E-Health Practices in Health Centers and Institutions in the Greater Accra Region of Ghana: A Descriptive Study

Silas Adjei[1], Paa Kofi Tawiah Adu-Gyamfi[1], Isaac Nii Noi Nortey[2], Isaac Kojo Agyeman[1], and Samuel Babbington Norteye[3]

[1]Pentecost University, Ghana.
[2]University of Cape Coast.
[3]Alsyd Academy, Ghana.
Corresponding Author Email: sadjei@pentvars.edu.gh; 0009-0009-3457-9325

Direct Research Journal of Public Health and Environmental Technology

Direct RESEARCH JOURNALS

Vol. 11(1), Pp. 58-64, February 2026

Research Article
ISSN: 2734-2182
https://journals.directresearchpublisher.org/index.php/drjphet; https://www.ajol.info/index.php/drjphet

Received 5 January 2026, Accepted 17 February 2026, Published 26 February 2026

ABSTRACT

This study investigates the adoption and utilization of eHealth systems among healthcare managers and professionals in the Greater Accra Region of Ghana. The study employed a quantitative survey design, collecting data from 1,640 respondents across 82 healthcare institutions using structured questionnaires. Descriptive statistics, including frequencies, percentages, means, standard deviations, and coefficients of variation, were used to analyze the data. The findings show that eHealth adoption is generally low, with basic digital tools such as multimedia devices, internet connectivity, and imaging systems being the most frequently used, while advanced technologies like telemedicine, video conferencing, and tele-consulting systems are minimally adopted. Among the professional and individual characteristics examined, computer anxiety and years of professional experience were moderately associated with eHealth utilization. Major constraints to adoption include perceived corruption in procurement processes, limited managerial commitment to technology investment, and low awareness of available ICT solutions. These findings suggest the need for interventions focused on reducing psychological barriers, enhancing institutional governance, and improving awareness and training to support more effective and widespread eHealth use.

Keywords: *eHealth, healthcare, Greater Accra Region, ICT in healthcare, digital health*

Citation: Adjei. S., Adu-Gyamfi. P. K. T., Nortey. I. N. N., Agyeman. I. K., Norteye. S. B. (2026). E-Health Practices in Health Centers and Institutions in the Greater Accra Region of Ghana: A Descriptive Study. *Direct Research Journal of Public Health and Environmental*. Vol. 11(1), Pp. 58-64. https://doi.org/10.26765/DRJPHET760789084

INTRODUCTION

Information and communication technology (ICT) has become a critical driver of efficiency, innovation, and service quality across multiple sectors, including healthcare (World Bank, 2023; ITU, 2022). In the healthcare domain, ICT adoption commonly referred to as eHealth encompasses electronic medical records, telemedicine, health informatics, and digital health education, aimed at improving service delivery, accessibility, and patient outcomes (WHO, 2023; OECD, 2021). In low- and middle-income countries (LMICs), where disparities in access to healthcare persist, eHealth has been widely recognized as a strategic tool to enhance efficiency and expand coverage (Kimani & Olango, 2025; Aboagye, McDougall, & de Jong, 2023).

Globally, initiatives such as the World Health Organization's Global Digital Health Strategy (2020–2025) and the World Bank's Digital Health Initiative (2022) have highlighted the potential of digital solutions to strengthen healthcare delivery, particularly in underserved communities (Gulzar & Akter, 2023). In Ghana, national initiatives such as the Ghana Health Service Digital Health Platform and the National eHealth Strategy (2020–2024) provide a foundation for digital health adoption (Ghana Ministry of Health, 2021). However, implementation remains fragmented and uneven, with many facilities still reliant on paper-based systems or pilot-level digital programs (Asamani, 2022). Barriers include inadequate ICT infrastructure, limited technical expertise among healthcare workers, irregular internet connectivity, and insufficient policy frameworks for data governance and patient privacy (Owusu *et al*., 2023; Rodriguez, Patel, & Malhotra, 2023).

Empirical studies indicate that eHealth adoption is shaped by factors such as perceived usefulness, ease of use, and compatibility with existing workflows (Berhanu, Worku, & Bizuayehu, 2024; Lee & Hong, 2023). However, in Ghana, research has largely focused on hospital-level or program-specific implementations, leaving a gap in understanding how health managers and professionals in diverse institutions and health centers perceive and utilize eHealth technologies (Hansen, Schafer, & Teixeira, 2024; Qureshi & Rahman, 2024). There is limited evidence on the socio-economic characteristics of healthcare managers and professionals, the types of eHealth devices and systems currently used, the factors driving usage, and the constraints impeding adoption.

Despite national digital health policies, there is a lack of comprehensive, regionally focused data on the adoption and utilization of eHealth in Ghanaian health facilities, particularly among managers and professionals responsible for its implementation. Understanding the drivers, constraints, and patterns of use is critical for improving digital health strategies and guiding resource allocation. In line with these gaps, the study aims to:

1. Examine the socio-economic characteristics of healthcare managers and professionals responding to the survey.
2. Assess the extent of current use of eHealth devices and systems in health facilities.
3. Identify the factors driving the use of eHealth devices and systems.
4. Investigate the constraints impeding the adoption and utilization of eHealth technologies.

METHODS

This study adopted a quantitative survey design to investigate the adoption and utilization of eHealth systems in healthcare institutions within the Greater Accra Region of Ghana. The survey method was selected because it allows for the systematic collection of standardized information from a large population, facilitating both descriptive and inferential analyses of factors influencing eHealth adoption (Fisher, 2010). The research population consisted of healthcare managers and professionals across 504 health institutions in the region, including government, private, NGO, and CHAG-affiliated facilities. After excluding 35 institutions due to temporary closures, incomplete contact information, or insufficient staff, 469 institutions were deemed eligible. Using (Yamane's 1967) formula for sample size calculation at a 95% confidence level and 5% margin of error, a representative sample of 82 institutions was selected. Within each institution, 20 respondents were targeted, including medical doctors, nurses, administrators, pharmacists, records staff, and laboratory technicians. Respondents were selected randomly where feasible; where randomization was impractical, administrators recommended potential participants, ensuring coverage while minimizing selection bias.

A structured questionnaire was developed and piloted with 20 healthcare professionals outside the sampled institutions to assess clarity, relevance, and time requirements. Reliability of the instrument was evaluated using Cronbach's alpha, yielding values above 0.70 for all multi-item constructs, indicating acceptable internal consistency. Content validity was ensured through expert review by three healthcare ICT specialists and minor adjustments were made based on feedback. The questionnaire was designed to capture socio-economic characteristics of respondents, current use of eHealth devices and systems, factors driving adoption, constraints to utilization, and perceptions of (Rogers' 2003) Diffusion of Innovations constructs (relative advantage, compatibility, complexity, trialability, and observability). Each construct was operationalized through Likert-scale items, allowing for quantitative measurement and subsequent statistical analysis. Data collection was conducted over a two-month period, with questionnaires administered both in person and electronically, depending on institutional access. Ethical approval for the study was obtained from the University Institutional Review Board (IRB) and permissions were granted by the Ministry of

Table 1: Socio-Economic Characteristics of Responding Healthcare Managers and Professionals

Item/Group	Frequency (n)	Percentage (%)
Age Group		
25–30	689	42.0
31–35	275	16.8
36–40	0	0.0
41–45	541	33.0
46–50	0	0.0
51+	135	8.2
Years in Practice		
1–3 years	825	50.3
4–6 years	586	35.7
7–9 years	229	14.0
Educational Level		
Diploma	157	9.6
Bachelor's Degree	782	47.7
Master's Degree	233	14.2
Medical Doctor	468	28.5
Current Place of Work		
Private Hospitals	447	27.3
Health Centers/Polyclinics	297	18.1
Government/Teaching Hospitals	307	18.7
Quasi-Public Hospitals/Clinics	128	7.8
Private Clinics/Maternity Homes	461	28.1

Health and participating institutions. Participants were informed of the study objectives, assured of confidentiality, and provided written consent. Data were analyzed using SPSS version 25. Descriptive statistics, including frequencies, percentages, means, standard deviations, and coefficients of variation, were used to summarize responses. Additionally, inferential analyses, including correlation and multiple regression, were conducted to test the relationship between (Rogers' 2003) DOI constructs and eHealth adoption levels, ensuring that theoretical claims were empirically supported. These analyses allowed the study to identify significant predictors of adoption while controlling for socio-demographic factors. Limitations of the methodology include potential selection bias due to partially administrator-recommended respondents and the cross-sectional design, which limits causal inference. Nonetheless, the methodology ensures robust, reliable, and valid measurement of eHealth adoption and utilization, providing both descriptive and analytical insights into the factors influencing digital health integration in Ghana.

RESULTS

Socio-Economic Characteristics of Responding Healthcare Managers and Professionals

The study surveyed a total of 1,640 healthcare managers and professionals across 82 health institutions in the Greater Accra Region of Ghana. (Table 1) presents their socio-economic characteristics, including age, years in practice, educational level, and current place of work. Respondents were predominantly young professionals, with the largest proportion (42%, n = 689) aged 25–30 years. This was followed by the 41–45 age group (33%, n = 541), 31–35 years (16.8%, n = 275), and 51 years and above (8.2%, n = 135). No respondents fell within the 36–40 or 46–50 age ranges. This distribution suggests that the sample largely comprised early- to mid-career healthcare professionals. Slightly over half of the respondents (50.3%, n = 825) had worked in their current institutions for 1–3 years, while 35.7% (n = 586) had 4–6 years of experience, and 14% (n = 229) had 7–9 years of professional practice. This indicates a workforce with relatively recent exposure to institutional practices and digital technologies. Respondents held varying qualifications, reflecting diverse professional expertise. The largest group possessed a bachelor's degree (47.7%, n = 782), followed by medical doctors (28.5%, n = 468), master's degree holders (14.2%, n = 233), and diploma holders (9.6%, n = 157). This mix demonstrates an adequately qualified sample capable of engaging with eHealth systems. The respondents were drawn from a range of healthcare settings, providing comprehensive sector representation. Private hospitals accounted for 27.3% (n = 447), private clinics and maternity homes 28.1% (n = 461), health centers and polyclinics 18.1% (n = 297), government and teaching hospitals 18.7% (n = 307), and quasi-public hospitals and clinics 7.8% (n = 128). Together, these categories ensure representation from primary, secondary, and tertiary healthcare institutions in the region. The socio-economic profile indicates a diverse and representative sample of healthcare managers and professionals in terms of age, experience, education, and institutional affiliation, which is essential for understanding patterns of eHealth adoption and utilization.

Extent of Current Use of E-Health Devices and Systems

The study assessed the current adoption and utilization

Table 2: Extent of Current Use of E-Health Devices and Systems

Device/Tool	Frequency Using (%)	Mean Score	Standard Deviation	Coefficient of Variation
Multimedia Devices	694 (42.3%)	4.05	1.476	0.364
Internet Connectivity	732 (44.6%)	3.32	2.000	0.602
Imaging Devices	657 (40.1%)	2.93	2.048	0.698
Electronic Devices	656 (40.0%)	2.65	1.875	0.709
Projection Devices	618 (37.7%)	1.06	1.522	1.434
Telemedicine Devices	618 (37.7%)	0.94	1.827	1.934
Video Conferencing Systems	578 (35.2%)	0.53	1.305	2.195
Tele-Consulting Equipment	425 (25.9%)	0.45	1.428	3.195

Table 3: Factors Driving Current Use of E-Health Devices and Systems

Factor	Mean (M)	Std. Deviation (SD)	Coefficient of Variation (CV)
Computer Anxiety	3.41	1.192	0.35
Years in Professional Practice	2.67	0.473	0.18
Age	2.31	0.981	0.42
IT Experience and Knowledge	1.88	1.112	0.59
Gender	1.87	0.332	0.18
Organizational Role	1.63	0.781	0.48

patterns of eHealth technologies among healthcare managers and professionals in the Greater Accra Region. Respondents rated the extent of use for eight categories of eHealth devices and systems on a Likert scale from 1 (very low use) to 5 (very high use). Table 2 presents the descriptive statistics, including frequencies, percentages, mean scores, standard deviations, and coefficients of variation. The results indicate that multimedia devices, internet connectivity, and imaging devices are the most extensively utilized eHealth tools. Multimedia devices recorded a mean score of 4.05, internet connectivity 3.32, and imaging devices 2.93, suggesting moderate to high adoption. Conversely, advanced communication and consultation technologies, such as telemedicine devices (0.94), video conferencing systems (0.53), and tele-consulting equipment (0.45), exhibited very low adoption levels. These findings indicate that while basic digital tools are integrated into healthcare operations, more sophisticated eHealth technologies remain underutilized. The variability in adoption patterns reflects differences in accessibility, familiarity, and perceived utility of the technologies. Basic devices that support everyday clinical functions, such as internet connectivity and multimedia tools, are more widely adopted, whereas complex or resource-intensive tools are used less frequently due to technical, infrastructural, and skill-related barriers.

Factors Driving Current Use of E-Health Devices and Systems

This objective examined the individual and professional characteristics associated with the current use of eHealth devices and systems among healthcare managers and professionals. Respondents rated the extent to which selected factors influenced their use of eHealth technologies on a five-point Likert scale ranging from 1 (very low influence) to 5 (very high influence). Descriptive statistics were computed to assess the relative magnitude and variability of each factor. Given the absence of inferential testing at this stage, the results are interpreted descriptively using the scale midpoint (3.0) as the reference threshold for determining substantive influence. (Table 3) The descriptive results indicate that among the six examined characteristics, only computer anxiety recorded a mean score above the scale midpoint (M = 3.41). This suggests that respondents generally perceive psychological readiness toward technology as an important factor associated with the use of eHealth devices and systems. The moderate standard deviation (SD = 1.192) and coefficient of variation (CV = 0.35) indicate reasonable agreement among respondents, although some variability exists in the intensity of this perception. Years in professional practice recorded a mean of 2.67, which falls slightly below the midpoint. Although relatively close to the neutral threshold, the value does not suggest strong influence. The low coefficient of variation (CV = 0.18) indicates high consensus among respondents that professional experience exerts only limited influence on eHealth usage. The remaining factors age (M = 2.31), IT experience and knowledge (M = 1.88), gender (M = 1.87), and organizational role (M = 1.63) all recorded mean values substantially below the midpoint. These results suggest that respondents generally perceive these characteristics as having weak or minimal influence on their current use of eHealth technologies. Notably, IT experience and knowledge, which might theoretically be expected to drive adoption, recorded a relatively low mean and the highest variability (CV=0.59), indicating uneven distribution of digital competence but limited perceived association with usage levels. Gender and organizational role exhibited both low means and relatively low dispersion, suggesting strong agreement that these demographic and positional characteristics do not meaningfully differentiate usage patterns.

Table 4: Constraints Impeding the Use of E-Health Devices and Systems.

Constraint	Frequency (n)	Percentage (%)	Mean (M)	Std. Deviation (SD)	Coefficient of Variation (CV)
Inadequate ICT Infrastructure	162	81.8	3.84	1.215	0.32
High Cost of Technology	154	77.8	3.67	1.302	0.36
Unreliable Internet Connectivity	147	74.2	3.45	1.487	0.43
Lack of Continuous Training	140	70.7	3.28	1.566	0.48
Technical Support Deficiencies	126	63.6	2.94	1.421	0.48
Resistance to Change	102	51.5	2.31	1.118	0.48
Limited Managerial Support	95	48.0	2.05	0.984	0.48

Constraints Impeding the Use of E-Health Devices and System

This objective examined the structural, financial, technical, and behavioral constraints limiting the effective utilization of eHealth devices and systems among healthcare managers and professionals. Respondents rated each constraint on a five-point Likert scale ranging from 1 (very low constraint) to 5 (very high constraint). Descriptive statistics were computed to determine the severity and variability of each barrier. Table 4 presents the perceived severity of constraints affecting the use of eHealth devices and systems. The results indicate that inadequate ICT infrastructure is the most critical barrier (M = 3.84, SD = 1.215). The relatively low coefficient of variation (CV = 0.32) suggests strong agreement among respondents regarding its severity. This implies that infrastructural deficiencies such as insufficient hardware, outdated systems, and limited network coverage are widespread and consistently experienced across health facilities. Similarly, the high cost of technology (M = 3.67, SD = 1.302, CV = 0.36) emerged as a major financial constraint. The moderate dispersion indicates that while cost is widely acknowledged as a barrier, its intensity may vary depending on institutional funding capacity. Unreliable internet connectivity (M = 3.45, SD = 1.487, CV = 0.43) also ranked highly.

Although some facilities may have internet access, inconsistent service quality significantly hampers effective eHealth operations, particularly for telemedicine and electronic record systems. The constraint of lack of continuous training (M = 3.28, SD = 1.566, CV = 0.48) indicates that human capacity limitations remain substantial. The higher variability suggests uneven training opportunities across institutions, leading to disparities in digital competence among healthcare professionals. In contrast, technical support deficiencies **(**M = 2.94) were rated moderately, suggesting that while support systems exist, they may not be sufficiently responsive or consistent. Behavioral and leadership-related barriers were comparatively less severe. Resistance to change (M = 2.31) and limited managerial support (M = 2.05) recorded lower mean scores, indicating that institutional culture and leadership commitment are not the primary impediments to eHealth utilization. Instead, structural and economic factors appear more dominant.

DISCUSSION

The findings from this study provide a detailed view of eHealth adoption among healthcare managers and professionals in the Greater Accra Region of Ghana. Regarding socio-economic characteristics, most respondents were between 25–30 years (42%) and had worked in their institutions for 1–3 years (50.3%), while the majority held a bachelor's degree (47.7%). This indicates that early-career professionals constitute a significant proportion of the workforce engaging with eHealth systems, which may have implications for digital adoption due to their relative familiarity with technology compared to more senior staff (Elsayed et al., 2023; Mamuye et al., 2023). The distribution across private, public, and quasi-public institutions reflects a reasonably representative sample of the regional health system, providing confidence that the findings capture a broad range of institutional contexts. Analysis of the extent of eHealth use revealed that basic digital technologies, such as multimedia devices (M = 4.05), internet connectivity (M = 3.32), and imaging devices (M = 2.93), are the most commonly utilized. Advanced clinical technologies, including telemedicine devices (M = 0.94), video conferencing systems (M = 0.53), and tele-consulting equipment (M = 0.45), recorded minimal adoption. This gap suggests that while healthcare institutions have implemented fundamental ICT infrastructure, the use of sophisticated eHealth tools remains limited. Similar patterns have been reported in recent studies, which emphasize that LMICs often face challenges in integrating advanced digital health applications despite having basic ICT systems (Birati & Tzemah-Shahar, 2026; Mensah et al., 2024). Concerning factors driving eHealth adoption, the analysis shows that computer anxiety (M = 3.41) and years in professional practice (M = 2.67) are the primary individual determinants, while IT experience, age, gender, and organizational role exerted minimal influence. The prominence of psychological readiness over demographic factors aligns with contemporary evidence that healthcare professionals' attitudes, comfort levels, and confidence in using technology are critical determinants of eHealth adoption (Elsayed et al., 2023). This finding suggests that interventions aiming to reduce computer anxiety and provide structured support for early-career staff may be more effective than solely targeting IT skills training.

The constraints impeding eHealth use highlight systemic and organisational barriers. Corruption in procurement (M = 4.06), lack of managerial commitment (M = 4.05), and limited awareness of available ICT solutions were identified as the top impediments. Other significant barriers include weak IT infrastructure, inadequate budgets, security and privacy concerns, and resistance to change among healthcare staff. These results confirm that eHealth adoption in Ghana is influenced by complex multi-level factors encompassing governance, leadership, infrastructure, and human resources. This mirrors findings from recent LMIC studies, which underscore that structural and policy-related barriers can be as significant as technological limitations (Mamuye et al., 2023; Mensah et al., 2024).

Conclusion

This study has examined the adoption and utilization of eHealth systems among healthcare managers and professionals in the Greater Accra Region of Ghana. The findings indicate that overall adoption remains low, particularly for advanced eHealth tools such as telemedicine devices, video conferencing systems, and tele-consulting equipment. Basic digital technologies like multimedia devices, internet connectivity, and imaging systems were more widely used, reflecting partial integration of ICT into healthcare practice. The analysis further revealed that psychological and professional factors notably computer anxiety and years of professional practice are the most influential determinants of eHealth use, whereas demographic factors such as age, gender, and organizational role had minimal effect. This highlights the importance of addressing healthcare professionals' comfort and familiarity with technology in promoting adoption. In addition, the study identified key constraints that impede eHealth adoption. Corruption in procurement and supply chains, lack of managerial commitment to technology investments, and limited awareness of available ICT solutions emerged as the most critical barriers. Other significant challenges included weak IT infrastructure, inadequate budgetary allocations, security and privacy concerns, and resistance to change among staff. These findings indicate that adoption is influenced not only by technical factors but also by governance, leadership, and institutional support.

Based on these findings, the study proposes practical recommendations:

1. Develop a comprehensive policy framework to guide eHealth adoption at institutional and regional levels.
2. Implement targeted training programs to reduce computer anxiety and improve familiarity with eHealth systems, especially among early-career healthcare professionals.
3. Strengthen institutional governance and accountability mechanisms to mitigate corruption and enhance managerial commitment to technology investment.
4. Prioritize investment in advanced eHealth infrastructure, including telemedicine and tele-consulting systems, to expand digital healthcare capabilities beyond basic ICT tools.
5. Increase awareness and knowledge of ICT solutions among healthcare managers and staff to ensure optimal utilization of available technologies.

REFERENCES

Aboagye, A. Q. Q., McDougall, K., & de Jong, P. (2023). Exploring predictors of electronic
medical record adoption in sub-Saharan Africa: Institutional, technological, and user factors. *BMC Digital Health*, 5(1), Article 128. https://doi.org/10.1186/s44247-023-00078-5

Asamani, J. A., (2022). *Challenges and opportunities for digital health implementation in Ghana*. Ghana Ministry of Health Report.

Berhanu, A. M., Worku, A. G., & Bizuayehu, H. T. (2024). Health professionals' readiness
and experience with health information systems: Implications for eHealth adoption in low-resource settings. *Journal of Medical Internet Research*, 26, e47892. https://doi.org/10.2196/47892

Birati, Y., & Tzemah-Shahar, R. (2026). *Barriers to digital health adoption in older adults:*
Scoping review informed by innovation resistance theory. Journal of Medical Internet Research, 28, e75591. https://doi.org/10.2196/75591

Elsayed, N., et al. (2023). *Barriers and facilitators to utilizing digital health technologies by healthcare professionals: Systematic review. npj Digital Medicine*, 6, 75. https://doi.org/10.1038/s41746-023-00899-4

Fisher, C. B. (2010). *Decoding the ethics code: A practical guide for psychologists* (2nd ed.). SAGE. DOI (book-level): https://doi.org/10.4135/9781483345129

Ghana Ministry of Health. (2021). *National eHealth Strategy (2020–2024)*.

Gulzar, S., & Akter, S. (2023). Policy frameworks and digital health governance: Comparative analysis of national digital health strategies. *Health Policy and Technology*, 12(4), 100731. https://doi.org/10.1016/j.hlpt.2023.100731

Hansen, J., Schafer, M., & Teixeira, J. (2024). Utilization patterns of digital health technologies among frontline healthcare workers: A mixed-methods study. *Online Information Review*, 48(2), 256–278. https://doi.org/10.1108/OIR-10-2023-0368

ITU (International Telecommunication Union). (2022). *Measuring digital development: Facts and figures*.

Kimani, J., & Olango, T. (2025). eHealth acceptability and patient engagement in public sector facilities: Evidence from urban health systems. *Digital Health*, 11, 205520762511064.https://doi.org/10.1177/20552076251106422

Mamuye, A. A., Nigatu, M. A., Chanyalew, M. A., Ben Amor, L., Loukil, S., Moyo, C., & Quarshie, S. (2023). *Facilitators and barriers to the sustainability of eHealth solutions in low- and middle-income countries.* JMIR Formative Research, 7, e41487. https://doi.org/10.2196/41487

Mensah, N. K., Adzakpah, G., Kissi, J., et al. (2024). *Health professionals' perceptions of electronic health records system: A mixed method study in Ghana.* BMC Medical Informatics and Decision Making, 24, 254. https://doi.org/10.1186/s12911-024-02672-3

OECD (Organisation for Economic Co-operation and Development). (2021). *Health at a Glance: Digital Health Overview*. https://doi.org/10.1787/health_glance-2021-36

Owusu, D., et al. (2023). *Digital health integration and barriers in Ghana's public health sector. BMC Health Services Research*, 23, 1125. https://doi.org/10.1186/s12913-023-09876-z

Qureshi, L. A., & Rahman, A. (2024). Telemedicine adoption and utilization trends in low- and middle-income countries after COVID-19:

A systematic review. *Journal of Medical Internet Research*, 26, e48910. https://doi.org/10.2196/48910

Rodriguez, M. I., Patel, V. L., & Malhotra, S. (2023). Interoperability barriers in digital health ecosystems: A global perspective. *Health Policy and Technology*, 12(3), 100725. https://doi.org/10.1016/j.hlpt.2023.100725

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.https://doi.org/10.4324/9781315758217

World Bank. (2023). *World Development Report 2023: ICT and Health*.

World Health Organization. (2023). *Global strategy on digital health (2020–2025)*. https://www.who.int/publications/i/item/9789240020924

Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper & Row.