

The Impact of E-Governance on Healthcare Service Quality: Survey Evidence from Setif's Multi-Service Clinics

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Abstract ;

This study aimed to examine the impact of e-governance implementation on healthcare quality in Setif's multi-service clinics. A purposive sample of 86 staff members from the clinic was selected based on their representation in departments directly interacting with e-governance systems. The research applied a descriptive-analytical approach. Data were collected through structured questionnaires that measured the dimensions of e-governance (human, technical, administrative, and organizational) as well as the dimensions of healthcare service quality (tangibility, reliability, responsiveness, assurance, and empathy). The data were analyzed using SPSS (v.27). The study highlights the importance of digital tools in improving institutional performance, confirming that e-governance dimensions have a statistically significant impact on Healthcare service quality. The study recommends prioritizing technological development, strengthening administrative practices, and building human capacities, with organizational measures integrated to ensure coherence. Collectively, these strategies can advance effective e-governance and improve healthcare service delivery in public institutions.

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1. Introduction:

The quality of healthcare services is widely recognized as a key indicator of the performance, responsiveness, and equity of health systems. It not only determines health outcomes but also reflects a system's capacity to adapt to evolving population needs and expectations. Despite the emphasis placed by global health policy on quality as a pillar of universal health coverage, many health systems-particularly in low- and middle-income countries continue to struggle with legacy infrastructures, limited managerial capacity, and inefficient governance mechanisms.

Today's health systems operate under mounting and multifaceted pressures, including aging populations, recurring public health crises, and the rapid evolution of digital technologies. These challenges have exposed the limitations of traditional governance models, leading to a growing interest in more agile, transparent, and data-driven approaches. Within this context, digital transformation has emerged as a critical enabler of reform. The integration of information and communication technologies (ICTs) into healthcare administration has enhanced transparency, improved inter-institutional coordination, optimized resource utilization, and facilitated evidence-based decision-making in real time. Among these digital innovations, e-governance represents a particularly promising model for addressing systemic inefficiencies and strengthening accountability in healthcare service delivery.

In Algeria, repeated reform initiatives have sought to modernize the national health system and respond to increasing public expectations. However, these efforts have often fallen short, hindered by bureaucratic inertia and the slow uptake of modern administrative tools. E-governance presents a strategic opportunity to overcome these barriers by promoting transparency, expanding access to services, and aligning institutional performance with international benchmarks. Moreover, this vision aligns with Algeria's national digital strategy "*e-Algeria* " which aspires to build a knowledge-based society grounded in innovation, efficiency, and high-quality public service provision.

1.1 Problem Statement:

Despite successive health-sector reforms in Algeria, routine practice continues to reveal persistent shortfalls in service quality. These gaps signal the need for administrative innovations capable of transforming the management of healthcare institutions. E-governance is widely considered a promising pathway to such change and to improved institutional performance. On this basis, the study is guided by the following main research problem:

To what extent does e-governance, through its key dimensions (human, technological, administrative, and organizational), impact healthcare service quality in multi-service clinics in Setif?

1.2 Research Questions :

This study seeks to address the following research questions:

1. To what extent does human e-governance capacity impact healthcare service quality in multi-service clinics in Setif?

2. To what extent does technological e-governance capacity impact healthcare service quality in multi-service clinics in Setif?

3. To what extent do administrative e-governance processes impact healthcare service quality in multi-service clinics in Setif?

4. To what extent does organizational e-governance impact healthcare service quality in multi-service clinics in Setif?

1.2 Hypotheses :

This study aims to examine the potential impact of e-governance on improving healthcare service quality in multi-service clinics in Setif. Accordingly, the following hypotheses are formulated:

- **H₀1:** There is no statistically significant impact at the level of ($\alpha = 0.05$) of e-governance, with its dimensions (human, technological, administrative, and organizational), collectively on healthcare service quality in multi-service clinics in Setif.
- **H₀1.1:** There is no statistically significant impact at the level of ($\alpha = 0.05$) of human e-governance capacity on healthcare service quality in multi-service clinics in Setif.
- **H₀1.2:** There is no statistically significant impact at the level of ($\alpha = 0.05$) of technological e-governance capacity on healthcare service quality in multi-service clinics in Setif.
- **H₀1.3:** There is no statistically significant impact at the level of ($\alpha = 0.05$) of administrative e-governance processes on healthcare service quality in multi-service clinics in Setif.
- **H₀1.4:** There is no statistically significant impact at the level of ($\alpha = 0.05$) of organizational e-governance on healthcare service quality in multi-service clinics in Setif.

1.4 Study Objectives :

- Assess implementation levels of e-governance across human, technological, administrative, and organizational dimensions in Sétif's public multi-service clinics ;
- Estimate the effects of each e-governance dimension on overall perceived healthcare service quality ;
- Develop actionable recommendations to strengthen digital transformation and e-governance effectiveness in the public sector.

2. Theoretical Framework and Literature Review :

2.1 E-governance Concept:

E- governance has accelerated worldwide, shifting public service delivery away from traditional, centralized models toward more citizen-centric approaches. By enabling two-way communication, improving operational efficiency, and increasing transparency, e-government strengthens engagement between citizens and state institutions. It also expands access to services by overcoming geographic barriers, reducing administrative burdens and transaction costs, and

promoting more inclusive governance. As an innovative application of information and communication technologies (ICT), e-government facilitates citizens' access to government information and services, supports social, economic, and political development, improves public-service quality and user satisfaction, and offers democratic, transparent, and equitable channels for interaction with public institutions (Mainda & Andrew , 2024, p. 589).

E-government is increasingly recognized as a strategic instrument for generating public value and reinforcing institutional legitimacy (Shahab, Antoni, & Akbar, 2020, p. 92). In line with this view, the United Nations Department of Economic and Social Affairs defines e-government as the use of ICT to enhance the effectiveness, efficiency, and transparency of public administration (UN DESA, 2025). More specifically, it reflects the digital transformation of government operations to achieve public goals through technology-enabled processes.

Anchored in a robust e-governance framework, digital governance seeks to reconfigure the modalities of public administration by enhancing accessibility, efficiency, and cost-effectiveness in service delivery. Through the digitization of processes, it strengthens accountability, fosters transparency, and mitigates corruption by enabling citizens to monitor governmental actions and decisions (Kumar, 2024, pp. 85-86). Equally, by institutionalizing participatory mechanisms, it enhances civic engagement and contributes to the legitimacy and trustworthiness of public institutions. At the systemic level, e-governance facilitates interdepartmental integration, reduces bureaucratic inefficiencies, and advances citizen-centric governance, thereby aligning with broader objectives of economic growth, social inclusion, and sustainable development. In particular, its capacity to expand access to public information and create opportunities for socio-economic advancement - especially in rural and historically underserved communities - underscores its role as both an administrative reform and a developmental catalyst (Malodia, Dhir , Mishra, & Zeeshan , 2021, pp. 5-8, 14-15; World Bank, 2002, p. 1).

2.2 E-governance Dimension:

E-governance is operationalized through four interlocking dimensions, each reinforcing the others:

2.2.1 Human Dimension:

The success of e-governance is not solely determined by technological infrastructure but fundamentally depends on the human dimension. where skilled, motivated, and ethically responsible personnel drive digital transformation. A core function of human resource management is to determine the eligibility of applicants through clear differentiation mechanisms based on established quality standards, ensuring the recruitment of the most competent and suitable candidates (Sunda, Choirul, & Darius, 2020, pp. 1-5, 12-13). The quality of these practices strongly influences the effectiveness of e-governance, the more organizations design human resource policies that emphasize efficiency, specialized skills, and balanced knowledge, the better positioned they are to achieve high performance and sustain digital transformation (Sunda, Choirul, & Darius, 2020, pp. 2–4). Competence and specialization in information and communication technologies (ICT), coupled with managerial capabilities such as strategic alignment, communication, and problem-solving, remain critical for successful implementation.

Equally, clearly defined roles and responsibilities, supported by transparent recruitment standards and ongoing evaluation, strengthen accountability and operational efficiency (Sinan & Ali Hassoun , 2021, p. 120). To maintain progress, continuous professional development and structured capacity-building initiatives are required to align institutional needs with employees' evolving skills, while change-management strategies are essential to address resistance and foster adaptability (Umiyati, 2023, pp. 13-15). Moreover, e-governance systems enhance motivation and performance by clarifying expectations, streamlining processes, and introducing transparent performance metrics, outcomes further reinforced by effective leadership and supportive organizational cultures (Vijay & Rahul , 2022, pp. 47-50). Collectively, these elements underscore that human resources are the backbone of e-governance, shaping not only its operational efficiency but also its long-term legitimacy and sustainability.

2.2.2 Technical Dimension:

The technical dimension of e-governance rests on robust infrastructure and the adoption of modern technologies to enhance state operations and service delivery. Core facilities such as data centers, secure networks, and sector-specific establishments provide the backbone for digital governance, while reliable ICT infrastructure ensures accessibility, scalability, and security (Malodia, Dhir , Mishra, & Zeeshan , 2021, pp. 11-12). Emerging technologies further strengthen this foundation: cloud computing enables flexible and cost-effective data management; artificial intelligence (AI) supports automation, analysis, and intelligent decision-making; the Internet of Things (IoT) facilitates real-time monitoring and smart resource management; and blockchain improves transparency, security, and trust in transactions such as voting and land registration (Thays , Miquel , & Helena, 2020, pp. 14-16). By integrating these tools, governments streamline workflows, reduce errors, and accelerate decision-making, thereby improving efficiency, transparency, and the quality of public services (Partha & Dip, 2019, pp. 14-18).

2.2.3 Administrative Dimension:

The administrative dimension of e-governance is a core pillar of digital transformation, extending beyond procedural simplification to include leadership, strategic planning, inclusiveness, and evaluation. Strong leadership is essential for aligning IT with organizational goals, allocating resources, and sustaining innovation, while also addressing resistance to change and fostering continuous staff development (Ademola, 2024, pp. 1-6, 10-11). Strategic planning provides clear objectives and flexibility, enabling institutions to adapt to evolving technological and social demands (Alshlah, 2023, pp. 400-401). Equally, inclusiveness ensures universal access to digital services, reducing inequalities in public service delivery (Chumbiauca-Castillo, 2024, p. 24). Finally, continuous monitoring and evidence-based management reinforce transparency, accountability, and efficiency, ensuring that e-governance remains responsive to citizen and institutional needs (Peng, 2022, p. 218).

2.2.4 Organizational Dimension:

The organizational dimension of e-governance focuses on how public institutions adapt their structures, cultures, and processes to effectively leverage information and communication technologies (ICT) for improved governance and service delivery. It encompasses leadership,

strategy, decision-making, process management, and public interaction, all of which are critical to achieving efficiency, transparency, and accessibility. At the structural level, e-governance requires transforming administrative arrangements, organizational culture, and control systems to support digital initiatives, with adaptability and openness to change serving as prerequisites for success (Saman, Omar, Mosleh, Goran, & Aqel, 2021, p. 15). Leadership commitment and participatory decision-making mechanisms are equally essential for aligning technology with institutional goals, ensuring resource allocation, and fostering organizational readiness for digital transformation (Azzam & Maryam, 2024, pp. 186-192).

Process management and interoperability form another core element, as reengineering administrative workflows enhances efficiency and service quality, while coordination across departments and with external partners ensures seamless information flow and integrated service delivery. ICT plays a central enabling role by supporting data-driven and transparent decision-making, expanding communication channels, and enabling citizen participation through e-participation platforms and feedback systems (Azzam & Maryam, 2024, pp. 186-187). Finally, sustainable e-governance depends on developing core organizational competencies, including process management, employee engagement, adaptability to change, and collaborative responsibility sharing. By fostering continuous learning, cooperation, and long-term innovation, organizations can strengthen resilience and ensure that e-governance delivers sustained value to both institutions and society (Nurdin, Rosemary, & Helana, 2020, pp. 11-18).

2.3 Healthcare service quality:

Service quality in healthcare is widely recognized as a central concept in health management, given its direct influence on both the effectiveness and efficiency of care as well as its ability to meet patients' needs and expectations. Traditionally, quality has been used as a benchmark for assessing health system performance, but more recent scholarship emphasizes its role as a key indicator of progress toward national and international health objectives, particularly amid rising patient expectations and institutional challenges. Concept analyses highlight that healthcare quality rests on four defining attributes: effectiveness, safety, a culture of excellence, and the achievement of desired outcomes. Accordingly, healthcare quality can be theoretically defined as the provision of effective and safe care, embedded in an excellence-oriented culture, and directed toward attaining optimal health outcomes (Alenezi, 2022, pp. 696-698).

Beyond its technical dimensions, scholars emphasize that quality also reflects stakeholder satisfaction, since it depends on the consistent delivery of efficient and evidence-based services that both meet patient needs and adhere to clinical guidelines. In this sense, healthcare quality has been defined as “consistently delighting the patient by providing efficacious, effective and efficient healthcare services according to the latest clinical guidelines and standards, which meet patient needs and satisfy providers” (Mosadeghrad, 2013, p. 215). Importantly, the literature underscores that service quality is a multidimensional construct. It encompasses not only

technical competence and safety but also interpersonal relations, organizational and environmental conditions, and administrative practices, Collectively, these elements position healthcare quality as an integrated framework that bridges clinical excellence with patient-centered care, thereby fostering both positive health outcomes and sustained public trust (Endeshaw, 2021, pp. 106-112).

Quality health services are essential for improving health outcomes, as they increase the likelihood of effective treatments, reduce mortality, and enhance recovery rates, while poor-quality care often results in preventable deaths, complications, and prolonged illness even where access exists (WHO, 2018, pp. 9-11). Beyond clinical outcomes, service quality builds patient trust, satisfaction, and loyalty, encouraging individuals to seek timely care, adhere to medical advice, and recommend services to others (Mosadeghrad, 2013, pp. 213-214). It is also a core component of universal health coverage (UHC), since expanding access without ensuring effective, safe, and people-centered care cannot guarantee improved health or the achievement of the Sustainable Development Goals (WHO, 2018, pp. 15-16). Moreover, quality improvement initiatives reduce errors, unnecessary treatments, and hospital readmissions, thereby increasing system efficiency and lowering healthcare costs, while also enhancing the reputation of health institutions and strengthening their competitiveness in both public and private sectors (Mosadeghrad, 2013, pp. 213-216).

2.4 Healthcare service quality Dimension:

Healthcare service quality is commonly conceptualized as a multidimensional construct comprising interrelated dimensions that shape patient experiences, satisfaction, and trust. Taken together, these dimensions establish a systematic framework for assessing the quality of care and for examining its influence on both clinical outcomes and patient perceptions (Setiono & Hidayat, 2022, pp. 330-333; Nguyen., 2024, pp. 2325-2825):

2.4.1 Tangibility : In healthcare, tangibility is more than just the “look and feel” of the service environment; it functions as a proxy for clinical competence. Patients often cannot directly evaluate medical expertise, so they judge quality based on visible cues such as cleanliness, modern equipment, and the professional appearance of staff. A well-maintained hospital signals organizational discipline and investment in safety, while poor tangible conditions raise doubts about the reliability of care. In this sense, tangibility shapes not only first impressions but also long-term trust, as patients equate visible orderliness with invisible clinical excellence.

2.4.2 Reliability : Reliability goes to the core of healthcare because it directly determines patient safety. Unlike many service sectors, where minor lapses may only inconvenience clients, lapses in reliability in healthcare—such as misdiagnoses, medication errors, or late procedures—

can be life-threatening, Patients expect healthcare providers to “get it right the first time” and consistent performance builds confidence in the institution. Analytically, reliability is not just about accuracy but about trust in the system’s capacity to deliver dependable outcomes every time, which explains why empirical studies consistently rank it as one of the strongest predictors of satisfaction.

2.4.3 Responsiveness : Responsiveness in healthcare extends beyond courteous service to reflect organizational agility and clinical urgency. The speed at which providers respond to patient needs, communicate results, or handle emergencies often determines not just satisfaction but survival. Delays can escalate conditions, heighten anxiety, and erode institutional credibility. Thus, responsiveness is not a superficial dimension—it captures the system’s capacity to respect patient time, prevent harm, and adapt quickly to dynamic clinical situations. Analytical evidence shows that responsiveness often differentiates high-performing health institutions from those struggling with patient dissatisfaction.

2.4.4 Assurance : Assurance plays a critical role in reducing the information asymmetry between healthcare providers and patients. Because patients rarely have the knowledge to evaluate medical accuracy, they rely on signals such as professional communication, courtesy, and perceived competence, Assurance is therefore not only about technical expertise but also about translating that expertise into confidence. When providers explain diagnoses clearly, safeguard confidentiality, and behave professionally, patients feel secure in their treatment, which enhances compliance and loyalty. In analytical terms, assurance is the “trust currency” of healthcare, converting technical competence into patient confidence.

2.4.5 Empathy : Empathy transforms clinical encounters from purely technical interventions into holistic care experiences. Patients frequently judge their care not only by outcomes but by whether they felt listened to, understood, and respected. In healthcare, empathy reduces anxiety, strengthens emotional resilience, and improves adherence to medical advice. Importantly, its absence can overshadow even technically excellent care, as patients may perceive indifference as a form of neglect. Analytically, empathy represents the “human face” of healthcare quality—turning standardized procedures into individualized care that fosters long-term trust and loyalty.

2.5 Healthcare service quality Vs E-governance:

E-governance opens new opportunities in the health sector, ensuring continuity of services, transparency in administrative procedures, and improved accountability. By granting all stakeholders access to more reliable and accurate services, it reduces corruption and bureaucratic inefficiencies while enhancing citizen satisfaction (Hijazi & Hanadi , 2014, pp. 5-6). In this sense, e-governance is not merely a technical innovation but a governance reform that strengthens

participatory dialogue, improves monitoring and control activities, and fosters a closer relationship between citizens and health institutions, Citizens become more empowered to influence healthcare policies and receive services that are timely, transparent, and responsive to their expectations, particularly as demand shifts from mere access toward higher-quality care. Service providers also benefit from improved information systems, enabling faster feedback and more effective alignment of services with user needs.

At a practical level, several studies confirm these benefits across diverse contexts. In Jordan, e-health information systems enhanced staff performance, patient care, and doctor–patient relationships by improving access to data and reducing medical errors (Alazzam, Al Khatib, Walid, & Alassery, 2021, p. 5). In Libya, the adoption of e-management tools at Sabha Medical Centre streamlined processes, reduced delays, and improved operational efficiency, although the study noted challenges linked to staff training and IT infrastructure (Jabar, Shabl, Mashmoor, Al-Saadi, & Mashmoor, 2025, p. 139). Evidence from Tanzania similarly demonstrates that e-government initiatives at Muhimbili National Hospital reduced waiting times, improved record management, and enhanced the allocation of doctors, resulting in timelier treatment and greater patient satisfaction (Mainda & Andrew , 2024, p. 602). At the regional level, research in Asian economies highlights that when supported by cybersecurity and governance reforms, e-government strengthens sustainability and public trust in healthcare systems (Abbas, Qaisar, Ali, Alturise, & Alkhalifah, 2022, pp. 8-9). Complementary findings from the EU further confirm that digital public services, particularly electronic health records, reduced clinical errors by about 25% and improved administrative efficiency by 30%, demonstrating e-governance’s potential to transform healthcare delivery at scale (Kwilinski, Szczepanska-Woszczyna, Lyulyov, & Pimonenko, 2024, pp. 7-9).

These outcomes align with broader conceptual arguments that position e-governance as a structural driver of healthcare equity, particularly through accessibility, engagement, and data management. The expansion of online health services does more than increase service availability; it strategically removes entrenched barriers of geography, infrastructure, and institutional capacity that have long disadvantaged rural and underserved populations. By digitizing appointment systems, records, and consultations, e-governance reduces dependency on physical proximity to health facilities, shortens waiting times, and facilitates real-time information flows. Analytically, this shift reframes accessibility from a purely spatial challenge into a question of digital inclusion and system responsiveness, emphasizing that sustainable gains in healthcare delivery require not only technological deployment but also the capacity of institutions and communities to adopt and adapt to these tools, (Msacky, 2024, pp. 2-4, 6-8). Likewise, digital platforms foster patient engagement by offering interactive educational resources, electronic communication channels, and peer support networks that improve

knowledge exchange and adherence to care (Barello, et al., 2016, pp. 6-7). Finally, advances in data management and quality control strengthen trust and transparency by reducing errors associated with manual processes and ensuring higher-quality information for both citizens and providers (Liaw, Pearce , Liyanage, Liaw , & de Lusignan , 2014, pp. 200-205).

In sum, the literature demonstrates that e-governance improves healthcare service quality by enhancing efficiency, accessibility, and accountability, while also empowering patients through engagement and data transparency. However, its success ultimately depends on the integration of robust ICT infrastructure, adequate staff training, and governance mechanisms that protect data security and ensure equitable delivery.

3. Materials & Methods:

3.1 Sample Selection:

This study is based on survey data collected from a purposive sample of 86 respondent (Doctors, nurses, admin staff, and technicians) selected from 5 multi-services clinics in Setif: Saoudi Abdelkader (Hashmi), Ben Toumi Said (Bilar), Kemmache Ahmed (El-Hidhab), Ben Behoush Naji (Tanja), and Ounouri Tayeb (El-Maabouda), The sample was systematically chosen to capture insights from individuals most interacted with e-governance processes, thereby ensuring information richness and validity of findings.

3.2 Instrument and Data Collection:

To accomplish the study's goals, data were obtained using a structured questionnaire comprising two main sections. The first section gathered demographic characteristics of the respondents (such as gender, age, etc.), while the second focused on assessing the core variables of the study, as follow :

- E-governance (Dependent Variable): assessed across 4 dimensions (human, technological, administrative and organisational) with a total of 20 items.
- Healthcare Service Quality (Independent Variable): formulated into 5 dimensions (reliability, tangibility, responsiveness, assurance and empathy) with a total of 20 items.

3.3 Demographic Characteristics of the Respondents:

This section presents the demographic characteristics of the respondents who took part in the study. The researcher examined key characteristics such as age, gender, occupation, ...etc, The summarized findings are presented in Table 1 below :

Table 1. Demographic characteristics of the respondents

Characteristic	Category	Frequency	Percentage
Gender	Male	11	12.8
	Female	75	87.2
	Total	86	100
Occupation	Doctor	25	29.07
	Nurse	34	39.53
	Coordinator	2	2.3
	Dentist	5	5.8
	Midwife	3	3.5
	Psychologist	3	3.5
	Admin staff	7	8.1
	Biologist	7	8.1
	Total	86	100
Working experience	1 – 5 years	12	14
	6 – 10 years	18	20.9
	>10 years	56	65.1
	Total	86	100
Departement	Emergency	24	27.9
	General Medicine	16	18.6
	post-surgical	4	4.7
	Pediatrics	5	5.8
	Maternal & Child Health	6	7
	Psychiatry	1	1.2
	Laboratory	10	11.6
	Radiology	3	3.5
	Addiction Unit	4	4.7
	Administration	6	7
	Dental Surgery	7	8.1
	Total	86	100
familiarity with e-governance	Very low	16	18.6
	Low	11	12.8
	Moderate	38	44.2
	Goog	15	17.4
	Very good	6	7
	Total	86	100

Source: Authors' calculations (SPSS 27)

As shown from the table above :

- **Gender:** 87.2% of respondents were female, whereas 12.8% were male. Thus, indicates that most of the sample consisted of female, which aligns with the characteristics of many health professions that are often female-dominated, particularly in nursing and direct patient care.
- **Occupation:** nurses formed the largest share of the sample (39.5%), followed by doctors (29.1%), administrative staff and biologists each represented 8.1%, dentists accounted for 5.8%, while midwives and psychologists 3.5% each, coordinators presented the smallest percentage at 2.3%. together, frontline clinical roles (nursing and doctors) comprise 68.6% of the workforce, compared with 20.9% for allied/specialized roles (dentistry. midwifery. psychology. biology) and

10.4% for administrative/coordination functions. indicating a staffing profile oriented toward direct patient care.

- **Working experience :** It is noted that 14% of the respondents had the experience of between 1 – 5 years. 20.9% had the experience of between 6 – 10 years, 65.1% of the respondents had the experience of 10 years and above. Form the experience of the respondents it can be concluded all the respondents have been good exposure to the e-government system and so they can provide an important insight on its effectiveness in services delivery.

- **Department :** emergency accounted for 27.9%, general medicine 18.6%, and laboratory 11.6%. sub-10% categories were dental surgery (8.1%). maternal & child health (7.0%), administration (7.0%), pediatrics (5.8%), post-surgical (4.7%). addiction unit (4.7%), radiology (3.5%), and psychiatry (1.2%). the top three departments together comprise 58.1%, suggesting a distribution weighted toward acute and primary care services.

- **Familiarity with e-governance :** we observe that 44.2% of respondents reported a moderate familiarity with the concept of e-governance, 18.6% of respondents indicated that their knowledge is very low, followed by 12.8% who reported low familiarity. By contrast, the categories reflecting higher familiarity appear at lower proportions: only 15 employees reported good familiarity (17.4%), and just 6 employees reported very good familiarity (7%). Overall, these results point to a relative shortfall in familiarity among a substantial segment of employees: those with low or very low familiarity constitute 31.4% of the sample. whereas those with good or very good familiarity together account for only 24.4% a limited share given the importance of such familiarity for the success of digital transformation.

3.4 Validity and Reliability of the Instruments :

To ensure instrument quality, internal-consistency reliability was assessed through item–total correlations (Pearson’s r) and Cronbach’s alpha. All item–total correlations were statistically significant ($p < .05$), and alpha coefficients were $\geq .70$, indicating acceptable to excellent reliability. Table 2 reports the results.

Table 2. Results of the Validity and reliability index test

Axis / Dimension		K	r (subscale-total)	p_value	Cronbach’s α
Axis I: E-governance	Human	5	0.797	$p < .001$	0.799
	Technological	5	0.907	$p < .001$	0.871
	Administrative	5	0.932	$p < .001$	0.841
	Organizational	5	0.832	$p < .001$	0.870
Total (Axis I)		20	/	/	0.939
Axis II: Healthcare Service Quality	Reliability	4	0.733	$p < .001$	0.763
	Tangibility	4	0.891	$p < .001$	0.788
	Responsiveness	4	0.866	$p < .001$	0.731
	Assurance	4	0.854	$p < .001$	0.820
	Empathy	4	0.775	$p < .001$	0.887
Total (Axis II)		20	/	/	0.921
Overall questionnaire reliability		40			0.952

Source: Authors’ calculations (SPSS 27).

3.5 Findings and Discussion:

3.5.1 Descriptive Statistical Techniques:

Means (**M**) and standard deviations (**Std**) were calculated for each questionnaire subscale. Table 3 reports the results.

Table 3. Descriptive Statistics

Questionnaire Subscales	M	Std	Level
Axis I: E governance			
Human	3.0605	0.95650	Moderate
Technological	3.0488	0.97060	Moderate
Administrative	3.1395	0.90336	Moderate
Organisational	2.9163	0.95127	Moderate
Axis II: Healthcare Service Quality			
Reliability	3.6686	0.86300	High
Tangibility	2.8779	0.95081	Moderate
Responsiveness	3.7035	0.72913	High
Assurance	3.9419	0.76569	High
Empathy	3.8953	0.80574	High

Source: Authors' calculations (SPSS 27)

- **E-governance** : The means across the four dimensions of e-governance range at the “moderate” level, The administrative dimension had the highest mean (≈ 3.14 ; $SD \approx 0.90$) followed by the human (≈ 3.06 ; $SD \approx 0.96$) and technological (≈ 3.05 ; $SD \approx 0.97$) dimensions. The organizational dimension had the lowest value (≈ 2.92 ; $SD \approx 0.95$). This pattern may be interpreted as showing that the human layer is still limited by gaps in digital literacy and training, plus provisions of resources and management practices, and so the implementations of digital practices are weakened even when basic tools exist. The technological layer appears adequate to keep a minimum level of operations running, yet it is not sufficient—at least for now—to enable a coherent e-governance regime. Addressing this shortfall will require infrastructure upgrades; stronger systems integration and interoperability; and reinforced cybersecurity controls and business-continuity arrangements. Although the administrative dimension exhibits a comparatively supportive orientation toward digital transformation (as reflected in the highest mean and relatively lower dispersion). institutionalizing this momentum will require periodic monitoring-and-evaluation systems with clear indicators that narrow the gap between strategic intent and executable policies.

By contrast with the other dimensions. the organizational dimension—given its lowest mean (≈ 2.92 ; $SD \approx 0.95$)—reveals pronounced shortcomings in policies. standard operating procedures. and frameworks for allocating responsibilities. These weaknesses undermine institutional coherence and produce notable variation in implementation across clinics. The findings therefore point to an urgent need to adopt standardized standard operating procedures (SOPs) and delegation-of-authority and accountability matrices to harmonize practices and reduce operational performance variability.

- **Healthcare service–quality:** the health service–quality domain indicates generally positive performance. with an overall mean of approximately 3.62 across the five dimensions and a clear advantage for the intangible over the tangible facets. Assurance posted the highest mean (≈ 3.94 ; $SD \approx 0.77$), followed by Empathy (≈ 3.90 ; $SD \approx 0.81$), Responsiveness (≈ 3.70 ; $SD \approx 0.73$), and Reliability (≈ 3.67 ; $SD \approx 0.86$)_all within the “high” range_ whereas Tangibility remained at a “moderate” level (≈ 2.88 ; $SD \approx 0.95$). This pattern suggests that patients perceive strong human–service quality (swift responsiveness, empathic engagement, and a sense of assurance/safety) that bolsters confidence in service reliability, while the material components_namely infrastructure, equipment, and reception environments constitute the principal weakness.

Dispersion metrics reinforce this conclusion: Assurance exhibits the lowest relative variability ($CV \approx 0.19$), implying consistency across clinics, whereas tangibility shows the highest relative variability ($CV \approx 0.33$), indicating marked heterogeneity in facility readiness and modernization across sites and departments. The moderate level observed for tangibility can plausibly be attributed to slow renewal of physical assets and uneven application of environmental standards across clinics and staff. By contrast, the elevated scores for Reliability, Responsiveness, Empathy, and Assurance reflect the quality of clinical interaction. streamlined procedures, and a sustained commitment to patient privacy and information security.

Taken together, the findings indicate that upgrading the physical environment equipment. Maintenance, cleanliness standards, signage, and accessibility should be the strategic priority for lifting overall perceptions of quality. At the same time, the performance attained on the other four dimensions ought to be sustained through ongoing training, standardized service protocols, and periodic measurement of performance indicators (KPIs) to reduce inter-clinic variation in implementation.

3.5.2 Hypothesis Testing :

Table 4. Results of Multiple Regression Test

	B	SE	β	T	P-value
Constant	2.167	0.217	-	9.970	<.001
Human	0.081	0.080	0.117	1.015	0.313
Technological	0.261	0.108	0.382	2.414	0.018*
Administrative	0.254	0.136	0.346	1.869	0.065**
Organizational	-0.134	0.094	-0.192	-1.416	0.161
R = 0.651	Adjusted R ² = 0.424		F= 14.887	p < .001	
Note :All confidence intervals are 95% unless noted; ** denotes marginal significance at the 10% level.					

Source: Authors’ calculations (SPSS 27)

Table 4 presents multiple regression estimates evaluating the effects of e-governance dimensions on overall healthcare service quality in the multi-service clinics of Sétif. The model is statistically significant, $F(4, 81) = 14.887$, $p < .001$, indicating that the set of e-governance predictors explains a substantive portion of the variance in the dependent variable. The multiple correlation is $R = .651$, and the adjusted coefficient of determination is $\text{Adjusted } R^2 = .424$, implying that approximately 42.4% of the variation in perceived healthcare service quality is accounted for by the e-governance dimensions included in the model. Thus, the alternative

hypothesis is accepted, with a statistically significant impact of e-governance (human, technical, administrative, and organizational) on healthcare service quality ($\alpha = 0.05$). thereby rejecting the null hypothesis.

Table 4: Results of Simple Linear Regression Test

Sub-hypotheses	Independent Variables	R	R ²	F	P- value
Ho1.1	Human	0.497	0.247	27.587	0.001
Ho1.2	Technological	0.619	0.383	52.050	0.001
Ho1.3	Administrative	0.588	0.345	44.300	0.001
Ho1.4	Organizational	0.387	0.150	14.778	0.001

Source: Authors' calculations (SPSS 27)

Table 05 shed light on the distinct influence of each e-governance dimension (human, technological, administrative, and organizational) on the quality of healthcare services in the surveyed clinics.

- **Human Dimension (Ho1.1):** The correlation coefficient ($R = 0.497$) indicates a moderate positive association, with the human factor explaining 24.7% of the variance in service quality ($R^2 = 0.247$). The F -statistic (27.587) and a highly significant p -value ($p = 0.001$) confirm the robustness of this relationship. These findings suggest that enhancing staff competencies, professional skills. and ICT literacy contributes significantly to perceived service quality. Accordingly, the null hypothesis is rejected in favor of the alternative.

- **Technological Dimension (Ho1.2):** The technological factor emerges as the strongest predictor. With $R = 0.619$ and $R^2 = 0.383$, technological capacity explains 38.3% of the variance in service quality. This is reinforced by a high F -statistic (52.050) and $p = 0.001$. These results demonstrate that robust digital systems, functional platforms, and seamless access strongly enhance healthcare quality. Hence, the null hypothesis for Ho1.2 is rejected, establishing technology as the most influential determinant.

- **Administrative Dimension (Ho1.3):** Administrative capacity also shows a statistically significant effect. The correlation coefficient ($R = 0.588$) and coefficient of determination ($R^2 = 0.345$) indicate that administrative processes account for 34.5% of the variance in service quality. The F -value (44.300) and $p = 0.001$ confirm the strength of this relationship. These findings imply that standardized workflows, harmonized procedures, and effective internal controls substantially improve healthcare quality. Thus, the null hypothesis is rejected in favor of the alternative.

- **Organizational Dimension (Ho1.4):** The organizational factor demonstrates a comparatively weaker but still significant effect. With $R = 0.387$ and $R^2 = 0.150$, organizational arrangements explain 15% of the variance in service quality. The F -statistic (14.778) and $p = 0.001$ support the validity of this effect, albeit at a lower magnitude than the other dimensions. Accordingly, the null hypothesis is rejected, though the organizational dimension exerts a more modest influence.

4. CONCLUSION

This study evaluates the impact of e-governance on healthcare service quality in multi-service clinics in Setif through an analysis of four dimensions human, technological, administrative, and organizational. Collectively, these dimensions explain 42.4% of the variance in perceived service quality ($R^2 = 0.424$). At the dimensional level, technological factors exert the greatest impact (38.3%), followed by administrative (34.5%) and human (24.7%) factors, with a comparatively modest contribution from organizational factors (15%).

Fieldwork highlights that successful e-governance requires more than technological adoption. It hinges on sustained investment in human capital, adequate ICT infrastructure, procedural simplification, and an enabling institutional culture. Digital competency among staff is uneven: some personnel use systems proficiently, while others face challenges linked to limited training and insufficient technical support. Resistance to change, particularly among older staff, reflects reliance on established routines and limited confidence in digital tools. Clinics also differ in their digital equipment and infrastructure, shaping patient access to e-services, notably electronic archiving of medical records and appointment management.

Despite these challenges, the integration of digital solutions improves operational efficiency, reduces waiting times, enhances interdepartmental coordination, and increases the accuracy of diagnosis and follow-up. Compared to paper-based systems, electronic systems lower error rates and strengthen data security, while enabling staff to devote more time to patient interaction. Accordingly, e-governance is closely intertwined with health-service quality—both through operational gains and through the reinforcement of trust and transparency between citizens and healthcare providers.

Overall, the analysis supports a holistic e-governance strategy for Algerian healthcare institutions: strengthen technological infrastructure, standardize administrative procedures, enhance digital competencies among staff, and establish supportive regulatory and organizational frameworks. The absence of any single element can weaken digital-transformation effectiveness, whereas their integration aligns transformation capacity with the requirements for sustained improvements in health-service quality.

Recommendations :

Based on the study's findings, several recommendations are proposed to guide decision-makers :

- **Enhance technological infrastructure:** Prioritize investment in developing digital systems and equipping clinics with secure information networks, supported by scheduled maintenance and regular updates ;
- **Unify administrative processes:** Implement a single digital platform and enforce standard operating procedures (SOPs) to reduce redundancy and ensure consistency across services ;
- **Build human capacity:** Provide continuous professional development in IT and digital governance, coupled with incentives that encourage staff to adopt and sustain digital practices;

- **Strengthen organizational frameworks:** Establish clear organizational structures and embed accountability and transparency mechanisms to improve the effectiveness of e-governance ;
- **Institutionalize a digital culture:** Promote an organizational climate supportive of digital transformation—anchored in openness, collaboration, and strong internal communication—to reinforce collective commitment.

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6. Appendices:

Section One: General Information about the Respondent

Please check (✓) the appropriate box or provide a written response where applicable:

1. **Clinic:**

- ☐ Multi-service Clinic *Saoudi Abdelkader*, Hashmi District
☐ Multi-service Clinic *Bentoumi El-Said*, Belar District
☐ Multi-service Clinic *Kemmach Ahmed*, El-Hodab District
☐ Multi-service Clinic *Benbahouche Naji*, Tanja District
☐ Multi-service Clinic *Wenoughi Tayeb*, El-Maabouda District

2. **Gender:** Male ☐ Female ☐

3. **Professional Category:**

- ☐ General Practitioner ☐ Specialist Physician ☐ Chief Physician ☐ Nurse ☐ Head Nurse ☐ Coordinator ☐ Dentist ☐ Midwife ☐ Psychologist ☐ Administrative Staff ☐ Biologist

4. **Years of Professional Experience:**

- ☐ 1–5 years ☐ 6–10 years ☐ More than 10 years

5. **Department/Service Unit:**

- ☐ Emergency Department ☐ General Medicine ☐ Postoperative Care ☐ Pediatrics ☐ Maternal and Child Health
☐ Psychiatry ☐ Home Care ☐ Laboratory ☐ Radiology ☐ Pharmacy ☐ Addiction Treatment ☐ Administration ☐ Dental Surgery

6. **Level of Familiarity with the E-governance:**

- Very Low ☐ Low ☐ Moderate ☐ Good ☐ Excellent ☐

Section Two: Survey Dimensions

Please read each statement carefully and indicate your opinion by checking (✓) the box that best reflects your view.

E-Governance – Human Dimension

N o.	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Staff possess sufficient skills to use electronic systems.					
2	There is awareness of the importance of digital transformation for improving work.					
3	Continuous training programs are conducted for healthcare staff on new systems.					
4	User-friendly electronic communication channels exist between patients and healthcare staff.					
5	Employees are administratively encouraged to use and adopt electronic systems.					

E-Governance – Administrative Dimension

N o.	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Reliable electronic systems are available to support daily operations in the health institution.					
2	An integrated and efficient technological infrastructure (devices, networks, software) is available.					
3	Electronic systems in the institution operate in compatibility and smooth					

	interoperability.					
4	Devices and digital systems undergo regular maintenance.					
5	Technical support is available when problems occur in electronic systems.					

E-Governance – Technical Dimension :

N o.	Statement	Strongly Disagree	Disagre e	Neutra l	Agre e	Strongly Agree
1	Senior management adopts and supports the principle of digital transformation.					
2	Management ensures accessibility of electronic systems to all beneficiaries.					
3	Administrative follow-up and periodic evaluation of electronic systems' performance is conducted.					
4	Plans exist to improve and develop electronic systems based on needs.					
5	Administrative decisions are made on the basis of electronic system data.					

E-Governance – Organizational Dimension

N o.	Statement	Strongly Disagree	Disagre e	Neutra l	Agre e	Strongly Agree
1	Clear internal policies exist to regulate and support the application of electronic systems.					
2	Instructional manuals are available to facilitate the use of electronic systems.					
3	Sufficient resources are allocated for the development and maintenance of electronic infrastructure.					
4	Committees or task forces are responsible for monitoring the application of electronic systems.					
5	Clear procedures exist for managing security risks related to electronic systems.					

Healthcare service quality – Reliability

N o.	Statement	Strongly Disagree	Disagre e	Neutra l	Agre e	Strongly Agree
1	Healthcare services are provided at the scheduled time.					
2	Healthcare services in the institution are delivered efficiently and in accordance with standards.					
3	Accurate and up-to-date information about patients' conditions is provided.					
4	The medical staff avoids errors in procedures and diagnoses.					

Healthcare service quality – Tangibility

N o.	Statement	Strongly Disagree	Disagre e	Neutra l	Agre e	Strongly Agree
1	An electronic system exists to facilitate appointment booking.					
2	The institution possesses modern					

	facilities and equipment.					
3	Medical supplies are available in an orderly and organized manner.					
4	The working environment within the institution is comfortable and clean.					

Healthcare service quality – Responsiveness

N o.	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Waiting times for services are reasonable.					
2	Immediate technical support is available for staff in dealing with patients.					
3	Requests and inquiries from patients are responded to promptly.					
4	Coordination exists among employees across the different departments of the institution.					

Healthcare service quality – Safety

N o.	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Confidentiality and security of health information are maintained.					
2	Medical records are preserved from damage or loss.					
3	Health services are provided in a safe, risk-free manner.					
4	Adherence to correct medical protocols and procedures is ensured.					

Healthcare service quality – Empathy

N o.	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Patients are listened to in order to understand their needs.					
2	Medical staff allocate sufficient time to interact properly with patients.					
3	Effective and continuous communication exists between staff and patients.					
4	Personalized support and advice are provided to patients based on their data.					