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**From Queues to Clicks: The Consumer Perspective
on Digital Public Health**

Alina Maria CIOCÎRLAN¹

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Abstract

The digitisation of public health systems is essential to improving efficiency, security, and patient-centred care. Despite technological advances, many public health institutions still rely on paper-based patient records, prone to loss, damage, and unauthorised access. This outdated system poses significant risks, including mismanagement of patient data, treatment delays, and confidentiality breaches. The move to electronic health records ensures secure storage, easy retrieval, and seamless sharing of medical information, increasing patient safety and healthcare efficiency. By implementing innovative healthcare solutions like telemedicine, artificial intelligence, and mobile health apps, public health systems can increase security, streamline workflows, and improve patient outcomes. However, data privacy concerns, digital literacy, and infrastructure limitations must be addressed. This article examines the need to replace paper-based records with digital solutions from a consumer perspective, highlighting the benefits and challenges of digitizing public health services to create a more efficient, secure, and accessible healthcare system.

Keywords: digitisation, electronic health records, intelligent healthcare, data privacy.

1. Introduction

The rapid evolution of digital technologies has led to significant changes in most industries, particularly in healthcare. The COVID-19 pandemic has further accelerated the adoption of digital tools, including electronic health records (EHRs), telemedicine platforms, and mobile health applications, making digital health a crucial component of global health reforms. In Romania, this process is

¹ Bucharest University of Economic Studies, Bucharest, Romania, alinamciocirlan@gmail.com.

still underway, facing challenges such as infrastructure limitations, digital illiteracy in certain population segments, supporting legislation and specific resistance within healthcare institutions.

This research explores the public's attitudes, knowledge levels, and perceived barriers regarding the digitalisation of the Romanian healthcare system. It also examines Romanian citizens' perspectives toward digital health services, their expectations for digital solutions, and their suggestions for improvement. Based on a qualitative and quantitative analysis this research aims to investigate and determine further actions and innovative solutions to be undertaken toward digital transformation of public health care system across Romania.

2. Literature Review

2.1 Digital Health and Service Quality in the Romanian Environment

Digital health is widely defined as using information and communication technologies to enhance the efficacy, accessibility, and quality of healthcare services. Digitally and globally, digital health has been linked to improving patient outcomes, optimising clinical workflows, and raising levels of engagement in managing health (World Health Organization [WHO], 2021). Such technologies include electronic health records (EHRs), telemedicine platforms, mobile health applications, and the use of artificial intelligence in diagnosis (Topol, 2019). The potential for such technologies to drastically enhance patient outcomes generates enthusiasm regarding the future state of healthcare. Nevertheless, the literature identifies considerable challenges, such as disparities in digital literacy, infrastructural shortcomings, and persisting ethical issues in data protection and patient confidentiality (Shaw et al., 2019).

Romania's eHealth infrastructure has evolved slowly compared to Western European counterparts. The National Health Insurance House (CNAS) introduced electronic prescriptions (e-Prescriptions) and electronic health records (EHRs) in the early 2010s, but these systems suffer from inconsistent integration, limited interoperability, and variable use across regions (Vlădescu et al., 2016; Ministry of Health Romania, 2021). Telemedicine regulations were only formalised in 2020, accelerated by the COVID-19 pandemic, yet remain underutilised due to reimbursement and regulatory uncertainties (Dumitra et al., 2021).

In assessing the impact of digital health on service quality, internationally recognised frameworks such as the Donabedian Model (structure–process–outcome) continue to be used. It has to be observed that applied to the Romanian context, structural weaknesses—such as fragmented IT systems, insufficient digital training for medical staff, and a lack of national health data governance—limit the effectiveness of digital processes and, consequently, their impact on patient outcomes (Arah et al., 2010; OECD, 2021). Moreover, regional health inequalities persist, as digitally enhanced services are more available in urban areas, leaving

rural populations with limited access (World Bank, 2022). It becomes obvious the foundation for improvement of public healthcare delivery in Romania lies in the capacity of the public administration to introduce technology and digitisation as real instruments to overcome systemic inefficiencies and limitations, through national e-Government initiatives able to address important issues such as interoperability of data systems, cybersecurity issues, e-learning platforms, facility infrastructure and integrate them across the health sector in Romania.

It is noticed that the OECD Health Care Quality Framework (2021) emphasises the dimensions of safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity. These are directly impacted by the degree of digital integration. In Romania, patients report low satisfaction with waiting times, communication, and service personalisation—dimensions that digital tools could address, yet have not consistently improved due to operational fragmentation (Eurobarometer, 2018; European Commission, 2023).

While research on Romania's digital health adoption often focuses on institutional and legislative readiness (Moga et al., 2021), fewer studies engage with how these technologies affect perceived service quality or the patient experience. Thus, a gap persists in understanding how digitalisation interacts with broader elements of healthcare service delivery, especially in terms of trust, usability, and equity. It can be noted that improving the quality of health services in Romania through digitisation requires a holistic transformation from installing new software to upgrading infrastructure, training staff, creating supporting legislation, having the right strategy and investment.

2.2 Health Service Quality: A Marketing Perspective

The quality of services provided is important to consider when evaluating healthcare provision, particularly as the industry shifts toward a framework that emphasizes consumer orientation.

In today's service-based economies, quality is a key competitive edge influencing customer satisfaction, loyalty, and organizational performance (Zeithaml et al., 1990). Unlike tangible products, services are frequently intangible, heterogeneous, and inseparable from their providers—characteristics that render it difficult to guarantee quality but necessitate it (Grönroos, 1984). In the Romanian context, Olteanu (2004) states that service quality must evolve in tandem with changing consumer expectations, which are largely derived from customised experiences and continuous improvement initiatives. Failure to match these expectations can undermine customer trust and the institution's credibility.

One of the most widely applied models for measuring service quality is SERVQUAL scale, developed by Parasuraman et al. (1988). It identifies five key dimensions—reliability, responsiveness, assurance, empathy, and tangibles—that reflect consumer expectations of service providers. Though originally applied in commercial sectors, SERVQUAL has been adapted for healthcare and used

in Romania to assess both public and private service delivery (Popa & Purcărea, 2019). These dimensions have become even more salient in the digital age. For example, responsiveness now includes timely digital communication; assurance is linked to cybersecurity and data transparency; and tangibles relate to user-friendly digital interfaces.

Moreover, experiential marketing approaches—which consider emotions, trust, and perceptions—are increasingly seen as essential for improving public healthcare image and loyalty, particularly in transitioning health systems like Romania's (Kotler et al., 2021). In this regard, branding, service personalisation, and communication strategies are not ancillary but central to fostering service quality. While private providers in Romania have embraced these approaches, public institutions remain largely focused on administrative efficiency rather than customer satisfaction.

Technological integration must be paralleled with improving perceived and actual service quality in a country embracing digital transformation. As Olteanu (2004) asserts, innovation and adaptability are crucial in rapidly evolving markets, particularly as consumer expectations rapidly shift due to the evolution of digital advancements. This patient-focused approach is critical in moulding the future healthcare sector in Romania. This review forms the foundation for a comprehensive analysis of Romania's digital health ecosystem, particularly emphasising systemic readiness and citizen experience. By combining macro-level data and local knowledge, this study highlights the potential of a marketing-informed approach to enhance Romania's healthcare quality, especially when coupled with inclusive digital strategies and citizen-focused design.

3. Methodology

This study employed a cross-sectional survey design to explore public perceptions, knowledge, and barriers concerning the digitisation of healthcare in Romania. Data was collected during the month of March 2025, using an online questionnaire distributed through social media platforms, email networks, and community groups. Seventy-eight individuals participated in the survey during the two-week collection period.

The questionnaire consisted of both closed and open questions. The closed questions collected data on demographic characteristics (age, sex, marital status, education level, employment status, and place of residence), frequency of healthcare utilisation, satisfaction with access and quality of services, and perception of digital health tools. These were structured using categorical and Likert-type response options.

The primary objectives of the study are as follows:

1. To assess public awareness and use of digital health tools in Romania.
2. To evaluate perceived quality and accessibility of healthcare services through digital channels.

3. To identify key barriers and facilitators to the adoption of digital health technologies.

Based on the research objectives and existing literature, the study proposes the following hypotheses:

H1: Higher levels of digital literacy are associated with more favourable perceptions of digital health services.

H2: Respondents who report higher satisfaction with overall healthcare services will also express greater openness to digital health tools.

H3: Age, education level, and place of residence significantly influence perceived barriers to adopting digital health technologies.

The survey instrument included both closed-ended and open-ended items:

- Closed-ended questions collected quantitative data using categorical options and 5-point Likert scales to measure attitudes toward digital health tools and satisfaction with healthcare services.
- Open-ended questions allowed participants to elaborate on their personal experiences, highlight perceived barriers, and suggest improvements in digital health implementation.

Quantitative responses were summarised using **descriptive statistics** such as frequencies and percentages. Although no advanced statistical modelling was conducted, some initial data processing and frequency checks were performed using IBM SPSS Statistics, mainly for organising and labelling variables.

A set of variables have been used in order to understand the correlations between them. There have been analysed two categories of variables, showing positive correlation and predictability, as demonstrated below.

- Independent variables:
 - Demographic characteristics: age, gender, marital status, education level, employment status, and place of residence
 - Frequency of healthcare utilisation
 - Level of digital literacy
 - Type of healthcare accessed (public vs. private)
- Dependent variables:
 - Perceived quality of digital health services
 - Satisfaction with the access to healthcare services
 - Reported barriers to using digital health technologies
 - Willingness to adopt or continue using digital tools for healthcare

Thematic analysis was applied manually to open-ended responses. Recurring themes, concerns, and suggestions were grouped and categorised to reflect broader user attitudes and expectations trends. This qualitative component added valuable context to the numerical data.

4. Analysis/Interpretation of Results

4.1 Demographic Characteristics of Respondents

Demographic analysis revealed a predominantly young, urban, and educated group of respondents. The majority (52.6%) were aged 25 to 34, followed by 16.7% who were between 35 and 44, and 26.9% aged 45 to 54. Those over 55 comprised the remaining percentage, with just 3.8% being under 25 years old. Female respondents were slightly more numerous than male participants. More than 80% of respondents lived in urban areas, suggesting more significant exposure to health facilities and digital infrastructure.

Regarding educational attainment, most participants have a university degree, with a significant proportion holding bachelor's or master's degrees. The higher level of education likely contributed to greater digital competence and openness to the use of technology. Employment status also revealed a digitally active population, with the majority working full-time and routinely in employer-supported healthcare services. Marital status varied, although most respondents were married or in long-term relationships (66,6%).

4.2 Perceived Quality of Healthcare Services

Survey results reveal a strong orientation of respondents towards healthcare solutions. Most said they use healthcare services annually, mainly for laboratory tests and specialist consultations. Interestingly, most participants used public and private providers, reflecting a hybrid model that is increasingly common in Romania. Digital tools were frequently used for scheduling appointments and accessing test results, especially among younger, more educated urban users. These patterns suggest the emergence of a digital health culture among specific population segments.

Respondents were also asked whether they think digital tools could improve the quality of healthcare services. In this case, 54.1% thought digitisation could significantly improve the quality of services, while 27% anticipated a moderate improvement. Only a tiny percentage expressed scepticism, indicating a generally optimistic but realistic position.

Participants associated digitalisation with improvements in:

- **Transparency:** Digital platforms were viewed as more reliable and traceable than paper-based systems.
- **Continuity of care:** Digital health records allowed easier transfer of information between institutions and providers, leading to more accurate diagnoses and fewer redundancies.
- **Timeliness:** Online access to lab results and remote consultations helped reduce delays in both diagnosis and treatment.

- Trust and accuracy: Centralised records and systematised data storage were perceived to improve care consistency.

Participants identified several dimensions of healthcare quality positively influenced by digital transformation, aligning with both SERVQUAL and Donabedian models:

Table 1. Reported effects of digital transformation across key healthcare service quality dimensions

Service Quality Dimension	Reported Improvement from Digitalisation
Communication	More responsive through SMS alerts, online portals, and email follow-up
Waiting Time	Reduced by online appointment scheduling and pre-visit triage
Service Delivery Time	Faster access to diagnostics and lab results
Continuity of Care	Enhanced through shared electronic health records between providers
Transparency	Patients felt better informed through digital health portals
Trust and Assurance	Contingent on perceived data security and ease of use

Source: author's own creation.

Many participants described digital health as more transparent and reliable than traditional systems, particularly in urban areas. However, this was conditional on platform usability and accessibility.

4.3 Perceptions of Technological Integration

Survey results revealed a generally favourable view of technology integration within the health system. 82,1% of respondents demonstrated high levels of engagement with digital tools, particularly for routine administrative tasks such as scheduling appointments and accessing lab results. These services were particularly popular among younger, urban, more highly educated respondents – groups driving early adoption of digital healthcare in Romania.

Participants highlighted several benefits of technology integration, **including faster access to health information, improved communication with healthcare providers, and reduced administrative errors.** These benefits were often linked to mobile platforms and online portals, which users described as more transparent and faster than traditional, paper-based systems.

In particular, **62,8% of respondents rated the transition to digital health records as "extremely important,"** while **29,5% considered it "important."** This almost unanimous consensus indicates widespread awareness of the importance of digital records for improving efficiency and continuity of care. Many respondents emphasised the role of integrated systems in facilitating the transfer of patient data between providers, reducing redundancies, and ensuring more accurate diagnoses.

In addition, over **60% of participants** expressed support for more advanced digital tools, including **artificial intelligence** and **telemedicine**, recognising their potential to increase speed and access to services. These technologies were considered particularly valuable in overcoming logistical barriers, such as limited access to specialists or long waiting times in public institutions.

Although the general sentiment was positive, some respondents expressed cautious optimism. While many were enthusiastic about the promise of digital transformation, several emphasized that technology integration needs to be accompanied by adequate training, user-friendly interfaces, and a solid infrastructure. Without these, digital tools risk becoming underutilised or ineffective despite their perceived value.

In summary, the results suggest that there is both awareness and demand for deeper technological integration in the Romanian healthcare system, especially among digitally literate users. The population seems increasingly ready – and in many cases eager – to adopt a more connected, data-driven model of care, provided that systemic and usability barriers are addressed in parallel.

4.4 Perceived Barriers to Digital Adoption

Despite overall optimism, multiple barriers were noted:

- Infrastructure gaps in rural areas (reported by 79% of respondents)
- Low digital literacy, particularly among elderly patients (61%)
- Resistance to digital tools among healthcare professionals (58%)
- Security and privacy concerns (42%)
- Unreliable or difficult-to-use interfaces (37%)

These align with global findings regarding the “digital divide” in health, highlighting that technology alone does not guarantee adoption or improved quality unless supported by training, equity-focused policy, and platform optimisation (World Bank, 2022).

4.5 Correlation Analysis: Perceptions and Predictors

To explore how various beliefs and behaviours correlate with perceptions of digital health’s impact, a Spearman correlation analysis was conducted.

Key Correlation Findings show the causality among indicators:

Table 2. Correlation analysis of perceived service quality and digital health factors

Variable Pair	Spearman's ρ	Interpretation
Perceived quality impact & Digital record importance	0.52	Moderate-strong positive relationship
Perceived quality impact & AI/Telemedicine value	0.46	Moderate positive relationship
Perceived quality impact & Trust in data security	0.38	Weak-moderate positive relationship
Perceived quality impact & Digital scheduling usage	0.00	No relationship – usage alone does not affect quality perceptions

Source: author's own creation.

These findings suggest that belief in strategic system-level improvements (such as digital records and AI) is a stronger predictor of perceived service quality than basic tool usage (like online booking). This distinction is critical when designing digital health campaigns or policies: trust and systemic utility matter more than exposure alone.

4.6 Regression Analysis: Predicting Perceived Quality Improvement

To assess which factors best predict citizens' views on digital health's ability to improve service quality, a multiple linear regression was conducted.

Regression Summary shows the main findings, respectively:

- $R^2 = 0.40$ – The model explains 40% of the variation in perceived quality improvement.
- $F(4, 73) = 12.19, p < .001$ – The overall model is statistically significant.

Table 3. Regression analysis of predictors of perceived digital health quality impact

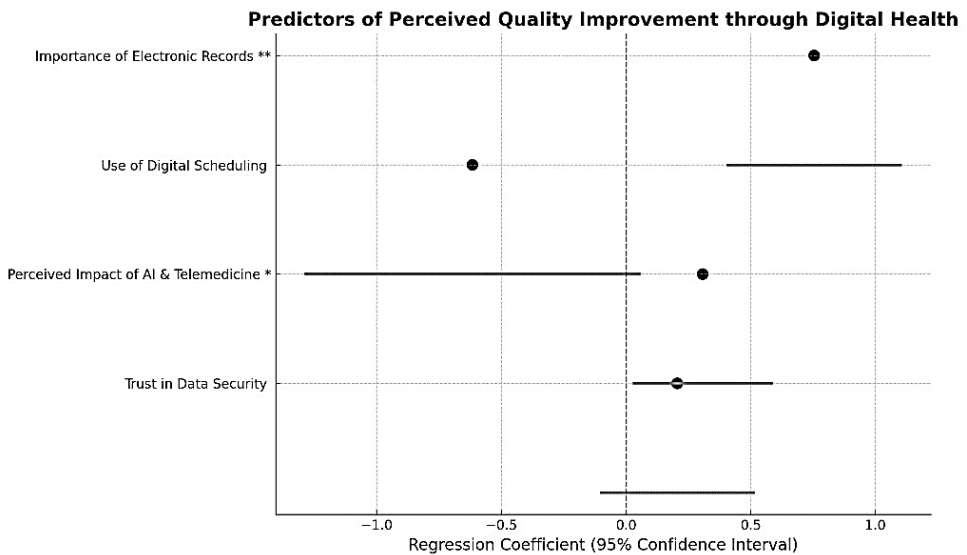
Predictor	β	p -value	Significance
Importance of Electronic Records	0.75	< .001	Strongest and most significant predictor
Perceived Value of AI/Telemedicine	0.31	.029	Significant moderate predictor
Trust in Data Security	0.21	.184	Positive, not statistically significant
Use of Digital Scheduling	-0.62	.071	Negative trend, marginal significance

Source: author's own creation.

These results show that the strongest influence on how people perceive digital health benefits is the importance they place on electronic medical records. Belief in the value of emerging technologies like AI and telemedicine also plays a critical role. Surprisingly, actual use of digital systems, such as scheduling platforms, does not increase perceived quality unless accompanied by other trust-building or efficiency-enhancing features.

The correlation between people's perceptions and needs and systems readiness becomes one of the major challenges to investigate.

Figure 1. Predictors of perceived quality improvement through digital health



*Note: Error bars represent 95% confidence intervals. ** $p < .01$; $p < .05$.

Source: author's own creation.

4.7 Digital Barriers and Suggested Improvements

Despite the enthusiasm for digital tools, several significant obstacles emerged. The most frequently mentioned challenge was inadequate infrastructure, particularly in rural or underdeveloped areas ($n = 62$). This is closely followed by concerns regarding digital literacy among older populations ($n = 48$), resistance to change within the medical profession ($n = 45$), and ongoing worries about data security and privacy ($n = 33$). These findings align with the global literature on digital health adoption, which often emphasises the 'digital divide' as a key issue.

In addition, participants reported frustrating experiences with current digital platforms, citing technical glitches, unfriendly interfaces, and limited functionality. Such problems discourage users and erode confidence in the system's digital capability. These concerns extend beyond anecdotes; they highlight systemic

issues that need resolution to guarantee an inclusive and dependable digital transformation.

The most frequently mentioned obstacles to digitisation of the public healthcare system include the lack of necessary IT infrastructure (n = 62), a low level of digital literacy among patients (n = 48), medical staff resistance to change (n = 45), data security concerns (n = 33), and bugs in existing platforms (n = 29).

4.8 The Health Card and Trust in Digital Records

Another focal point for the digitalisation debate is Romanian citizens' use of the national health card. Most respondents (30.8%) considered the health card important, with many supporting the transition to a digital format for routine tasks such as obtaining medical certificates or communicating with assigned family doctors or health institutions on online platforms. However, several barriers were noted: 55 respondents mentioned technical difficulties, 45 mentioned a lack of digital readiness, and 29 raised security concerns.

These attitudes reveal a complex tension: while the public generally favours digitisation, there is still a trust deficit in terms of system reliability and security. Bridging this gap will require technical upgrades and strategic efforts to build digital trust through education and transparent governance.

4.9 Expectations and Recommendations for Improvement

Participants offered numerous recommendations to improve the digital healthcare landscape in Romania. A recurring theme was the need for national digital literacy programs for healthcare professionals and patients. These should focus on practical digital literacy, security awareness, and navigation on digital platforms.

Investments in infrastructure—especially cloud computing and cybersecurity—were considered essential. Respondents also called for intuitive digital platforms that are compatible with mobile devices and designed with users' needs in mind. One respondent emphasised the importance of "educating staff and patients on how to use digital platforms," while another highlighted the need for "quick and transparent access to personal medical history."

The data also showed that favourable attitudes toward digital health tools were significantly associated with higher education, urban residence, and full-time employment. These findings indicate that digitally ready individuals drive uptake, while vulnerable groups may be left behind unless targeted interventions are introduced.

In addition, the analysis showed that favourable perceptions of digital tools were strongly correlated with higher levels of education, urban residence, and occupation. These groups, already exposed to digital environments in other areas of life, are more receptive to similar systems in healthcare. The implications are clear:

targeted efforts to bridge the urban-rural and intergenerational digital divides will be essential to ensure equitable digital transformation.

5. Conclusions

The outcomes of this study reveal both promising opportunities and pressing challenges regarding the digitalisation of the Romanian healthcare system. On one hand, there is substantial enthusiasm among Romanian citizens—particularly those who are younger, more educated, and residing in urban areas—for the integration of digital health services. On the other hand, significant barriers remain, including infrastructural shortcomings, low digital literacy among certain population groups, and resistance from within healthcare institutions. Addressing these obstacles necessitates a coordinated, multi-stakeholder approach.

The findings of this study highlight both encouraging trends and persistent challenges in Romania's digital healthcare transformation. Romanian citizens—particularly those who are younger, highly educated, and urban-based—demonstrate high levels of engagement with and support for digital tools such as electronic health records, online scheduling, and telemedicine. However, structural inequalities, limited digital literacy among older adults, and insufficient infrastructural capacity continue to obstruct equitable implementation across the country.

These results are consistent with national-level assessments of Romania's digital health readiness. For instance, Moga et al. (2021) and Vlădescu et al. (2016) found that while Romania's policy framework references digitalisation, actual deployment remains fragmented, especially in rural areas. Similarly, Purcărea (2019) noted that while Romanian healthcare consumers are becoming increasingly service-oriented, their expectations are often unmet due to inefficient digital interfaces and low responsiveness in public institutions.

Comparatively, studies in Estonia and Slovenia—countries with advanced eHealth ecosystems—highlight the importance of long-term state investment, centralised digital governance, and early stakeholder engagement (European Commission, 2022). Romania's current position is thus one of latent potential: public readiness exists, but institutional and infrastructural gaps hinder progress. A research conducted by Beckfield et al. (2013) concluded there are four research themes to be considered when doing a comparative research, namely – classification, convergence, institutional boundaries, and disparities, emphasising that the first challenge is however comparability between systems, key dimensions that differentiate or variation among health systems that can be measured.

From the author's perspective, the contrast between public optimism and systemic inertia reflects a deeper misalignment between citizen needs and institutional capabilities. Unlike resistance-driven failures seen in other contexts, Romania's challenges are largely logistical and managerial. The public's

favourable perception of digital tools—despite limited access or poor quality—is a unique opportunity for health leaders to build trust and momentum by investing in inclusive, scalable digital health infrastructure.

5.1 Theoretical Implications

This study contributes to the expanding literature on digital health service quality by grounding its analysis in established evaluation frameworks. The findings reinforce the relevance of the SERVQUAL model (Parasuraman et al., 1988), with respondents prioritizing dimensions such as reliability, responsiveness, and assurance in assessing digital systems. In line with Olteanu (2004), this reflects a shift toward consumer-driven expectations in public health service delivery.

The data also align with the Donabedian model (structure-process-outcome), as digital transformation in Romania has primarily influenced structural inputs (e.g., platforms, portals), with improvements in care processes and patient outcomes contingent on accessibility and digital trust.

As such, the study extends theoretical work by illustrating how perceptions of system quality in digital contexts are shaped not only by usage but also by beliefs about institutional reliability and personal empowerment. It offers a framework for understanding how citizens evaluate quality in digitally mediated healthcare environments.

5.2 Managerial and Policy Implications

From a managerial standpoint, the study identifies four strategic priorities:

1. National digital infrastructure development, especially in underserved regions;
2. Digital literacy campaigns tailored for both patients and healthcare providers;
3. Human-centred digital platform design, emphasizing usability, security, and multilingual support;
4. Trust-building mechanisms, including transparent governance of digital data and user privacy.

These recommendations echo those of the World Bank (2022) and OECD (2021), which emphasise not only the technical but also the cultural and organisational dimensions of successful digital health implementation.

Importantly, Romania's private healthcare providers were frequently cited by respondents as more digitally responsive and user-friendly than public institutions. This indicates an opportunity for public-private knowledge transfer, whereby digital best practices from the private sector could inform the modernization of public health services.

In summary, Romania demonstrates a strong foundation for advancing digital health, supported by a receptive and increasingly digitally literate public. However, meaningful progress will depend on addressing infrastructural gaps, promoting

inclusivity, and reinforcing trust through transparent, user-friendly, and secure digital systems. The potential for transformation is real—what remains is the strategic execution required to make it a lasting reality.

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