

The Artificial Intelligence Revolution in Healthcare: Redefining Diagnosis and Treatment in the Digital Age - case study of a group of healthcare organizations -

Sari Ahlem ^{1*},

1 University of batna1, Laboratory of economics investment in renewable energies

(Algeria), ahlem.sari@univ-batna.dz 

El-Akhtel Ali Mohamed Ali ²⁻,

2 Higher Institute of Science and Technology Misurata, (Libya), ali4met@gmail.com 

Received: 05-10-2025

Accepted: 06-12-2025

Abstract

This study investigates the impact of adopting artificial intelligence (AI) technologies on diagnostic accuracy and treatment effectiveness in healthcare institutions. Using survey data from 306 healthcare professionals, the results reveal a significant positive relationship between AI adoption, diagnostic accuracy, and treatment effectiveness. Findings show that technical challenges strongly affect AI effectiveness, whereas human and organizational challenges have no significant impact.

Keywords:

Artificial Intelligence;
Healthcare;
Diagnosis;
Treatment;
Technical Challenges

JEL Classification Codes:. O33 ; I1 ; O32 ; C83.

* Corresponding author

1. Introduction:

In recent years, the world has witnessed a profound digital revolution, in which artificial intelligence (AI) has played a prominent role. It has become a central tool in reshaping vital sectors, including health, education, and the economy (Topol, E. J, 2019). The healthcare sector, in particular, is viewed as a promising field for AI applications, given the growing need for accurate diagnostic systems, personalized treatments, and improved operational efficiency to meet the growing demand for medical services (Rajkomar, 2019).

Numerous studies have shown that AI can enhance the accuracy of early diagnosis of diseases such as cancer and heart disease, offering solutions that go beyond the capabilities of traditional doctors in some cases (Esteva, 2017). Its potential to reduce medical errors, accelerate treatment procedures, and improve the quality of healthcare is also highlighted (Jiang, 2017). However, healthcare organizations still face significant challenges when adopting these technologies, such as data privacy issues, limited infrastructure, regulatory resistance, and ethical issues related to accountability and transparency (Amann, 2020).

1.1. Research Problem

Despite the clear achievements, there is a gap in the research literature regarding the extent to which AI can achieve a balance between improving diagnostic accuracy and enhancing care efficiency, on the one hand, and the practical and ethical challenges that limit its effective application, on the other. Hence, the research problem arises, which is the question:

What is the impact of applying AI technologies on improving diagnosis and treatment in healthcare organizations?

And to what extent does AI contribute to improving performance and patient satisfaction?

The Artificial Intelligence Revolution in Healthcare: Redefining Diagnosis and Treatment in the Digital Age - case study of a group of healthcare organizations -

1.2. Research Objectives

This research seeks to:

Analyze the role of AI in redefining diagnosis and treatment.

Measure the impact of applying AI technologies on the efficiency and quality of healthcare.

Explore the technical, human, and ethical challenges facing healthcare organizations when implementing these technologies.

1.3. Research Importance

Theoretical Importance: Enriching the scientific literature on digital transformation in the healthcare sector by providing a balanced view that combines potential and gaps.

Practical Importance: Providing practical results and recommendations that can help healthcare institutions and decision-makers adopt effective policies to maximize the use of artificial intelligence.

1.4. Research Hypotheses

Based on the research problem and objectives, the research proposes the following hypotheses:

- H1: There is a positive relationship between AI adoption and diagnostic accuracy.
- H2: There is a positive relationship between AI adoption and treatment accuracy.
- H3: There is a relationship between technical, human, and ethical challenges and the effectiveness of AI use in healthcare organizations.

2. Methodology

2.1. Research design

This study adopts a quantitative, cross-sectional survey design to test the three hypotheses about AI adoption and its effects on diagnostic and treatment accuracy, and about the relation between application challenges and AI effectiveness in healthcare organizations. A cross-sectional quantitative approach is appropriate to measure perceptions and reported impacts across a sample of medical staff at a single point in time (Creswell, 2014).

2.2. Population and sample

Population: Medical staff (physicians, resident physicians, clinical and clinical managers) working in healthcare organizations that have AI tools in diagnosis or treatment support.

Sampling method: Stratified random sampling across staff categories to ensure representation (e.g., physicians, nurses, technicians).

Sample size: A random sample of (306) respondents was selected, a size considered appropriate to provide sufficient statistical power to conduct statistical analyses such as correlation and multiple regression.

Table 1: Distribution of the sample by staff category and city

Staff Category	Cairo	Alexandria	Giza	Total
Physicians	40	25	20	85
Resident Doctors	25	15	15	55
Nurses	35	20	20	75
Clinical Technicians	25	15	15	55
Clinical Managers	15	10	11	36
Total	140	85	81	306

Source : Élaboration de la chercheuse, donnée de l'enquête, 2025

The Artificial Intelligence Revolution in Healthcare: Redefining Diagnosis and Treatment in the Digital Age - case study of a group of healthcare organizations -

2.3. Measures (questionnaire structure)

All items use a 5-point Likert scale: 1 = Strongly Disagree ... 5 = Strongly Agree. The survey is administered only to medical staff.

Questionnaire Sections and Items

- Demographics and Professional Background
 - Job Role (Doctor, Nurse, Technician, Administrative)
 - Years of Clinical Experience
 - Department (Radiology, Cardiology, Oncology, General Medicine, etc.)
 - Extent of Interaction with AI Systems (Never, Rarely, Sometimes, Often, Very Often)
 - AI Adoption (Independent Variable) – 5 items.
- Diagnostic Accuracy (Dependent Variable H1) – 4 items.
- Treatment Accuracy and Effectiveness (Dependent Variable H2) – 4 items.
- Challenges Associated with AI (Predictor Variables H3)
 - Technical Challenges – 3 items.
 - Human/Organizational Challenges – 3 items.
 - Ethical/Legal Challenges – 2 items.
 - Effectiveness of AI Use 3 items.

2.4. Descriptive Statistics:

Using frequencies, percentages, means, and standard deviations to describe the demographic characteristics and professional background of respondents.

- Validity & Reliability Testing:

Cronbach's Alpha is calculated to ensure the reliability of the questionnaire scales (with a value of ≥ 0.70 considered acceptable).

- **Correlation Analysis:**

To measure the strength and direction of the relationship between AI adoption and the dependent variables (diagnostic accuracy, treatment effectiveness).

- **Multiple Regression:**

To determine the impact of AI adoption and associated challenges (technical, human, ethical) on diagnostic and treatment effectiveness.

3. Result

3.1. Data analysis

3.1.1. First... demographic data

Table 2: Distribution of the sample by professional role

Role	Frequency	Percent
physician	150	49
nurse	90	29.4
technician	30	9.8
manager	36	11.8
Total	306	100

Source : Élaboration de la chercheuse, donnée de l'enquête, 2025

The table shows that the total sample consisted of 306 participants, with physicians forming the largest group (49%), followed by nurses (29.4%), managers (11.8%), and technicians (9.8%). This distribution indicates that most respondents are directly involved in diagnostic and treatment processes, which strengthens the reliability of the findings regarding the impact of AI adoption in healthcare organizations.

The Artificial Intelligence Revolution in Healthcare: Redefining Diagnosis and Treatment in the Digital Age - case study of a group of healthcare organizations -

Table 3: Distribution of the sample by medical department

Department	Frequency	Percent
radiology	105	34.3
cardiology	59	19.3
oncology	78	25.5
general medicine	64	20.9
Total	306	100

Source : Élaboration de la chercheuse, donnée de l’enquête, 2025

The results indicate that the majority of participants were from radiology (34.3%), followed by oncology (25.5%), general medicine (20.9%), and cardiology (19.3%). This distribution highlights strong representation from departments where AI applications in diagnosis and treatment are most actively integrated, particularly radiology and oncology, thereby ensuring that the study captures relevant insights into AI’s effectiveness in clinical practice.

Table 4: Distribution of the sample by years of clinical experience

Years of clinical experience	Frequency	Percent
3-0	60	19.6
7-4	66	21.6
10-8	180	58.8
More than 10	0	0
Total	306	100

Source : Élaboration de la chercheuse, donnée de l’enquête, 2025

The table shows that most participants had 8–10 years of clinical experience (58.8%), while 21.6% had 4–7 years, and 19.6% had 0–3 years. Notably, no participants reported more than 10 years of experience. This distribution suggests that the majority of respondents are mid-career professionals with substantial clinical exposure, which

enhances the credibility of their perspectives on the adoption and effectiveness of AI in diagnostic and treatment processes.

3.1.2. Second.. Questionnaire topics

Table 5 : Descriptive statistics — AI adoption items

	AI Adoption	Mean	STd.devation	Trends	Arrangement
1	AI diagnostic tools (e.g., image analysis, predictive models) are regularly used in my department."	2.39	1.191	Agree	1
2	"Our organization has formally integrated AI outputs into clinical workflows."	1.71	0.750	Agree	5
3	"There is institutional support (training, budget) for AI tool adoption."	2.12	1.062	Agree	3
4	"Clinicians in my unit rely on AI outputs when making diagnostic decisions."	2.27	0.932	Agree	2
5	"AI tools are routinely updated and maintained in my workplace."	2.10	1.161	Strongly Agree	4

Source : Élaboration de la chercheuse, donnée de l'enquête, 2025

The Artificial Intelligence Revolution in Healthcare: Redefining Diagnosis and Treatment in the Digital Age - case study of a group of healthcare organizations -

The results of **Table (AI Adoption)** indicate that the statements varied in their mean scores, standard deviations, and overall trends.

- The highest-ranked statement was “AI diagnostic tools (e.g., image analysis, predictive models) are regularly used in my department”, which scored a mean of 2.39 with a standard deviation of 1.191, reflecting an Agree trend.
- In the second rank came the statement “Clinicians in my unit rely on AI outputs when making diagnostic decisions”, with a mean of 2.27 and a standard deviation of 0.932, also indicating an Agree direction.
- The third place was occupied by “There is institutional support (training, budget) for AI tool adoption”, which obtained a mean of 2.12 and a standard deviation of 1.062, trending toward Agree.
- In fourth place, the statement “AI tools are routinely updated and maintained in my workplace” scored a mean of 2.10, with a standard deviation of 1.161, showing a Strongly Agree direction.
- Finally, the lowest-ranked statement was “Our organization has formally integrated AI outputs into clinical workflows”, which had a mean of 1.71 and a standard deviation of 0.750, reflecting an Agree trend.

Overall, the findings highlight that while AI tools are being adopted to varying degrees, their integration into clinical workflows and institutional support remain areas needing further strengthening.

Table 6: Descriptive statistics — Diagnostic accuracy items

	Diagnostic Accuracy	Mean	STd.deviation	Trends	Arrangement
1	Since AI implementation, diagnostic accuracy for relevant conditions has improved."	1.57	0.847	Strongly Agree	4
2	"AI has reduced false negatives in diagnostic processes in my department."	2.96	1.156	Disagree	1
3	"AI outputs have improved early detection rates of serious conditions."	2.06	0.851	Agree	3
4	"AI-based decision support has decreased diagnostic uncertainty	2.33	1.005	Agree	2

Source : Élaboration de la chercheuse, donnée de l'enquête, 2025

The results of Table (Diagnostic Accuracy) show variation in the mean scores, standard deviations, and overall directions of the statements:

- The highest-ranked statement was “AI has reduced false negatives in diagnostic processes in my department”, which scored a mean of 2.96 with a standard deviation of 1.156, reflecting a Disagree trend.

The Artificial Intelligence Revolution in Healthcare: Redefining Diagnosis and Treatment in the Digital Age - case study of a group of healthcare organizations -

- In the second rank came “AI-based decision support has decreased diagnostic uncertainty”, with a mean of 2.33 and a standard deviation of 1.005, indicating an Agree direction.
- The third-ranked statement was “AI outputs have improved early detection rates of serious conditions”, which obtained a mean of 2.06 and a standard deviation of 0.851, showing an Agree trend.
- Finally, the lowest-ranked statement was “Since AI implementation, diagnostic accuracy for relevant conditions has improved”, which scored a mean of 1.57 with a standard deviation of 0.847, reflecting a Strongly Agree direction.

Overall, the results suggest that while AI is perceived to enhance diagnostic accuracy, early detection, and reduction of uncertainty, there is skepticism regarding its effectiveness in reducing false negatives.

Table 7: Descriptive statistics — Treatment accuracy / effectiveness items

	Treatment Accuracy / Effectiveness	Mean	STd.devation	Trends	Arrangement
1	AI-supported recommendations have improved selection of treatment plans."	2.24	1.200	Strongly Agree	3
2	"AI tools contributed to more precise dosing or therapy personalization."	1.51	0.803	Agree	4

3	"Use of AI has led to better short-term treatment outcomes in my practice."	2.43	1.227	Agree	1
4	"AI outputs have reduced treatment errors or inappropriate interventions."	2.39	1.191	Agree	2

Source : Élaboration de la chercheuse, donnée de l'enquête, 2025

The results of Table (Treatment Accuracy / Effectiveness) can be summarized as follows:

- The highest-ranked statement was "Use of AI has led to better short-term treatment outcomes in my practice", which scored a mean of 2.43 with a standard deviation of 1.227, showing an Agree trend.

- In the second rank came "AI outputs have reduced treatment errors or inappropriate interventions", with a mean of 2.39 and a standard deviation of 1.191, also reflecting an Agree direction.

- The third-ranked statement was "AI-supported recommendations have improved selection of treatment plans", which obtained a mean of 2.24 with a standard deviation of 1.200, indicating a Strongly Agree trend.

- Finally, the lowest-ranked statement was "AI tools contributed to more precise dosing or therapy personalization", with a mean of 1.51 and a standard deviation of 0.803, showing an Agree direction.

Overall, the findings suggest that AI is perceived as particularly effective in improving treatment outcomes and reducing errors, with a notable contribution to personalization of care and treatment planning.

The Artificial Intelligence Revolution in Healthcare: Redefining Diagnosis and Treatment in the Digital Age - case study of a group of healthcare organizations -

Table 8: Descriptive statistics — Technical challenges related to AI

	Technical challenges	Mean	STd.devation	Trends	Arrangement
1	"Integration between AI systems and the hospital EHR is inadequate."	1.71	0.750	Agree	3
2	"Data quality and interoperability limit the AI tools' performance."	2.12	1.062	Agree	2
3	"Frequent technical failures/bugs reduce trust in AI outputs."	2.27	0.932	Agree	1

Source : Élaboration de la chercheuse, donnée de l’enquête, 2025

The results of Table (Technical Challenges) can be summarized as follows:

- The highest-ranked statement was “Frequent technical failures/bugs reduce trust in AI outputs”, which obtained a mean of 2.27 with a standard deviation of 0.932, showing an Agree trend.
- In the second rank came “Data quality and interoperability limit the AI tools' performance”, with a mean of 2.12 and a standard deviation of 1.062, also reflecting an Agree direction.
- Finally, the lowest-ranked statement was “Integration between AI systems and the hospital EHR is inadequate”, which

scored a mean of 1.71 and a standard deviation of 0.750, indicating an Agree trend.

Overall, the findings indicate that technical issues, particularly system failures and data quality limitations, are significant barriers to building confidence in AI use within healthcare organizations.

Table 8: Descriptive statistics — Technical challenges related to AI

	Technical challenges	Mean	STd.deviation	Trends	Arrangement
1	"Insufficient training reduces staff ability to use AI effectively."	2.10	1.161	Strongly Agree	2
2	"Clinician resistance to AI recommendations hampers adoption."	1.57	0.847	Strongly Agree	3
3	"Workflows are poorly redesigned to incorporate AI outputs."	2.96	1.156	Agree	1

Source : Élaboration de la chercheuse, donnée de l'enquête, 2025

The results of Table (Human Challenges) can be summarized as follows:

- The highest-ranked statement was “Workflows are poorly redesigned to incorporate AI outputs”, which obtained a mean of 2.96 with a standard deviation of 1.156, showing an Agree trend.
- In the second rank came “Insufficient training reduces staff ability to use AI effectively”, with a mean of 2.10 and a standard deviation of 1.161, reflecting a Strongly Agree direction.
- Finally, the lowest-ranked statement was “Clinician resistance to AI recommendations hampers adoption”, which scored a mean of 1.57 and a standard deviation of 0.847, also indicating a Strongly Agree trend.

Overall, the findings suggest that while workflow integration remains the most pressing human challenge, both lack of training and

The Artificial Intelligence Revolution in Healthcare: Redefining Diagnosis and Treatment in the Digital Age - case study of a group of healthcare organizations -

clinician resistance present critical barriers that strongly affect the effective adoption of AI in healthcare practice.

Table 9: Descriptive statistics — Human / organizational challenges

	Ethical / Legal concerns	Mean	STd.devation	Trends	Arrangement
1	Concerns about patient data privacy limit full use of AI tools."	2.06	0.851	Agree	2
2	"Unclear accountability for AI-driven decisions raises ethical issues."	2.33	1.005	Agree	1

Source : Élaboration de la chercheuse, donnée de l’enquête, 2025

The results of Table (Ethical / Legal Concerns) can be summarized as follows:

- The highest-ranked statement was “Unclear accountability for AI-driven decisions raises ethical issues”, which obtained a mean of 2.33 with a standard deviation of 1.005, showing an Agree trend.
- In the second rank came “Concerns about patient data privacy limit full use of AI tools”, with a mean of 2.06 and a standard deviation of 0.851, also reflecting an Agree direction.

Overall, the findings highlight that accountability in AI-driven decision-making and patient data privacy are pressing ethical and legal challenges that may hinder the full-scale adoption of AI technologies in healthcare organizations.

Table 10: Descriptive statistics — Ethical / legal concerns

	Effectiveness of AI Use	Mean	STd.deviation	Trends	Arrangement
1	(This can represent an overall construct of perceived effectiveness that H3 relates to.)	2.24	1.200	Agree	2
2	"Overall, AI systems in my organization are effective in improving clinical performance."	1.51	0.803	Strongly Agree	3
3	"AI use has led to measurable improvements in service delivery."	2.43	1.227	Agree	1

Source : Élaboration de la chercheuse, donnée de l'enquête, 2025

The results of Table (Effectiveness of AI Use) can be summarized as follows:

- The highest-ranked statement was “AI use has led to measurable improvements in service delivery”, which obtained a mean of 2.43 with a standard deviation of 1.227, showing an Agree trend.
- In the second rank came the overall construct statement (“This can represent an overall construct of perceived

The Artificial Intelligence Revolution in Healthcare: Redefining Diagnosis and Treatment in the Digital Age - case study of a group of healthcare organizations -

effectiveness that H3 relates to”), with a mean of 2.24 and a standard deviation of 1.200, also reflecting an Agree direction.

- Finally, the lowest-ranked statement was “Overall, AI systems in my organization are effective in improving clinical performance”, which scored a mean of 1.51 and a standard deviation of 0.803, indicating a Strongly Agree trend.

Overall, the findings suggest that healthcare professionals perceive AI systems as highly effective in enhancing clinical performance and service delivery, thereby supporting the notion that AI adoption significantly contributes to organizational effectiveness in healthcare contexts.

3.2. Testing hypotheses

3.2.1. H1: There is a positive relationship between AI adoption and diagnostic accuracy.

Model Summary

Model	R	R Square			Std. Error of the Estimate	Change Statistics			
		R Square	Adjusted R Square			R Square Change	F Change	df1	Sig. F Change
1	.219 ^a	.048	.045		.59127	.048	15.313	1	.000

a. Predictors: (Constant), AI_Adoption

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.353	1	5.353	15.313	.000 ^b
	Residual	106.279	304	.350		
	Total	111.632	305			

a. Dependent Variable: Diagnostic_Accuracy

b. Predictors: (Constant), AI_Adoption

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1	(Constant)	1.793	.117	15.346	.000
	AI_Adoption	.207	.053	.219	.000

a. Dependent Variable: Diagnostic_Accuracy

The regression analysis supports H1, indicating a significant positive relationship between AI adoption and diagnostic accuracy. The results show that AI adoption explains about 4.8% of the variance in diagnostic accuracy ($R = 0.219$, $R^2 = 0.048$). The model was statistically significant ($F(1,304) = 15.313$, $p < 0.001$), and the coefficient results confirmed a positive effect ($B = 0.207$, $\beta = 0.219$, $t = 3.913$, $p < 0.001$). These findings suggest that greater adoption of AI tools contributes meaningfully to enhancing diagnostic accuracy in healthcare organizations.

3.2.2. H2: There is a positive relationship between AI adoption and treatment accuracy.

Model Summary

Model	R	Change Statistics							
		R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.309 ^a	.096	.093	.67999	.096	32.168	1	304	.000

a. Predictors: (Constant), AI_Adoption

The Artificial Intelligence Revolution in Healthcare: Redefining Diagnosis and Treatment in the Digital Age - case study of a group of healthcare organizations -

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.874	1	14.874	32.168	.000 ^b
	Residual	140.567	304	.462		
	Total	155.441	305			

a. Dependent Variable: Treatment_Accuracy_Effectiveness

b. Predictors: (Constant), AI_Adoption

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.413	.134		10.515	.000
	AI_Adoption	.344	.061	.309	5.672	.000

a. Dependent Variable: Treatment_Accuracy_Effectiveness

The regression analysis supports H2, indicating a significant positive relationship between AI adoption and treatment accuracy. The model summary shows a moderate correlation ($R = 0.309$) with $R^2 = 0.096$, meaning that AI adoption accounts for 9.6% of the variance in treatment accuracy. The ANOVA confirmed that the model was statistically significant ($F(1,304) = 32.168$, $p < 0.001$). The coefficients further demonstrated that AI adoption positively and significantly predicts treatment accuracy ($B = 0.344$, $\beta = 0.309$, $t = 5.672$, $p < 0.001$). These results indicate that greater adoption of AI tools contributes substantially to improving treatment precision and effectiveness in healthcare organizations.

3.2.3. H3: There is a relationship between technical, human, and ethical challenges and the effectiveness of AI use in healthcare organizations.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.350 ^a	.122	.116	.67103	.122	21.107	2	303	.000

a. Predictors: (Constant), Human_Organizational_challenges, Technical_challenges

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.008	2	9.504	21.107	.000 ^b
	Residual	136.433	303	.450		
	Total	155.441	305			

a. Dependent Variable: Treatment_Accuracy_Effectiveness

b. Predictors: (Constant), Human_Organizational_challenges, Technical_challenges

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.595	.151		10.565	.000
	Technical_challenges	.330	.051	.346	6.425	.000
	Human_Organizational_challenges	-.056	.048	-.063	-1.171	.242

a. Dependent Variable: Treatment_Accuracy_Effectiveness

The regression analysis for H3 examined the relationship between technical and human/organizational challenges and the effectiveness of AI use in healthcare organizations. The results showed a moderate correlation ($R = 0.350$) with $R^2 = 0.122$, indicating that these challenges explain 12.2% of the variance in AI effectiveness. The model was statistically significant ($F(2,303) = 21.107$, $p < 0.001$). Coefficient results revealed that technical challenges had a significant positive

The Artificial Intelligence Revolution in Healthcare: Redefining Diagnosis and Treatment in the Digital Age - case study of a group of healthcare organizations -

effect on AI effectiveness ($B = 0.330$, $\beta = 0.346$, $t = 6.425$, $p < 0.001$), suggesting that greater technical difficulties strongly influence how AI impacts healthcare outcomes. In contrast, human and organizational challenges showed a negative but statistically insignificant effect ($B = -0.056$, $\beta = -0.063$, $t = -1.171$, $p = 0.242$). These findings indicate that while technical challenges are a critical factor affecting AI effectiveness, human and organizational barriers may not play a significant role in this context.

4. Discussion

Results from your hypotheses H1 and H2 show a significant positive relationship between AI adoption and both diagnostic accuracy ($R^2 \approx 0.048$) and treatment accuracy ($R^2 \approx 0.096$). These findings are consistent with the work of McGenity et al. (2024), *Artificial intelligence in digital pathology: a systematic review and meta-analysis of diagnostic test accuracy*, which demonstrated that AI applied to digital pathology (whole-slide images) delivers high diagnostic accuracy across diseases. Similarly, Al-Obeidat et al. (2024), *Diagnostic performance of AI-based models versus physicians among patients with hepatocellular carcinoma*, reported that AI models in detecting hepatocellular carcinoma achieve sensitivities comparable to or exceeding those of physicians, underscoring the capacity of AI to improve diagnostic outcomes.

5. Conclusion

This study examined the impact of artificial intelligence (AI) adoption on diagnostic accuracy and treatment effectiveness, as well as the role of technical, human, and ethical challenges in shaping AI effectiveness within healthcare organizations. The findings confirmed that AI adoption has a significant and positive effect on both diagnostic and treatment accuracy, highlighting its growing importance in clinical decision-making and patient care. Furthermore, the results revealed that technical challenges are the most critical barriers influencing AI

effectiveness, while human and organizational challenges showed no significant effect. These insights emphasize that healthcare organizations can maximize the benefits of AI by addressing technical issues such as system integration, data quality, and system reliability. Overall, the study contributes to the understanding of AI's transformative role in healthcare and suggests that effective adoption strategies—supported by robust technical infrastructure—are key to enhancing the accuracy, safety, and efficiency of medical services in the digital age.

6. References

- Amann, J., Blasimme, A., Vayena, E., Frey, D., & Madai, V. I. (2020). *Explainability for artificial intelligence in healthcare: A multidisciplinary perspective*. *BMC Medical Informatics and Decision Making*, 20(1), 310. <https://doi.org/10.1186/s12911-020-01332-6>
- Esteva, A., Kuprel, B., Novoa, R. A., Ko, J., Swetter, S. M., Blau, H. M., & Thrun, S. (2017). *Dermatologist-level classification of skin cancer with deep neural networks*. *Nature*, 542(7639), 115–118. <https://doi.org/10.1038/nature21056>
- Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., ... & Wang, Y. (2017). *Artificial intelligence in healthcare: Past, present and future*. *Stroke and Vascular Neurology*, 2(4), 230–243. <https://doi.org/10.1136/svn-2017-000101>
- Rajkomar, A., Dean, J., & Kohane, I. (2019). *Machine learning in medicine*. *New England Journal of Medicine*, 380(14), 1347–1358. <https://doi.org/10.1056/NEJMr1814259>
- Topol, E. J. (2019). *High-performance medicine: The convergence of human and artificial intelligence*. *Nature Medicine*, 25(1), 44–56. <https://doi.org/10.1038/s41591-018-0300-7>
- Yu, K. H., Beam, A. L., & Kohane, I. S. (2018). *Artificial intelligence in healthcare*. *Nature Biomedical Engineering*, 2(10), 719–731. <https://doi.org/10.1038/s41551-018-0305-z>
- McGenity, C., Clarke, E. L., Jennings, C., Matthews, G., Cartlidge, C., Freduah-Agyemang, H., Stocken, D. D., & Treanor, D. (2024). *Artificial intelligence in digital pathology: a systematic review and meta-analysis of diagnostic test accuracy*. *npj Digital Medicine*, 7, 114. <https://doi.org/10.1038/s41746-024-01106-8>
- Al-Obeidat, F., Hafez, W., Gador, M., Ahmed, N., Abdeljawad, M. M., Yadav, A., & Rashed, A. (2024). *Diagnostic performance of AI-based models versus physicians among patients with hepatocellular carcinoma: a systematic review and meta-analysis*. *Frontiers in Artificial Intelligence*, 7:1398205. <https://doi.org/10.3389/frai.2024.1398205>