



Bridging the Digital Divide: Challenges of Adopting Medical Information Technology in Algeria

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Abstract

The COVID-19 pandemic highlighted the urgent need to use medical information technology in the national healthcare sector to find innovative solutions to improve patient care, medical process efficiency, and the speed of evidence-based decision-making. Following this global health crisis, public authorities took the initiative to adopt medical digitization as a strategic option for the problems facing the healthcare sector in Algeria. Despite more than 18 years since the actual launch of this initiative, many obstacles still limit its success. Therefore, this study aimed to identify the main challenges hindering medical digital transformation in Algeria.

To study this topic, numerous literatures related to research and studies on the subject were reviewed, including scientific articles, reports, and official statements. The results indicated that although medical information technologies provide great opportunities in enhancing healthcare, there are many challenges hindering their use, the most important of which are resistance to change by healthcare workers, weak infrastructure and interoperability due to the fragmentation of the systems comprising this technology and their lack of integration, lack of skills in using medical information technologies, and weakness in their funding process.

Improving digital and health culture, having supportive policies, strong infrastructure, and targeted training programs to facilitate successful digital transformation are essential. Collaboration among stakeholders, including healthcare providers, policymakers, and technology developers, is necessary to address these challenges and achieve the benefits of digital innovation across the healthcare sector.

Article info

Received 16/01/2026
Accepted 05/03/2026

Keyword:

- ✓ Medical information
- ✓ technology,
- ✓ digital divide,
- ✓ enhancing healthcare,
- ✓ national medical care system.

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Introduction

The National Healthcare System (NHS) blend the **Bismarck model** (social insurance model), with employer/employees contributions via social insurance funds for universal coverage with aspects of **Beveridge model**, with tax funded and government run services, creating a **hybrid model** and aiming for universal care with private providers, balancing public funding with private services delivery to achieve universal coverage and access (Walid, Hammouda , & El Moudden , 2014)

Algeria relies on two main sectors in providing healthcare: the **Dominant Public Sector**, offering universal state-guaranteed free basic care via many health organizations like local health facilities, multi-service clinics, university hospitals, and specialized hospitals, and growing **Private Sector**, with includes private clinics, mainly present in major cities with high purchasing power, where healthcare is provided for a fee and part of it is reimbursed according to public tariffs. **In finance**, the healthcare system is primarily state-funded, flowed by social Security funds from mandatory contributions, and than families pay directly thought co-pay or out-pocket- money for uncovered services, especially in the private sector, making it a mixed system with a strong public base but growing family financial responsibility. Given the limited public funds, rising demand (quantitative population growth & qualitative needs like aging/chronic diseases), inefficient spending, and unsustainable models; reforms are essential, focusing on efficiency, diverse funding (insurance/private), prevention, tech use, better governance, and social determinants to achieve Universal Health Coverage (UHC) and ensure long-term health outcomes.

Algeria's population in 2025 is around 47.7 millions, with a density of 20 people per km²; showing slowing growth (around 1.52 % recently from over 2% earlier) due to felling birth rates, with a shifts towards an older, urbanized population. The statement accurately reflects a global demographic trend: growing numbers of young children (under 15) and older adults (over 60) stain healthcare system, with the elderly, often needing more complex care for chronic diseases , and requiring more specialized services and healthcare workers, placing a heavier burden on our NHS, impacting health care budget and resources (National Office of Statistics, 2024).

Indeed, Algeria shows strong health indicators, with life expectancy reaching a record 79.6 years in 2023 (78.2 for men, 81 for women), significantly rebounding post-pandemic

and ranking high in Africa and the Maghreb, reflecting better quality of life, though challenges like managing chronic diseases and regional disparities persist. This passage highlights significant progress in overall mortality (down to 4.15 per 1000 in 2023) and declining infant mortality (around 20 per 1000 in early 2023), but points out that neonatal deaths remain a critical issue, with premature births and issues in the first 48 hours (respiratory distress, birth defects) being leading causes, especially for males (21.9 par 1000) versus females (17.8 par 1000). The key take away is that while general child survival improves, the most vulnerable newborns need target interventions for survival during their first few days, as global trends show slow progress in neonatal care compared to post-neonatal care, risking SDG targets (Mohamed, 2017) .

In recent years, Algeria has witnessed an epidemiological change from infectious to, non-communicable diseases (NCDs) such as vascular and heart diseases, diabetes, and cancer, driven by increased life expectancy and changing lifestyles, challenges its health care system, requiring urgent multi-sectoral strategies for prevention, better data collection, and policy adaptation to an aging population with more chronic conditions (Leulmi, 2008).

The national healthcare system struggles with financing gaps, rising tech costs and economic shifts, leading to underfunded primary care, infrastructure deficits, fragmented services and work force imbalances, requiring reforms in governance, funding (more GDP allocation), technology integration, and community engagement for better access and equity.

Public authorities, led by the Ministry of Health, Population and Hospital Reform, are driving a Health Digital Transformation (H.D.T) to tackle sector challenges like workforce shortages, rising costs, and evolving patient needs by implementing technologies for improved efficiency, accessibility, quality, and satisfaction, as seen in initiatives like Electronic Records, Telemedicine, and AI, mirroring global strategies for integrated health systems. This push aims to create a more responsive, high-quality system that meets modern expectations through strategic, integrated approaches to technology adoption. Experts agree digital transformation is crucial for sustainable healthcare, but its implementation is often inefficient due to significant obstacles like poor infrastructure, lack of funding/trained staff, data governance issues, regulatory gaps, and resistance to change, creating a digital divide that hinders equitable access despite technology's potential for improving care, reducing costs, and boosting efficiency.

Therefore, this study attempts to answer the following main question:

What are the main obstacles to adopting medical information technology in Algeria?

This study aims to:

- Evaluate the current situation in the field of medical information systems implementation and identify areas of delay at the healthcare sector level;
- Identify the main obstacles in adopting medical information technology such as weak infrastructure, resistance to change, financial constraints, lack of qualified personnel, issues related to the design of medical information systems, and interoperability;
- Analyze the positive and negative effects of digital transformation on operational, economic, and administrative efficiency, quality of healthcare, and patient management;
- Assess the effectiveness of current policies, strategies, and laws related to digital health;
- Propose practical solutions to overcome challenges and benefit from the advantages of medical information technology to achieve better health outcomes.

1. Literature Review

Medical information technology (MIT) is central to modern healthcare's data-driven shift, bridging medicine and IT to create interconnected systems for better care, efficiency, and patient outcomes through tools like EHRs, telemedicine, AI, and big data analytics, enabling proactive, personalized, and safer care by improving decision-making, reducing errors, and enhancing access, despite ongoing challenges in security, privacy, and integration. The ultimate goal of using medical information technologies is the proper management of health and medical data to improve the patient's health level. They provide all beneficiaries of the healthcare system with clear foundations and real-time information to make sound and informed decisions based on data and facts for the purpose of enhancing public health.

Due to the overlap of the term medical information technology with a group of other terms, it is difficult to provide an accurate definition of the term. The work of Robert Ledley and Lee Browning in 1959 is considered a major starting point for the later use of the term. Although they did not provide a definition of the term, this theoretical work is considered the cornerstone of the field of medical informatics and changed perspectives on diagnostic methods and how computing technologies can be utilized in education and clinical practices to improve diagnostic accuracy and the selection of optimal treatments (Lidely & Lee B.

Lusted; 1959). Medical information technology is considered a branch of health information technology, which concerns the use of information technology in the clinical, medical, and therapeutic environment in general.

The reviewer of local databases perceives the scarcity of studies that addressed the concept of medical information technology, as only a few research papers and theses dealing with hospital information systems in general were found, including (Khaled, Aouni, and Lahoul, 2017). However, the epidemiological shift caused by the COVID-19 pandemic, the expansion witnessed in electronic intermediaries, and the spread of technologies in various fields, along with the policy adopted by the Ministry of Higher Education and Scientific Research in Algeria, which relied on digitization as a key pillar of sector reform, encouraged Algerian researchers to study digitization in general and its applications in various fields. The year 2025 witnessed notable scientific publishing activity in the field of digital transformation, such as the study by Naima Menad and Emhamed Ziyad that addressed the contribution of digital transformation applications in the health sector in Algeria (Menad and Emhamed, 2025), and the study by Zahra Bahraoui and Mansouri Haj Moussa that dealt with the reality of digital transformation in health institutions (Zahra and Mansouri, 2024), in addition to the important study conducted by Aboubakr Khoulad on the digital transformation path of healthcare institutions in the Wilaya of Annaba (Khoulad, Abdelghani, Mouloud, & Djihad, 2025).

2. 2-1. The Need to Use Medical Information Technology

In today's rapidly evolving healthcare landscape, technology is reshaping the way healthcare is delivered, making patient outcomes more accurate and data-driven. As we continue to see advancements in medical technologies, medical informatics has emerged as a fundamental component of modern healthcare. This field, which combines medical care, information technology, and data science, plays a pivotal role in improving patient care, facilitating healthcare management, and supporting public health initiatives. Understanding the importance of Medical informatics is essential for anyone working in healthcare, from practitioners to administrators and even those looking to enter the field.

Information technology has witnessed rapid growth in the medical care sector. The increasing integration of modern technologies has revolutionized healthcare through advancements in artificial intelligence and the ability to analyze big data in how patients are diagnosed and their care improved. The significant potential offered by artificial intelligence

has enhanced the efficiency and accuracy of healthcare delivery by demonstrating exceptional skills in personalized medicine, early disease detection, and predictive analytics (Thacharodi, et al., 2024)

The technologies, tools, equipment, and procedures required for collecting, storing, retrieving, and using health and medical data provide a vast amount of data and information for patients, nurses, hospital administrators, doctors, insurance providers, and other stakeholders through electronic access to medical records via health information technologies.

The use of new technologies to keep up with developments will allow for cost reduction, improved safety, increased equity of access, reduced pressure on limited hospital facilities, and enhanced public health and overall community well-being.

2-2. The Evolving Reality of Medical Information Technology in Algeria

Algeria is actively pursuing Medical digitalization through initiatives like the National Agency for Digitization of Health (ANNS) to improve efficiency, reduce errors, and enhance access, with the pandemic accelerating telemedecine adoption. It has engaged with the World Health Organization's (WHO) strategy in adopting the digital dimension of health. The first item in WHO Global Strategy on Digital Health involves urging Member States to "consider drawing up a long-term strategic plan for developing and implementing eHealth services," focusing on building ICT infrastructure, ensuring equitable access, creating national visions, and developing action plans with monitoring frameworks, aligning with their 2020-2025 strategy and its 2027 extension to integrate digital health for universal health coverage (WHO, 2005, p.5.). Algeria has engaged in this area by establishing a long-term strategy to develop and implement e-health services in various fields of the health sector, including health administration, so that this plan includes an appropriate legal framework, suitable infrastructure, and the encouragement of partnerships between the public and private sectors (Zidane., A , Benkadi., H, 2023, p.163).

2-2-1. Digital Health Initiatives

Algeria has made significant progress in adopting technologies in the health sector. The 1994 Finance Law was the first step towards digitizing the national health system, where the Algerian legislator established what is called the contractual system between health institutions and social security bodies. According to this system, admission offices were

created in 2001, and a digital program called (Logiciel PATIENT) was implemented to record the movement of patient admissions and discharges. This program is directly linked to the (IDAAS) program of the National Social Security Fund to digitally verify the patient's affiliation status with one of the social security funds (Menad, N, Ziad, A, 2025, p.236).

The years 2008-2010 also witnessed attempts at digital transformation through to modern systems, introducing telemedicine, electronic health records (EHRs), and national platforms for better care, though challenges in infrastructure and training persist, requiring ongoing investment in digital skills and regulation for full potential. This phase also saw the emergence of a national digital initiative with the launch of the electronic health card (Chifa). It was characterized by a significant lack of expertise and weak technical infrastructure, which was qualitatively strengthened in the subsequent phase from 2011 to 2015, during which the "National Health Development Plan 2011-2015" was launched. However, this plan was limited to the initial steps of digitizing medical records in some large hospitals, following the appearance of the preliminary version of the electronic medical file developed by a group of IT engineers in the Wilaya of Setif. Afterward, this field *experienced stagnation and slowdown, with scattered, uncoordinated, and limited efforts*, until it *entered a phase of acceleration due to the emergence of the COVID-19 pandemic from 2020 to 2022*, which revealed the urgent need for digitization. Digital telemedicine platforms have been developed, and digital health solutions have emerged through smartphones. This transformation has crystallized through the establishment of an official roadmap between the Ministry of Health and the World Health Organization by adopting the "National Digital Health Strategy 2023-2027" as a result of a long process of attempts and experiments, following the development of the digital and technological landscape and the adoption of advanced technologies such as artificial intelligence and the Internet of Things.

2-2-2. Digitization of National Health Information Systems

In this context, the Algerian authorities seek to bridge the digital gap in health facilities by investing in information and communication technology through the construction of an information system consisting of six systems, some of which are used on the administrative side such as the human resources information system, maintenance-related information systems, and some used on the medical therapeutic side such as the information system related to the mandatory reporting of diseases, information systems related to the electronic

vaccination record, the application related to health activities, and information systems related to scorpion poisoning (Zidane and Kadi, 2023).

More than 60 digital platforms are distributed among the various central directorates of the Ministry of Health according to need and their specificities, enabling centralized management and better coordination between various public and private health institutions.

Among them, for example but not limited to, the following active platforms are mentioned:

1- Human Resources Information System: RH Santé Dz is a comprehensive web platform on the internet for managing human resources in the public health sector in Algeria.

2- Information System related to Mandatory Disease Reporting: DMO is a platform containing all information and data including personal patient information (address, age, gender, hospitalization status) related to notifiable diseases.

3- Information System related to Medical Equipment Data: GMAO includes data and information related to the maintenance and monitoring of medical devices and equipment.

4- Information System related to the Electronic Vaccination Record: DEVAC is a platform that allows access to vaccinated individuals' data and information including the type and date of vaccination.

5- Application related to Health Activities: SISDZ 8080 is one of the most important applications as it includes all medical activities, obstetric activities, reports, and daily, monthly, semi-annual, and annual statistics for both patients and users in the health sector.

6- Information Systems related to Scorpion Poisoning: EVEN.SCO

7- Central Pharmacy Information System for Hospitals: to monitor drug stock levels at all public hospitals and embody the principle of solidarity and justice.

8- Digital Platform related to Radiotherapy Appointment Scheduling: RDV Radiothérapie is an online system that facilitates scheduling radiotherapy sessions for breast cancer patients.

10- The digital platform for managing death certificates CERT DC.

11- The digital platform for managing oxygen stock in healthcare institutions.

12- The digital platform for Hajj HADJSIHA.

13- The digital platform for patients with autism (Autism).

14- The digital platform for school health.

15- The electronic request support platform linked to the drug management program EPIPHARM.

16- The platform for reporting drug fluctuations.

- 17- The digital platform for managing and monitoring the budgets of health institutions.
 - 18- The digital platform for remote continuous training MOOC.
 - 19- The digital platform for monitoring projects in the health sector GSPI DEP.
 - 20- The digital platform for managing emergency departments and patient waiting rooms.
- The network of institutions comprising the health information system in Algeria has evolved starting with the establishment of the National Institute of Public Health in 1964 to prepare and publish reports related to the health situation in Algeria, then the establishment of health sectors and preventive services in 1979, followed by the establishment of epidemiology and preventive medicine services in health institutions in 1985, then the establishment of two national agencies for the development of health research and health documentation in 1995, culminating in the establishment of the Directorate of Information Systems and Communication in 2011 at the Ministry of Health.

In its response to the 2024 report of the Court of Auditors, the Ministry of Health stated that in order to achieve an integrated and coherent information system containing verified information, the Ministry of Health initiated the establishment of the National Agency for Digitalization in Health by Executive Decree No. 22-251 dated June 30, 2022 (in the context of completing the establishment of executive and advisory bodies and organizational tools) with the aim of implementing sectoral strategies and action plans related to the generalization of the use of information and communication technologies through digital applications and services. The agency was tasked with supporting health services across the country (Court of Auditors, 2024).

2-2-3. Digital Health Strategy 2023-2027:

It is a strategic vision for a comprehensive, integrated, and secure digital health system that places the citizen at the core of attention and enables health professionals to provide high-quality, data-driven care while ensuring equity and universal access for all. It aims to achieve five strategic objectives:

1. Achieve comprehensive digital health coverage targeting 90% of the population to have an electronic health record, cover 70% of remote and rural areas with telemedicine, and connect 100% of university hospitals.
2. Achieve full interoperability by linking various systems such as pharmacy, laboratory, and radiology, and full integration with social security agencies.
3. Improve quality of care through data and artificial intelligence by developing a national platform for big health data analysis and using AI systems to support diagnosis and

treatment.

4. Empower citizens and professionals by granting citizens full access to their health records and developing health applications for prevention and self-monitoring, targeting 100% of doctors for training on using these systems.
5. Ensure the security and protection of personal data by establishing a national authority for health data protection, applying international cybersecurity standards, and creating a national center for responding to health cybersecurity incidents.

With a budget estimated at 57 billion Algerian dinars, the strategy was based on axes that include the following measures:

- Digital infrastructure: The strategy proposes a set of practical measures to develop the technical infrastructure to ensure that 100% of institutions are connected to the network and a response time of less than 2 seconds. Among these measures is the establishment of a national data center according to international standards with a storage capacity of at least 10 petabytes, in cooperation with Algeria Telecom; the creation of the national health network that connects all health institutions with fiber optics at varying flow speeds according to their size, with the adoption of hybrid cloud computing.
- The national application system through the establishment of a national electronic medical file as a unified digital identity granted to the patient for life, to be implemented in phases until it is generalized throughout the country by 2027; as well as the construction of a national telemedicine platform to launch medical consultations, expertise, medical monitoring, and remote medical assistance, alongside the design of national systems to support clinical decisions through the establishment of the Algerian medical knowledge base containing 500 unified treatment protocols and a system of alerts and reminders for drug interactions and periodic tests, utilizing artificial intelligence applications to monitor diseases, especially chronic ones.
- Training and Empowerment: This axis focuses on training human resources in modern technologies by reviewing the national program for training doctors in digital skills and establishing three master's programs in health informatics, encouraging scientific research to train 500 specialists by 2030. On the citizen empowerment side, the strategy aimed to enable the launch of the "Sehati" application, allowing users to access health services from their smartphones.
- Governance and Regulation: The state's strategy in its legal aspect revolves around preparing a legal framework by enacting the Digital Health and Health Data Protection

Law, alongside establishing new bodies and structures such as the National Agency for Digital Health, the National Observatory for Digital Health, in addition to other advisory committees.

Within the framework of the digitalization strategy of the health sector to ensure high-quality healthcare, the Ministry of Health, through its minister Mr. Abderrahmane Benbouzid in 2022, announced the launch of six innovative digital projects including: the Digital Hospital project, the digitization of contractual relations with social security bodies, the project of adopting the national identification number in the biometric identity card and integrating it into the patient's electronic medical record, the digitization of the central administration and linking it with health institutions, the digitization of health structure plans, and the electronic pharmacy and health information system in Algeria. These projects are considered a strength factor in the digital transformation of the sector due to their provision of accurate data processing and effective decision-making in a timely manner (Yatou and Radia Bouchour, 2024).

2-2-4. Applications of Medical Information Technology in Algeria:

Among the most common uses of information technology in the medical field, which have been adopted by the Ministry of Health, we mention:

2-2-4.1. Electronic Medical Record: The origin of the application of the electronic medical record in Algeria dates back to the agreement signed by the Ministry of Health with the European Union in 2002 with the aim of assisting the health sector in defining and implementing a sectoral modernization strategy. In 2012, three sites were selected as pilot sites in addition to three applications: a central data repository, a human resources information system, and the electronic medical record system (Labangi, 2024).

The Algerian legislator has obligated public and private health institutions through Health Law No. 18/11 to provide a single electronic medical record at the national level according to the text of Article 26, which states: "Each patient must have a single medical record at the national level." Article 292 of the same law also stipulates: "Public and private health structures and institutions must prepare a single computerized medical record for each patient and update it, and they must maintain the confidentiality of the information in their possession." Furthermore, they must ensure the management and preservation of the medical archive.

To ensure the full operation of the electronic medical record, which is scheduled for 31/12/2025 as the deadline to achieve 100 percent operation, the Ministry of Health has

concluded a framework agreement with Algeria Telecom to connect 2,599 health facilities across the national territory via fiber optics. This initiative contributes to a significant increase in flow speed to reach 2 Mbps for the central site and between 10 Mbps and 50 Mbps for other health facilities at the same rate. This project requires upgrading the current infrastructure and updating the central sites to effectively meet the needs of infrastructure connectivity, as well as installing all necessary equipment, including equipment for activities and residents, cybersecurity devices, in addition to managing subscriptions and fees related to the fiber optic service and specialized connections. This framework agreement provides many advantages, as it enables the ministry to establish a modern, secure, and high-performance communication network, which improves the quality of public service at competitive costs.

2-2-4-2. National Health Identification Number

The National Health Identification Number (INS) is a unique number assigned to each individual upon their first interaction with the health system. It allows for reliable identification throughout their treatment journey and is somewhat similar to a digital identification card in the health sector. The number includes, from left to right: gender, year of birth, month of birth, type of person, municipality code, serial number, and key.

This number enables the secure linking of all personal health data and ensures the connection of the patient's medical information to the correct individual, avoiding errors and medical duplication caused by identity confusion or file duplication. It also facilitates communication among various actors in the health sector and improves care coordination, contributing to enhancing the quality of patient care.

Adopting this identifier helps reduce the time wasted verifying identity or searching for information across different systems and decreases administrative paperwork. It guarantees confidentiality and protection of patients' sensitive data in accordance with applicable legislation, especially Law 18/07.

2-2-4-3. Telemedicine Experience:

The national health system in Algeria comprises 170 hospitals, multi-specialty clinics, and health centers. The goal is to connect all these health structures into a national network and link doctors across all hospital sites. Telemedicine is considered one of the most important strategic alternatives adopted by the state to overcome the challenges imposed by the reality of the health system, the most significant of which are the vast area and geographical

dispersion of hospital organizations and the imbalance in the distribution of medical practitioners in these organizations.

Algeria has adopted this project under the leadership of the Advanced Technology Development Center with the assistance of the International Development Center in Canada, and the main partners in implementing this project are: the "Hajira" Health Center in Ouargla, Algeria Telecom, in addition to four reference hospitals (Bir Traria Hospital, Hassan Badi in the capital, Ouargla, and Adrar) with the support of the Ministry of Higher Education and Scientific Research (Hamidouch and Souad, 2017).

The Algerian experience in the field of telemedicine can be summarized as follows:

- November 2007: Use of telemedicine between Bir Traria Hospital in the capital and Ouargla Hospital, located more than 800 km to the south. The operation included a lecture presented by Professor "Moussa Achir" from Bir Traria Hospital attended by doctors from Ouargla Hospital, with communication between the two hospitals to diagnose the case of a 10-year-old child, followed by the professor supervising a surgical operation at Ouargla Hospital from the Advanced Technology Development Center in December 2007.
- The year 2015 witnessed the launch of qualitative telemedicine imaging operations, starting with remote medical consultation by providing medical guidance from doctors at the Mustapha Bacha University Hospital Center in the capital to their colleagues in the Tamanrasset province. Then, a twinning agreement was signed between the public institution Mohamed Boudiaf in El Bayadh and the Tijani Demrji University Hospital in Tlemcen on November 11, and the first remote medical diagnosis was conducted by Professor "Aman Allah Bouayad," a specialist in surgery.
- January 20, 2016: Launch of the model telemedicine room project under the leadership of the Advanced Technology Development Center between the Ouargla Regional Military Hospital and the Central Army Hospital in Ain Naaja.

Other experiences:

- Clinical decision support systems: OLAP (Online Analytical Processing) medical decision support platform
- "Tashreeh" platform developed by the startup company at the request of the Faculty of Medicine of Saida University.

-The "Docta" platform, developed by a group of Algerian experts, works on organizing and managing medical records, information, and patient data in one platform and in a digital manner.

-The "DZDOC" platform developed by KHidma tech company as the first service for doctors and patients to book medical appointments online in Algeria in 2015 (Amer, 2024)

3. Key Challenges in Adopting Medical Information Technology

Challenges are an integral part of implementing any new technology, regardless of its type (medical, related to healthcare service delivery, or patient-oriented, technology-based innovation). The barriers to implementing technology in medical care are similar to those in other industries.

Many studies have confirmed that the adoption of medical information technology largely depends on individuals' opinions, and healthcare organizations are usually resistant to change, especially when it comes to adopting new technologies. The professional and administrative categories may be hesitant to adopt this technology due to concerns related to disruptions in current operations, inability to overcome traditional practices, and inefficiency in workflow (Mir, 2024). Many healthcare workers believe that medical information technology may interfere with their ability to make independent diagnoses, their relationships with patients, and the lack of digital culture and skills among hospital staff. Additionally, doctors fear that this technology could be a means of administrative control (Safi, Thomas, & Kurt, 2018) . Conversely, patients are found to be more enthusiastic about medical information technology compared to professionals and healthcare managers because it has enabled them to gain more autonomy in making decisions regarding their healthcare options (Safi, Thomas, & Kurt, 2018) . Many researchers believe (Petrakaki, Petros, Emma , & Andy, 2025) Changes in the distribution of authority, creating disparities and threats, are some of the most common reasons behind resistance to the use of information technology.

The hesitation of specialists in the health field towards change constitutes an obstacle to the implementation of an effective and efficient program. One of the issues related to their hesitation is the transition from paper files to electronic files. They justify this hesitation by the fact that the transition from paper information to electronic files may cause severe data loss and disruption in their workflow (STAMATIAN, Catalalin , & Mara, 2013) .

Also raised regarding Algeria is the difficulty of using and understanding digital health solutions for the elderly and individuals in low-income or rural areas due to low levels of health literacy. Therefore, socioeconomic disparities and the resulting digital divides create a digital gap that negatively affects marginalized groups, leading to limited access to technologies, internet connectivity, and education in health informatics, exacerbating disparities in access to healthcare and its outcomes, thereby increasing existing health inequalities (Mir, 2024) .

Among the challenges resulting from the use of this technology is an increase in data security and privacy risks. These systems may lack strong security measures and integrated protection mechanisms across communication systems, making healthcare systems vulnerable to data breaches, unauthorized access to sensitive and protected patient information, and cyberattacks. There is also the issue of the absence of clear legal and regulatory guidelines for digital medicine initiatives, resulting in regulatory and legal gaps.

One of the most persistent problems in technology within the healthcare sector is fragmentation and lack of interoperability, also known as poor interoperability. Systems such as electronic health records, laboratory software, imaging tools, and pharmacy databases often operate separately. Without operational compatibility, vital patient data cannot flow freely between departments, leading to communication breakdowns and incomplete records. Many healthcare providers, whether in the public or private sector, still rely on legacy systems that were not designed to support cloud applications, mobile access, or remote work. These outdated platforms limit innovation and cannot meet the demands of modern clinical or administrative workflows. Physicians and support staff often have to deal with multiple logins, different devices, and disconnected platforms just to perform routine tasks. This fragmented approach drains time, increases the risk of data entry errors, and frustrates teams working under pressure. The result is decreased productivity, increased chances of errors, and a declining care experience at every level from the front desk to patient outcomes.

Technology is supposed to make communication easier, but in many healthcare settings, the opposite happens. Staff often rely on a disparate set of tools that do not integrate or support real-time updates. Nurses, doctors, and administrators may use completely different platforms, leading to delays, confusion, or even missed steps in care. This kind of fragmentation is one of the most overlooked problems in healthcare technology. Without a unified communication system, teams cannot coordinate efficiently, especially across

multiple locations.

The shift towards home care has accelerated, driven by patient preferences and the reduction of healthcare costs. Many individuals now manage chronic conditions or recover from medical procedures using medical devices in their homes, such as ventilators, dialysis machines, and infusion pumps. Despite the benefits, the lack of adequate technological support for home care patients poses a significant risk and creates a unique challenge in health IT. Patients and caregivers may struggle to set up or operate medical devices correctly, leading to medical errors, undetected incidents, or misinterpretation of device readings.

Economic challenges also constitute one of the most important factors limiting the use of medical information technology in the national healthcare sector, especially given the limited financial resources and the high costs of establishing and maintaining health informatics systems alongside ongoing operational expenses, which may exceed available budgets, leading to the postponement or reduction of efforts to adopt medical information technologies. This is particularly true since Algeria relies on government sources to finance digital health, resulting in limited investment in medical information technology. Additionally, weak infrastructure, especially in remote areas, limits the spread of medical information use, resulting in weak digital solutions.

Among the challenges that may face the implementation of medical information technology in Algeria is the lack of appropriate knowledge and skills to operate this type of technology. In healthcare institutions, it is difficult to apply the same improvements across many healthcare institutions, as each healthcare institution has its own particularities, organization, and needs (T & Religioni, 2025).

Amid the rising population, epidemiological transition, and increasing aging rate of Algerian society, there are pressures on medical information systems due to the increased demand for healthcare in both quantity and quality.

4. Possible Solutions and Recommendations

The proper application of medical information technology in Algeria will undoubtedly lead to a revolution in the methods of delivering and improving healthcare for patients and enhancing the efficiency of health institutions. After more than eighteen years (since 2008) of the actual launch of digital transformation in Algeria, the adoption rate of this technology remains a persistent obstacle, limiting its positive impacts. Without effective implementation, medical information technology cannot expand, which restricts its ability to improve the level of national healthcare.

Overcoming the challenges hindering Algeria in the process of real investment in the field of medical information technology requires the implementation of many multi-sectoral strategies that do not only affect the healthcare sector. Starting from improving the digital and health culture of users of this technology and training the workforce, enhancing infrastructure and the partnership between the public and private sectors, and ending with the development of regulatory and legal frameworks to control and regulate information systems and their security.

Considering that the human element is the basis for the success of any technology, it is necessary to develop the competence of users of medical information technology by providing continuous and comprehensive training for all workers in the health sector, whether in the public or private sector, including all health-related parties on new digital tools and systems in order to raise the level of digital health culture. Training in computer skills, open online courses, and blended learning will certainly expand the skills of the workforce in the field of informatics and communications.

To overcome the infrastructure barrier, Algeria must invest in building strong and secure systems capable of improving interoperability among all parties and enhancing access to high-speed internet, especially in remote areas, in order to encourage telemedicine. It is also absolutely impossible to rely solely on public authorities in the process of adopting medical information technology; the success of these technologies requires a strategic partnership between the public sector, the private sector, and other community stakeholders for the purpose of unification, cooperation in management, financing, and improvement to establish sustainable medical information systems.

In the regulatory field, coordinated and unified protocols and standards must be established across all healthcare institutions to ensure smooth exchange of information and data. These standards also enable improved interoperability and data exchange

The healthcare sector has become a primary target for cyberattacks due to the sensitive nature of health data. According to IBM, this sector experienced the most expensive data breaches in 2023, with costs reaching approximately 10.93 million US dollars, nearly double the cost of breaches in the financial sector. These breaches can lead to significant financial losses, violations of patient privacy, disruption of healthcare services, treatment delays, and even endanger patients' lives (WHO/Europe, 2024). Therefore, it requires the implementation of strong cybersecurity measures and protocols to protect medical and health data.

5. Conclusion

Algeria's desire to implement medical information technology is evident through initiatives to digitize the health information system, which has allowed the creation of more than 60 digital health platforms, efforts in establishing the electronic medical record and the national health identification number, and some successful experiences in telemedicine practice, but widespread adoption faces barriers. While the potential benefits are huge, a strategic focus on infrastructure, digital and health literacy among beneficiaries, investment, local development, and robust policies is essential to bridge the gap between aspiration and reality that ensure medical digital success in Algeria.

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