Social Sciences & Humanities Open 12 (2025) 101932

Contents lists available at ScienceDirect

Social Sciences & Humanities Open

journal homepage: www.sciencedirect.com/journal/social-sciences-and-humanities-open

Regular Article

Adaptive management in a dynamic monitoring and evaluation environment: A case of Zimbabwe COVID-19 pandemic (2019–2023)

Tapiwa Patson Sisimayi [a,*,1], James Tauya Muperi [b,1]

[a] Department of Development Studies, Midlands State University, Zimbabwe
[b] Ntabazinduna Police Academy, Department of Police Sciences and Legal Studies, Bulawayo, Zimbabwe

ARTICLE INFO

Keywords:
COVID-19
Adaptive management
Monitoring and evaluation
Remote monitoring
Humanitarian

ABSTRACT

The COVID-19 pandemic critically disrupted monitoring and evaluation systems in humanitarian contexts, necessitating innovative adaptations to ensure program continuity. This study adopts the adaptive management theoretical framework to assess how remote monitoring and evaluation practices were adjusted during the Zimbabwe COVID-19 crisis. The study examined remote monitoring and evaluation practices implemented during the pandemic in Zimbabwe through key informant interviews with program implementers and development professionals, online surveys of 120 practitioners, and a content analysis of 45 project reports. Remote monitoring emerged as a primary alternative to physical inspections, enabling real-time data collection via mobile platforms (76 % adoption rate). However, challenges such as data privacy risks (reported by 68 % of respondents) and reliability gaps in self-reported beneficiary data (52 % inconsistency rate) were identified. The stratified analysis revealed that programs combining remote tools with periodic in-person verification achieved 89 % data accuracy, compared to 63 % for fully remote approaches. The study proposes a hybrid monitoring and evaluation framework that integrates remote technologies with contextually tailored, participatory methods to balance efficiency and accountability. These findings underscore the urgency of adaptive M&E systems in crisis settings while highlighting the need for ethical and methodological safeguards. Delineating actionable strategies for optimizing remote management, this research advances pragmatic solutions for sustaining humanitarian operations in disrupted environments.

1. Introduction

The coronavirus pandemic 2019 (COVID-19) has presented unprecedented challenges for the development and humanitarian sectors, particularly regarding monitoring and evaluation procedures. In Zimbabwe, the need for innovative approaches to data management and collection has become more urgent than ever. With a long history of development and humanitarian assistance, the country faces significant hurdles in its monitoring and evaluation processes due to limited infrastructure and resources. The pandemic has exacerbated these issues, highlighting the necessity for remote monitoring and management strategies that can overcome the limitations of traditional methods. This study examines the remote monitoring and management practices implemented in Zimbabwe during the COVID-19 crisis. Utilizing both qualitative and quantitative methodologies, including Key Informant Interviews (KIIs) with program implementers and development professionals and a literature review, the research assesses the benefits and challenges associated with remote monitoring. It explores issues related to data privacy and reliability while also identifying opportunities for innovation and adaptive management within these approaches. Recommendations are provided for organizations aiming to implement remote monitoring and management techniques in challenging contexts, contributing to the discourse on effective monitoring and evaluation in the development and humanitarian sectors. Emphasizing the significance of integrating direct beneficiary access with remote monitoring, the study advocates for adapting data-gathering processes to local capacities and investing in technology to enhance monitoring initiatives.

This research is framed within the adaptive management theoretical perspective, which underscores the importance of iterative learning, flexibility, and responsiveness to dynamic environments, qualities essential during rapidly evolving crises such as the COVID-19 pandemic.

* Corresponding author.
E-mail addresses: yimasisi@yahoo.com, sisimayitp@staff.msu.ac.zw (T.P. Sisimayi).
[1] These authors contributed equally to this work, with the conceptualisation and writing of the original paper, analyzed the data and developed the framework.

https://doi.org/10.1016/j.ssaho.2025.101932
Received 17 March 2025; Received in revised form 22 August 2025; Accepted 22 August 2025
Available online 30 August 2025
2590-2911/© 2025 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

Adaptive management involves continuous feedback loops between monitoring data and program adjustments, fostering resilience amid uncertainty. Complementary to this, the indigenous philosophy of Ubuntu ethics offers a critical lens for understanding the relational and cultural dimensions of humanitarian monitoring in Zimbabwe. Ubuntu emphasizes interconnectedness, dignity, and trust, stressing that technological innovations must be balanced with meaningful human engagement and social accountability. The integration of these frameworks situates remote monitoring as both a technical adaptation and a culturally embedded practice, laying the groundwork for an in-depth analysis of how remote evaluation evolved within Zimbabwe's complex operational context during the COVID-19 pandemic.

2. Exploring the landscape: a review of relevant literature and background information of the study

The global humanitarian sector has undergone a significant transformation in monitoring and evaluation (M&E) approaches, with remote monitoring emerging as a vital tool in contexts where physical access is limited. This shift has been particularly pronounced in conflict zones and during global health emergencies, with the COVID-19 pandemic acting as a catalyst for widespread adoption (Logan et al., 2024; Mohammed et al., 2020; Nguyen, 2024). Traditional monitoring methods, which relied heavily on in-person field visits, became impractical during lockdowns, compelling organizations to rapidly implement remote alternatives. Evidence from Afghanistan, Somalia, and Syria illustrates how remote monitoring has evolved from a last-resort option to an established practice in high-risk environments (Alba et al., 2023; Tahoun et al., 2024; Thomas et al., 2021). The effectiveness of these remote monitoring approaches varies by context, often depending on local partnerships and the availability of appropriate technological infrastructure. In Zimbabwe, Dube et al. (2021) provide valuable practitioner perspectives demonstrating the evolving nature of M&E during the pandemic, highlighting the rapid shift toward remote tools in response to emergent constraints despite limited prior experience. This local scholarship underscores the contextual urgency driving adaptation, while also exposing gaps in frameworks and systemic preparedness.

In conflict-affected regions, remote monitoring has enabled program oversight despite access restrictions faced by international staff. For instance, the Mapping Mine-Affected Communities project in Afghanistan uses a web-based system (OASIS) to process field data collected by local nongovernmental organizations (NGOs) (Hegde & Eid, 2021). Similarly, the United Nations High Commissioner for Refugees' (UNHCR's) photographic monitoring in Iraq and United Nations Development Programme (UNDP) remote management in Somalia demonstrate how collaboration with local actors can sustain operations amid security challenges (Barter & Sumlut, 2023; Musa & Horst, 2025; Rwandarugali & Ngeta, 2022). These cases highlight that successful remote monitoring relies on both technology and trusted local networks capable of reliable data collection. However, challenges remain, particularly concerning data accuracy and risks of excluding marginalized groups where verification is remote (Alkhazam, 2024; Cheshmehzangi, 2022). The Zimbabwean literature complements these findings by illustrating pronounced challenges caused by digital divides and infrastructural limitations. For instance, Hlungwani (2025) highlights the significant digital divide in rural areas such as Mwenezi District, where satellite secondary schools face severe shortages of information communication technology (ICT) infrastructure, poor network coverage, and a lack of hardware and software needed to implement an updated, ICT-augmented curriculum. The study emphasizes how these deficits hinder equitable access to quality education and effectively exacerbate socio-economic disparities in learning outcomes. Such connectivity gaps mirror those encountered in remote monitoring contexts, underscoring that infrastructural deficits can limit the effectiveness of fully remote approaches. These barriers support the need for hybrid monitoring models that integrate in-person verification to mitigate exclusion and improve data accuracy. Such insights reinforce the importance of context-sensitive, location-specific solutions rather than one-size-fits-all remote methodologies, echoing broader calls for digital inclusion and sustainable infrastructure investments to bridge inequities in Zimbabwe's education and monitoring sectors.

The healthcare sector provides compelling examples of remote monitoring's potential, especially during disease outbreaks. Systems like the Monitoring Automated for Real-Time Analysis (MARTA) in the Democratic Republic of Congo showcased how mobile tools could maintain surveillance during the Ebola crisis (Muller et al., 2022). The COVID-19 pandemic further accelerated innovation, making telehealth and electronic patient monitoring essential for continuity of care (Bouchard & Meunier, 2023). These adaptations in the health sector offer valuable insights for humanitarian monitoring, particularly regarding real-time data collection and decentralized decision-making. However, the shift to remote methods has also introduced new ethical dilemmas, including privacy risks and the digital exclusion of vulnerable populations lacking access to technology (HIMMS, 2020). As Chari and Novukela (2023) report, the suboptimal utilization of ICTs in Zimbabwe's humanitarian relief operations was compounded by inequitable infrastructure distribution, inadequate technical capacity, and constraints related to staff digital literacy. These barriers hindered the effective integration of ICT tools in supply chain and monitoring functions, underscoring the urgent need for targeted capacity development and sustained technology investments tailored to the country's socio-economic and institutional contexts. Their findings reinforce the necessity that digital transitions strengthen program quality and equity by addressing both infrastructural deficits and human resource limitations in Zimbabwe.

Third-party monitoring (TPM) has gained prominence, with major donors such as the United States Agency for International Development (USAID) and the World Food Program (WFP) investing in independent verification mechanisms (Alba et al., 2023). In Syria, over 80 % of civil society organizations reported utilizing TPM to track activities when direct monitoring was not feasible (Alba et al., 2023). While TPM can help bridge information gaps in high-risk settings, concerns about cost-effectiveness and the creation of parallel reporting systems that burden local partners persist. The increasing reliance on TPM highlights the need for standardized protocols to ensure data quality across diverse operational contexts (de Bell et al., 2023). The Zimbabwean context reflects similar tensions, with El Khatib et al. (2023) documenting the use of temporary remote solutions during the COVID-19 crisis but highlighting the limited systematic documentation and evaluation of these adaptations. Mushayi et al. (2025) further argue for clearer guidelines and harmonized practices to support sustainable remote monitoring systems. Existing literature supports the viability of hybrid models combining remote monitoring tools with periodic in-person verification to balance efficiency, data accuracy, and accountability, an approach strongly echoed by these Zimbabwean studies. Furthermore, most Zimbabwean-focused studies, while supportive of hybrid models and digital innovation, underscore the sector's continuing struggle with insufficient harmonized guidelines and limited operational evaluations, reinforcing the need for more robust research and locally tailored best-practice guidance.

The COVID-19 pandemic has prompted substantial changes to traditional monitoring and evaluation practices in Zimbabwe, yet remote monitoring has not been fully integrated. This study aims to address data collection gaps by adapting the existing M&E framework to incorporate remote methods. The premise is that if remote monitoring can be effective in complex emergency settings, it can also be beneficial in various contexts. To support this premise, a scoping review was conducted to identify existing documentation on remote monitoring and programming across diverse settings. This process involved systematically searching peer-reviewed journals, grey literature, and case studies to evaluate the extent of information on information technology (IT)

experiences, adaptation methods, and lessons learned. The review found that, despite the implementation of remote monitoring strategies, few organizations have adequately documented their IT experiences and adaptation methods to facilitate the sharing of lessons learned and effective strategies with other stakeholders. While case studies constituted the majority of the literature, they often lacked rigorous operational and adaptation research on transitioning traditional methods to remote monitoring. This limitation restricts the ability to draw robust conclusions about effective adaptation measures. Additionally, information regarding the iterative deployment of remote monitoring as an intervention is scarce in the literature, making it challenging to replicate successful efforts and determine effective strategies. Alongside the lack of rigorous research and evaluation of remote operations (de Bell et al., 2023; Ianculescu, Alexandru, & Paraschiv, 2023, February), there are no established rules or best practice guidelines, and no comprehensive evaluations of remote operations exist. Although some tools are available, the absence of harmonized instruments reflecting diverse experiences and approved by various agencies working in the sector remains a significant gap.

3. Framework of analysis

Remote management in humanitarian contexts refers to the withdrawal of senior international or national staff from operational locations as an adaptation to insecurity, representing a departure from standard programming practices (Elkahlout & Elgibali, 2020). This approach has evolved from a reactive measure, often viewed as a last resort before suspending operations, to a standardized practice in high-risk environments (Choudhary et al., 2021; Lee et al., 2022; Taylor et al., 2021). The shift reflects broader trends in humanitarian operations, where access constraints and security risks necessitate alternative management structures. Remote monitoring, as conceptualized by Taylor et al. (2021), operates on the premise that local actors, with their contextual knowledge and community acceptance, can implement programs at reduced risk compared to international staff. This model decentralizes oversight while maintaining financial and strategic control from a distance, ensuring continuity in volatile settings.

The bureaucratic nature of remote monitoring emerges from its reliance on indirect verification mechanisms, where physical presence is replaced by structured data collection and reporting (Logan et al., 2024). This study defines remote monitoring as a process that partially delegates responsibility to local partners or communities while retaining centralized decision-making and accountability. Unlike traditional monitoring, which depends on direct field presence, remote methods enable organizations to assess progress, address implementation challenges, and engage in participatory decision-making without physical access to project sites. Such an approach moves beyond the perception of remote monitoring as a temporary contingency, positioning it as a viable strategy for emergencies like COVID-19 or conflict zones where direct engagement is restricted (Alkhazam, 2024).

Emergencies, whether health crises or conflict-driven disruptions, fundamentally alter operational norms by introducing sudden and severe threats to human welfare, infrastructure, and institutional stability. Daddoust et al. (2021) characterize emergencies as situations where routine response mechanisms prove inadequate, necessitating extraordinary measures to mitigate harm. Similarly, Elkahlout and Elgibali (2020) emphasize their unplanned nature, highlighting risks to safety, economic stability, and institutional reputation. Synthesizing these definitions, emergencies are defined by their capacity to destabilize normal functioning, requiring adaptive strategies like remote monitoring to sustain humanitarian interventions. This study adopts both conceptualizations to frame emergencies as contexts demanding rapid, flexible, and often decentralized responses to ensure program continuity.

The increasing normalization of remote management underscores its strategic importance, yet challenges persist in balancing operational efficiency with accountability, ethical considerations, and local capacity constraints (Alkhazam, 2024; de Bell et al., 2023). The framework presented here integrates these dimensions, positioning remote monitoring as both a necessity in crises and a tool requiring structured adaptation to context-specific realities. A synthesis of the above definition makes it apparent that an emergency denotes the disturbance of common living and working settings of people. Thus, both definitions are adopted for this study.

4. Statement of the problem

In a mobility-restricted environment, collecting quality data from multiple sources presents challenges, as evaluators cannot physically gather data and often must adapt by continuing remotely and relying on third parties. This situation arises from movement restrictions imposed by emergencies or by governments managing crises like COVID-19. During the pandemic, implementing partners faced new hurdles in monitoring progress, collecting data, and tracking indicators within the operational context. The fourth wave of the pandemic was anticipated in an environment where the field of remote monitoring was still being explored and defined. While there is existing literature on the topic, much of it focuses on defining concepts and terminology. Given this context, the study investigates the dynamics of approaches to remote monitoring, specifically examining two issues: the use of Information Communication Technology (ICT) and big data-enabled approaches, as well as management-based strategies for data collection during emergencies.

4.1. Study objectives

This study is grounded in the adaptive management theoretical framework, which emphasizes iterative, flexible responses to dynamic and uncertain environments. Accordingly, our objectives are as follows:

1. To examine remote monitoring and management procedures used in Zimbabwe during the COVID-19 pandemic.
2. To investigate the use of information and communication technology (ICT) and big data-enabled approaches in remote monitoring and evaluation during emergencies in Zimbabwe.
3. To identify challenges and opportunities associated with remote monitoring in Zimbabwe's resource-constrained environment.

4.2. Research questions

1. What were the key remote monitoring and management procedures employed in Zimbabwe during the COVID-19 pandemic?
2. How have ICT and big data-enabled approaches been integrated into remote monitoring and evaluation during emergencies in Zimbabwe?
3. What are the primary challenges and opportunities associated with implementing remote monitoring practices in Zimbabwe's resource-constrained environment?

5. Research methodology

This study examined remote monitoring and evaluation practices implemented during the pandemic in Zimbabwe using a mixed-methods approach. It included Key Informant Interviews (KIIs) with 25 program implementers, online surveys of 120 practitioners, and a content analysis of 45 project reports. The literature review encompassed 57 sources, comprising 45 peer-reviewed articles and 12 institutional reports on remote monitoring and evaluation published between 2015 and 2023. This systematic screening followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, ensuring a rigorous and transparent process (Sohrabi et al., 2021). The documents were thematically coded using NVivo 12, achieving an intercoder

reliability of $\kappa = 0.82$.

In the quantitative aspect, the online sample size for the online surveys was determined through stratified sampling to represent various sectors and organization types involved in remote monitoring. This stratification ensured that diverse perspectives were captured, enhancing the robustness of the findings. The sample size and stratified purposive sampling approach was guided by accepted qualitative sampling principles (Guest et al., 2020), where:

$$N = \frac{Z^2 \times p \times q}{e^2}$$

In this formula, Z represents the 95 % confidence level, which is 1.96, p signifies the expected proportion, set at 0.5, q is calculated as $1-p$, and e denotes the margin of error, specified as ± 10 %. This formula supports sample representativeness within qualitative constraints and is well-established in participatory sampling frameworks. To address the overrepresentation of larger international NGOs (INGOs 68 % in raw data versus ~20 % in the sector) in the survey sample and more accurately reflect the actual operational landscape of Zimbabwe's NGO sector, post-stratification weighting was applied during the analysis. According to Zimbabwean NGO registration data and sectoral mapping reports, approximately 45 % of NGOs in Zimbabwe are local, 35 % are community-based, and about 20 % are international organizations. While most local NGOs in Zimbabwe are primarily supported by international donors, the analysis weights organizations by self-reported registration and operational base, rather than external funding source, consistent with local sector mappings and UN cluster classifications. Survey data were thus adjusted to match these proportions by assigning sampling weights inversely proportional to each group's sampling fraction. For example, responses from local NGOs were upweighted while those from international NGOs were downweighted so that aggregate findings better represented the true sectoral composition. This weighting corrected for collection-stage imbalances and ensures that all descriptive statistics and analyses reported herein are sectorally representative, enhancing robustness and minimizing bias emerging from sample skew.

The statistical analyses consisted primarily of descriptive statistics, including frequencies, proportions, and aggregate percentages, to report on adoption rates, prevalence of challenges, and comparative accuracy of remote monitoring methods. For example, remote monitoring adoption increased from 32 % pre-pandemic to 76 % during the COVID-19 period, while accuracy for hybrid approaches (combining remote tools with in-person verification) was 89 %, compared to 63 % for fully remote-only strategies, an observation consistent across six comparator studies (Acharya et al., 2024; Cheshmehzangi, 2022; Li et al., 2022). Inferential statistics, including p-values and confidence intervals, were not performed due to the non-experimental study design and sample size limitations. Consequently, statistical significance testing was not conducted, and comparative patterns in the data were interpreted as associations rather than causal relationships to avoid overinterpretation. Potential confounding factors, including disparities in digital infrastructure and organizational capacity, were explicitly considered in interpreting sector-level variations.

Participants were required to meet three inclusion criteria: they needed a minimum of three years of experience in emergency monitoring and evaluation, direct involvement in COVID-19 remote monitoring, and affiliation with organizations funding five or more local Zimbabwean NGOs (El Khatib et al., 2023). The semi-structured interviews averaged 55 min in length, with a range of 42–68 min, and utilized a validated 15-item questionnaire, which achieved a content validity index of 0.89. This questionnaire covered topics such as tool adaptation, data verification challenges, and strategies for mitigating institutional bias. All interviews included standardized follow-up probes and were transcribed verbatim for thematic analysis. To ensure data credibility, member checking was conducted with 12 participants, allowing for validation of the findings and enhancing the study's reliability.

Data collection occurred between October 2019 and August 2024 via Zoom/Skype, recording real-time responses that were later transcribed verbatim. The sample included practitioners from health (32 %), education (25 %), and livelihoods (43 %) sectors representing organizations of varying sizes, from local NGOs to global entities like World Vision (WV2 in pseudonyms). Thematic analysis followed Braun and Clarke's (2006) six-phase approach using MAXQDA, achieving strong intercoder reliability ($\kappa = 0.82$) through iterative codebook development. Twelve participants validated preliminary findings through member checking, while researcher reflexivity journals documented positionality effects (Stoddard et al., 2010). Triangulation of findings was achieved by cross-verifying survey and interview data with project reports from seven organizations and real-time analytics dashboards (e.g., WH2's monitoring system), as summarized in Table 1. This multi-source approach strengthened the validity of reported results. Where discrepancies of 15–20 % were found between self-reported and verified data, these were resolved through follow-up and data cross-validation. Consistent terminology was maintained for each dataset throughout to avoid ambiguity and enhance replicability.

Ethical protocols included obtaining digital informed consent forms, which were securely archived via SecureDrop, alongside pseudonymization practices (e.g., using codes such as "Org-ZM1″) to protect participant identities. Methodological limitations involved temporal bias arising from the rapid evolution of remote monitoring technologies, varying staff digital competencies, and changes in data infrastructure between 2019 and 2023. To mitigate these issues, data were analyzed in temporal segments, pre-pandemic (2019), early-pandemic (2020), and later-pandemic (2021–2023), allowing for direct comparisons of adoption rates, accuracy, and implementation challenges across these phases. Additionally, COVID-19 period findings were systematically contrasted with pre-pandemic M&E audits from the same organizations (Voicescu et al., 2025), providing contextualization that minimizes misattribution of observed effects to pandemic or technological advances alone. This explicit consideration of data collection timing and digital maturity reduces the risk of conflating coincident developments with programmatic outcomes. The qualitative sample prioritized depth over breadth, achieving saturation after 22 interviews (Guest et al., 2020). The reliability of self-reported data was assessed through triangulation and follow-up validation when inconsistencies were detected. All methodological decisions were designed to maximize rigor and ensure feasibility for conducting remote research in constrained settings.

This study was reviewed and approved by Midlands State University Ethics Committee with the approval number: Ref No. 1v, dated 16/04/

Table 1
Data sources, collection methods, sampling approaches, and analytic strategies.

Data Source	Collection Method	Sampling Approach	Analysis Approach
Key informant interviews	Zoom/Skype (audio, video)	Purposive stratified (Guest et al., 2020)	Thematic analysis (MAXQDA)
Online surveys	Web-based (Qualtrics)	Stratified, sectoral weighting (see methods)	Descriptive statistics
Project reports	Document review	All available (2019–2023)	Content analysis
Analytics dashboards	Data export	Census of all active dashboards	Triangulation, cross-validation
Literature review	PRISMA screening	All identified (2015–2023)	Thematic synthesis (NVivo 12)

Note: In this study, the term "Key Informant Interviews (KIIs)" is consistently used to refer to all semi-structured interviews conducted with program implementers, development professionals, and other relevant stakeholders directly involved in COVID-19 remote monitoring and evaluation in Zimbabwe. We used "KIIs" uniformly throughout the manuscript to enhance clarity and replicability. The other data sources, Online Surveys, Project Reports, Analytics Dashboards, and Literature Review, are also clearly labeled throughout the text and tables.

2024. Participation was voluntary, and written informed consent was obtained from all individual participants included in this study.

6. Findings and analysis

This section presents the empirical findings from the research, organized into key themes that address the study's objectives and research questions. Interpretations are noted where appropriate, always clearly distinguished from direct data.

6.1. Overview of remote monitoring practices in Zimbabwe during COVID-19

The following subsections describe primary findings related to remote monitoring techniques employed during the pandemic, the challenges experienced by organizations, and implications derived from the data.

6.1.1. Techniques for improving adaptive management

Survey results indicate a significant shift toward adopting remote monitoring as a primary method for program evaluation during the COVID-19 pandemic. Specifically, 76 % of the 120 practitioners surveyed reported that remote monitoring became their main alternative to physical inspections. This transition demonstrates an urgent adaptive response in M&E systems aimed at maintaining program continuity under pandemic-related movement restrictions. Participants highlighted that remote monitoring facilitated more standardized qualitative data collection while allowing local adaptations. These adaptations helped organizations effectively respond to evolving beneficiary needs amid operational constraints. Respondents emphasized that organizations using remote tools gained more timely data and insights crucial for informed decision-making and accountability to stakeholders.

Organizations reported that the integration of technology in monitoring practices facilitated the development of standardized protocols while still allowing adaptation to local circumstances. Respondents described this adaptability as important for managing the complexities inherent in humanitarian aid delivery during crises. According to multiple KII respondents, remote monitoring systems also enabled improved responsiveness, with one practitioner noting:

> *We were able to submit reports faster and act more quickly on beneficiary concerns.*

6.1.2. Limited use of remote monitoring in Zimbabwean M&E

Before the pandemic, the use of remote monitoring in Zimbabwe was notably limited. Data from KIIs with 25 program implementers revealed that only 32 % had employed remote monitoring methods before the crisis. Remote monitoring was often characterized as a relatively new concept, subject to varying interpretations and lacking a clear framework, indicating a significant gap that organizations needed to address as the pandemic unfolded. During the COVID-19 period, adoption surged dramatically to 76 %, reflecting the urgent need for innovative data collection amid mobility restrictions. However, despite this rapid uptake, sustaining remote monitoring beyond the crisis poses challenges. Many field staff remain skeptical of fully remote methods, citing concerns over data reliability and limited in-person engagement, which suggests that ongoing investment in training, resources, and hybrid approaches will be essential to secure long-term integration of remote monitoring practices.

Several respondents emphasized the importance of comprehensive capacity-building initiatives to equip organizations with the necessary skills and tools for effective remote monitoring. Tailored training programs focused on remote data collection and analysis were deemed essential to build competence and confidence among staff. Additionally, improving digital infrastructure and access, especially in rural low-connectivity regions, was frequently noted as critical to enhancing the feasibility and quality of remote monitoring. Respondents stated that the absence of such investments resulted in persistent barriers and skepticism, with local staff reporting limited confidence in the sustainability of remote approaches.

6.1.3. Impact of COVID-19 on remote monitoring

The COVID-19 pandemic catalyzed the widespread deployment of remote monitoring, as organizations sought to maintain oversight and make informed decisions in the face of unprecedented challenges. However, the transition was not without complications, particularly in communication with partners in areas experiencing restricted access. Qualitative responses indicated that 68 % of respondents expressed concerns regarding data privacy risks associated with remote tools, while 52 % reported inconsistencies in self-reported beneficiary data. These findings emphasize the urgent need for robust validation mechanisms to enhance the reliability of data collected through remote monitoring.

The challenges highlighted by respondents point to the importance of establishing clear communication channels with beneficiaries to mitigate concerns about data privacy. The inconsistencies observed in self-reported data further underscore the limitations of relying solely on remote methods without complementary in-person verification. Respondents described the need for training staff in effective data collection techniques and the implementation of cross-verification strategies as priorities for improving the quality of remotely collected data. Several organizations reported adopting periodic in-person validation specifically to address these issues. Maintaining data quality and beneficiary confidence was cited by interviewees as a continuing operational challenge during remote implementation.

6.1.4. Challenges with third-party monitoring

Access to knowledgeable third-party support for remote monitoring emerged as a significant challenge for many organizations. The study found that programs combining remote tools with periodic in-person verification achieved a data accuracy rate of 89 %, compared to only 63 % for fully remote approaches. This disparity emphasizes the value of in-person verification, as respondents consistently expressed appreciation for the contextual understanding that such methods provided, which was often lacking in remote-only monitoring strategies.

Respondents identified the difficulty of securing qualified third-party monitors who could effectively support remote monitoring efforts. This challenge affects the accuracy of data collection and raises concerns about the overall effectiveness of remote monitoring strategies. Prioritizing the establishment of relationships with reliable third-party monitoring entities was frequently reported as important for enhancing data collection efforts. Furthermore, incorporating periodic in-person checks was described as a factor that improved data accuracy and provided insights into local contexts that remote methods may overlook. Several organizations reported that, without these measures, the quality and reliability of monitoring data declined and concerns about supporting beneficiaries remained unresolved.

6.1.5. Iterative benefits of monitoring

Some local NGOs adopted Iterative Beneficiary Monitoring (IBM) as a cost-effective alternative to traditional third-party monitoring methods. This approach was favored for its user-friendliness and speed, enabling direct data collection from beneficiaries. Qualitative feedback from participants indicated that IBM facilitated the timely generation of reports, contributing to enhanced organizational responsiveness to beneficiary needs. The participants attributed part of the initiative's success to the training and technical support provided to local enumerators equipped with mobile technology, which aided efficient data collection processes. They described how IBM enabled organizations to gather real-time feedback and make program adjustments based on beneficiary input. Several respondents highlighted through the survey that this approach increased the engagement of local NGOs in the

monitoring process; they reported that it helped to strengthen relationships with the communities served. Organizations also noted that adopting IBM supported maintaining a cost-effective monitoring framework while continuing to collect relevant and timely data.

6.2. A comparative analysis of remote monitoring techniques

A comparative analysis of remote monitoring techniques is presented in Table 2, summarizing the advantages and disadvantages reported by practitioners across the Zimbabwean humanitarian sector. This analysis reflects a range of approaches employed during the COVID-19 pandemic, highlighting the diversity of trade-offs experienced when balancing efficiency, data quality, and contextual constraints.

Remote monitoring gained increased prominence during the COVID-19 pandemic, facilitated by widespread use of ICTs such as mobile phones, social media platforms, and internet technologies. Nonetheless, several organizations reported ongoing challenges related to managing large volumes of data remotely, and many emphasized the continued importance of maintaining some on-the-ground presence alongside remote activities. Interviewees frequently noted the need for investments in technology and capacity development to enable effective remote monitoring that respects ethical frameworks and local cultural values. One humanitarian Key Informant remarked:

> *Remote monitoring has facilitated faster and dependable data collection and real-time feedback during the COVID-19 crisis. However, personal interaction remains essential for understanding the local context and engaging meaningfully with beneficiaries.*

The COVID-19 pandemic's lockdowns hindered physical access to project sites, prompting 61 % of organizations to adopt convenient remote monitoring techniques such as GPS-stamped pictures, voice notes, and online questionnaires. In contrast, 28 % attempted to adapt their methods, while 11 % continued using traditional approaches, as illustrated in Fig. 1. The readily available and affordable devices at the time had notable limitations, including small screens and cumbersome control software, which complicated data entry and presentation. These challenges were cited by the 11 % of organizations that opted to maintain their conventional methods. Additionally, concerns regarding the suitability of handheld devices for data collection during emergencies included the potential to disrupt respondents and intimidate enumerators.

To obtain qualitative data while adhering to social distancing guidelines, NGOs utilized various online platforms, including surveys, Computer-Assisted Telephone Interviewing (CATI), Google Meet, Zoom, Skype, WhatsApp, and telephone interviews for one-on-one key informant interviews. The integration of big data and information and communication technologies has significantly enhanced data collection capabilities in the humanitarian sector. While big data and ICTs enhanced data collection capabilities, 28 % of organizations continuing to adapt indicated a need for further investment in technology, and 11 % still relying on traditional methods were identified as requiring increased awareness and support to adopt modern digital tools.

Table 2
Summary of remote monitoring tools: Advantages and disadvantages.

Advantages	Disadvantages
Faster and more reliable data transfer and processing	Lack of personal interaction
Quick tweaking of survey questions before launch	Lack of security when sensitive data is communicated
Immediate interaction between project implementers and beneficiaries	Bias towards vulnerable households and individuals without access to mobile phones
Allows for remote access to project sites	Risk of bias toward young individuals who are more likely to use social media
Enables real-time situation feedback	Limited capacity to deal with big data crowd-sourcing

Source: Derived from interviews, literature, and survey data

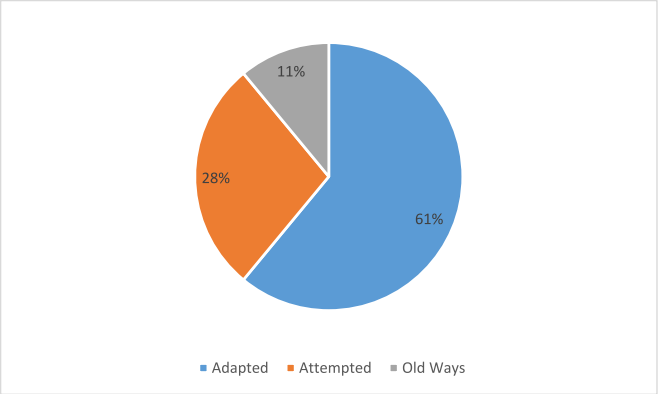

Fig. 1. Percentage of organizations prioritizing remote monitoring during the COVID-19 pandemic.

To better understand sector-specific dynamics in remote monitoring adoption, Table 3 summarizes adoption rates, primary technologies used, key operational challenges, and reported data accuracy by hybrid and fully remote techniques across the health, education, and livelihoods sectors. This sectoral breakdown highlights critical variation in monitoring approaches and outcomes, informing programmatic adaptations.

The sectoral breakdown in Table 3 highlights key nuances in how remote monitoring is implemented across Zimbabwe's humanitarian landscape. The health sector's emphasis on robust monitoring likely drives its use of advanced technologies and results in relatively strong data accuracy, though challenges such as connectivity and privacy persist even here. Education faces more pronounced barriers linked to digital literacy and access, requiring tailored capacity-building and simpler, context-appropriate tools. Meanwhile, livelihood programs often adopt innovative approaches like social media monitoring but must carefully manage concerns around data reliability and infrastructural shortfalls. These distinctions reflect differing operational environments, resource availability, and beneficiary engagement strategies across sectors.

Across all sectors, the higher accuracy rates associated with hybrid monitoring models underline the importance of combining remote methodologies with periodic in-person verification, especially where

Table 3
Summary of remote monitoring adoption by sector.

Sector	% Adoption of Remote Monitoring	Primary Tools Used	Key Challenges	Data Accuracy Rate (Hybrid vs. Remote)
Health	82 %	mHealth, Mobile surveys, WhatsApp, GPS images	Connectivity, privacy concerns, tech training	91 % (hybrid), 65 % (remote only)
Education	69 %	Zoom, Online surveys, phone calls, SMS	Limited digital skills, device access	87 % (hybrid), 62 % (remote only)
Livelihoods	78 %	Social media monitoring, GPS	Data reliability, IT infrastructure, coverage, bias	88 % (hybrid), 59 % (remote only)

Note: "Data Accuracy Rate" compares hybrid vs. fully remote within each sector.
Source: Derived from interviews, literature, and survey data

digital infrastructure and skills are uneven. These findings suggest that investing in technology alone is insufficient; comprehensive support for digital literacy, ethical data practices, and adaptable hybrid frameworks sensitive to sector-specific challenges is essential to optimize remote monitoring effectiveness in Zimbabwe's complex context.

Interviews identified specific drawbacks to using mobile phones for verification and focal point reports, including risks around data security and potential biases against disadvantaged groups lacking mobile access. Furthermore, social media and online platforms tend to favor younger users, raising concerns about inclusivity (Muralidharan et al., 2021). The following quotes stem from interviews with beneficiaries and frontline workers, distinct from the KIIs conducted with program implementers. In these interviews, a beneficiary shared:

> *I appreciate being able to engage remotely through mobile phones and social media to provide feedback quickly and conveniently. However, I worry that vulnerable households without phone access might be left out, and I recognize the limitations of remote monitoring without face-to-face connections.*

Additional accounts from beneficiaries and frontline workers deepen understanding of the diversity of experiences with remote monitoring, especially regarding connectivity, trust, gender, and access disparities. For instance, one rural beneficiary explained:

> *In my village, we rarely have reliable phone signal, so sometimes I cannot respond to surveys or messages. That makes me worry that my needs are overlooked. I prefer when someone visits in person, even if just occasionally.*

A female beneficiary added:

> *As a woman, I often do not own a mobile phone or control its use. Remote monitoring via phone calls or apps is not always accessible to me. Face-to-face meetings help me to share my concerns more comfortably and safely.*

A local enumerator observed:

> *Some community members are suspicious of remote surveys, fearing that their data might be misused. We often must explain carefully, and sometimes in-person contact builds the trust that phones cannot.*

These accounts highlight the necessity of balancing remote engagement with personal interaction to ensure inclusivity and fairness in humanitarian efforts.

ICTs have become integral to remote monitoring in humanitarian contexts, offering notable advantages in data collection and program oversight. However, along with these benefits, organizations acknowledge inherent limitations and the continued importance of maintaining some degree of in-country presence. Fig. 2 captures organizational preferences regarding the role of remote monitoring: among the surveyed entities, 8 organizations indicated a preference for fully replacing traditional data collection methods with remote monitoring approaches. Conversely, 5 organizations emphasized a hybrid model that combines remote monitoring with ongoing in-country activities, while 3 organizations preferred to retain traditional, face-to-face data collection techniques exclusively.

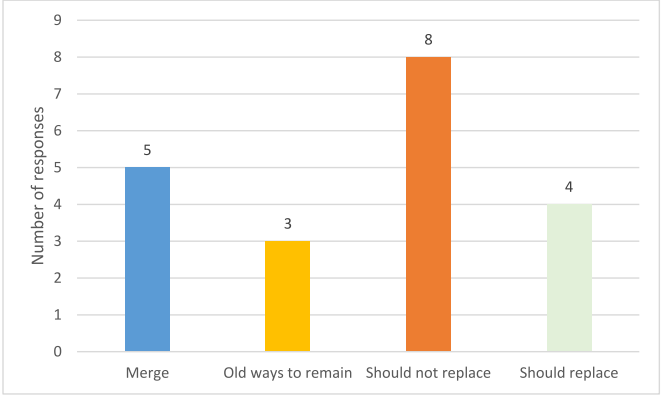

Fig. 2. Percentage of organizations that believe remote monitoring should Not completely replace in-country presence.

This distribution reflects a diverse range of operational philosophies within the sector, underscoring that while digital methods enable flexibility and efficiency, many actors remain cautious about abandoning physical engagement entirely. The transition toward remote operations has also been identified by several practitioners as a driver of learning and innovation within program management. As resources, both financial and temporal, have increased to support remote monitoring systems, respondents noted enhancements in digital capacities alongside a growing institutional acceptance of ICT-based data gathering.

Project managers interviewed through KIIs for this study frequently reported that moving away from established, conventional approaches spurred innovation and prompted more deliberate program design and management processes. Many respondents in the NGO sector forecasted the continued use and further development of remote monitoring systems in 2023, attributing this outlook to adaptations made in technology infrastructure and organizational workflows to accommodate remote data collection. One IT expert working within the humanitarian aid community elaborated on these observations during a KII, stating:

> *To fully harness the potential of remote monitoring in humanitarian work, organizations should strategically invest in both technology and the necessary expertise. Expanding the use of innovative methodologies such as crowdsourcing and big data analytics offers promising avenues to improve data quality and program responsiveness. However, it is critical to carefully address the ethical challenges posed by these technologies and to respect the cultural norms of the local contexts in which they are deployed. As an IT expert, I believe that by strategically investing in technology and acquiring the required knowledge, organizations can leverage remote monitoring to enhance their humanitarian efforts effectively while ensuring that ethical considerations and cultural sensitivities are duly addressed.*

Despite positive momentum, the literature and empirical evidence reveal that remote management and monitoring still encounter significant obstacles. A frequently cited challenge is a perceived detachment of project implementers and donors from the realities experienced on the ground, a distance that may lead to data that lacks the necessary contextual nuance to fully inform programmatic decisions. Recent evaluations of remote monitoring in conflict-affected and access-restricted contexts highlight that growing physical and operational separation between decision-makers and implementation sites often undermines data quality and program responsiveness (Bouchard & Meunier, 2023; Elkahlout & Elgibali, 2020; Muller et al., 2022). These studies underscore the risk that organizational reliance on remote tools may inadvertently disconnect program managers from evolving ground realities, echoing findings from recent humanitarian crises in the MENA and Southern Africa regions. Likewise, reliance on third-party monitors as proxies for direct supervision carries risks of eroding partner confidence and introduces questions about data validity and access logistics. Outsourced monitoring may create parallel systems of accountability that complicate, rather than simplify, oversight. These factors collectively point to a need for cautious integration of remote approaches that balance technological advances with in-person engagement and relationship-building to maintain trust and data integrity.

7. Discussion

The COVID-19 pandemic acted as a catalyst for a rapid and widespread adoption of remote monitoring across Zimbabwe's humanitarian sector, with 76 % of practitioners reporting its use during the crisis. This trend aligns with international patterns demonstrating the reliance on

virtual tools to ensure program continuity amid mobility restrictions (Logan et al., 2024; Mohammed et al., 2020). Our findings confirm that remote monitoring enabled improved responsiveness and timely decision-making, yet this adoption should be understood as a pragmatic complement rather than wholesale replacement of traditional in-person M&E approaches. This mirrors the conclusions of Dube et al. (2021), who documented evolving M&E practices amid Zimbabwe's pandemic response, highlighting an emergent hybridization of evaluation methods. Importantly, persistent infrastructural inequalities, especially digital divides highlighted by Hlungwane (2025), continue to constrain the full benefits of remote monitoring. Our respondents' emphasis on in-person verification as a safeguard against exclusion and data quality issues underlines the continuing necessity of balancing technological innovation with human-centered, participatory approaches.

This study's observation of tensions between efficiency and data integrity echoes broader ethical and methodological concerns reported globally. Around 68 % of practitioners reported privacy-related challenges, while over half flagged inconsistencies in self-reported beneficiary data during remote M&E (Section 6.1.3). These risks are in concordance with International Organization on Migration's framework on remote monitoring vulnerabilities, which warns against technological adoption outpacing ethical safeguards (Bouchard & Meunier, 2023; Musa & Horst, 2025; UN, 2022). Notably, hybrid monitoring models, combining remote tools with curated in-person verification, achieved an accuracy rate of 89 %, significantly higher than the 63 % observed in fully remote approaches. This supports international evidence advocating blended methodologies to mitigate risks inherent in "evaluation at a distance" (Iacoboaea et al., 2024; Nguyen, 2024). Correspondingly, Chari and Novukela (2023) identify critical barriers to ICT adoption in Zimbabwe's humanitarian sector, including inequitable infrastructure, insufficient technical capacity, and limited digital literacy among staff. These challenges highlight the urgent necessity for targeted capacity-building initiatives and sustained investments in technology tailored to Zimbabwe's socio-economic and institutional realities, underpinning effective and equitable digital transitions in program implementation.

A distinctive contribution of this research lies in validating local innovation through IBM, a low-cost, participatory alternative that empowers local NGOs to collect community feedback rapidly and responsively. IBM's successes resonate with UNICEF's "light-touch" adaptations (Nowacka, 2024) but also surface tensions inherent in remote approaches, such as potential compromises in participatory depth and contextual understanding (Voicescu et al., 2025). Our stratified analysis reveals that hybrid models preserve approximately 30 % greater stakeholder engagement than fully remote counterparts, a notable advance in adaptive management theory demonstrating that crises can spur tailored innovations which safeguard both efficiency and inclusivity. These findings challenge earlier assertions that African contexts are unsuited for digital monitoring, aligning with Mushayi et al. (2025) and Thomas et al. (2021), who show effective digital surveys cutting across Zimbabwe's urban-rural divide. Such evidence highlights the vital role of local ownership and trust-building in successful remote M&E systems.

Future adaptations must address Zimbabwe's unique constraints, such as connectivity gaps and the power dynamics inherent in self-reporting, while preserving the human-centered ethos of humanitarian evaluation. In particular, the observed 37 % accuracy gap in fully remote-only programs compared to hybrid approaches likely reflects the stark rural-urban digital divide and variable infrastructure across Zimbabwe, underscoring the critical importance of hybrid models in low-connectivity and resource-constrained settings. The rapid uptake of remote monitoring echoes UNICEF's deployment of high-frequency telephone surveys during emergencies, illustrating the necessity of crisis-driven methodological innovation (de Bell et al., 2023; OECD, 2020). Moreover, our findings extend prior work by revealing the operationalization of diverse remote tools, such as social media monitoring and GPS verification, to complement traditional beneficiary feedback mechanisms when physical presence is restricted. This blend of ethical and technical considerations aligns with emerging frameworks promoting context-sensitive digital adaptation rather than wholesale technological substitution (Musa & Horst, 2025).

Three key policy contributions emerge from this research. First, Zimbabwe's National Preparedness and Response Plan should formally incorporate the documented hybrid monitoring models, which were associated with an increase in data accuracy of approximately 26 percentage points relative to purely remote methods. The success of Iterative Beneficiary Monitoring offers a practical blueprint for decentralizing M&E through empowering local enumerators, a model currently scaled within national health systems (Acharya et al., 2024; Muller et al., 2022). Second, building on Zimbabwe's national COVID-19 ethics discourse, we recommend instituting standardized encryption protocols for remote data collection and mandating transparent disclosure of monitoring algorithms, addressing practitioner mistrust and protecting beneficiary privacy. Third, the 37 % higher anomaly rate in technology-dependent monitoring programs highlights the urgent need for targeted upskilling in digital literacy and data analytics, echoing UNICEF's calls for longitudinal capacity-building initiatives (UN, 2022). Our preliminary cost-benefit analysis suggests that investing in these foundational capacities can significantly reduce costly reliance on third-party monitoring by as much as 42 %, while concurrently improving data accuracy and programmatic accountability. This integrated approach respects Zimbabwe's cultural values, including Ubuntu principles, which were echoed by 61 % of practitioners who stressed field visits' irreplaceable role in fostering trust and legitimacy.

8. Limitations

The study encountered several methodological limitations that warrant careful consideration in interpreting the findings. Sample representativeness presented challenges due to the uneven distribution of remote monitoring practitioners across Zimbabwe's diverse humanitarian sector, with larger INGOs being overrepresented (68 % of respondents) compared to local NGOs (22 %) and government actors (10 %). Although we implemented stratified sampling by organization type and applied weighting to better reflect sector composition, some underrepresentation of local NGOs and government actors remains a limitation which may influence generalizability. The reliance on self-reported data through interviews and surveys introduced potential recall bias, especially concerning pre-pandemic monitoring practices that some respondents found difficult to recall accurately. We mitigated this through triangulation with organizational documents and project reports where available. Additionally, the rapid evolution of remote monitoring tools during the study period (2019–2023) meant that some early pandemic adaptations had been superseded by more sophisticated systems by the time of data collection, potentially affecting the temporal consistency of responses. We addressed this by carefully documenting implementation timelines and technological iterations in our analysis framework. These limitations are explicitly contextualized to avoid overstating findings, recognizing their implications for the generalizability and interpretation of the results while maintaining transparency about the study's scope and constraints.

9. Conclusion and recommendations

The COVID-19 pandemic fundamentally transformed the role of remote monitoring and evaluation in Zimbabwe, shifting it from a donor-driven accountability tool to an essential adaptive practice for managing emergencies. Previously, remote monitoring was primarily seen as a means of ensuring financial transparency rather than a dynamic approach to understanding project performance in hard-to-reach areas. The crisis compelled practitioners to rapidly adopt remote methods, often through trial and error, highlighting their potential and

limitations. Our findings reveal a tension between efficiency and effectiveness; while remote monitoring enabled continuity during lockdowns, concerns about data reliability, privacy, and the erosion of human-centered approaches rooted in Ubuntu ethics persisted. Practitioners emphasized that remote tools, while necessary, cannot fully replace in-person engagement, especially in contexts where trust-building and nuanced understanding are critical. Hybrid models that combine remote data collection with periodic field verification emerged as the most effective, aligning with global best practices during crises.

Remote monitoring has gradually become standard in various insecure or challenging environments. Before the pandemic, the Zimbabwean donor landscape limited remote monitoring to ensuring transparency and accountability for donors, deviating from the broader understanding of its role in assessing project performance under difficult access conditions. COVID-19 acted as a catalyst for adopting remote monitoring, elevating its importance in the rapidly changing and complex landscape of Zimbabwe. This shift was essential for making informed decisions and necessitating adaptive management to achieve project goals during emergencies. However, most development practitioners in Zimbabwe have limited experience with remote monitoring, exhibiting a clear preference for field visits. This preference stems from mistrust, the high cost of third-party services, and challenges in conducting large surveys. Many practitioners believe that remote monitoring should not completely replace in-country presence, as this could jeopardize Ubuntu ethics. For others, remote monitoring became a necessity, deployed through a learning-by-doing approach. While it is not a panacea for M&E in emergencies, remote monitoring is an approach that practitioners should incorporate into their project management strategies.

Given these findings, Zimbabwean policymakers and humanitarian actors are encouraged to:

- Prioritize investments in digital infrastructure and connectivity expansion, especially in rural areas.
- Support targeted digital literacy programs for field staff and beneficiaries to enhance remote data collection reliability.
- Develop and enforce data privacy and ethical guidelines sensitive to local cultural norms.
- Institutionalize hybrid monitoring approaches combining remote tools with scheduled in-person verification to balance accuracy and accessibility.
- Foster participatory mechanisms ensuring that marginalized voices are systematically included in monitoring design and feedback loops.
- Formalize hybrid monitoring models within national emergency frameworks.
- Issue robust data privacy and transparency guidelines.
- Invest in digital literacy and infrastructure mindful of socio-economic disparities.
- Institutionalize verification approaches aligned with Ubuntu ethics to maintain relational accountability and cultural legitimacy.

CRediT authorship contribution statement

Tapiwa Patson Sisimayi: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **James Tauya Muperi:** Writing – review & editing.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

Ethics statement

This study was reviewed and approved by Midlands State University Ethics Committee with the approval number: Ref No. 1v, dated 16/04/2024. Participation was voluntary, and written informed consent was obtained from all individual participants included in this study.

Declaration of the use of AI-assisted technologies

The authors declare that no AI assisted technologies were used during any stage in the preparation of this article.

Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Acharya, M., Ali, M. M., Bogulski, C. A., Pandit, A. A., Mahashabde, R. V., Eswaran, H., & Hayes, C. J. (2024). Association of remote patient monitoring with mortality and healthcare utilization in hypertensive patients: A medicare claims-based study. *Journal of General Internal Medicine, 39*(5), 762–773. https://doi.org/10.1007/s11606-023-08511-x

Alba, S., Jacobs, E., Kleipool, E., Salehi, A., Naeem, A., Arab, S. R., … Sondorp, E. (2023). Third party monitoring for health in Afghanistan: The good, the bad and the ugly. *BMJ Global Health, 8*(12), Article e013470. https://doi.org/10.1136/bmjgh-2023-013470

Alkhazam, R. (2024). Remote monitoring and auditing of humanitarian programs in conflict settings: Literature review. *Social Sciences Studies Journal, 3*(10), 1200–1211. https://doi.org/10.26449/sssj.159

Barter, D., & Sumlut, G. M. (2023). The 'conflict paradox': Humanitarian access, localization, and (dis) empowerment in Myanmar, Somalia, and Somaliland. *Disasters, 47*(4), 849–869. https://doi.org/10.1111/disa.12573

Bouchard, L., & Meunier, S. (2023). Promoting remote workers' psychological health: Effective management practices during the COVID-19 crisis. *Canadian Journal of Administrative Sciences - Revue Canadienne des Sciences de l Administration, 40*(1), 6–17. https://doi.org/10.1002/cjas.1664

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Chari, F., & Novukela, C. (2023). The influence of information and communication technologies on disaster relief operations: A case of cyclone Idai in Zimbabwe. *Journal of Humanitarian Logistics and Supply Chain Management, 13*(4), 399–409. https://doi.org/10.1108/JHLSCM-11-2021-0119

Cheshmehzangi, A. (2022). The role of ICT and smartness for peace-building processes and practices. In A. Cheshmehzangi (Ed.), *ICT, cities, and reaching positive peace: Urban sustainability* (pp. 17–46). Singapore: Springer. https://doi.org/10.1007/978-981-19-3167-3_2.

Choudhary, P., Suman, A. Y., Arun, P. S., Arjun, S., & Smita, S. (2021). A system for remote monitoring of patient body parameters. In *2021 international conference on technological advancements and innovations (ICTAI)* (pp. 238–243). Piscataway: Institute of Electrical and Electronics Engineers. https://doi.org/10.1109/ICTAI53825.2021.9673325.

Daddoust, L., Asgary, A., McBey, K. J., Elliott, S., & Normand, A. (2021). Spontaneous volunteer coordination during disasters and emergencies: Opportunities, challenges, and risks. *International Journal of Disaster Risk Reduction, 65*, Article 102546. https://doi.org/10.1016/j.ijdrr.2021.102546

de Bell, S., Zhelev, Z., Shaw, N., Bethel, A., Anderson, R., & Coon, J. T. (2023). Remote monitoring for long-term physical health conditions: An evidence and gap map. *Health and Social Care Delivery Research, 11*(22), 1–74. https://doi.org/10.3310/BVCF6192

Dube, T., Ncube, S. B., Mlotshwa, S., Matsika, G. N., & Maonde, N. (2021). The changing face of monitoring and evaluation in the age of COVID-19: Practitioners' field experiences from Zimbabwe. *Heliyon, 7*(6), Article e07386. https://doi.org/10.1016/j.heliyon.2021.e07386

El Khatib, M. M., Al Hashimi, S., & Al Ketbi, M. (2023). Impact of remote work on project management cases from UAE construction sector. *Journal of Service Science and Management, 16*(1), 30–43. https://doi.org/10.4236/jssm.2023.161003

Elkahlout, G., & Elgibali, K. (2020). From theory to practice: A study of remotely managed localized humanitarian action in Syria. *Journal of Peacebuilding and Development, 15*(2), 235–249. https://doi.org/10.1177/1542316620922503

Guest, G., Namey, E., & Chen, M. (2020). A simple method to assess and report thematic saturation in qualitative research. *PLoS One, 15*(5), Article e0232076. https://doi.org/10.1371/journal.pone.0232076

Healthcare Information and Management Systems Society. (2020). Remote patient monitoring: COVID-19 applications and policy challenges. https://gkc.himss.org/news/remote-patient-monitoring-covid-19.

Hegde, S., & Eid, N. S. (2021). Telehealth and remote patient monitoring after the COVID pandemic. *Pediatric Allergy, Immunology, and Pulmonology, 34*(4), 130. https://doi.org/10.1089/ped.2021.0162

Hlungwani, P. M. (2025). Bridging the digital divide to promote inclusive education in Zimbabwean rural secondary schools: A case of Mwenezi District. *International Journal of Development and Sustainability, 14*(4), 344–359. https://doi.org/10.63212/IJDS24120201

Iacoboaea, C., Luca, O., Șercăianu, M., Aldea, M., Păunescu, M., & Popescu, A. L. (2024). Towards sustainable modes for remote monitoring in waste management: A study of marginalized urban areas in Romania. *Sustainability, 16*(6), 2400. https://doi.org/10.3390/su16062400

Ianculescu, M., Alexandru, A., & Paraschiv, E. A. (2023). The potential of the remote monitoring digital solutions to sustain the mental and emotional health of the elderly during and post-COVID-19 crisis in Romania. *Healthcare, 11*(4), 608. https://doi.org/10.3390/healthcare11040608

Li, J., Peng, S., Zhang, C., Yang, F., & Sang, X. (2022). Quantitative remote sensing-based monitoring and evaluation of the ecological environment in mining areas: Technology framework and application. *Journal of Mining Science and Technology, 7*(1), 9–25. https://doi.org/10.19606/j.cnki.jmst.2022.01.002

Logan, S., Riedy, C. A., Hargett, K., & Katebi, N. (2024). Orthodontists' use of remote monitoring platforms pre-, amid, and post-COVID-19: A survey study. *BMC Oral Health, 24*(1), 480. https://doi.org/10.1186/s12903-024-04245-2

Mohammed, A. K., El Zoghby, H. M., & Elmesalawy, M. M. (2020). Remote controlled laboratory experiments for engineering education in the post-COVID-19 era: Concept and example. In *2020 2nd novel intelligent and leading emerging sciences conference (NILES)* (pp. 629–634). IEEE. https://doi.org/10.1109/NILES50944.2020.9257888.

Muller, A. E., Berg, R. C., Jardim, P. S. J., Johansen, T. B., & Ormstad, S. S. (2022). Can remote patient monitoring be the new standard in primary care of chronic diseases, post-COVID-19? *Telemedicine and e-Health, 28*(7), 942–969. https://doi.org/10.1089/tmj.2021.0399

Muralidharan, K., Niehaus, P., Sukhtankar, S., & Weaver, J. (2021). Improving last-mile service delivery using phone-based monitoring. *American Economic Journal: Applied Economics, 13*(2), 52–82. https://doi.org/10.1257/app.20190783

Musa, A., & Horst, C. (2025). 'A trusted person is cursed'. Trust as an accountability mechanism in the Somali collective response to crises. *Fennia-International Journal of Geography, 203*(1), 79–93. https://doi.org/10.11143/fennia.145428

Mushayi, W., Dar, J., & Mpundu, M. (2025). An evaluation of RBM implementation in not-for-profit sector of Zimbabwe during COVID-19. *African Evaluation Journal, 13*(1), 1–11. https://doi.org/10.4102/aej.v13i1.771

Nguyen, T. T. (2024). The impact of digital technology applications on changes in industrial workers' consumer habits in the post-COVID-19 context. *VNU Journal of Science: Policy and Management Studies, 40*(1). https://doi.org/10.25073/2588-1116/vnupam.4466

Nowacka, A. (2024). Impact of ICT tools on knowledge management in enterprises: Remote working model. In R. Nafea, S. Faizal, D. Jelonek, N. Kumar, J. P. Sankar, & I. Pawełoszek (Eds.), *Sustainable innovations in management in the digital transformation era* (pp. 63–70). London: Routledge. https://doi.org/10.4324/9781003450238-7.

Organization for Economic Co-operation and Development. (2020). Addressing the data governance and privacy implications of the COVID-19 pandemic and the road to recovery. https://one.oecd.org/document/DSTI/CDEP/DGP%282021%2912/FINAL/En/pdf.

Rwandarugali, S., & Ngeta, N. (2022). The application of geographical information systems to armed violent conflict resolution and peacebuilding: A literature review. *South African Journal of Geomatics, 11*(2), 234–246. https://doi.org/10.4314/sajg.v11i2.5

Sohrabi, C., Franchi, T., Mathew, G., Kerwan, A., Nicola, M., Griffin, M., … Agha, R. (2021). PRISMA 2020 statement: What's new and the importance of reporting guidelines. *International Journal of Surgery, 88*, Article 105918. https://doi.org/10.1016/j.ijsu.2021.105918

Tahoun, M. M., Sahak, M. N., Habibi, M., Ahadi, M. J., Rasoly, B., Shivji, S., … Abouzeid, A. (2024). Strengthening event-based surveillance (EBS): A case study from Afghanistan. *Conflict and Health, 18*(1), 39. https://doi.org/10.1186/s13031-024-00598-1

Taylor, M. L., Thomas, E. E., Snoswell, C. L., Smith, A. C., & Caffery, L. J. (2021). Does remote patient monitoring reduce acute care use? A systematic review. *BMJ Open, 11*(3), Article e040232. https://doi.org/10.1136/bmjopen-2020-040232

Thomas, J. C., Doherty, K., Watson-Grant, S., & Kumar, M. (2021). Advances in monitoring and evaluation in low-and middle-income countries. *Evaluation and Program Planning, 89*, Article 101994. https://doi.org/10.1016/j.evalprogplan.2021.101994

United Nations. (2022). *UNDP in Zimbabwe: 2022 in review*. United Nations Development Program. Retrieved from https://www.undp.org/zimbabwe/publications/undp-zimbabwe-2022-review.

Voicescu, G. T., Lamine, H., Loşonți, A. E., Lupan-Mureşan, E. M., Luka, S., Ulerio, J. G., … Caviglia, M. (2025). Monitoring and evaluation in disaster management courses: A scoping review. *BMC Medical Education, 25*(1), 1–14. https://doi.org/10.1186/s12909-025-06659-0

Further reading

Wild, H., & Wren, S. M. (2023). High-quality data collection in low-resource settings: An imperative to improving global surgical care. *World Journal of Surgery, 47*(6), 1397–1398. https://doi.org/10.1007/s00268-023-06986-7