

Digital skills and attitudes towards digital transformation as an indicator of digital readiness for health sector employees - a quantitative study on a sample of health professionals in Adrar

المهارات الرقمية والمواقف تجاه التحول الرقمي كمؤشر على الجاهزية الرقمية للعاملين في القطاع الصحي
- دراسة كمية على عينة من المهنيين الصحيين بولاية أدرار

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Received: 12/05/2025

Accepted: 22/09/2025

Published: 30/09/2025

Abstract :

This study aimed to assess the level of digital readiness among health sector employees in Adrar Province by examining their digital skills and attitudes towards digital transformation within the sector. The research sample consisted of 120 employees from the target population in Adrar Province, with data collected through a questionnaire. After validation, 103 responses were deemed suitable for analysis. Data were analyzed using descriptive statistics and Pearson correlation coefficients via JASP version 0.19.3. The results indicated that health sector employees in the province demonstrate a notable level of digital readiness, supported by strong digital skills and positive attitudes towards digital health transformation. Additionally, the findings revealed a significant positive correlation among digital skills, attitudes, and digital readiness.

Keyword: Digital transformation, digital health, digital skills, attitude, digital readiness, healthcare sector

JEL Classification Codes : I15, J24, O33

ملخص:

هدفت هذه الدراسة إلى تقييم مدى الجاهزية الرقمية لموظفي القطاع الصحي لولاية أدرار، من خلال قياس مهاراتهم الرقمية و كذا موقفهم تجاه التحول الرقمي لقطاعهم، كان عدد الموظفين المشمولين بالدراسة 120 موظف كعينة من مجتمع الدراسة بولاية أدرار، و تم جمع البيانات بواسطة إستبيان، حيث كان 103 إستبيان منها صالحة للتحليل، و حللت بالاعتماد على الإحصاءات الوصفية و معامل الارتباط بيرسون باستخدام البرنامج الإحصائي JASP 0.19.3. أظهرت النتائج أن موظفي القطاع الصحي بالولاية جاهزون رقميا بناء على المستوى الجيد لمهاراتهم الرقمية و موقفهم الإيجابي من الصحة الرقمية، و أن المهارات الرقمية و الموقف و الجاهزية الرقمية مرتبطة إيجابيا ببعضها البعض.

الكلمات المفتاحية : التحول الرقمي، الصحة الرقمية، الموقف، الإستعداد الرقمي، القطاع الصحي .

تصنيفات JEL : I15, J24, O33

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Introduction

In a constantly changing digital world, digital transformation has emerged as a global imperative, especially over the last two decades as it has spread to all sectors. The health sector is no exception; the digitisation of healthcare systems is considered necessary for modernisation, improvement and inclusion worldwide (Anastasiou & Smith, 2023). The World Health Organization has emphasised this need in its Global Strategy for Digital Health 2020-2025.

In this digital landscape, where relatively little is known about staff digital readiness (Nguyen & Broekhuizen, n.d.), several studies have emphasised the importance of assessing health staff's readiness to implement the shift toward digital health (Saleh et al., 2016). This is because the success of the shift depends not only on the provision of technical infrastructure, but also on the readiness of human resources. Human resources are key to implementing and sustaining digital technologies.

During rapid technological shifts and growing demands on the healthcare sector, health professionals require advanced digital skills (Anastasiou & Smith, 2023). The lack of these skills poses a significant barrier to the adoption of eHealth technologies and, consequently, to the success of digital health (Olok et al., 2015). Additionally, the uptake of eHealth technologies hinges on employees' positive attitudes toward digital health and their proficiency in using these technologies (Olok et al., 2015). Attitude plays a critical role in determining the sector's digital readiness, as positive attitudes promote engagement in the transformation process, while negative attitudes hinder progress.

In this particular context, the launch of the National Digital Health Strategy 2023-2027 in Algeria signifies a substantial advancement in the direction of digitising healthcare services. The success of this initiative hinges on empowering, training, and enhancing the capabilities of the healthcare workforce. Studies focusing on digital readiness at both local and national levels can provide valuable insights for policymakers, enabling them to assess current digital competencies, identify challenges, and develop targeted strategies for effective digital transformation in the health sector.

Study Problem:

The issue of the study arises from the inevitability of adopting eHealth and the challenges it creates, the most important of which is the alignment of human resources with this transformation as one of the main pillars for its success. Because digital competencies and attitude towards digital transformation are considered one of the most important determinants to assess the readiness of health sector professionals and employees, exploring, mapping and assessing the digital skills and competencies of health sector employees became an important issue for policy making and building on them to make this transformation a success.

Thus, the study seeks to answer the following key question: **What is the readiness of health sector employees in Adrar state to adopt the digital transformation of the sector based on their digital skills and attitude towards this transformation?**

The following sub-questions fall under this question:

1. What is the level of digital skills of the health sector staff in Adrar?
2. What is the attitude of health sector employees in the state of Adrar toward the digital transformation of the sector?

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3. Is there a statistically significant relationship between digital skills, attitudes towards digital transformation, and digital readiness among health sector employees in Adrar?

Study hypotheses:

H1: There are indications of a high level of skill in its various dimensions among health staff in Adrar.

H2 :Health sector employees in the state have a positive attitude towards the digital transformation of the sector.

H3 :There is a positive relationship between digital skills and attitude toward digital transformation and digital readiness among health sector employees in the state of Adrar.

Objectives of the study:

This study aimed to assess the extent of digital readiness of health sector employees in the state of Adrar, by measuring their digital skills and exploring their attitudes towards the digital transformation of their sector, thereby drawing conclusions that help formulate practical recommendations. The study also seeks to fill the knowledge gap on this topic in the local context.

The importance of the study:

The importance of the study stems from the knowledge gap it tries to cover, as the qualification of health sector employees digitally to be ready to adopt and manage digital health solutions is one of the most important axes of global, national and even local strategies for digital health, which helps stakeholders to develop policies to qualify health systems in line with the desired goals, and therefore this study highlights its importance in the following:

- Assessing the current digital skills of health sector staff in Adrar
- Understanding the sector's readiness to embrace digital health
- The possibility of developing appropriate curricula and strategies to digitally qualify sector employees by assessing their current capabilities.

Previous studies:

A study(Saleh et al., 2016) : The study aimed to assess the readiness of healthcare providers working in primary healthcare centres in Lebanon to use eHealth tools. The study relied on a sample of 541 doctors, nurses and other service providers working in 22 primary health care centres distributed throughout Lebanon. The study instrument consisted of a quantitative questionnaire - translated into Arabic - developed by Holt et al. to assess the readiness to change employees within organisations. The questionnaire consists of 26 closed-ended questions formulated on a 6-point Likert scale, which is divided according to four factors: The first factor relates to fit, the second factor to administrative support, the third factor to change effectiveness, and the fourth factor assesses whether respondents believe they will benefit from eHealth applications. The results of the study revealed that doctors, nurses and others with access to computers believe that they have the necessary skills to implement and adapt to an eHealth system, and that the majority of healthcare providers in primary healthcare centres across Lebanon are ready to implement eHealth.

A study(Wubante et al., 2022) : Health professionals' readiness and associated factors to implement telemedicine system in private hospitals in Amhara region, Ethiopia 2021, This study aimed to assess health professionals' readiness and associated factors to implement telemedicine system in public hospitals in Northwest Ethiopia. A cross-sectional study was conducted on a total of 423 health professionals working in public hospitals, data was collected using an adapted, pre-tested, self-administered, Likert scale questionnaire, Part I of the questionnaire included demographic information and individual, technical and organisational access to basic technologies, and Part II included a questionnaire on telemedicine. Respondents with good knowledge and positive attitude towards telemedicine were more willing to adopt this technology and the study concluded that there is a need for capacity building to promote computer literacy, build computer skills to increase the confidence of doctors to be ready to adopt this technology and build their capacity through training and building good internet connectivity

A study(Abore et al., 2022) : Titled: Health professionals' readiness to implement electronic medical record system and its associated factors in public hospitals in Sidama Zone, Ethiopia, This study aimed to determine the level of health professionals' readiness to implement electronic medical record system and its associated factors in public hospitals in Sidama Zone, Ethiopia, using a cross-sectional study design complemented by a qualitative study in three public hospitals with a study sample of 306 participants. A self-tested questionnaire was used to collect quantitative data and an in-depth interview was used for the qualitative study. The study found that the readiness of health professionals in this study was low at 36.5 per cent of the participants.

A study (Veikkolainen et al., 2023): Building e-health competencies for future doctors and nurses - attitudes and capabilities. The aim of this study is to describe medical and nursing students' attitudes towards digital health and measure their digital capabilities based on self-assessment. The study was conducted as an online cross-sectional survey using Webropol at Oulu University and Oulu University of Applied Sciences in Finland on a sample of 250 students using a questionnaire with seven main themes and 16 questions on a five-point Likert scale (completely disagree to completely agree) and according to the results of the study, students generally had a positive attitude towards e-health and digitisation of health.

A study(Marsilio et al., 2024): Digital Readiness for Future Doctors: Caring for Post-Pandemic Medical Education, this study aimed to identify gaps in current medical education programmes by examining two key aspects: Technical Readiness (including general and health-related digital competencies) and Behavioural Readiness, which includes past experiences and future intentions related to telemedicine education and implementation among medical students and residents. A cross-sectional study was conducted on a sample of 307 students at a university in northern Italy using a web-based questionnaire consisting of 25 questions, divided into three sections: Demographic, Technical and Behavioural. Demographic information included gender, age, educational level and year of study (for medical students) or year of specialisation (for residents) for the first section. The digital competencies of medical students and residents, including technological skills and knowledge, as well as digital literacy and e-health for the technical section, while the behavioral section investigated participants' experiences, attitudes and behavioural intentions with telemedicine, including previous experiences, desire for

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training and education, and intentions to use telemedicine. The study concluded that proficiency in technological and digital skills as well as expertise in telemedicine is relatively low while most student future physicians showed a strong interest in receiving training in telemedicine and integrating telemedicine into their future clinical practice.

A study(S & Umamy, 2024) : Digital competence and adaptability are the keys to career readiness in the age of artificial intelligence. This study aimed to determine the impact of digital competence and adaptability on the career readiness of students at the Faculty of Economics and Business. The study population consisted of 372 students and was conducted on a sample of 79 students from the Faculty of Economics and Business, using a questionnaire on a Likert scale, and the results showed that the digital competence variable and the adaptive ability variable alone have a partial effect on career readiness. At the same time, the variables of digital competence and adaptive capacity combined have an impact on the professional readiness of students in the Faculty of Economics and Business.

Commenting on previous studies:

This study drew upon prior research regarding the theoretical framework and the development of the research instrument. Furthermore, the findings were compared with those of earlier studies, highlighting areas of both convergence and divergence. Specifically, these studies concurred on the identification of digital skills or competencies as a crucial indicator of digital readiness. Concerning attitude, some studies addressed this topic explicitly, while others referred to it as adaptation to digital transformation; however, all studies acknowledged the relationship between digital skills, attitude towards digital transformation, and the digital readiness of employees. While some studies concentrated on medical and nursing students as future healthcare employees, and others focused specifically on doctors and nurses, our study aligns with the work of Saleh et al. (2016) by broadening its scope to encompass all categories of healthcare employees, including administrators.

1. Theoretical Framework:

1.1. Conceptual Framework

1.1.1. Digital Transformation of the Health Sector:

Digital transformation involves cultural and organizational changes driven by digital technologies, re-engineering processes, and enhancing service delivery, with a deeper understanding of people's behaviour and skills (Barbosa da Silva et al., 2024). In health, it can be defined as the use of digital technologies to transform health-related business and administrative services(Stoumpos et al., 2023)

Rahma (2024) defines digital transformation as the process of adopting digital technologies to transition traditional processes into digital formats, aligning with contemporary demands and customer needs (Rahma, 2024, p. 14)

Although there is no clear and agreed upon definition of digital transformation, researchers usually describe digital transformation as a major organisational change driven by digital technology that changes the way business is conducted(Figueiredo & Uchoa, 2024).

In essence, digital transformation in healthcare can be defined as a technology-driven shift in organization, structures, processes, and work culture, propelled by rapid digital innovations. This transformation contributes to reshaping the healthcare system, reducing bureaucracy, enhancing the quality of life for vulnerable populations, improving access and diagnostic accuracy, elevating service quality while reducing costs, and empowering healthcare professionals with new skills (Bahraoui & Mansouri, 2024, p. 390).

1.1.2. E-health/digital health:

The term eHealth emerged between 1999 and 2000, and there is still no agreement on its conceptual scope. The term is used in various forms as a synonym for health informatics, telemedicine, and e-business in health (Pagliari et al., 2005) .

The World Health Organization (WHO) defines digital health as the use of digital technologies in health-related activities, extending the concept of eHealth to include advanced digital tools such as smart devices, the Internet of Things, artificial intelligence, big data analytics, and other emerging technologies (WHO, 2021).

Digital health serves as an umbrella term that encompasses various components, including **mHealth, telemedicine, telehealth, telecare, sensor-based surveillance, and health information technology** (Jarva et al., 2023). However, subtle distinctions exist between eHealth, health informatics, and digital health, with the latter being broader in scope (Wickramasinghe, 2024).

According to Snowden (n.d.) and the OECD (2023), digital health involves not only the use of digital ICT in healthcare products, services, and processes but also organisational changes in healthcare systems and the competencies required to effectively utilise these technologies. EHealth, specifically, encompasses interactions between patients and healthcare providers, data transfer across organisations, and peer-to-peer communication between patients and health professionals (Wickramasinghe, 2024).

1.1.3. The concept of Digital Skills:

The concept of skills varies depending on the context in which they are studied, and the terms skill and competence are often used interchangeably (Van Dijk & Van Deursen, 2014) , which is what was adopted in this study. Skill as a term means competence and quality in performance, and requires a period of organised practice and intentional training (Al-Nuaimi & Al-Falahi, 2024, p. 20) , OECD defines skills as: The ability to apply knowledge and use practical experience to accomplish tasks and solve problems. Competence is : The demonstrated ability to apply knowledge, skills and attitudes to achieve observable results (Fernandez Sanz, 2023)

So skill or competence can be said to describe an individual's functional ability to perform in the workplace

The American Library Association defines a digitally skilled individual as one who possesses both technical and cognitive abilities, enabling them to interpret digital information, collaborate effectively in digital environments, and adapt to new digital knowledge and practices (Fan & Wang, 2022).

In the context of healthcare, digital skills are defined as the ability to utilise technological resources, digital devices, and communication applications to access and manage various types of information within healthcare settings (Oberlander, 2022). This includes proficiency in using **electronic health records (EHRs), telemedicine platforms, medical devices, and health-**

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related mobile applications(Anastasiou & Smith, 2023), Or it is a set of core knowledge, skills and abilities that enable people to efficiently and successfully accomplish their job tasks in relation to digital media at work. (Oberlander, 2022, p. 24).

1.1.4. The importance of digital skills:

Digital skills are critical for successful digital transformation, forming a core component of national digital transformation strategies (McDonald et al, 2021) The workplace of the future needs digitally competent people who know how to use digital technologies(Widén & Teixeira, 2023). A lack of digital skills remains a significant barrier to the successful implementation of digital transformation initiatives at both individual and organisational levels(Misra, 2022, P 3). The absence of skilled human resources especially digital ones, limits the success of e-management transformation plans due to the inability to use its technologies and to keep up with its rapid changes (Al-Anazi, 2016; Bobker, 2022).

The World Economic Forum (2021) emphasised that for organisations to fully leverage technological advancements, they must prioritise the development of a digitally skilled workforce (McDonald et al., 2021).

In the health sector, the success of digital transformation efforts is particularly reliant on the competence of healthcare professionals. Effective strategies for accelerating digital transformation can only be developed through the assessment and enhancement of health professionals' digital skills (Montero Delgado et al., 2019). For example, the central importance of digital skills was emphasised in the Pan American Health Organization's digital transformation strategy for the advancement of digital health (Ferreira et al., 2025) .

Brief definitions of the digital skills dimensions under study

Table (1) : Definition of Digital Skills Dimensions

Concept/Dimension	The definition
Digital Literacy	Glaister (1997) defined "digital literacy" as the ability to understand and use information in multiple formats from a wide range of sources when presented via computers(Reddy et al., 2020)
Information Management	The ability to search for, process, select relevant, and evaluate information in digital media (VanDijk & Van Deursen, 2014)
Communication and collaboration skills	Ability to select and use appropriate digital tools to interact, exchange and communicate efficiently with different stakeholders(Audrin et al., 2024)
Communication skill	The ability to transmit and receive various communication messages through digital systems to achieve certain goals(Abis Al-Shafei & Kazim Al-Hamdani, 2019, p. 1653)

Analyse and manage data	The ability to recognise and manipulate different sources of health data to extract knowledge and findings to facilitate decision-making(Montero Delgado et al., 2020)
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Source: Prepared by the researcher based on the listed sources.

1.1.5. Attitude towards the digital transformation of health:

Attitude towards digital transformation as an organisational change is an employee's overall positive or negative evaluative response to a change initiative implemented by their organisation(Utami & Triady, 2019) Studies indicate that one of the facilitating factors for successful adoption and implementation of eHealth is the acceptance and readiness of healthcare providers(Saleh et al., 2016) , and professionals' acceptance and implementation of digital health is influenced by competence, capabilities and experience(Jarva et al., 2022) Feeling less competent in a digitised work environment may lead to negative attitudes towards technology and therefore towards the transformation process as a whole(Borges do Nascimento et al., 2023) Conversely, when an employee possesses the necessary digital skills or competencies, they are more likely to respond positively to digital transformation, as they feel more confident in their ability to perform their job effectively (Utami & Triady, 2019).

1.1.6. Digital Readiness:

The study is concerned with digital readiness at the individual level, which is different from the digital readiness of the organisation as a whole, But it's part of it. Employee digital readiness is defined as the employee's willingness and ability to engage in digital transformation(Nguyen & Broekhuizen, n.d.), based on Marsilio et al. (2024), digital readiness includes technical competencies and behavioural readiness and is defined as those behavioral competencies, cognitive skills and digital competence of an organisation's employees that help them adapt and manage the digital transformation process (Kathpalia, 202) .

The Mercer | Mettle Digital Readiness Model (2020) defines readiness as a combination of behavioral competencies (e.g. openness to learning) and cognitive abilities (e.g. technical skills) (Kathpalia, 2020) .

In this study, readiness was taken as a composite variable combining digital skills and digital attitude, a measure supported by the previous study and the definitions of digital readiness above.

1.2. Theoretical Foundation:

The theoretical basis for this study was based on the European Digital Competence Framework (DigComp2.2), the Technology Acceptance Model (TAM), and the Mercer/Mettle model for measuring digital readiness

1.2.1. The DigComp22 framework: is one of the most widely used frameworks describing the knowledge, skills and attitudes necessary to use digital technologies in a confident, critical, collaborative and creative manner to achieve goals related to work, learning, leisure and integration into the digital society. It includes five main areas of competence: information, communication, content creation, security, and problem solving (Vuorikari et al., 2022). This framework is a reference for most surveys related to skills.

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1.2.2. The TAM model: Developed by Davis (1989), this model assumes that individuals' acceptance of technology is determined by perceived usefulness and perceived ease of use, and that these two factors determine behavioral intentions towards technology use and thus influence attitudes towards use (Ben Haloum, 2025). These two factors are influenced by a set of external factors that can affect technology acceptance processes, with digital skills being the most prominent of these factors.

1.2.3. The Mercer/Mettl model: This is a global electronic assessment framework developed by Company Mettle that suggests that digital readiness consists of capabilities (such as attitudes and behaviours) and competencies (such as digital skills), and measures it through psychological tests, competency tests and simulations (Kathpalia, 2020).

In the context of this study, the study model was adapted to measure digital readiness (as a dependent variable) by combining digital skills and attitude (independent variables).

2. Methods:

2.1. Study Design:

The study followed the descriptive-analytical approach by presenting the theoretical framework of the main themes of the study and then analysing and interpreting the data in its applied aspect. Based on previous definitions of readiness and relying on (Abore et al., 2022; Marsilio et al., 2024), and inspired by the Mettl model, digital readiness was designed as a composite variable from the average of selected skills and attitude questions.

2.2. The study tool:

The study utilized a quantitative questionnaire consisting of three sections. The first section included questions related to the socio-demographic characteristics of the participants (gender, age, occupation, employment status, educational level number of years of experience, prior knowledge of digital health and its degree). The second section included (4 questions) to know the employees' attitude towards the digital transformation of the sector. The last section of the questionnaire included (24 questions), which is a reliable and validated scale that evaluates digital skills. The complete questionnaire is included in the appendix.

2.3. Study Sample:

The sample of the study consisted of 120 employees from a total of 4057 health sector employees in Adrar belonging to three public hospital institutions from different disciplines such as doctors, nurses, informants and administrators. Paper questionnaires were distributed to them, of which we retrieved (110) questionnaires, of which (103) were valid for analysis, and the following are the characteristics of the sample:

Table No. (2): Demographic characteristics of the study sample

The sample	Categories	Repetition	Ratio
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Sex	Male	39	37.864%
	Female	64	62.136%
Age	From: 18-24 years old	8	7.767%
	From: 25-31 years old	35	33.981%
	From: 32-37 years old	39	37.864%
	From: 38-44 years old	17	16.505%
	More than 44 years	4	3.883%
Function	A medical professional	8	7.767%
	Doctor	22	21.359%
	Nurse	34	33.010%
	Administrative	27	26.214%
	Detective	12	11.650%
Educational qualification	Postgraduate studies	35	33.981%
	University	37	35.922%
	Secondary	28	27.184%
	Professional	0	%0
	Other	03	2.913%
Years of experience	Less than: 5 years	30	29.126%
	From: 6-10 years old	39	37.864%
	From: 11 - 15 years	27	26.214%
	More than : 15 years old	4	6.796%
Sample		103	

Source: Prepared by the researcher based on the outputs of the JASP 0.19.3 programme

Table 2 shows that the study sample is predominantly female (62.136%) and male (37.864%), which reflects the possibility of female dominance in the health sector in Adrar, especially in jobs such as nursing (33% of the sample). This distribution may affect the results, as studies such as (Velibor, 2024) indicate that females show higher comfort levels with digital communication tools. Conversely, a large number of studies have found that in self-assessments of self-reported skills, women tend to rate their digital competencies lower than men (Cai et al., 2017; Dida et al., 2021; Kaarakainen et al., 2018; Long et al., 2023). The study sample is relatively young, as the young age groups (26-31 years) and (32-37 years) represent most of the

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sample members (71.8%) in the age groups, In Terms of professional distribution nurses represent the largest percentage (33%) of the respondents, followed by administrators (26.2%) and doctors (21.4%), while the percentage of specialists (7.8%) and Laboratory staff (11.7%) is lower. This reflects the functional diversity in the sector and is in line with the real proportions of each category on the ground.

Regarding educational qualifications, the sample shows a high level of academic attainment, with 35.9% holding university degrees and 33.9% possessing postgraduate qualifications. due to the specificity of the jobs in the sector, while the percentage of those with secondary qualifications (27.2%) are all nurses but have received specialised training according to their nursing specialty. In terms of experience, since most of the sample members are young people, the experience was concentrated in the middle two categories (6-10 years: 37.9%, 11-15 years: 26.2%), followed by the newly employed category less than five years (29.1%) and then those with long experience (6.8%) whose number of years of work exceeds 15 years.

Understanding digital health and the possibilities it offers is part of digital health competence(Jarva et al., 2022) In our study, about 70% of respondents stated that they had prior knowledge of the term digital health, although their knowledge scores were characterised by a large standard deviation (0.695), but this is considered a positive thing for the future of the sector's digital transformation.

2.4. Data Analysis:

Data analysis was conducted using several statistical techniques, including:

- Arithmetic Mean and Standard Deviation: To summarise central tendencies and data dispersion.
- Pearson Correlation Coefficient: To assess the strength and direction of relationships between variables.
- Cronbach's Alpha Coefficient: To evaluate the reliability and internal consistency of the study instrument.
- Normality Analysis: To assess the normality of the distribution of digital skills, attitudes, and digital readiness using the Shapiro-Wilk test.

Data analysis was performed using the **Jeffrey's' Amazing Statistics Program (JASP) Version 0.19.3**, a free, open-source software developed by researchers at the University of Amsterdam. JASP is widely used for both **Frequentist and Bayesian statistical analysis** (JASP - A Fresh Way to Do Statistics, n.d.).

Additionally, a **five-point Likert scale** was adopted, with the categories and their respective significance defined as follows

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Table (3): Categories and scores of the five-point Likert scale and their significance

Category	Categories galore	Grades	Weights	Significance of the categories
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01	From 01 to less than 1.80	Strongly Disagree/Absolutely Disagree	01	Very low
02	1.80 to less than 2.60	Disagree/Very rare	02	Low
03	2.60 to less than 3.40	Neutral/Sometimes	03	Medium
04	3.40 to less than 4.20	Agree/often	04	High
05	4.20 to less than 5	Strongly/always agree	05	Too high

Source: Digital transformation and the challenges of organising and developing competencies in Algerian organisations, (Gurari, 2024, p. 140), PhD thesis.

3. Results:

Assessment of Data Normality:

The normality of data distribution for the main variables (digital readiness, attitudes towards digital transformation, and digital skills) was assessed using the Shapiro-Wilk test in JASP 0.19.3. The results are shown in the following table:

Table (4) : Normality Assessment of Key Variables

Variable	Valid	Mis sing	Mean	Std. Deviation	Skewn ess	Std. Error of Skewn ess	Kurtosis	Std. Error of Kurtosis	Shapir o-Wilk	P-value of Shapiro-Wilk	Minim um	Maxim um
Digital Readiness	103	0	3.917	0.649	-0.709	0.238	0.051	0.472	0.947	< .001	2.000	5.000
Attitudes	103	0	4.352	0.488	-0.592	0.238	0.954	0.472	0.915	< .001	2.500	5.000
Digital Skills	103	0	3.476	0.745	-0.721	0.238	0.304	0.472	0.960	0.003	1.375	4.792

Source: Prepared by the researcher based on the outputs of the statistical programme JASP 0.19.3

The results showed low Shapiro-Wilk index values (0.947 for digital readiness, 0.915 for attitudes, 0.960 for skills) with P values less than 0.05 ($P < 0.001$ for readiness and attitudes, $P = 0.003$ for skills), indicating a significant deviation from normal distribution. Negative skewness values (-0.709, -0.592, -0.721, respectively) showed a slight leftward concentration, supported by kurtosis values ranging from 0.051 to 0.954, reflecting an asymmetrical distribution. These results support the focus on descriptive analysis as the main approach in the study.

Internal consistency reliability of the study tool:

– Construct Validity Analysis: Pearson Correlation Coefficients for skills axis and its constituent dimension:

To assess the construct validity and internal consistency of the study tool, the Pearson correlation coefficient. The analysis focused on the digital skills axis and its constituent dimensions. The results are presented in Table 4 below:

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Table (5) Pearson correlation coefficient for the skills axis and its constituent dimensions

	Digital Skills	Digital Literacy	Information Management	Workplace Connectivity	Communication and co-operation at work	Analyse and manage data
Digital Skills	1					
Digital literacy	0.782***	1				
Information Management	0.886***	0.678***	1			
Workplace Connectivity	0.923***	0.668***	0.755***	1		
Communication and co-operation at work	0.770***	0.475***	0.538***	0.741***	1	
Analyse and manage data	0.821***	0.515***	0.724***	0.680***	0.481***	1

Source: Prepared by the researcher based on the outputs of the statistical programme JASP 0.19.3

-All dimensions of the digital skills axis exhibit statistically significant correlations at the($p < 0.001$)level, indicating strong internal consistency and reliability.

-The correlation coefficients between the dimensions range from(**0.475 to 0.923**), reflecting moderate to very strong relationships.

-The highest correlation was observed between Workplace Connectivity and Digital Skills ($r = 0.923$, $p < 0.001$), indicating that workplace connectivity is a critical component of overall digital skills.

-The lowest correlation was found between Communication & Cooperation and Digital Literacy ($r = 0.475$, $p < 0.001$), suggesting a relatively weaker but still significant relationship between these two dimensions.

These findings confirm that the digital skills axis demonstrates adequate internal consistency, which supports its use as a scale in this study.

- Construct Validity Analysis: Pearson Correlation Coefficients for Study Axes:

To verify the construct validity of the study tool, the Pearson correlation coefficient. The analysis examined the relationships between the three main axes of the study: Attitude towards Digital Transformation, Digital Skills, and Digital Readiness. The results are presented in Table 5 below :

Table (6) Pearson correlation coefficient for the axes of the study

	Attitude towards digital transformation	Digital Skills	Digital Readiness
Attitude towards digital transformation	1		
Digital Skills	0.364***	1	
Digital Readiness	0.550***	0.854***	1

Source Prepared by the researcher based on the outputs of the statistical programme JASP 0.19.3

From the table, and at a significance level of ($p < 0.001$), we can see a moderate positive correlation between Attitude towards Digital Transformation and Digital Skills ($r = 0.364$, $p < 0.001$), indicating that a positive attitude is associated with higher digital skills, albeit to a moderate extent. A strong positive correlation between Attitude towards Digital Transformation and Digital Readiness ($r = 0.550$, $p < 0.001$), suggesting that positive attitudes significantly contribute to the overall readiness for digital transformation. A very strong positive correlation between Digital Skills and Digital Readiness ($r = 0.854$, $p < 0.001$), indicating that digital skills are a critical component of digital readiness in the health sector.

These findings provide evidence of construct validity for the study model, demonstrating that the axes are meaningfully interrelated.

Tool Stability:

To assess the reliability and stability of the study instrument, Cronbach's alpha coefficient was calculated for the axes and sub-dimensions. The results are presented in Table 6 below:

Table (7) : Cronbach's alpha for axes and dimensions

Axes/Dimensions		Number of phrases	Cronbach's alpha	
Attitude towards digital transformation		4	0.717	
Digital Skills	Digital Literacy	5	0.750	0.939
	Information Management	5	0.826	
	Workplace Connectivity	5	0.834	
	Communication and co-operation at work	4	0.813	
	Analyse and manage data	5	0.853	
Digital Readiness		5	0.716	
Total		33	0.937	

Source: Prepared by the researcher based on the outputs of the statistical programme JASP 0.19.3

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The overall Cronbach's alpha coefficient for the entire questionnaire is 0.937, indicating excellent internal consistency. The reliability of the Attitude axis (0.717) and Digital Readiness axis (0.716) is acceptable, demonstrating consistency in measuring these constructs. The sub-dimensions of the Digital Skills axis exhibit very good to excellent reliability, ranging from (0.750 to 0.853). The highest reliability was recorded for the Digital Skills axis as a whole (0.939), further confirming the robustness of the skill-related items. Digital readiness as a composite variable recorded a value of (0.716), which is also acceptable.

These results confirm the stability, reliability and internal consistency of the study tool, so the questionnaire is a valid and reliable instrument for assessing the digital readiness of health sector employees in Adrar.

Testing the hypotheses:

To test the validity of the first and second hypotheses respectively, the calculation of the mean as the most important indicators of central tendency and the calculation of the standard deviation as one of the most important indicators of dispersion measures, after which the results are extracted and discussed.

Testing the first and second hypotheses:

The two hypotheses respectively state the following:

H1: "The level of digital skills of health sector employees is high".

H2: "Health sector employees in Adrar have a positive attitude towards the digital transformation of the sector."

By calculating the mean and standard deviation, the results appear as in the following table:

Table (8): Arithmetic means and standard deviations of axes and dimensions

Pivots/Dimensions	Mean (M)	SD	Relative importance	Interpretation
Digital Literacy	3.948	0.718	01	Big
Information Management	3.456	0.882	02	Big
Workplace Connectivity	3.276	0.951	04	Medium
Communication and co-operation at work	3.223	1.005	05	Medium
Analyse and manage data	3.425	0.896	03	Big
Digital Skills	3.476	0.649	Big	
Attitude towards digital transformation	4.352	0.488	Too big	

Source: Prepared by the researcher based on the outputs of the statistical programme JASP 0.19.3

The highest mean was recorded for Digital Literacy ($M = 3.948$, $SD = 0.718$), indicating a high level of proficiency in basic technological skills among employees with relatively low variability. Information Management ($M = 3.456$, $SD = 0.882$) ranked second, with a slightly higher standard deviation, suggesting some disparities in employees' competence in handling information effectively. The lowest mean was for Communication & Cooperation at Work ($M = 3.223$, $SD = 1.005$), indicating moderate skills in this area with the highest variability, reflecting significant differences in digital communication competencies. The overall mean of Digital Skills ($M = 3.476$, $SD = 0.649$) falls within the "High" category, supporting the first hypothesis (H1) that the level of digital skills among health sector employees is high. The mean score for Attitude towards Digital Transformation ($M = 4.352$, $SD = 0.488$) is very high, suggesting a positive and relatively homogeneous attitude towards digital transformation, thus supporting the second hypothesis (H2).

Thus, both hypotheses H1 and H2 are accepted.

Testing the third hypothesis:

The third hypothesis posits a positive relationship between skills, attitudes, and digital readiness, according to Pearson's correlation analysis presented in Table 5. To test the third hypothesis (H3), which posits a positive relationship between digital skills, attitudes toward digital transformation, and digital readiness, Pearson's correlation coefficients were calculated. As shown in Table (5), significant positive correlations were observed between: attitudes and digital skills ($r = 0.364$, $p < 0.001$), attitudes and digital readiness ($r = 0.550$, $p < 0.001$), and digital skills and digital readiness ($r = 0.854$, $p < 0.001$). These results support hypothesis H3, indicating a strong positive relationship between the variables, with the strongest relationship between digital skills and digital readiness.

Therefore, the third hypothesis (H3) was accepted, indicating that as digital skills improve, employees become more open to digital transformation and more ready to embrace this change.

4. Discussion of the results:

The digital readiness of employees is recognized as a critical factor in the successful digital transformation of the health sector in various countries worldwide. However, studies that focus on assessing the digital skills of health sector employees and evaluating their digital readiness in regions such as Adrar remain limited. This study aims to address this knowledge gap by examining the digital readiness of health sector employees in Adrar, specifically by assessing their digital skills and attitudes towards the digital transformation of the health sector in the state.

The results of the study indicate a generally good level of digital skills among health sector employees in Adrar, reflecting a satisfactory level of digital competencies. This finding is consistent with previous studies (Jarva et al., 2022; Oberländer et al., 2022), but exceeds the skill levels reported by health professionals in the Amhara province of Ethiopia (Shiferaw et al., 2020), possibly due to the more supportive digital infrastructure in Algeria. In contrast, the findings differ from those of Saigí-Rubió et al. (2024), where the skill levels of Catalan health professionals were reported as average.

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Other studies, however, have reported lower skill levels among health sector employees (Campbell & McDowell, 2011; Tegegne et al., 2023). Despite the generally positive level of digital skills observed in Adrar, the results also indicate a high degree of variability, suggesting significant differences in skill levels among employees. This variability underscores the urgent need for targeted training and coaching programs to bridge the skill gaps and enhance overall digital readiness (Kak et al., 2001; Kruszyńska-Fischbach et al., 2022; Kuek & Hakkennes, 2020).

The study identified a positive relationship between digital skills, employee attitudes, and digital readiness. These findings align with prior research by Abou Hashish and Al-Najjar (2024), Elhadi et al. (2021), and Kuek and Hakkennes (2020), which similarly reported such associations. Additionally, the current results corroborate the observations of Veikkolainen et al. (2023) and Reixach et al. (2022), who noted a fundamental linkage between skills and attitudes. This relationship is further supported by the studies of Höyng and Lau (2023), Putteeraj et al. (2022), Saleh et al. (2016), and Wubante et al. (2022).

Nevertheless, training emerges as a critical factor in sustaining and improving employee readiness, particularly within a continuously evolving technological context, as evidenced by Brommeyer and Liang (2022), Kuek and Hakkennes (2020b), and Wubante et al. (2022).

Conclusion:

The actual implementation of eHealth systems can only be effectively achieved if health sector employees are adequately prepared for this change. This study found that the majority of health sector employees in Adrar are digitally ready for the sector's digital transformation. Such findings provide valuable insights for decision-makers, offering a clearer perspective on the challenges and opportunities associated with the successful implementation of digital health initiatives.

Despite the limitations of the study, the results can be generalized at least at the state level in Adrar. Based on these findings, it is essential to emphasize that efforts should be directed towards building digital competencies among health sector employees. Moreover, a sustainable policy of continuous training and capacity building is necessary to keep pace with the rapid and ongoing changes in digital health technologies and tools.

It is also worth noting that there is a notable lack of studies focusing on digital readiness in the health sector in this region, underscoring the need for further research to better understand the specific training and development needs of health sector employees in the context of digital transformation.

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Appendix:	Survey	Instrument
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The full list of survey items used in this study is available at the following link

<https://docs.google.com/spreadsheets/d/1W3QsxfUCr99ZcTkSQAR1tbEkTqseN4hg/edit?usp=sharing&ouid=115790956887884393712&rtpof=true&sd=true>