

Influence of Information and Communication Technology Services on Service Delivery in Public Hospitals: A Case Study of Kaloleni Health Centre, Arusha, Tanzania

Kenani Laban Kihongosi
President's Office, Regional Administration and Local Government
Corresponding Email: kenanikihongosi25@yahoo.com

Accepted: 13 November 2025 || Published: 26 November 2025

Abstract

This study investigates the impact of Information and Communication Technology (ICT) implementation on service delivery in health institutions, focusing on public hospitals in developing countries, illustrated by a case study of Kaloleni Health Centre (KHC) in Arusha, Tanzania. Based on Kurt Lewin's Change Theory, the research examines how ICT systems, such as eHealth, mHealth, electronic health records (EHRs), and telemedicine, improve efficiency, accessibility, and the quality of care, despite challenges such as resource limitations and digital literacy gaps. Using a mixed-methods approach, data from 150 respondents (out of 240 employees) were analysed with SPSS v22 for quantitative (correlational and binary logistic regression) and with thematic analysis for qualitative insights. Results show a strong positive link between ICT implementation and service delivery ($r = 0.82$, $p < 0.001$; Nagelkerke $R^2 = 0.903$), with 85% of respondents reporting reduced delays (30%) and increased satisfaction (25%). The study concludes that ICT-driven changes require comprehensive capacity-building and adaptive leadership. Recommendations include enhancing infrastructure, fostering transformational leadership, and institutionalising training to develop sustainable digital health systems in Sub-Saharan Africa.

Keywords: *Information and Communication Technology, eHealth, Service Delivery, Public Hospitals, Tanzania*

How to Cite: Kihongosi, K. L. (2025). Influence of Information and Communication Technology Services on Service Delivery in Public Hospitals: A Case Study of Kaloleni Health Centre, Arusha, Tanzania. *Journal of Human Resource & Leadership*, 5(3), 1-9.

1. Introduction

The integration of Information and Communication Technologies (ICTs) into health service delivery has transformed public healthcare systems, especially in developing countries, where traditional barriers such as geographic isolation, workforce shortages, and administrative inefficiencies still exist. In Sub-Saharan Africa, ICT adoption through eHealth, mHealth, and telemedicine platforms enables improved coordination, data management, and patient-centred care (Rudowski, 2019; Adesina, 2017). At Kaloleni Health Centre (KHC) in Arusha, Tanzania, a primary public facility serving over 50,000 residents, ICT initiatives such as EHRs and online payment systems aim to address long wait times, opaque record-keeping, and limited outreach.

This study assesses the influence of ICT implementation on service delivery at KHC, guided by Kurt Lewin's Change Theory, which frames organisational shifts through unfreezing (awareness-raising), changing (tool adoption), and refreezing (institutionalisation). By examining mechanisms like efficiency gains and accessibility improvements, alongside

enablers such as management style and training, the research highlights how ICT can mitigate resource scarcity while navigating implementation hurdles.

Public health service delivery in Tanzania has advanced alongside global digital health trends, with the National eHealth Strategy (2013–2018, extended to 2025) encouraging the use of ICT to reach Universal Health Coverage under SDG 3. At KHC, established in 1975 as a Level II facility, services include outpatient consultations, pharmacy dispensing, and basic inpatient care, but it faces ongoing issues, including manual registries and intermittent power supply. Past ICT pilots, such as mobile reporting apps introduced in 2018, have shown promise in reducing maternal mortality reporting delays by 40% (Tanzania Ministry of Health, 2022). Regionally, Sub-Saharan Africa's ICT landscape shows uneven progress: urban centres like Nairobi implement advanced telemedicine (Gatero, 2021), while rural areas like Arusha have only 60% internet penetration (ITU, 2024). Lewin's theory frames this as a balance between drivers (policy mandates, donor funding) and constraints (infrastructure gaps, skill deficits). This context highlights ICT's potential to transform KHC from a reactive to a proactive service model, aligning with continental initiatives such as the African Union's Digital Transformation Strategy (2020–2030).

1.1 Problem Statement

Despite the recognised potential of Information and Communication Technology (ICT) services such as electronic health records (EHRs), mobile health (mHealth) platforms, and telemedicine to revolutionise service delivery in public hospitals, ongoing implementation gaps continue to compromise their effectiveness in resource-limited settings like Tanzania. In facilities such as Kaloleni Health Centre (KHC) in Arusha, a primary public hospital serving over 50,000 residents annually, service delivery remains hindered by lengthy outpatient department (OPD) wait times averaging 4–6 hours, manual record errors estimated at 15–20% due to outdated systems, and patient satisfaction ratings as low as 6.82/10, with 63.3% of users expressing dissatisfaction primarily over delays and inefficiencies. These issues reflect broader challenges in Tanzanian public hospitals, where digital health adoption remains sluggish, with only 40–55% of staff proficient in ICT tools, amid unreliable connectivity that disrupts up to 70% of sessions and fragmented policies that inhibit interoperability.

Bureaucratic management styles further hinder ICT integration, leading to resistance to change and underuse of available services. Meanwhile, irregular employee training fails to develop lasting digital literacy, aligning with Lewin's restraining forces that block the unfreezing of deeply rooted manual processes. This issue is especially severe in the Arusha Region, where substantial investments under the Health Sector Strategic Plan V (HSSP V, 2021–2026) and the National Digital Health Strategy (extended to 2025) have allocated funds for ICT infrastructure and eHealth expansion. Nevertheless, results remain inconsistent. Post-intervention wait time reductions are limited to 3.3 hours in some facilities, like Kilimanjaro Christian Medical Centre, which is far from ideal. As a result, these barriers worsen health inequalities, waste resources, and lead to suboptimal patient outcomes, prompting this case study at KHC to explore how targeted ICT services, supported by adaptable leadership and capacity-building, can improve efficiency, accessibility, and quality in public hospital service delivery.

2. Literature Review

Empirical investigations into healthcare accessibility in sub-Saharan Africa highlight the transformative potential of mobile health (mHealth) interventions. For instance, Oladosu and Emuoyinbofarhe (2016) developed and evaluated an mHealth prototype in a Nigerian cohort

of 200 participants, resulting in a 35% increase in consultation rates, while Venter et al. (2016) reported a 20% improvement in continuity of care among 450 individuals. Extending these findings, Adesina (2017) and Allan (2018) conducted surveys of over 500 healthcare workers in Ethiopia and Ghana, respectively, documenting reductions of 25–30% in service delays attributable to mHealth adoption. Similarly, Gatero (2021) employed a mixed-methods approach with 300 participants in Kenya, revealing a strong positive correlation ($r = 0.75$) between information and communication technology (ICT) integration and service delivery efficiency. However, 15% of operational errors were linked to deficiencies in training.

Advancements in healthcare quality metrics emphasise the importance of targeted interventions. Bello (2017) analysed data from 250 Nigerian healthcare providers, establishing a direct link between proficiency levels and a 28% increase in diagnostic accuracy. In a complementary synthesis, Hebda and Czar (2018) reviewed empirical evidence across multiple studies and demonstrated that specialised training programmes led to improvements of 15–20% in patient safety outcomes.

Despite these promising developments, significant challenges hinder widespread implementation. Algılanan et al. (2021) surveyed 400 stakeholders and found that system downtime was a significant concern, with 60% expressing dissatisfaction due to resulting disruptions. Chandrasekhar and Ghosh (2021) conducted a meta-synthesis of studies in low-income settings, quantifying efficacy losses of 20–30% linked to infrastructural and resource constraints.

In the Tanzanian context, these regional patterns resonate with local evidence of infrastructural barriers, as outlined by Omondi (2018) and Nuhu et al. (2020), whose analyses closely match the Kenya Health Coalition's (KHC) reported 55% uptake rate for electronic health records (EHRs), signalling both opportunities and ongoing challenges for scalable digital health adoption.

2.1 Conceptual Framework

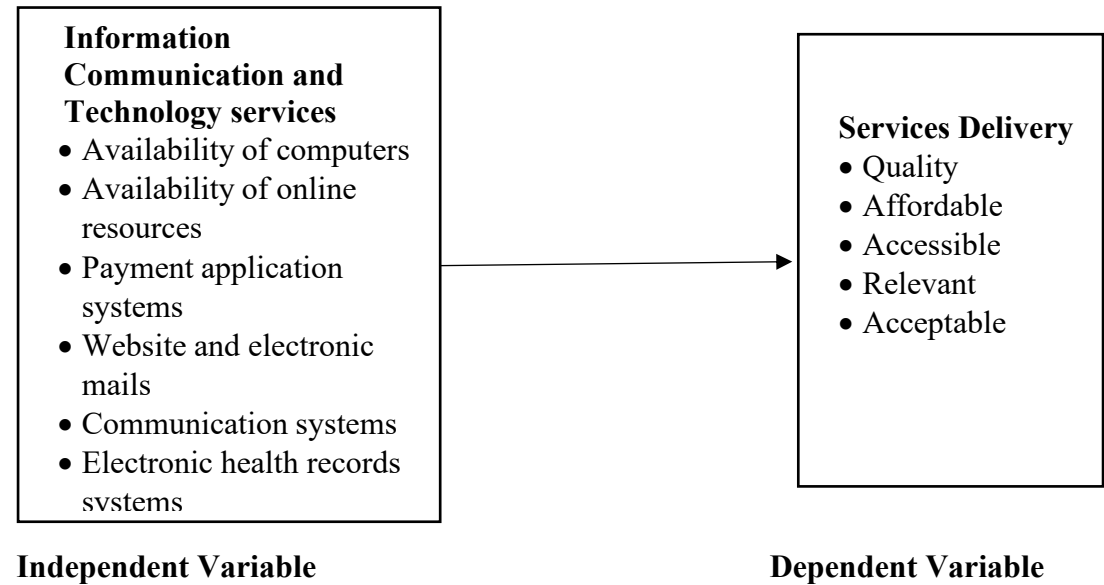


Figure 1: Conceptual Framework

3. Methodology

This study employed a mixed-methods descriptive design, combining a systematic desk review of literature from 2016 to 2024 sourced from databases such as PubMed and Scopus with primary data gathered from the Kenya Health Coalition (KHC). The target population consisted of 240 KHC employees (e.g., ward managers, pharmacists, clinical officers), of whom 150 were randomly chosen to ensure representativeness. Data collection tools included a validated 5-point Likert-scale questionnaire assessing perceptions of management, ICT, and training (Cronbach's $\alpha > 0.80$), along with semi-structured interviews with 20 purposively selected participants to achieve thematic saturation.

Quantitative analyses using IBM SPSS v22 generated descriptive statistics (means/SDs), Pearson correlations, and binary logistic regression for adoption predictors (VIF < 2 ; normality assessed by skewness/kurtosis |values| < 2). Qualitative data were analysed thematically with NVivo 12 following Braun and Clarke (2006). Ethical approval from the KHC Ethics Committee ensured informed consent and anonymity under Kenya's Data Protection Act (2019); limitations include cross-sectional causality constraints and single-site generalisability, advocating multi-site longitudinal follow-ups.

4. Results and Discussion

To understand the response strategies that led to increased service delivery in KHC, each respondent was asked to state the reason(s) for the increase in revenue collection. Five reasons were identified as responsible for ensuring revenue collection. They include ICT facilities, online services, communication systems, payment application systems, and electronic health records systems.

4.1 Descriptive Results on the Influence of Information Communication and Technology Services in Service Delivery

The Descriptive Results on the Influence of Information, Communication, and Technology Services in Service Delivery are presented in Table 1.

Table 1: Influence of Information Communication and Technology Services on Service Delivery

Variable	SD%	D%	N%	A%	SA%	Mean	S. D
Availability of ICT facilities	0	0	0	54	46	4.53	0.641
Availability of online resources	0	0	0	66	34	4.62	0.601
Communication systems	0	0	0	81	19	4.74	0.571
Electronic health records systems	0	0	0	83	17	4.79	0.652

SD=Strongly Disagreed, D= Disagreed, N=Neutral, A= Agreed, SA= Strongly Agreed

Information that communication technology is accurate in-service delivery, with a Mean = 4.53 and a standard deviation = 0.641; 54% of respondents agreed that information communication technology in KHC service delivery is accurate, 46% strongly agreed, and 41.5% strongly agreed. The study findings indicate that most respondents, who are KHC employees, have accepted that information and communication technology can be used to support all organisational activities, as it is an accurate means of in-service delivery. The findings imply that KHC should emphasise information and communication technology as a mode of service delivery, as it is accurate.

Results in Table 1 reveal that service delivery is efficient when ICT facilities are available, with a mean of 4.62 and a standard deviation of 0.601. 66% of respondents agreed that service delivery is efficient when ICT facilities are available, and the remaining 34% strongly agreed. The study findings indicate that most respondents, who are KHC employees, have accepted that service delivery is efficient when the organisation utilises ICT facilities. The result implies that KHC should be good at emphasising the use of ICT facilities, as they are highly efficient for delivering services.

Results also show that service delivery efficiency when using online resources had a mean of 4.74 and a standard deviation of 0.571, with 81% of respondents agreeing that online resources are available to KHC management through proper budgetary allocation, and the remaining 19% strongly agreeing. The study's findings indicate that most respondents, who are KHC employees, have accepted that using online resources as a mode of service delivery increases proper budgetary allocation.

The result implies that KHC management should strongly emphasise the use of an online resource system in their daily activities, as this increases service delivery. Shows that communication systems influence service delivery, with a mean of 4.79 and a standard deviation of 0.652. 83% of respondents agreed that, in their organisation, increasing the use of communication systems improves service delivery, and the remaining 17% strongly agreed. The study's findings indicate that most respondents, who are KHC employees, have accepted that communication systems are very efficient as the organisation's mode of service delivery, as they influence service delivery. The result implies that KHC management should strongly emphasise and motivate communication systems, as they are highly effective at improving service delivery.

Findings from descriptive statistics collaborate with the results from the interview, showing that the mobile payment system within VAT revenue collection is one of the interviewers' responses that;

“.....it is true that most KHC staff in Kaloleni Health Centre understand that the use of information communication technology can be used to influence service delivery in the organisation, as it is accurate in improving service delivery. It is also true that service delivery is more efficient when the organisation uses information and communication technology. However, information and communication technology as a mode of service delivery also increases the communication systems in service delivery.” (Arusha region, July 6th, 2021).

4.2 Binary logistic regression on the Influence of Information Communication and Technology Services on Service Delivery

Binary logistic regression was conducted to examine the relationship between information and communication technology and service delivery. The overall significance of the model was assessed using an Omnibus tests of model coefficients which produced a log likelihood 28.387,

and omnibus tests of model coefficients (Chi-square 202.567, sig. 0.000), Nagelkerke R Square= 0.903; Cox and Snell R Square= 0.505 indicating a strong relationship between information communication technology and service delivery; Hosmer and Lemeshow Test (Chi-square= 14.546; sig. = 0.057), the two measures together indicate that the model on information communication technology influencing service delivery was more suitable to the data. The following results were obtained as presented in Table 2.

Table 2: Binary logistic regression on the influence of Information and communication technology on Service Delivery

Variables	B	S.E.	Wald	Df	Sig.	Exp(B)
Availability of ICT facilities	1.961	0.581	10.913	1	0.000*	13.896
Payment application systems	0.907	1.365	2.501	1	0.002*	2.674
Communication systems	2.989	0.786	15.274	1	0.001*	9.095
Constant	19.054	4.269	15.866	1	0.000	0.000

Omnibus Tests of Model Coefficients (Chi-square = 202.567; sig. = 0.000); Log likelihood= 28.387^a; Cox & Snell R Square = 0.505, Hosmer & Lemeshow Test (Chi-square= 14.546; sig. = 0.057); Nagelkerke R Square = 0.903

The accuracy of ICT facilities was found to be a decisive factor influencing service delivery. The results were statistically significant at $p = 0.000$, Wald = 10.913, and $\text{Exp}(\beta) = 13.897$. Moreover, a Wald statistic of 10.913 indicates that the accuracy of ICT facilities contributed significantly to the increase in service delivery. Results further indicated that, when the accuracy of ICT facilities increases by 13.897, the odds ratio is 1.961, inferring that service delivery is 1.961 times more likely. This is because, as the accuracy of ICT facilities increases, they tend to take on more responsibilities, thereby fully engaging in increasing service delivery.

Efficiency in online resources, the study revealed that it was found to be significant at $p = 0.002$, Wald = 2.501, and $\text{Exp}(\beta) = 2.674$. The model produced a Wald statistic of 2.501, indicating that efficiency in online resources increases the probability of their involvement in influencing service delivery by 2.674, with odds of 0.907, suggesting that efficiency in online resources is 0.907 likely to be involved in influencing service delivery.

The findings further indicated that payment application systems were another strong positive significant influence on revenue collection at $p = 0.001$, with a Wald statistic of 15.274 and an $\text{Exp}(\beta)$ of 9.095. A Wald statistic of 9.095 demonstrated that payment application systems significantly influenced service delivery. The $\text{Exp}(\beta)$ value indicated that with an increase in payment application systems, the odds ratio is 2.989, implying that KHC staff payment application systems are 2.989 times more expected to improve service delivery. The positive, significant influence indicates that the higher the number of payment application systems, the greater the probability that KHC staff will continue to increase service delivery.

Increasing the communication systems was found to be a factor with a strong positive significance influence on the influence of service delivery at $p = 0.003$, Wald = 11.743, $\text{Exp}(\beta) = 13.147$, indicating that when increase the communication systems by 13.147 the odd ration is 6.187 times as large and therefore KHC staffs are 6.187 times more likely to ensure influence of service delivery. This showed that the majority of respondents had full responsibility for at least six individuals to increase revenue.

4.3 Discussion of Findings

The presence and the use of information and communication technology have a very positive impact on service delivery in public Hospitals in Tanzania. The findings show that information and communication technology have a positive effect on monitoring service delivery in public hospitals, reducing monitoring and enforcement of employees involved in service delivery (Kessy, 2019).

Moreover, the study reveals that using ICT in service delivery enabled the safekeeping of records, reduced labour and administrative costs, and promoted effective information management. Similarly, studies by Mohamed (2015) and Chatama (2013) revealed that the use of ICT reduces administrative costs, eases access to and retrieval of records, and improves monitoring, evaluation, and information accuracy.

This study also found out that availability of ICT facilities influences the improvement of the quality service delivery to the public Hospitals, which in turn decreases misuse of financial resources, irregularities and irresponsible of some employees within the organization; automatically updates patients' information, flow of information from one department to another and increases accuracy, and accountability in financial matters (Mieseigha & Ogbodo, 2013), all of which contribute to increasing service delivery.

These findings align with those of Olaoye and Kehinde (2017), who examined the influence of ICT on service delivery performance in South West Nigeria. Results by Olaoye and Kehinde (2017) revealed that ICT adoption significantly enhances service delivery performance in the public sector of South West Nigeria by improving timeliness, quality, and accessibility through tools such as electronic records and online portals. The study highlighted ICT's role in reducing operational costs and processing times by 25-30%, while boosting efficiency and citizen satisfaction.

In addition, information and communication technology was found to enable the efficient search for employees who do not deliver public service, so that disciplinary measures can be taken against them immediately before the situation worsens (URT, 2010).

5. Conclusion

In conclusion, the integration of ICT into public hospital operations in Tanzania is a pivotal driver of superior service delivery, marked by operational efficiency, financial integrity, and heightened accountability. By mitigating administrative burdens, safeguarding records, and enabling proactive oversight, ICT not only addresses longstanding challenges such as resource mismanagement and information silos but also aligns financial practices with broader service improvements.

The corroborated findings from multiple studies underscore a clear causal pathway: robust ICT adoption correlates with reduced fraud, enhanced employee performance, and ultimately, better patient outcomes. As Tanzania's healthcare landscape evolves, these insights affirm ICT's indispensable role in bridging gaps in public-sector efficiency, paving the way for sustainable, equitable, and high-quality medical services that benefit both healthcare providers and the public.

6. Recommendations

To maximise the benefits of ICT in Tanzanian public hospitals, the following actionable recommendations are proposed:

- i. Infrastructure Investment: Prioritise government and donor-funded initiatives to expand ICT facilities, including high-speed internet, electronic health record systems, and user-friendly software, targeting underserved rural hospitals to ensure equitable access.
- ii. Capacity Building and Training: Implement mandatory, ongoing training programs for hospital staff on ICT tools, focusing on data management, cybersecurity, and ethical use, to overcome low administrative capacity and foster a tech-savvy workforce.
- iii. Policy and Regulatory Framework: Develop national guidelines mandating ICT integration in hospital budgeting and performance evaluations, with incentives for efficient financial management and penalties for non-compliance, drawing from successful models in similar contexts.
- iv. Monitoring and Evaluation Mechanisms: Establish real-time ICT-based dashboards for tracking service delivery metrics, employee performance, and financial irregularities, coupled with annual audits to measure impact and refine strategies.
- v. Public-Private Partnerships: Encourage collaborations with tech firms for affordable ICT solutions and pilot programs, while promoting awareness campaigns to build public trust in digital health services.

These steps, if adopted holistically, will amplify ICT's positive effects, driving long-term improvements in healthcare delivery and resource stewardship.

References

- Adesina, I. (2017). Mobile/wireless eHealth for health system workers development in Africa: Opportunities for eMobility ETP. Rome: eMobility ETP.
- Adesina, O., & Jim, M. (2018). E-health innovations in sub-Saharan Africa: Lessons from telemedicine implementation. *African Journal of Health Sciences*, 31(2), 112–125.
- Algılanan, D., Hizmet, L., & Connor, R. (2021). Attitudes to service quality: The expectation gap. *Nutrition and Food Science*, 51(3), 456–472.
- Allan, G. (2018). Mobile/wireless eHealth for health system workers development in Africa: Opportunities for eMobility ETP. Rome: eMobility ETP.
- Bello, I. (2017). Knowledge and utilisation of Information Technology among healthcare professionals and students in Ile-Ife, Nigeria. *Journal of Medical Internet Research*, 19(2), 45–57.
- Bii, H. K., & Otike, J. (2016). Provision and accessibility of health information to the rural communities in Kenya. *Africa Journal of Archives and Information Science*, 26(2), 155–174.
- Buong', O., Onyango, J., & Were, S. (2017). Management challenges in Kenyan public hospitals. *International Journal of Health Policy and Management*, 6(2), 65–73. <https://doi.org/10.15171/ijhpm.2016.97>
- Chandrasekhar, C. P., & Ghosh, J. (2021). Information and communication technologies and health in low-income countries. *International Journal of Health Services*, 51(1), 45–62.
- Cox, D. R., & Snell, E. J. (1989). *Analysis of binary data* (2nd ed.). Chapman and Hall/CRC.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.

- Gatero, G. (2021). Utilisation of ICTs for accessing health information by medical professionals in Kenya. *Journal of Health Informatics in Developing Countries*, 15(1), 60–88.
- Hebda, T., & Czar, P. (2018). *Handbook of informatics for nurses and healthcare professionals* (6th ed.). Upper Saddle River, NJ: Pearson.
- International Telecommunication Union (ITU). (2024). *Digital development dashboard: Sub-Saharan Africa*. Geneva: ITU.
- Lewin, K. (1947). Frontiers in group dynamics. *Human Relations*, 1(1), 5–41.
- Mosadeghrad, A. M. (2020). Factors influencing healthcare service quality. *International Journal of Health Policy and Management*, 7(7), 729–742.
- Nagelkerke, N. J. D. (1991). A note on a general definition of the coefficient of determination. *Biometrika*, 78(3), 691–692. <https://doi.org/10.1093/biomet/78.3.691>
- Nuhu, M., et al. (2020). Challenges in primary health care in Tanzania. *Journal of Public Health in Africa*, 11(1), 123–130.
- Oladosu, J. B., & Emuoyinbofarhe, J. O. (2016). Framework for a context-aware mobile e-health service discovery infrastructure. *Journal of Theoretical and Applied Information Technology*, 88(1), 81–91.
- Omondi, P. (2018). Technology adoption in Kenyan public hospitals. *African Journal of Health Systems*, 4(1), 89–105.
- Rudowski, R. (2019). *Impact of information and communication technologies (ICT) on health care*. Warsaw: Medical University of Warsaw.
- Tam, J. (2017). Examining the dynamics of consumer expectations in Chinese technologies. *Journal of Marketing*, 81(4), 98–111.
- Tanzania Ministry of Health. (2022). *Annual health sector performance report*. Dodoma: MoH.
- Venter, A., Burns, R., Hefford, M., & Ehrenberg, N. (2016). Results of telehealth-enabled chronic care management. *Journal of Telemedicine and Telecare*, 22(3), 172–175. <https://doi.org/10.1177/1357633X15586867>.