The Role of Artificial Intelligence in Healthcare Decision-Making: Examining the Integration of AI in Diagnostics, Treatment Plans, and Improving Operational Efficiency

Lajli Ahlem[1], Ahamed Jazeel Mohamed Mubarak[2]

[1]*(Research Student, Britts Imperial University College, SPC Freezone - Block - N, Sharjah Book Authority Building, Al Zahia – Sharjah, United Arab Emirates, research.department@brittsimperial.com)*
[2]*(Senior Business Faculty, Britts Imperial University College, SPC Freezone - Block - N, Sharjah Book Authority Building, Al Zahia – Sharjah, United Arab Emirates, jazeel.mubarak@brittsimperial.com)*

Abstract:

Background: *This research paper investigates the transformative impact of Artificial Intelligence (AI) on healthcare decision-making, particularly within the context of Dubai's healthcare system. It explores the evolution of AI technologies from early expert systems to sophisticated machine learning and deep learning applications that enhance diagnostic accuracy, treatment planning, and operational efficiency. The study highlights significant advancements in AI capabilities, including the ability to analyze vast datasets, improve clinical judgment, and personalize patient care, thus leading to better healthcare outcomes. However, the research also addresses critical challenges hindering AI adoption, such as algorithmic bias, data security concerns, ethical dilemmas, and workforce adaptation.*

Materials and Methods: *This study examines the impact of AI on healthcare decision-making in Dubai using a quantitative approach. It explores AI's role in diagnosis, treatment planning, and operational efficiency through a survey of residents aged 18–40. Data will be collected via an online survey with multiple-choice, Likert scale, and open-ended questions. Secondary data will come from peer-reviewed journals and official reports. A convenience sampling method will recruit at least 30 participants through social media and personal networks. Descriptive statistics (frequency distribution, mean, standard deviation) will be used to identify trends in public knowledge, confidence, and experiences with AI in healthcare.*

Results: *Through quantitative analysis involving a survey of Dubai residents, the study assesses public awareness, trust, and perceived usefulness of AI in healthcare, revealing a general openness towards its integration but also significant apprehensions regarding privacy and accountability. The findings underscore the necessity for educational initiatives, robust cybersecurity measures, and ethical frameworks to facilitate the effective incorporation of AI in healthcare.*

Conclusion: *Ultimately, the paper advocates for a phased approach to AI implementation to ensure that it complements rather than replaces human expertise in clinical settings, thereby enhancing the quality of patient-centered care in Dubai and beyond.*

Key Words: *Artificial intelligence (AI), Healthcare, Healthcare System, Decision Making*

I.   Introduction

Artificial Intelligence (AI) has become a disruptive force in healthcare, transforming operational efficiency, diagnosis, treatment planning, and medical decision-making. Artificial intelligence (AI)-powered tools, such as machine learning (ML) and deep learning (DL), allow medical practitioners to analyze enormous volumes of data, spot trends, and improve clinical judgment (Topol, 2019). Advances in computing power, the availability of big data, and better algorithms have sped up the integration of AI into healthcare in recent years, resulting in more precise and individualized healthcare delivery (Jiang et al., 2017). Early expert systems like Mycin and Internist-I, created in the 1960s and 1970s, that sought to replicate human thinking in medical diagnosis are where the history of AI in healthcare begins (Shortliffe and Buchanan, 1975). However, their practical applications were constrained by their poor computing capacity. Modern AI applications have shown increased accuracy in illness diagnosis, medical image analysis, and patient outcome prediction since the development of machine learning and neural networks (Shortliffe and Buchanan, 1975). In several medical domains, AI has greatly increased diagnostic efficiency and accuracy. Deep learning models, for instance, have surpassed radiologists in the detection of breast cancer from mammograms; certain algorithms have achieved an accuracy of over 94%. (McKinney et al., 2020).

Similarly, it has been discovered that AI-powered postoperative report generation lowers errors; according to one study, discrepancies in AI-generated reports were present in just 29% of cases, whereas those written by surgeons were present in 53% of cases (Reuters, 2025). These results demonstrate how AI may improve accuracy in medical documentation and decrease human mistake (Rajpurkar et al., 2018). By evaluating patient data and suggesting the best therapeutic strategies, AI plays a critical part in individualized treatment programs. AI-powered systems, for example, can forecast how cancer patients will react to medications, allowing the best possible treatment plans to be chosen (Kourou et al., 2015). Additionally, AI has been incorporated into robot-assisted procedures, improving accuracy and lowering risks (Hashimoto et al., 2018). AI-driven decision-support systems are being used by healthcare providers in Dubai more frequently in an effort to help with treatment planning and enhance patient outcomes (Dubai Health Authority, 2022).

AI improves hospital and healthcare system operational efficiency in addition to its clinical applications. Chatbots and virtual assistants driven by AI simplify administrative procedures, medical record administration, and patient triage, lowering healthcare costs and enhancing access to care (Shen et al., 2021). Dubai's Artificial Intelligence Strategy 2031, which attempts to enhance hospital administration, cut down on patient wait times, and maximize the use of healthcare resources, heavily relies on AI (Ministry of Health and Prevention, UAE, 2023).

II. Research Methodology

This study evaluates the influence of artificial intelligence (AI) on healthcare decision-making in Dubai using a quantitative research methodology. In order to examine how AI is incorporated into diagnosis, treatment planning, and operational efficiency, the study uses a descriptive and exploratory methodology. People between the ages of 18 and 40 will be surveyed to learn more about their opinions and experiences with AI in healthcare. An online survey using Google Forms will be used to gather primary data from Dubai residents who fall into the chosen age range. Multiple-choice, Likert scale, and open-ended questions will be included in the survey to gauge public knowledge, confidence, and experiences with AI in healthcare. Peer-reviewed journals, official documents, and trade publications—including citations from PubMed, Google Scholar, and Dubai Health Authority reports—will be the sources of secondary data. The target demographic consists of Dubai residents between the ages of 18 and 40. Social media and personal networks will be used to recruit participants via the convenience sample method. In order to assure relevant analysis, the goal is to gather a minimum of 30 responses. Descriptive statistics, such as frequency distribution, mean, and standard deviation for quantitative responses, will be used to examine survey data. To find trends in public opinion, knowledge, and confidence in AI-powered healthcare solutions, the data will be analyzed.

III. Result

The findings of the study that was done to find out how the general public, especially in Dubai, felt about AI in healthcare are presented in this chapter. To find patterns in AI awareness, trust, dependability, privacy issues, and the use of AI in medical decision-making, the replies from 30 participants were examined. The results are compared with previous research in a discussion that follows.
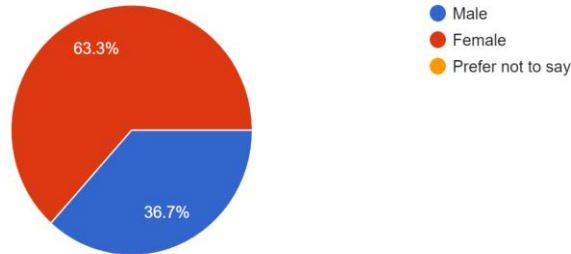
Demographics of Respondents:
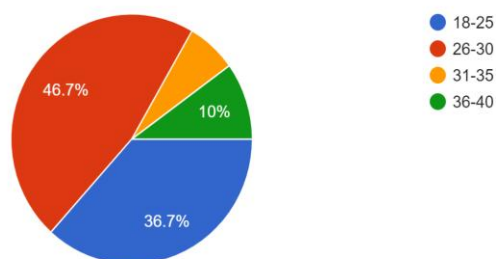
Graph 1 : Distribution of Respondents by Age

The survey was completed by 30 people in total. Most were between the ages of 26 and 30 (46.7%), followed by 18 to 25 (36.7%), 36 to 40 (10%), and 31 to 35 (6.7%). The majority of responders are young professionals, according to this age distribution, and may have varied levels of experience with AI technologies.
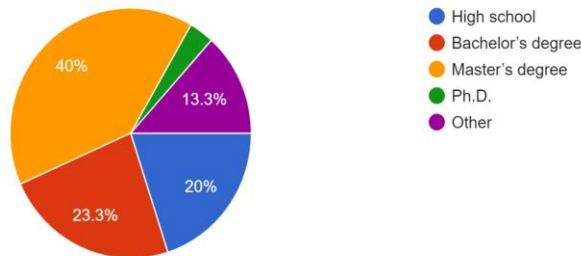

Graph 2 : Distribution of Respondents by Gender

Gender-wise, 36.7% of responders were men and 63.3% were women.

Graph 3 : Distribution of Respondents by Education Level

Participants' educational backgrounds varied, with 40% having a Master's degree, 23.3% having a Bachelor's degree, 20% having only completed high school, 3.3% having a Ph.D., and 13.3% falling into other educational categories.
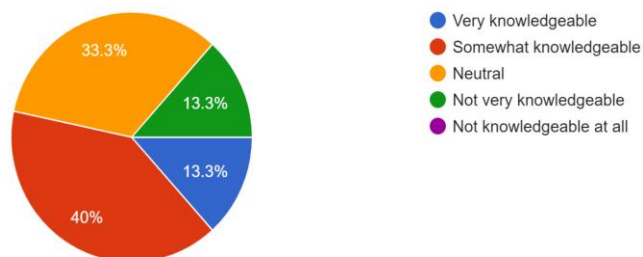
Awareness and Knowledge of AI in Healthcare
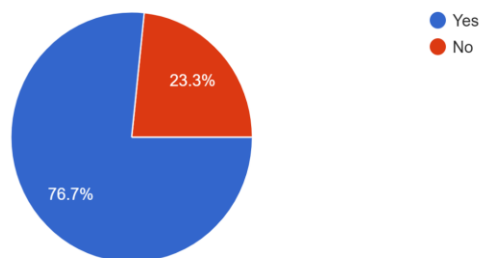
Graph 4 : Awareness of AI in the Medical Field

A significant **76.7% of respondents** were aware of AI applications in the medical field, while **23.3% were not**. This suggests that AI in healthcare has gained considerable public attention.

How much do you think you know about AI in healthcare?
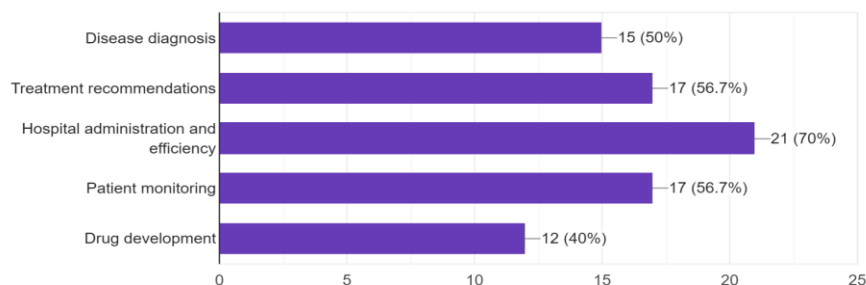30 responses

Graph 5 : Knowledge Level of AI in Healthcare

when asked about their knowledge level, only **13.3% considered themselves very knowledgeable**, while **40% were somewhat knowledgeable**. A significant portion (**33.3%**) remained neutral, indicating a gap in AI-related education, and **13.3% admitted to not being very knowledgeable**.

Perceived Usefulness of AI in Healthcare

Which healthcare domains do you believe AI can be most helpful in? (Select all that apply)
30 responses

Graph 6 : Distribution of Perceived AI Applications in Healthcare

When asked about the areas where AI could be most beneficial, responses varied:
- Hospital administration and efficiency (70%)
- Treatment recommendations (56.7%)
- Disease diagnosis (50%)
- Patient monitoring (17%)
- Drug development (12%)

This implies that although AI is frequently viewed as a means of increasing operational effectiveness, its application to direct patient care is still viewed with some skepticism.

**Trust and Reliability of AI in Healthcare**

Would you trust a system driven by AI to assist with disease diagnosis?
30 responses
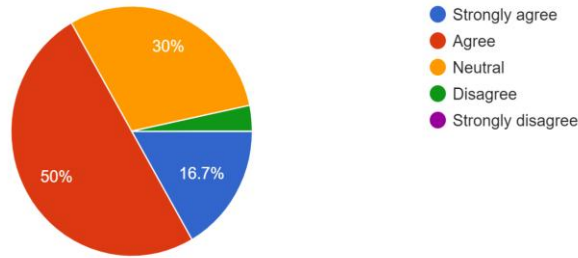
Graph 7 : Trust in AI for Disease Diagnosis

One of the biggest factors impacting the acceptance of AI-driven medical decisions is still trust. 50% of respondents agreed, 16.7% strongly agreed, 30% were neutral, and 3.3% disagreed with the statement that they would trust AI to help with disease diagnosis.

Would you be comfortable receiving treatment recommendations from an AI system?
30 responses
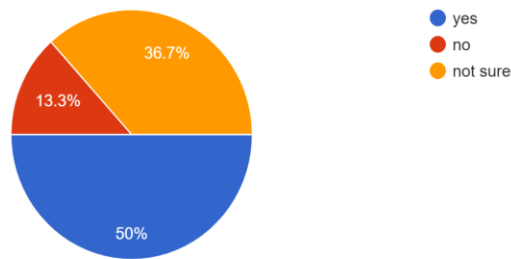
Graph 8 : Comfort with AI-Based Treatment Recommendations

In a similar vein, 50% of respondents said they would feel comfortable with AI making treatment recommendations, 36.7% said they were doubtful, and 13.3% said they would not.

Do you believe AI in healthcare is reliable and accurate?
30 responses
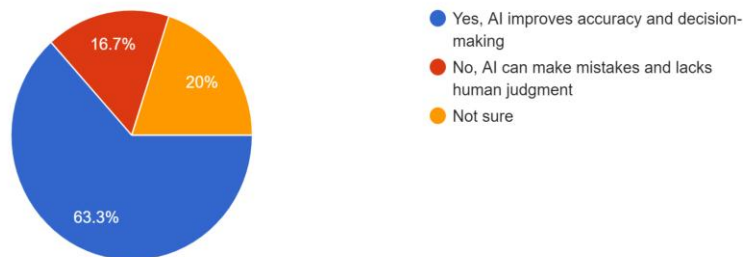
Graph 9 : Perceived Reliability and Accuracy of AI in Healthcare

63.3% of respondents thought AI improved accuracy and decision-making in healthcare, compared to 16.7% who questioned its dependability and 20% who were unsure.
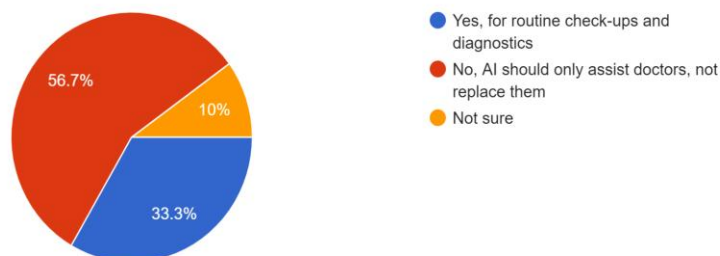
Privacy and Ethical Concerns

Do you have privacy worries regarding AI's usage in healthcare?
30 responses

- Yes, I worry about data security
- No, I trust AI with healthcare data
- Not sure

30%

13.3%

56.7%
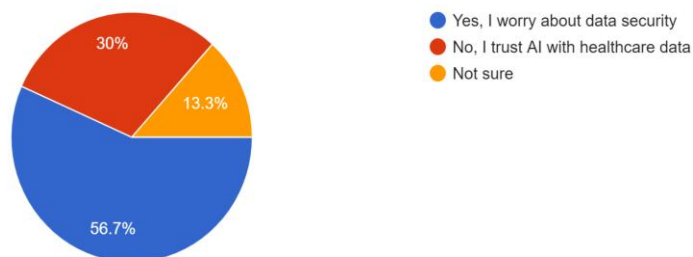
Graph 10 : Concerns About Data Privacy in Healthcare

While 30% of respondents trusted AI with healthcare data, 13.3% were unsure, and 56.7% expressed concerns about data privacy, data security is still a big worry for AI in healthcare.

Do you think AI should replace doctors in certain medical tasks?
30 responses

- Yes, for routine check-ups and diagnostics
- No, AI should only assist doctors, not replace them
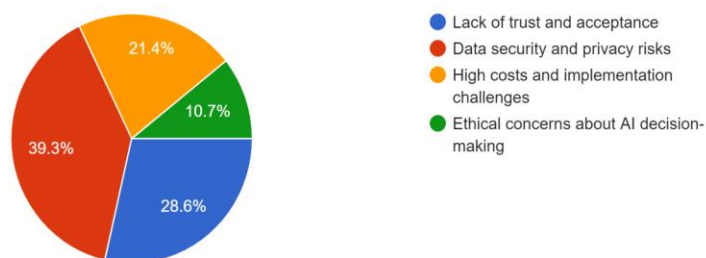- Not sure

56.7%

10%

33.3%

Graph 11 : Opinions on AI Replacing Doctors

When asked how AI should be used in medical decision-making, 56.7% of respondents said it should support physicians rather than take their place, 33.3% said it should be used for routine chores like diagnostics and check-ups, and 10% were unsure.

Challenges in AI Implentation

In your opinion, what is the biggest challenge in implementing AI in healthcare?
28 responses

- Lack of trust and acceptance
- Data security and privacy risks
- High costs and implementation challenges
- Ethical concerns about AI decision-making

21.4%

10.7%

39.3%

28.6%

Graph 12 : Challenges in Implementing AI in Healthcare

The biggest challenges in AI adoption in healthcare were identified as follows:
- **Data security and privacy risks (39.3%)**
- **Lack of trust and acceptance (28.6%)**
- **High costs and implementation challenges (21.4%)**
- **Ethical concerns regarding AI decision-making (10.7%)**

These results demonstrate that even if AI is thought to be advantageous, issues with cost, security, and trust must be resolved before it can be widely used.

AI Integration in Dubai's Healthcare System
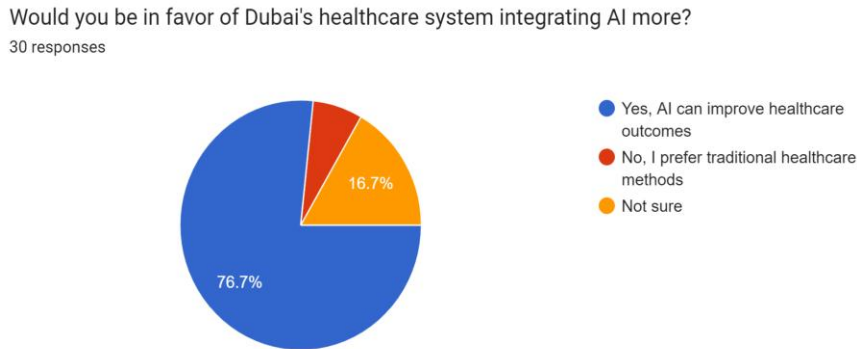
Graph 13 : Support for Increased AI Integration in Dubai's Healthcare System

76.7% of respondents strongly agreed that integrating AI into Dubai's healthcare system would enhance patient outcomes. But 6.7% favored conventional medical procedures, while 16.7% were unsure. This suggests a generally favorable opinion, despite some people's reluctance to accept AI's influence on healthcare.

IV. Discussion

The survey's findings provide a clear picture of how the general population in Dubai feels about AI in healthcare. Several major themes that are examined in light of the body of existing research are revealed by analyzing the responses of thirty participants.

In line with the growing global exposure to AI technology in healthcare, a significant majority of respondents (76.7%) stated that they were aware of AI applications in the medical profession (Topol, 2019). But when it came to evaluating their own expertise, only 13.3% said they were very knowledgeable, 40% said they were moderately knowledgeable, and 33.3% said they were neutral. This discrepancy implies that even if there is a high level of general awareness, focused educational programs are still desperately needed to increase knowledge of AI's potential and constraints (Topol, 2019) (Jiang et al., 2017).

AI's capacity to enhance hospital administration and efficiency is strongly supported by the data (70%), followed by treatment recommendations (56.7%) and disease diagnosis (50%). Uncertainty regarding AI's suitability in these fields may be the reason for the lower ratings for medication development (12%) and patient monitoring (17%). These results are consistent with past research showing that the first advantages of AI are more noticeable in operational enhancements prior to wider therapeutic uses (Davenport and Kalakota, 2019).

When it comes to adopting AI, trust is still essential. According to our study, 66.7% of participants (of whom 16.7% strongly agreed and 50% agreed) said they trusted AI to help diagnose diseases, while 30% said they were neutral. In a similar vein, barely half of respondents were at ease with AI systems suggesting treatments. Although 63.3% of respondents said AI improved accuracy and decision-making, a sizeable minority were either unsure (20%) or had doubts (16.7%) about its dependability. As recent research have shown, these conflicting opinions highlight the need for more explainability and openness in AI models (Esteva et al., 2017) (Davenport and Kalakota, 2019) (Dubai Health Authority, 2022).

Data security and privacy are further issues. Strong cybersecurity measures and well-defined legal frameworks are crucial preconditions for AI integration, as 56.7% of respondents expressed concerns about data security and just 30% trusted AI with healthcare data(Morley et al., 2020) (Dubai Health Authority, 2022).

Furthermore, 56.7% of respondents think AI should simply support physicians rather than take their place, highlighting the ongoing significance of human oversight in clinical decision-making (Esteva et al., 2017) (Davenport and Kalakota, 2019) (Wang and Preininger, 2019).

These difficulties are consistent with international research that emphasizes how critical it is to resolve ethical, economical, and technical barriers in order to promote a wider adoption of AI in healthcare (Wang and Preininger, 2019) (Obermeyer et al., 2019) (Morley et al., 2020). However, the high percentage of people who support AI integration (76.7%) points to a generally positive perspective. Strategic initiatives like the Dubai Health Strategy 2021-2030, which seeks to propel digital transformation in healthcare, serve to bolster this confidence (Dubai Health Authority, 2022) (Dubai Health Authority, 2022).

V. Conclusion

In conclusion, there is great potential for transforming clinical decision-making and operational procedures through the incorporation of artificial intelligence (AI) into Dubai's healthcare system. According to the study, artificial intelligence (AI) technologies greatly improve diagnostic accuracy and make early disease diagnosis easier, which eventually leads to better patient outcomes (McKinney et al., 2020) (Esteva et al., 2021). Furthermore, more precise treatment planning and tailored medicine are made possible by AI's capacity to collect and evaluate massive datasets, which supports clinical judgments and maximizes resource allocation (Kourou et al., 2015) (Rajkomar et al., 2019) (Davenport and Kalakota, 2019).

The shift to broad AI integration is not without difficulties, though. Because biases in training datasets might result in unequal healthcare delivery, especially for underrepresented populations, concerns about algorithmic bias are still very much alive (Obermeyer et al., 2019) (Obermeyer et al., 2019). Furthermore, patient privacy and data security are critical, requiring strict cybersecurity protocols and compliance with legal frameworks to protect sensitive data (Morley et al., 2020) (Dubai Health Authority, 2022). The difficulty of completely incorporating AI into clinical settings is further highlighted by ethical considerations, such as the requirement for openness and unambiguous accountability in decisions made with AI assistance (Morley et al., 2020) (Morley et al., 2020).

The results also emphasize how crucial it is to apply AI gradually and in phases. Broader clinical applications can be based on the deployment of AI in operational domains, where there is greater acceptance and confidence (Davenport and Kalakota, 2019) (Dubai Health Authority, 2022). Bridging the current knowledge gap requires this approach in conjunction with focused educational programs to improve AI literacy among the general public and healthcare professionals (Topol, 2019) (Jiang et al., 2017). By making such efforts, it will be possible to guarantee that AI complements human expertise rather than replaces it (Wang and Preininger, 2019).

The future of artificial intelligence in healthcare depends on legislators, medical professionals, and technology specialists working together to create thorough legal and ethical frameworks. To solve the complex issues raised in this work, strengthen data security procedures, and create transparent and interpretable AI models, more research is required (Holzinger et al., 2019) (Morley et al., 2020). In the end, Dubai's healthcare system can fully utilize AI to provide high-quality, patient-centered treatment while reducing risks and guaranteeing fair access for everyone by carefully striking a balance between innovation and accountability (Dubai Health Authority, 2022) and (Rigby, 2019).

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