IJBMC
International Journal of Body, Mind and Culture

Volume 12, Issue 6, pp 5-12
DOI: 10.61838/ijbmc.v12i6.981

Article type:
Original Research

Attitudes of Primary Healthcare Centers Workers' towards Artificial Intelligence in Healthcare

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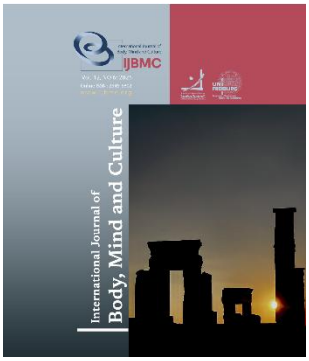

Article history:

Received 21 Feb 2025
Revised 14 May 2025
Accepted 24 June 2025
Published online 01 Sep 2025

How to cite this article:
Hussien, M. H., & Mohammed, Z. J. (2025). Attitudes of Primary Healthcare Centers Workers' towards Artificial Intelligence in Healthcare. International Journal of Body, Mind and Culture, 12(6), 5-12.

ABSTRACT

Objective: The appearance of artificial intelligence (AI) technologies has developed as a promising solution to develop healthcare efficiency and improve patient outcomes. The objective of the study was to assess the primary healthcare centers worker's attitudes towards artificial intelligence in healthcare.

Methods and Materials: A descriptive cross-sectional study design has been carried out from period 9 October, 2024 to 1st March, 2025. Non-probability (purposive) sample of (451) primary healthcare centers workers from (12) primary healthcare centers in Baghdad City centers, were selected to participate in the study. Data were collected through a self-report instrument that includes the socio-demographic data (age, sex, marital states, job description, educational qualification, years of experience and AI training), Likert scale of primary healthcare worker's attitudes towards AI. The data were analyzed using the Statistical Package for Social Sciences (SPSS) version 26.

Findings: The study results reveals that, more than quarter of the participant age (28.1-34) years (n=115;25.5%), The majority of the study participants didn't participate in training course regarding artificial intelligence (96.7%). More than third of the study participants have 6-10 years' experience in primary healthcare centers (34.6%). More than half of the study participant have positive attitudes towards artificial intelligence in healthcare (54.33%). There was a statistical significant positive correlation between the participants age, educational qualification, years of experience and the level attitudes towards artificial intelligence in healthcare (r=.208 at p <0.01: r=.396 at p<0.05: r=.136 at p =0.01) respectively.

Conclusion: The study concluded that, more than half of primary healthcare centers workers have positive attitudes regarding artificial intelligence in healthcare. There are statistical significant association between the primary healthcare centers workers and their age, educational qualification and years of experience. The study recommended that, holding continuous periodic training sessions activities to primary healthcare centers workers to enhance their attitude toward AI to provide more effective healthcare. Further studies related to use of artificial intelligence techniques in the field of primary health care should be conducted on a larger sample size.

Keywords: Attitude, Primary Healthcare Workers, Artificial Intelligence, Healthcare.

Introduction

In recent times, the care of most countries has started availing the patient data for enhanced quality of care. In such times of technology advancements, there are various developments that can employ hospital care data in the welfare of the patients. This will eventually result in better services, and it will also improve the outcomes. (Lovis, 2019; van Hartskamp et al., 2019) Artificial intelligence (AI) has been utilized as an essential tool for technological advancement in the health system today (Yu et al., 2018). AI technologies are currently supporting and shaping the health system for achieving their purposes in regards to patient care (Wu et al., 2019)

Research shows that AI has the capability to make nurses contribute even more in healthcare delivery by offering sophisticated tools to aid nurses anywhere/anytime enabling nurses to play a practitioner role and delivering care along the continuum (Robert, 2019).

Other research studies all over the world that have tested the use and application of AI in healthcare system to improve the outcome pertaining to medical decision-making and effectiveness (Hadi & Fadhil, 2020; Rajkomar et al., 2019). Artificial intelligence will finally come into use to healthcare system because the doctors and healthcare workers would be the greatest beneficiary of this technology as this would help them make informed decision in terms of their patient diagnosis and treatment methods (Topol, 2019). In United Kingdom (UK), new digital technologies have been applied in the healthcare system that has resulted in current national government review (Department of Health and Social Care, 2019). Attitude is defined as a way of behavior produced by emotional state and opinions (Gong et al., 2019). The performance of health-care professionals in applying AI is showing willingness, and this is helping for it to be implemented easily by the authorities. There have been previous experiences reported from Canada (Dos Santos et al., 2019) and Germany (Sarwar et al., 2019) as well, where preparedness to incorporate AI among healthcare workers and medical personnel has been examined. A study (Maskara et al., 2017) examined the acceptance of AI among different clinical specialties and proved that they were knowing of AI technology application in their field, and their peers were using AI carefully; however, the physicians were confident about AI, but once again they were concerned that the use of AI would have a cost factor as well as an empathy factor with patient counseling. Another study (Oh et al., 2019) found that physicians were extremely positive regarding the implementation of AI in healthcare system. The most of respondents (91,5%) is confident in the fact that AI is going to affect health care in the not so far future. Particularly, the responses were summarized into those who are going to show strong agreement (33.6%,) and those who are going to show agreement (57.9%). In this regard, the research found that Iraqi medical students find AI indeed adjacently affecting and are open to interacting with such new technology. Additionally, it leaves open a question - we should provide accompanying training programs against Artificial Intelligence during medical education for doctors and nurses (Murad, 2024; Shehab & Khalifa, 2021) The use of Artificial Intelligence (AI) in healthcare has been subject to extensive study but with the primary emphasis on technical potential, ethics, and usability by specialist clinicians or patients (Hsiao, 2019; Reddy et al., 2020). There is limited evidence about how primary health care center (PHC) staff, general practitioners, nurses, and administrative support staff feel about AI. PHC providers are the backbone of primary health care systems in low- and middle-income countries, and their perceptions are instrumental to the effective integration of AI technologies into daily practice (Topol, 2019) Their attitudes, expectations, and concerns regarding AI are not yet investigated (Purohit et al., 2022). Furthermore There is very little literature on this topic in the context of Iraq, despite the technological revolution this country is going through. Few studies have assessed respondents' attitudes and knowledge about artificial intelligence in Iraq. Our work aim to assess the primary healthcare centers attitudes towards artificial intelligence in healthcare and to find out the association between worker's attitudes and socio-demographic characteristics data.

Methods and Materials

A decretive cross-sectional study design was used in the study from period 9 October, 2024 to 1st March, 2025. The study was applied on (12) primary healthcare centers randomly selected from (6) primary healthcare sectors in Baghdad City centers. Non-probability (purposive) sampling that included (451) primary health care centers workers. The inclusion criteria for the current study were health care providers in primary health care centers and for various medical and health specialties such as (doctors, dentists, pharmacists, nurses, technicians in various fields, administrators) from the selected primary health care centers. while the exclusion criteria were health care workers working outside the selected primary health care centers, and those who refuse to participate in the study. Before data collection, the official permission was obtained from Board of the College of Nursing \ Planning Ministry - Statistical Center\ Al-Karkh Health Directorate / Primary Health Care Sectors / the selected Primary Health Care Centers. Al-Rusafa Health Directorate\

Primary Health Care Sectors / the selected Primary Health Care Centers. The subject's agreement is also obtained from the healthcare workers. The data was collected by the researcher from 10 December, 2024 to 1 February, 2025. Data were collected through a self-report instrument that includes the socio-demographic data (age, sex, marital states, job description, educational qualification years of experience and AI training), Likert scale of primary healthcare worker's attitudes towards AI. The validity of the questionnaire was verified by presenting it to (10) experts. Descriptive and inferential statistics were used to analyze the results of the study using the Statistical Package of Social Sciences (SPSS) version 26.

Findings and Results

Table 1 indicate distribution of the study sample according socio-demographics data, the participants age means are 3.30 ± 1.441, more than quarter of the participant age 28.1-34 years (n=115;25.5%), followed by those who age 34.1-40 years (n=114:25.3%), and those who age 40.1-46 years (n=79: 17.5%), and those who age 46.1-52 years (n=62:13.7%), and those who age 52.1-58 years (n=42:9.4%) and finally those who age 22-28 years (n=39:8.6%). Concerning the participant sex, more than half of the study participants are male (n=232:51.4%), compared with those who are female (n=219:48.6%). Regarding the marital states, most of the study participants are married (n=323: 71.6%), followed by those who are single (n=90:20%), and those who are divorced (n=25:5.5%), and those who are widowed (n=13:2.9%). With respect to participant job description, approximately a third of the study participants are technician (n= 137:30.4%), followed by those who are nurse (n=103:22.8%), and those who are laboratory assistant (n=73:16.2%), and those who are have other job description (n=70:15.5%), and those who are pharmacist (n=40:8.9%) and faintly those who are physician (n=27:6%). The study result reveals that, approximately half of the study participants hold bachelor degree (n=216: 47.9%), followed by those who hold diploma degree (n=178: 39.5%), and those who hold higher degree (n=29:6.4%), and those who hold secondary school (n=28 6.2%). The study results reveal that more than third of the study participant have 6-10 years of experience (n=156: 34.6%), followed by those who have 1-5 years (n=128:28.4%), and those who have more than 16 years (n=66:14.6%) and those who have 11-15 years (n=53:11.8%) and those who have less than year (n=48: 10.6%). The workers participating in AI course of training means are 3.22 ± 1.068, majority of the study participants didn't participate in course of AI training (n=436:96.7%) compared with those who participate in AI course of training (n= 12: 2.7%).

Table 1

Distribution of the study sample according socio-demographics data (N=451)

Variables	Groups	Frequency	Percentage
Age	22-28	39	8.6
	28.1-34	115	25.5
	34.1-40	114	25.3
	40.1-46	79	17.5
	46.1-52	62	13.7
	52.1-58	42	9.4
M.S ± SD		3.30 ± 1.441	
Sex	Male	232	51.4
	Female	219	48.6

Table 2 Shaw primary healthcare centers worker's attitudes about artificial intelligence in healthcare, the highest percentage (58.3%) of the study participants agreed that artificial intelligence can help reduce the number of medical errors while the lowest percentage (22.4%) of them agreed that diagnostic ability of AI is superior to the clinical experience of a human doctor.

Table 2

Primary healthcare centers worker's attitudes about artificial intelligence in healthcare (N=451).

No	Items	Scale	F	%	M.S	SD
1	How useful do you think AI could be in your area of work?	Dis Agree	89	19.7	2.26	.768
		Neutral	155	34.4		
		Agree	207	45.9		
2	Do you agree that the diagnostic ability of AI is superior to the clinical experience of a human doctor?	Dis Agree	238	52.8	1.70	.813
		Neutral	112	24.8		
		Agree	101	22.4		
3	Artificial intelligence can help reduce the number of medical errors.	Dis Agree	76	16.9	2.41	.762
		Neutral	112	24.8		
		Agree	263	58.3		
4	Artificial intelligence can deliver clinically relevant, vast amounts of high-quality data in real time.	Dis Agree	76	16.9	2.38	.757
		Neutral	128	28.4		
		Agree	247	54.8		
5	Artificial intelligence has no emotional exhaustion or physical limitation.	Dis Agree	110	24.4	2.22	.812
		Neutral	133	29.5		
		Agree	208	46.1		
6	I believe that the future of healthcare will heavily rely on AI technologies	Dis Agree	142	31.5	2.20	.889
		Neutral	78	17.3		
		Agree	231	51.2		
7	I believe that AI can help identify health trends and improve preventive care strategies.	Dis Agree	96	21.3	2.27	.791
		Neutral	136	30.2		
		Agree	219	48.6		
8	I think AI tools can help reduce my workload and allow me to focus more on patient care	Dis Agree	84	18.6	2.31	.768
		Neutral	141	31.3		
		Agree	226	50.1		
9	I am concerned that AI may negatively impact the patient-provider relationship	Dis Agree	116	25.7		.803
		Neutral	150	33.3	2.15	
		Agree	185	41.0		
10	I think AI will replace healthcare jobs in the near future	Dis Agree	144	31.9	2.06	.832
		Neutral	138	30.6		
		Agree	169	37.5		

F: Frequency , %: Percentage , M.S: Mean of score , SD: Standard deviation

Figure 1 indicate that primary healthcare centers worker's attitudes towards artificial intelligence in healthcare, the results reveal that (54.33%) of the study participants show positive attitudes towards artificial intelligence compared with those who show negative attitudes towards artificial intelligence in healthcare (45.67%).

Figure 1

Level of primary healthcare centers worker's attitudes about artificial intelligence in healthcare (N=451).

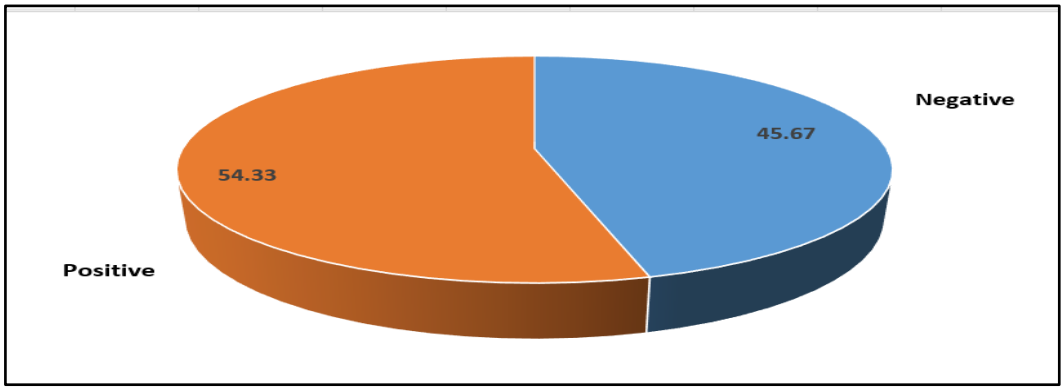

Table 3 represents the correlations among study variables, the results display that there was a statistical significant positive correlation between the participants age, educational qualification, years of experience and the level attitudes towards artificial intelligence in healthcare (r=.208 at p <0.01: r=.396 at p<0.05: r=.136 at p =0.01) respectively.

Table 3

Correlations among study variables (N=451).

Factors	Spearman's rho	Overall Attitudes
Age	Correlation Coefficient	.208**
	Sig. (2-tailed)	.000
Sex	Correlation Coefficient	.014
	Sig. (2-tailed)	.382
Marital States	Correlation Coefficient	.002
	Sig. (2-tailed)	.483
Job Description	Correlation Coefficient	-.030
	Sig. (2-tailed)	.261
Education Qualification	Correlation Coefficient	.396*
	Sig. (2-tailed)	.021
Years of Experience	Correlation Coefficient	.136**
	Sig. (2-tailed)	.002
AI Training	Correlation Coefficient	-.064
	Sig. (2-tailed)	.088

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Discussion and Conclusion

Concerning the age, the results reveal that the highest percentage of the study participants with in age 28.1-34 years, this finding supported by that of (World Health Organization, 2021) reported that highest percentage of primary health care centers workers within 27-35 years. Regarding the participant sex, the results reveal that, more than half of the study participants are male (51.4%), this finding consistent with that of (Ameen & Hussein, 2023) reported that the highest percentage of the study participant working in the primary healthcare centers are male (63.2%). this finding also supported by that of (Alnaser, 2022) stated that, the most of the primary healthcare workers in primary healthcare centers are male (66.2%). Regarding the marital states, most of the study participants are married (71.6%), this finding consistent with that of (Ahmed et al., 2023; Hadi & Fadhil, 2020; Tuoma, 2021; Wadah & Mohammed, 2022) reported that, the highest percentage of nurses working in the primary healthcare center are married (68,1%), (72.5%) respectively. With respect to participant job description, the results reveal, that the highest percentage of healthcare workers in the primary healthcare centers are technicians in various specialty (30.4%), this finding supported by that of (Ahmed et al., 2023) who reported that the highest percentage of the study participants their job description are technicians (43.1%). The study results reveal that more than third of the study participant have 6-10 years of experience (34.6%), this finding supported by that of (Salam & Aziz, 2020) stated that the highest percentage of the workers in the primary healthcare centers have 6-10 years of experience (41.2%). This finding also supported by other study (Selman & Arkan, 2017) conducted among primary healthcare centers workers and revealed that highest percentage of workers have 6-10 years of experience (56.3%). The study results reveals that, majority of the study participants didn't participate in course of AI training (96.7%), this finding supported by that of cross-sectional study (Abd-Alabass & Faraj, 2021) conducted among (402) study participants, the results reveals that (79.8%) of the participants had never attended a course on AI. Despite this lack of formal training.

The study results reveals that, the highest percentage (58.3%) of the study participants agreed that artificial intelligence can help reduce the number of medical errors, this finding consistent with study (Tezpal et al., 2024) conducted among (3018) medical students in Bursa, Turkey, the results reveals that Seventy percent (70.5%) of the study's respondents agreed that artificial

intelligence could reduce medical mistakes, recording their opinion of AI as an assistive technology that enhances the accuracy and effectiveness of medicine. The study results reveals that, the lowest percentage (22.4%) of the participants agreed that diagnostic ability of AI is superior to the clinical experience of a human doctor. This finding supported by the study (Civaner et al., 2022) conducted on trust in AI n medical diagnosis found that, participants tended to have lower trust in AI, particularly for high-risk diseases, and did not consider AI's diagnostic ability superior to human physicians, since only (22.4%) of participants agreed on AI superiority in diagnostic ability. The results reveal that (54.33%) of the study participants show positive attitudes towards artificial intelligence, this finding supported by cross-sectional mixed method study (Juravle et al., 2020) conducted among (146) healthcare workers in Karachi, Pakistan, the findings of the study indicate that the majority (77.3%) of healthcare professionals are positively inclined towards the application of AI in healthcare, AI is seen as a helpful tool for monitoring patient progress and treatment regimens. The results display that there was a statistical significant positive correlation between the participants age and attitude towards artificial intelligence (r= .208 at p <0.01), this finding supported by study (Rehman et al., 2024) show that age is linked to a more favorable view of the role of AI in improving diagnostic accuracy and treatment of patients, senior medical practitioners and workers tend to have more experience, and this could result in better comprehension of the advantages and limitations of AI. The results display that there was a statistical significant positive correlation between the participant's educational qualification and the level attitudes towards artificial intelligence in healthcare (r=.396 at p<0.05), this finding supported by study (Hajesfandyari et al., 2024) reported that, advanced educational levels are associated with greater awareness and knowledge of AI technologies. Physician and dentist who have received formal education in AI have more favorable attitudes towards its adoption into practice. The results display that there was a statistical significant positive correlation between the participant's years of experience and the level attitudes towards artificial intelligence in healthcare (r=.136 at p =0.01), this finding supported by the study (Fitzek & Choi, 2024; Pandya et al., 2024) found that years of medical experience significantly influenced attitudes toward AI at (p = 0.02).

Conclusions:

1. More than half of primary healthcare centers workers have positive attitudes regarding artificial intelligence in healthcare.

2. Majority of the primary healthcare centers workers didn't participate in training course regarding artificial intelligence.

3. There are statistical significant association between the primary healthcare centers workers and their age, educational qualification and years of experience.

Recommendations:

1. Holding continuous periodic training sessions activities to primary healthcare centers workers to enhance their attitude toward AI to provide more effective healthcare.

2.Adding courses or subjects related to artificial intelligence to the university curriculum and starting to include healthcare workers in the working processes during their student years.

3. Further studies related to use of artificial intelligence techniques in the field of primary health care should be conducted on a larger sample size.

Acknowledgments

The authors express their gratitude and appreciation to all participants.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

Authors' Contributions

All authors equally contribute to this study.

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