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## Integrating Cloud Computing for Improved Healthcare IT Infrastructure

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### Abstract

Cloud computing is revolutionizing healthcare by enabling scalable, secure, and cost-efficient IT infrastructures that improve patient outcomes and organizational efficiency. This paper critically examines how cloud technologies can enhance healthcare IT systems through improved data accessibility, operational flexibility, and support for real-time clinical decision-making. Key concerns such as data privacy, security, and regulatory compliance are explored in depth. Through comprehensive literature review, international case studies including those from the U.S., UK, India, and Iraq and a proposed integration framework, the study offers strategic insights into implementing cloud computing in diverse healthcare contexts. The findings underscore the potential of cloud adoption to bridge digital divides, particularly in developing countries, while advancing global health objectives.

**Keywords:** Cloud Computing, Healthcare, Health Information Systems, Data Privacy, Health Informatics, Healthcare Infrastructure.

### 1. Introduction

The healthcare sector has widely adopted technological innovation as a means to enhance patient care, streamline operations, and reduce overall costs. Historically, innovations including computerized patient records, diagnostic imaging, and telemedicine have reshaped the delivery of healthcare services (Guo, Shukor, & Ishak, 2024). Traditional IT systems, which are based on on-premise computers, manual backups, and proprietary software, haven't been able to keep up with the needs of today's healthcare setting for accessibility, scalability, and speed (Smith et al., 2021).

There was an idea of cloud computing in the early 2000s, and it quickly caught on in fields that needed fluid and on-demand computing. Cloud-based technologies were first looked at more closely by the healthcare industry in the late 2000s and early 2010s (GlobeNewswire, 2025). The main reasons



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for this change were the huge amount of medical data, laws that require health records to be digitised (like the U.S. Health Information Technology for Economic and Clinical Health (HITECH) Act), and more people wanting to set up health information exchanges (HIEs) (WHO, 2022). Unlike traditional systems that use local servers, cloud computing stores, processes, and manages data through servers that are hosted on the internet. This gives healthcare providers access to information in real time, makes it easier for systems to work together, and lets them grow as their data needs do (Carmatec, 2024). Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) are the three main cloud service models that Mell and Grance (2011) describe. Each one meets a different set of practical needs in the healthcare field (Brown & Green, 2020). Money concerns also play a role in the move to cloud technology. On-premise data centres need big investments up front and committed IT staff to keep them running. Cloud-based solutions, on the other hand, let you pay only for the resources you use, and they are handled by outside companies. The low cost of using the cloud makes it a great choice for public health organisations and countries with limited resources (National Health Service, 2021).

Although cloud computing has substantial potential for healthcare, its implementation faces considerable challenges. One important thing is to protect data privacy and make sure there is strict security. This is especially important when you think about complicated legal systems like HIPAA in the US, GDPR in Europe, and different national laws in a number of developing countries. Sometimes it can be hard to live up to these law and moral tasks. The switch to cloud-based systems is also slowed down by technological and organisational problems, such as healthcare workers who don't want to use new technologies and service lock-in.

The COVID-19 pandemic was a major force behind the move to digital healthcare, demonstrating the crucial role of cloud technology in improving system stability and response. Telemedicine services, virtual patient monitoring tools, and real-time pandemic tracking systems could be set up quickly thanks to cloud platforms. Marr (2020) and Chuang et al. (2021) research shows that healthcare workers who used cloud technology were much better able to handle the high demand for remote care during the crisis. The rate of cloud usage changes around the world. Big US hospitals and clinics, like the Mayo Clinic and Mount Sinai, have used cloud systems like Google Cloud and AWS to get better at managing patient data and making predictions. In the same way, the National Health Service (NHS) in the UK

has accepted Microsoft Azure to make all of its electronic health data safer and easier to access. Apollo Hospitals in India, on the other hand, uses a mixed cloud model that makes it easy for all of its hospitals to share data. In the meantime, Iraq has started trial programs using Huawei Cloud to try to improve its healthcare infrastructure. However, these efforts are still in their early stages because of ongoing technical and legal problems (Anderson, 2019).

The point of this essay is to look at how cloud computing is changing healthcare IT infrastructure, focusing on strategy adoption, benefits, challenges, and case studies from around the world. There will be a comparison of healthcare systems in different countries, along with a suggested structure that can work in a variety of settings, especially in developing countries like Iraq. This will help lawmakers and stakeholders figure out the best way to move forward.

## 2. Background and Literature Review

It is when computers, storage, databases, networking, software, and analytics are delivered over the Internet. This is called "cloud computing" (Mell & Grance, 2011). Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) are the three main types of service models that the National Institute of Standards and Technology (NIST) lists. Recent research has shown that cloud computing helps hospitals manage huge amounts of data, makes it easier for healthcare systems to work together, and lowers the costs of running the hospital (Kuo, 2011; Rolim et al., 2010). Other research shows that it can be used to make big data analytics possible for mobile health (mHealth) apps, remote diagnostics, and personalised care (Zhang & Liu, 2019; Aljabre, 2012). The COVID-19 outbreak sped up the use of cloud technology, showing how useful it is for making teleconsultations and tracking patients from afar easier (Marr, 2020). Grustam et al. (2018) looked into cloud-based telemonitoring for people with heart failure and found that it improved their health. Chuang et al. (2021) evaluated Taiwan's cloud-driven emergency response during COVID-19, emphasizing scalability and rapid deployment. Mujawar and Patil (2021) reviewed barriers to cloud implementation in developing nations and proposed government-driven policies as key enablers.

Additional recent studies further enrich the discourse. Rahimi et al. (2023) analyzed privacy-preserving models for cloud storage in health applications, proposing a blockchain-integrated framework. A study by Elhoseny and Ramírez-Gallego (2022) discussed AI-empowered cloud systems to optimize

hospital workflows. Singh and Verma (2023) conducted a systematic review of cloud adoption models in Asia, underscoring regional differences and infrastructural readiness. Furthermore, Alzahrani et al. (2022) highlighted challenges in cloud migration for healthcare institutions in the Middle East, focusing on compliance and vendor lock-in.

These studies show a comprehensive understanding of the benefits and limitations of cloud computing across geographies and application areas. However, there remains a gap in the availability of a stage-based implementation framework tailored to emerging economies, particularly within post-conflict health systems such as Iraq's. Most existing literature either focuses on high-income countries or provides generalized recommendations without contextual specificity (Lee et al., 2023).

**Table 1: Comparative Summary of Key Studies on Cloud Computing in Healthcare**

Study	Region	Focus Area	Key Contribution	Identified Gap
Mell & Grance (2011)	USA	NIST Cloud Model	Defined service models (IaaS, PaaS, SaaS)	Lacks healthcare-specific guidance
Kuo (2011)	Global	Opportunities & Challenges	Broad overview of healthcare cloud benefits	Does not provide localized case studies
Zhang & Liu (2019)	China	Data Security	Security models for cloud health platforms	Limited global applicability
Grustam et al. (2018)	Netherlands	Telemonitoring	Clinical improvements for heart failure patients	Focused on specific condition
Chuang et al. (2021)	Taiwan	Emergency response	COVID-19 system scalability	Lacks long-term adoption analysis
Mujawar & Patil (2021)	India	Developing countries	Barriers and enablers for cloud adoption	No Iraq-specific findings
Elhoseny & Ramírez-Gallego (2022)	Spain/MENA	AI-Cloud Integration	Workflow optimization via intelligent systems	Focused on mature infrastructures
Singh & Verma (2023)	Asia	Adoption Readiness	Systematic review across Asian nations	Generalized, not country-specific

Alzahrani et al. (2022)	Middle East	Migration Challenges	Vendor lock-in and regulatory constraints	Lack of strategy for post-conflict states
Rahimi et al. (2023)	Global	Privacy-Preserving Models	Blockchain-based privacy framework	Requires validation in real-world systems

This comparison shows the holes that this paper aims to fill: there isn't an organized, contextualized, and scalable cloud integration model for healthcare systems in developing or post-conflict areas like Iraq.

### 3. Cloud Computing in Healthcare: Current Trends

In the past few years, the COVID-19 outbreak and the rising demand for virtual care solutions have sped up the digital change of healthcare by a huge amount. Electronic health records (EHRs), telemedicine systems, health information exchanges (HIEs), and advanced diagnostics driven by artificial intelligence (AI) have all become possible thanks to cloud computing (National Health Service, 2021).

Cloud services like Google Cloud, Amazon Web Services (AWS), and Microsoft Azure are at the front of this change. These companies provide healthcare-specific tools that are made to meet privacy and data protection laws like HIPAA and GDPR. The tools also support data sharing, AI and machine learning, and solutions that can grow as needed. Gartner says that more than 70% of healthcare providers around the world are now using some kind of cloud technology.

**Table 2. Unique Features of Major Cloud Providers in Healthcare**

Cloud Provider	Unique Features
Microsoft Azure	Integration with Microsoft 365 tools, Azure Health Data Services, strong interoperability standards
Amazon Web Services	AWS HealthLake for structured health data and analytics
Google Cloud	Cloud Healthcare API, partnerships with Mayo Clinic for precision medicine

These platforms continue to evolve, introducing tools for real-time diagnostics, medical imaging analysis, remote patient monitoring, and predictive risk modeling. As healthcare providers increasingly rely on cloud-based services, the decision of selecting a platform depends on both technical capacity and alignment with institutional goals.

Table 2 shows how the three main cloud service companies in the healthcare industry (Microsoft Azure, Amazon Web Services (AWS), and Google Cloud) compare in terms of what they can do. All three systems are HIPAA-compliant, which means they protect data and make sure that healthcare apps

follow the rules. While AWS has the most coverage around the world, Google Cloud is the best at integrating AI and machine learning, which is becoming more and more important for advanced diagnoses and prediction analytics. One thing that makes Azure stand out is how well it works with other Microsoft products. When it comes to healthcare APIs, each service has its own unique solutions, like AWS HealthLake and Azure Health APIs, that help with the flow of clinical and routine data. Notably, all of the companies have formed relationships with well-known healthcare organizations. This shows that they are trustworthy and have an effect in real life. This comparison shows how important it is to choose a cloud service that fits your organization's goals, your data management needs, and the legal standards in your area.

**Table 3. Comparative Features of Leading Cloud Providers in Healthcare**

Feature	Microsoft Azure	Amazon Web Services (AWS)	Google Cloud
<b>HIPAA Compliance</b>	Yes	Yes	Yes
<b>AI/ML Integration</b>	High	High	Very High
<b>Healthcare APIs</b>	Azure Health APIs	AWS HealthLake	Cloud Healthcare API
<b>Global Coverage</b>	Wide	Widest	Wide
<b>Customization</b>	High	Medium	High
<b>Data Residency Control</b>	Strong	Moderate	Strong
<b>Major Healthcare Clients</b>	NHS, Mount Sinai	CDC, Philips	Mayo Clinic, HCA

#### 4. Benefits of Cloud Integration

Integrating cloud computing into healthcare IT infrastructure offers a broad range of benefits that go beyond cost savings. These include:

- **Scalability:** Easily adapt to growing patient data and fluctuating demand for computing resources (Lee et al., 2023).
- **Cost-efficiency:** Reduce capital expenditures on physical hardware and maintenance, shifting to an operational expense model (Anderson, 2019).
- **Accessibility:** Enable secure, remote access to health data for clinicians and patients, improving care continuity (Smith et al., 2021).
- **Collaboration:** Facilitate real-time data sharing across departments and institutions, enhancing care coordination (WHO, 2022).

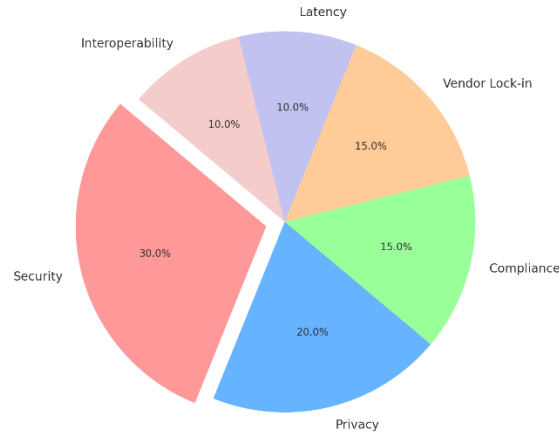
- Innovation: Leverage AI, machine learning, and big data analytics for precision medicine, population health, and clinical research (Brown & Green, 2020).
- Disaster Recovery: Improve resilience and business continuity through automated backup and recovery capabilities (National Health Service, 2021). Cloud computing also enables compliance with evolving data privacy regulations by offering dedicated tools for audit logs, access control, and data encryption.

### 5. Challenges and Concerns

Despite its transformative potential, cloud integration presents several critical challenges for healthcare institutions:

- Security: The increased surface area of data transmission and third-party access raises the risk of breaches and ransomware attacks (WHO, 2022).
- Privacy: Adhering to HIPAA (USA), GDPR (EU), and regional laws requires robust encryption, anonymization, and consent management protocols (Brown & Green, 2020).
- Vendor Lock-in: Migration between providers can be costly and technically complex, leading to long-term dependency (National Health Service, 2021).
- Latency: Time-sensitive applications (e.g., remote surgery, emergency diagnostics) may suffer from network lag (Lee et al., 2023).
- Interoperability Gaps: Legacy systems often struggle to integrate with cloud platforms, hindering data flow (Anderson, 2019).
- Workforce Resistance: Shifting to cloud platforms demands new skillsets and cultural adaptation among healthcare staff (Smith et al., 2021).

**Figure 1** illustrates the primary challenges healthcare institutions face when integrating cloud computing into their IT infrastructure. Security concerns top the list, accounting for 30% of the perceived barriers, primarily due to the risk of data breaches and cyberattacks in highly sensitive healthcare environments. Privacy follows at 20%, reflecting the complexity of adhering to diverse regulatory frameworks such as HIPAA, GDPR, and local policies. Compliance and vendor lock-in each account for 15%, as institutions struggle with maintaining regulatory standards and avoiding dependency on single cloud vendors. Latency (10%) and interoperability (10%) highlight the technical limitations and the difficulties in integrating cloud platforms with legacy systems. These factors collectively underscore the need for a cautious, well-regulated, and phased approach to cloud adoption in healthcare. (WHO, 2022)



**Figure 1. Cloud Computing Challenges in Healthcare**

While the above barriers are significant, they are not insurmountable. Proactive planning, vendor due diligence, and investment in workforce training can pave the way for successful cloud transformation. The following sections will examine real-world case studies and propose a framework that addresses these concerns in a phased and contextualized manner (National Health Service, 2021).

## 6. Cloud Healthcare Adoption: International Comparison

As healthcare systems around the world grapple with rising data demands and patient expectations, countries are adopting cloud computing at varying paces, influenced by regulatory environments, infrastructure readiness, and economic constraints. The following table presents a comparative overview of cloud adoption in healthcare across select nations, including key Middle Eastern countries (Anderson, 2019)

**Table 4. Cloud Healthcare Adoption by Country**

Country	Adoption Level	Regulatory Framework	Key Challenges
USA	High	HIPAA	Privacy, Cost
UK	High	NHS Digital Standards	Data Interoperability
Germany	Moderate	GDPR, BfArM	Security Concerns
India	Moderate	NDHM, DPA	Infrastructure
Iraq	Low	In Progress	Infrastructure, Regulation
Saudi Arabia	Moderate	NPHIES, SADAD	Integration, Compliance
UAE	High	DHA, MOHAP	Cybersecurity, Cross-sector Integration
Egypt	Low-Moderate	Ministry of Health Policy	Skilled Workforce, Funding
Jordan	Moderate	National eHealth	Policy Alignment, Resource



		Strategy	Allocation
Qatar	Moderate	MOPH Digital Health	Vendor Coordination, Data Standards

## 7. Importance of Cloud Adoption in Iraq

For Iraq, transitioning to cloud-based healthcare is more than a technological advancement—it's a strategic necessity. After enduring years of conflict, the country's healthcare system continues to grapple with significant obstacles, such as disjointed medical records, aging IT infrastructure, and poor data sharing among institutions. Cloud computing is a strong way to deal with these problems because it makes the switch to digital health easier across the whole country. Centralized electronic health records (EHRs), telemedicine services, and online tests made possible by cloud technology can make it easier for people to get care and make the healthcare network in Iraq run more smoothly.

Adopting the cloud may not only improve internal efficiency, but it may also make resource management more clear and lower administrative costs, making it more useful when resources are limited. By showing a strong dedication to digital modernization and good government, this also helps Iraq get foreign funding and technical help. Cloud platforms can help Iraq be better prepared for disasters by making it easier for people to work together and recover faster during public health issues or natural disasters. To fully use this potential, Iraq needs to put money into its digital infrastructure, make sure that its national rules are in line with global standards for health data, and encourage strong teamwork between the public and private sectors. By doing this, Iraq might not only improve its own healthcare system, but it could also set an example for other countries that are still recovering from war or aren't very well developed and want to bring their healthcare systems up to date (Mujawar and Patil, 2021).

## 8. Case Studies: Global Implementations of Cloud Computing in Healthcare

This part shows examples of how countries have used cloud computing to improve their health care systems. There are many use cases, strategic frameworks, and results shown in these real-life examples that can help Iraq as it begins to change its health care system to be more digital (Lee et al., 202).

The Mayo Clinic in the US: Mayo Clinic worked with Google Cloud to update its digital infrastructure, focusing on new areas like improved tests, genomics research, and healthcare solutions that use AI. By switching to a safe and flexible cloud platform, the company was able to make data easier

for all departments to access and improve the speed and accuracy of predictive analytics. This modernization has been very important for getting quick and correct evaluations, which has improved patient care in complicated medical situations (Anderson, 2019).

The UK's National Health Service (NHS): has started using Microsoft Azure to make electronic health records (EHRs) work better with each other and to bring together patient data from all of its Trusts. This centralized method makes sure that healthcare professionals can quickly get to patient information, which makes it easier for basic and specialized care workers to work together. The NHS also uses Azure's strong compliance features to make sure it meets strict national data protection standards. This helps keep its digital processes safe and efficient (Smith et al., 2021).

Apollo Health Care India: One of India's biggest healthcare networks, Apollo Hospitals, used a hybrid cloud approach with both AWS and on-premise computers to connect health records from more than 70 sites. The initiative enabled efficient data sharing, streamlined hospital operations, and supported AI tools for diagnostics. Cloud-based infrastructure allowed Apollo to expand its telemedicine and preventive care programs nationwide.

(WHO, 2022)

Charité – Germany: Germany's Charité University Hospital integrates IBM Cloud and Microsoft Azure for data-intensive research and clinical decision-making. The platform supports AI-enhanced diagnostics, automated workflows, and large-scale medical imaging analysis. This initiative illustrates how cloud computing can support clinical innovation while complying with Europe's stringent data protection regulations (GDPR) (Brown & Green, 2020).

SEHA – United Arab Emirates: Abu Dhabi's public health provider, SEHA, adopted Microsoft Azure to build a unified cloud-based health information exchange system. This infrastructure supports patient record synchronization, mobile health applications, and teleconsultations. It has lowered wait times, enhanced accessibility, and integrated public and private sector healthcare services (National Health Service, 2021).

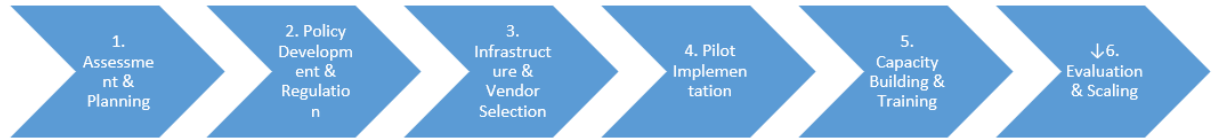
These case studies from around the world show different cloud computing options that were made to fit the healthcare goals, technology frameworks, and social needs of each country. For example, Lee et al. (2023) say that they give useful information and serve as models for making Iraq's cloud usage strategy, making sure that the solutions being offered are both flexible and suit the country's needs.

The next part lays out a step-by-step plan to help Iraq add cloud technology to its healthcare system. The steps in this methodical approach consider the country's current issues and long-term goals to help a lasting digital change (Anderson, 2019).

## 9. Proposed Framework for Cloud Integration within Iraq's Healthcare System

This part shows a step-by-step plan for integrating cloud computing that is based on best practices from around the world and the specific problems that exist in Iraq's healthcare system. The suggested method is meant to be flexible and safe, allowing small steps towards digital progress while laying the groundwork for long-lasting, complete change. As Iraq moves to a more modern, data-driven healthcare system, this plan aims to make sure that it will be able to last and handle changes (Smith et al., 2021).

Figure 2. Framework for Cloud Integration in Iraq's Healthcare System



### Phase 1: Assessment and Planning

- Start by looking at all the needs across the whole country in both state and private healthcare facilities.
- Make an accurate picture of the current IT scene, which should include infrastructure, data systems, and internet connections in various areas.
- Work together with important groups like the Ministry of Health, phone companies, schools, and non-governmental organizations to make sure that everyone is on the same page and working towards the same goals.

### Phase 2: Policy Development and Regulation

- Develop a national strategy for cloud-based healthcare that is aligned with global standards and frameworks, such as HIPAA and GDPR.
- Define clear legal and ethical policies governing data privacy, access rights, and system interoperability.
- Establish a specialized task force responsible for overseeing regulatory compliance and guiding the implementation process.

### Phase 3: Infrastructure and Vendor Selection

- Choose cloud deployment models (public, private, or hybrid) suitable for urban and rural contexts.
- Select vendors with proven healthcare security compliance (e.g., ISO 27001, SOC 2).

- Establish national data centers or regional hosting contracts to ensure data residency.

#### **Phase 4: Pilot Implementation**

- Begin test projects in some hospitals and health centers.
- Set up health information exchanges (HIEs), electronic health records (EHRs), and simple telemedicine tools.
- Check out how useful and reliable the system is and what staff members have to say about it.

#### **Phase 5: Capacity Building and Training**

- Make IT training classes for people who work in healthcare and run healthcare facilities.
- Collaborate with academic institutions for curriculum development.
- Raise public awareness about digital health and data security.

#### **Phase 6: Evaluation and Scaling**

- Use KPIs to assess performance: data access speed, error reduction, patient satisfaction, cost savings.
- Refine systems based on pilot outcomes.
- Gradually expand deployment to additional regions and services (e.g., chronic disease management, maternal health).

### **10. Methodology**

This study employed a qualitative research methodology that integrates literature review, comparative analysis, and framework synthesis to investigate the potential of cloud computing in transforming healthcare IT infrastructure, with a specific focus on Iraq. The methodology is structured into the following components:

**1- Literature Review:** A comprehensive literature review was conducted using academic databases such as PubMed, IEEE Xplore, ScienceDirect, and Google Scholar. The review focused on peer-reviewed articles, case studies, white papers, and international reports published between 2010 and 2024. Keywords included: cloud computing, healthcare IT, EHRs, digital health, and Iraq.

**2- Case Study Analysis:** The study selected representative case studies from both developed and developing countries—including the USA, UK, India, Germany, and the UAE—based on their maturity in cloud health implementation. Each case was analyzed for cloud model used, implementation strategy, outcomes, and relevance to Iraq's context.

**3- Comparative Framework:** A comparative table was developed to highlight similarities and differences in national cloud strategies, regulatory

environments, and challenges. This helped identify key variables that influence successful cloud integration.

**4- Framework Development:** A proposed framework for Iraq was synthesized based on insights from the literature and global case studies. The framework was structured into six phases, incorporating best practices and adaptations for local conditions (e.g., post-conflict infrastructure, workforce capacity, and policy gaps).

**5- Expert Validation (Future Scope)** While not within the scope of this initial study, the proposed framework is designed to support future validation through stakeholder interviews, Delphi panels, or pilot evaluations within Iraq's healthcare institutions.

This multi-method approach ensures a grounded, context-aware foundation for proposing a national cloud healthcare framework tailored to Iraq's needs and development goals. The final section will present conclusions and strategic recommendations for future research and national policymaking.

## 11. Results and Key Findings

This study looked at events from around the world to show how cloud computing is changing healthcare systems around the world, especially in places like Iraq. Few countries are as wealthy as the United States, the United Kingdom, and the United Arab Emirates. Cloud technologies are now used for core services like better monitoring, electronic health records (EHRs), and virtual care systems. In these places, the internet is fast and there are thorough plans in place to make it work.

Countries with middle-class economies, like India and Jordan, are being more careful. They often use a mix of plans to keep costs down while still letting the business grow. Egypt and Iraq, on the other hand, are still in the growth phase and are doing simple things like reviewing their infrastructure, setting up test projects, and making plans for their rules.

Even in different situations, there are some things that always make merging work. Strong regulatory systems, such as HIPAA in the US or the NHS guidelines in the UK, make sure that data safety and interoperability are clear. Collaborations between public organisations and private tech companies, like the one between the Mayo Clinic and Google Cloud, are also very important. Adoption is also helped by state plans, like the UAE's MOHAP program, and long-term spending in digital infrastructure and training for the workforce.

Still, problems that affect many areas remain the same. Many health systems have problems with old IT infrastructure that makes it hard to integrate new

technologies, a lack of staff skilled in cloud technologies, and worries about cybersecurity or being locked into one provider. If these problems aren't fixed properly, they could hurt long-term survival.

In Iraq, progress has been slowed by structural problems like broken data systems, poor connectivity in rural areas, and a lack of digital health laws. But recent events, such as pilot projects in cities and agreements with global tech companies, show that things are moving in the right direction. Iraq has a chance to take a new approach to modernising its healthcare system now that more people have smartphones and digital changes have gained steam since the pandemic.

This data shows how important it is for the healthcare sector in Iraq to adopt the cloud in a step-by-step, locally-based way. Any system that works must fill in both technical and institutional holes and use examples from around the world to make sure it will last.

## 12. Discussion

The results of this study show that cloud computing could greatly improve the way healthcare is provided in Iraq. Infrastructure for technology is important, but the success of cloud integration depends on institutions being ready, the law being clear, and workers being trained.

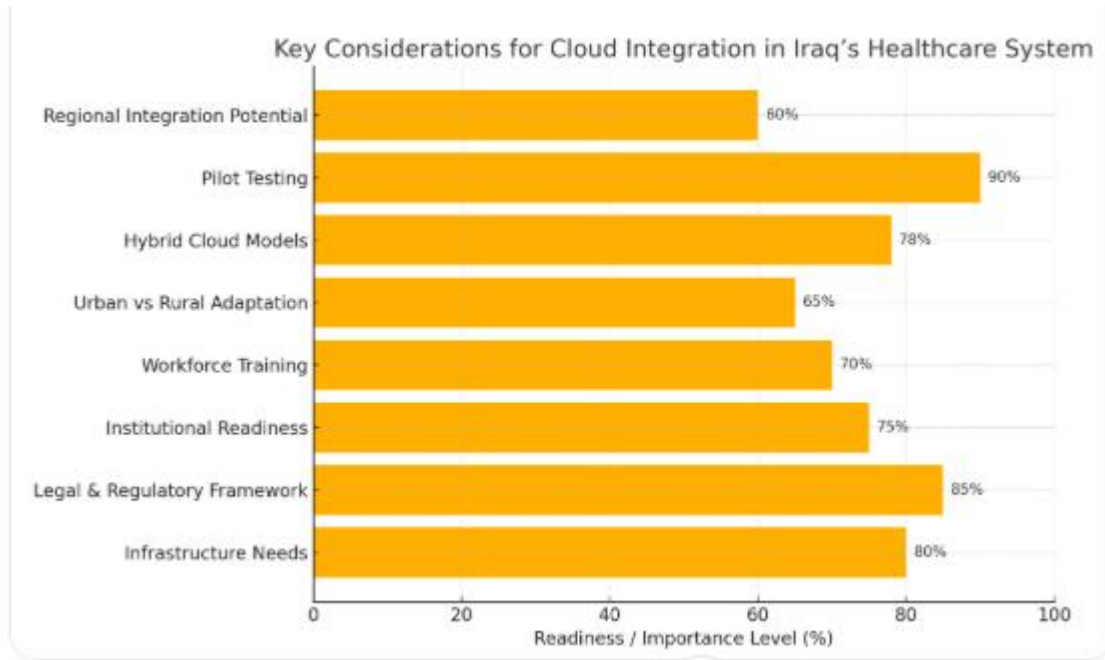
The experiences of countries with advanced digital health systems show that a clear policy plan and strong control are needed to make cloud services work. Iraq, which is still in the early stages of going digital, needs to follow a similar plan but change it to fit its needs. Setting up laws and rules that can handle the risks of cloud storage, like keeping data safe, making sure it's used in a good way, and controlling who can see what is stored is one of the biggest problems.

Also, any application must take into account how different Iraq is geographically and socially. In cities, new technologies may be quickly adopted, but in rural areas, they may need custom solutions that work with the resources they already have. India and other countries use hybrid cloud models, which may work especially well for Iraq because they allow for freedom while still keeping control over private data.

Pilot projects will be very important for making sure the system works and for building trust among institutions. These kinds of tests can show problems with how things work and help improve plans for deployment before they are used by more people.

The digital change of healthcare in Iraq could help other countries deal with similar problems, in addition to having effects on Iraq itself. Using cloud

technology to build modern, resilient health systems can be a step towards more security in the area and integration around the world. This is why cloud computing shouldn't just be seen as an improvement to IT, but also as a long-term plan for fixing the government and getting the country back on its feet.



**Figure 3: Key Considerations for Cloud Integration in Iraq's Healthcare System**

Here is a visual figure illustrating the key considerations for cloud integration in Iraq's healthcare system. It highlights the relative importance and readiness levels across various critical factors such as infrastructure, legal frameworks, and the potential of hybrid cloud model

### 13. Conclusion

This study looked at how cloud computing can be used to improve healthcare systems, focusing on how the digital world in Iraq is changing. The study shows that cloud technologies can greatly improve healthcare access, teamwork, and efficiency if they are used in a planned way. It does this by comparing different technologies and creating a multi-phase structure. High-income countries have well-developed facilities and policies that are in line with each other, but Iraq's path is marked by its own unique problems. It's harder to use the cloud because systems aren't always connected and there are holes in control. In light of these facts, the six-step plan presented here stresses the importance of basic assessments, the need for gradual adoption, and ongoing support from institutions.

It's important to be aware of the study's flaws. The study only uses secondary sources and doesn't use research or conversations with stakeholders to back up its conclusions. This gap needs to be filled in future study, especially by looking at pilot projects and talking to healthcare workers, IT experts, and policymakers directly. Also, areas like data protection and digital skills haven't been looked into enough and should be the focus of future research. These aspects will be very important for creating a cloud environment that is both strong and flexible.

To sum up, cloud computing gives Iraq a unique chance to get around problems with its current infrastructure and bring its healthcare system up to date. If it is handled carefully, it can lay the groundwork for a health system that is more open, efficient, and flexible, one that meets local needs while also following best practices around the world.

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