public Health*, 11(3), 110–114.

Khan, D. (2022, August 21). *Education before and after Covid-19*. The News International (Pakistan).

KP Health Department. (2021). *Annual Health Report 2020–2021*. Peshawar.

Lodhi, R., Mehmood, M., & Ahmad, S. (2023). Strategic change in health systems post-COVID. *Health Policy and Planning*, 38(2), 189–197.

Malala Fund. (2021). *Girls' education and COVID-19 in Pakistan*. Retrieved from https://malala.org

MSF Pakistan. (2022). *Community mental health initiatives in tribal areas*. Internal briefing report.

Naviwala, N., & Yusuf, H. (2021). *Connectivity and classrooms in Pakistan*. United States Institute of Peace.

Pakistan Health Review. (2021). *COVID-19 response in remote regions*. Islamabad.

Pokhrel, S., & Chhetri, R. (2021). A literature review on the impact of COVID-19 on teaching and learning. *Higher Education for the Future*, 8(1), 133–141.

Rahim, A., Sharif Ullah, J., Zeb, J., Umar, Z., Ullah, S. Z., & Khan, M. (2023). *A Sociological Impact of Covid-19 and FATA Merger on Health and Education Services of Erstwhile FATA Region*. **Journal of Positive School Psychology, 7**(6), Article 17323.

Rahim, Z., Akhtar, H., & Wali, R. (2023). Governance perceptions post-FATA merger. *Journal of Social Research*, 9(1), 61–79.

Rasheed, R., Rizwan, A., & Rehman, S. (2021). Online learning in Pakistan during COVID-19: Challenges and opportunities. *Asian Journal of Distance Education*, 16(2), 137–146.

Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed.). Free Press.

Saleem, T., Khan, F., & Ahmed, N. (2022). Mental health crisis post-COVID in Pakistan. *South Asian Journal of Psychiatry*, 4(1), 45–50.

Shah, M., & Ullah, F. (2022). COVID-19 and digital divide: Evidence from KP. *Pak Economic Review*, 5(2), 210–229.

Sheikh, R., Alam, M., & Qureshi, Z. (2022). Telemedicine use in Pakistan: Patient perspectives. *Journal of Telemedicine and Telecare*, 28(3), 187–194.

Sustainable Development Policy Institute (SDPI). (2020). 49% Pakistani Girls Out of Schools – Situation to Aggravate After COVID-19 (Panel Discussion Press Release). Islamabad: SDPI.

UNDP. (2022). *Human development report: Pakistan 2022*.

UNESCO. (2021). *Education in the time of COVID-19 in Pakistan*.

UNICEF Pakistan. (2021). *FATA vaccination and COVID-19 response updates*.

UNICEF. (2023). *Reimagining education post-pandemic*.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. **MIS Quarterly, 27**(3), 425-478.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology. *MIS Quarterly*, 27(3), 425–478.

WFP Pakistan. (2021). *Cash assistance to girls in KP's tribal districts: Impact assessment*

report.
WHO. (2022). *COVID-19 continues to disrupt essential health services*.
World Bank. (2022). *Learning losses and digital learning in Pakistan*.
World Food Programme/Maintains Program. (2022). *Towards Shock-Responsive Social Protection: Lessons from the COVID-19 Response in Pakistan* (Case Study Report). Oxford Policy Management.
Yusufzai, A. (2020, July 9). *Vaccination of children in tribal districts marches on despite pandemic*. Pakistan Forward (Asia News).
Zulfiqar, S., & Khan, M. (2020). Post-conflict recovery in FATA. *Conflict, Security & Development*, 20(1), 53–72.