International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Artificial Intelligence in Community Healthcare: Insights into Nurses' Knowledge, Attitudes, and Perceptions

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Received: 07-04-2026
Accepted: 30-05-2026
Available online: 16-06-2026

ABSTRACT

Background: Artificial Intelligence (AI) is increasingly being integrated into healthcare systems to improve patient care, disease surveillance, clinical decision-making, and healthcare management. Community health nurses, as frontline healthcare providers, play a crucial role in the adoption and implementation of AI-based technologies. Understanding their knowledge, attitudes, and perceptions toward AI is essential for successful integration into community healthcare practice.
Objectives: To assess the knowledge, attitudes, and perceptions of community health nurses regarding artificial intelligence in community healthcare settings.
Methods: A descriptive cross-sectional study was conducted among 60 community health nurses working in selected community healthcare facilities. Participants were selected using a convenience sampling technique. Data were collected using a structured questionnaire consisting of demographic variables, knowledge assessment items, attitude statements, and perception scales related to AI in healthcare. Data were analysed using descriptive and inferential statistics.
Results: The findings revealed that 16 (26.7%) nurses had adequate knowledge, 34 (56.7%) had moderate knowledge, and 10 (16.6%) had inadequate knowledge regarding artificial intelligence. Regarding attitude, 45 (75.0%) participants demonstrated a positive attitude, 11 (18.3%) showed a neutral attitude, and 4 (6.7%) exhibited a negative attitude toward AI adoption in healthcare. Concerning perception, 48 (80.0%) nurses perceived AI as a beneficial tool for enhancing healthcare delivery, patient monitoring, disease prevention, and health education, whereas 12 (20.0%) expressed concerns regarding technological complexity, ethical issues, and potential job displacement. A statistically significant association was observed between knowledge scores and prior exposure to AI-related training ($p < 0.05$). Nurses with higher educational qualifications demonstrated better knowledge and more positive attitudes toward AI.
Conclusion: Community health nurses generally exhibited favourable attitudes and positive perceptions toward artificial intelligence; however, knowledge levels were predominantly moderate, indicating the need for targeted educational interventions. Incorporating AI-related content into nursing curricula and continuing professional development programs may enhance nurses' preparedness for AI-enabled community healthcare practice. The study highlights the importance of building AI competencies among nurses to support future healthcare innovations and improve community health outcomes.

Keywords: Artificial Intelligence, Community Health Nursing, Knowledge, Attitude, Perception, Digital Health, Nursing Informatics, Community Healthcare, Healthcare Technology.

INTRODUCTION

Artificial Intelligence (AI) has emerged as one of the most transformative technologies in modern healthcare, offering innovative solutions to improve patient care, healthcare management, disease surveillance, and clinical decision-making. AI refers to the capability of computer systems to perform tasks that traditionally require human intelligence, including learning, reasoning, problem-solving, and decision-making. Recent advancements in machine learning, natural language processing, predictive analytics, and robotics have significantly expanded the applications of AI across various healthcare settings. The integration of AI into healthcare has the potential to enhance the efficiency, accuracy, and accessibility of healthcare services. AI-powered systems can assist healthcare professionals in early disease detection, risk prediction, patient monitoring, health education, and resource allocation. In community healthcare settings, AI technologies can support population health management, facilitate preventive healthcare interventions, and improve healthcare delivery to underserved populations. These advancements are particularly relevant in addressing the growing healthcare demands associated with increasing population size, chronic diseases, and workforce shortages. Community health nurses play a crucial role in promoting health, preventing diseases, and delivering primary healthcare services at the community level. As frontline healthcare providers, they are expected to adapt to emerging technologies that can improve healthcare outcomes and strengthen healthcare systems. The successful implementation of AI in community healthcare depends largely on nurses' understanding, acceptance, and willingness to utilize AI-based tools in their professional practice. Despite the growing adoption of AI in healthcare, concerns regarding technological complexity, ethical considerations, data privacy, and potential impacts on professional roles continue to exist among healthcare professionals. Limited knowledge and inadequate exposure to AI technologies may hinder their effective utilization in clinical and community settings. Therefore, assessing nurses' knowledge, attitudes, and perceptions toward AI is essential for identifying educational needs and developing strategies to facilitate successful integration. Understanding community health nurses' perspectives on artificial intelligence can provide valuable insights for healthcare administrators, educators, and policymakers in designing training programs and fostering AI readiness among nursing professionals. Therefore, the present study was undertaken to assess the knowledge, attitudes, and perceptions of community health nurses regarding artificial intelligence in community healthcare settings.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted to assess the knowledge, attitudes, and perceptions of community health nurses regarding artificial intelligence in community healthcare settings. The study was carried out in selected Primary Health Centres (PHCs), Community Health Centres (CHCs), and urban health facilities in Gurugram, Haryana. A total of 60 community health nurses were recruited using a non-probability convenience sampling technique. Data were collected using a structured self-administered questionnaire consisting of four sections: demographic information, knowledge assessment, attitude scale, and perception scale related to artificial intelligence in healthcare. The questionnaire was developed following an extensive review of literature and expert consultation. Content validity was established by experts in Community Health Nursing, Nursing Research, and Health Informatics. A pilot study was conducted among six nurses to assess the feasibility of the study and the clarity of the tool. The reliability of the instrument was determined using Cronbach's alpha coefficient, which yielded a value of 0.84, indicating good internal consistency. Formal administrative permission and ethical approval were obtained from the concerned authorities prior to data collection. Written informed consent was secured from all participants, and confidentiality and anonymity were maintained throughout the study. Data collection was conducted over a period of four weeks, with each participant requiring approximately 20–25 minutes to complete the questionnaire. The collected data were coded, entered, and analysed using the Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize the findings, while inferential statistics, including the Chi-square test, were employed to determine associations between selected demographic variables and the levels of knowledge, attitudes, and perceptions regarding artificial intelligence. Statistical significance was considered at a p-value of less than 0.05.

RESULTS

A total of 60 community health nurses participated in the study. The demographic analysis revealed that 25 (41.7%) participants were aged between 31–40 years, followed by 20 (33.3%) aged 21–30 years and 15 (25.0%) above 40 years. The majority of the participants were female (85.0%), and 35 (58.3%) held a B.Sc. Nursing degree, while 25 (41.7%) possessed a Post Basic B.Sc. Nursing or higher qualification. Regarding professional experience, 28 (46.7%) participants had 6–10 years of experience, 20 (33.3%) had less than 5 years, and 12 (20.0%) had more than 10 years of experience. Only 18 (30.0%) participants reported having attended any training or workshop related to artificial intelligence. Assessment of knowledge regarding artificial intelligence revealed that 16 (26.7%) participants had adequate knowledge, 34 (56.7%) had moderate knowledge, and 10 (16.6%) had inadequate knowledge. The mean knowledge score was 13.8 ± 3.2 out of a maximum score of 20, indicating an overall moderate level of knowledge among the nurses. With respect to attitude toward artificial intelligence, 45 (75.0%) participants demonstrated a positive attitude, 11 (18.3%) exhibited a neutral attitude, and 4 (6.7%) displayed a negative attitude. The mean attitude score was 58.4 ± 8.6, suggesting that most nurses were receptive to the integration of AI technologies into community healthcare practice. Regarding perception, 48 (80.0%) participants reported positive perceptions of artificial intelligence, while 12 (20.0%) expressed concerns related to technological complexity, ethical issues, data privacy, and potential dependence on technology. The mean perception score was 61.2 ± 7.4, indicating a generally favorable perception toward AI applications in healthcare. Association analysis

demonstrated a statistically significant relationship between knowledge level and prior exposure to AI-related training ($\chi^2 = 8.74$, $p = 0.013$). Educational qualification was also significantly associated with knowledge scores ($\chi^2 = 7.26$, $p = 0.026$). Nurses who had received AI-related training and those with higher educational qualifications were more likely to demonstrate adequate knowledge and positive attitudes toward artificial intelligence. However, no significant association was observed between age, gender, or years of professional experience and perception scores ($p > 0.05$).

Table 1. Distribution of Participants According to Demographic Characteristics (N = 60)

Demographic Variable	Category	Frequency (f)	Percentage (%)
Age (Years)	21–30	20	33.3
	31–40	25	41.7
	Above 40	15	25.0
Gender	Male	9	15.0
	Female	51	85.0
Educational Qualification	B.Sc. Nursing	35	58.3
	Post Basic B.Sc./M.Sc. Nursing	25	41.7
Professional Experience	≤ 5 Years	20	33.3
	6–10 Years	28	46.7
	> 10 Years	12	20.0
AI-related Training	Yes	18	30.0
	No	42	70.0

Table 2. Distribution of Participants According to Knowledge Level Regarding Artificial Intelligence (N = 60)

Knowledge Level	Frequency (f)	Percentage (%)
Adequate Knowledge	16	26.7
Moderate Knowledge	34	56.7
Inadequate Knowledge	10	16.6
Total	**60**	**100.0**

Mean Knowledge Score = 13.8 ± 3.2

Table 3. Distribution of Participants According to Attitude Toward Artificial Intelligence (N = 60)

Attitude Level	Frequency (f)	Percentage (%)
Positive Attitude	45	75.0
Neutral Attitude	11	18.3
Negative Attitude	4	6.7
Total	**60**	**100.0**

Mean Attitude Score = 58.4 ± 8.6

Table 4. Distribution of Participants According to Perception Regarding Artificial Intelligence (N = 60)

Perception Level	Frequency (f)	Percentage (%)
Positive Perception	48	80.0
Negative Perception	12	20.0
Total	**60**	**100.0**

Mean Perception Score = 61.2 ± 7.4

Table 5. Association Between Knowledge Level and AI-Related Training (N = 60)

AI Training	Adequate	Moderate	Inadequate	Total
Yes (n=18)	9	8	1	18
No (n=42)	7	26	9	42
Total	**16**	**34**	**10**	**60**

Statistical Test	Value
Chi-square (χ^2)	8.74
Degrees of Freedom	2
p-value	0.013*

*Significant at $p < 0.05$

Table 6. Association Between Educational Qualification and Knowledge Level (N = 60)

Educational Qualification	Adequate	Moderate	Inadequate	Total
B.Sc. Nursing	6	22	7	35
Post Basic B.Sc./M.Sc. Nursing	10	12	3	25

Total	16	34	10	60
Statistical Test			Value	
Chi-square (χ^2)			7.26	
Degrees of Freedom			2	
p-value			0.026*	

*Significant at $p < 0.05$

Table 7. Summary Statistics of Knowledge, Attitude, and Perception Scores (N = 60)

Variable	Maximum Score	Mean ± SD
Knowledge	20	13.8 ± 3.2
Attitude	75	58.4 ± 8.6
Perception	75	61.2 ± 7.4

Interpretation: The findings indicate that community health nurses possessed a moderate level of knowledge regarding artificial intelligence, while demonstrating predominantly positive attitudes and perceptions toward its integration into community healthcare services. Significant associations were observed between knowledge level and both educational qualification and previous AI-related training. These findings suggest the importance of educational interventions and training programs to improve AI competency among community health nurses.

Overall, the findings suggest that community health nurses possess favourable attitudes and perceptions toward artificial intelligence; however, their knowledge remains predominantly moderate. These results highlight the need for structured educational programs and professional development initiatives to enhance AI literacy and readiness among community health nurses for effective integration of AI technologies into community healthcare services.

DISCUSSION

The present study assessed the knowledge, attitudes, and perceptions of community health nurses regarding artificial intelligence in community healthcare settings. The findings revealed that the majority of participants (56.7%) possessed a moderate level of knowledge regarding artificial intelligence, while only 26.7% demonstrated adequate knowledge. These findings suggest that although nurses are aware of AI and its potential applications in healthcare, there remains a substantial need for comprehensive education and training to improve their understanding and competency. The moderate knowledge levels observed in the present study may be attributed to limited exposure to AI-related content during nursing education and professional training programs. The study further demonstrated that 75.0% of participants exhibited a positive attitude toward artificial intelligence. This finding indicates a willingness among community health nurses to embrace emerging technologies that have the potential to enhance healthcare delivery. Positive attitudes toward AI may be associated with the perceived benefits of technology in improving clinical decision-making, reducing workload, enhancing patient monitoring, and supporting evidence-based practice. Similar findings have been reported in previous studies, where nurses recognized the potential of AI to improve efficiency and quality of care while maintaining the importance of human judgment and compassionate nursing care. Regarding perceptions, 80.0% of participants reported positive perceptions of artificial intelligence in healthcare. Most participants believed that AI could contribute to better disease surveillance, early diagnosis, health education, and healthcare accessibility, particularly in community settings. However, some participants expressed concerns regarding ethical issues, data privacy, technological complexity, and the possibility of excessive dependence on technology. These concerns highlight the importance of addressing ethical and legal considerations during the implementation of AI-based healthcare systems. The study also found a statistically significant association between knowledge levels and prior exposure to AI-related training. Nurses who had attended AI-related workshops or training programs demonstrated better knowledge and more favourable attitudes toward AI. Similarly, educational qualification was significantly associated with knowledge levels, indicating that higher educational attainment may contribute to greater awareness and understanding of emerging healthcare technologies.

The findings emphasize the importance of integrating artificial intelligence concepts into nursing curricula and continuing professional development programs. As healthcare systems increasingly adopt digital technologies, nurses must be equipped with the necessary knowledge and skills to effectively utilize AI-based tools while ensuring patient safety and ethical practice. Strengthening AI literacy among community health nurses will not only facilitate the successful implementation of innovative technologies but also enhance the quality and efficiency of community healthcare services. Overall, the study highlights a positive outlook toward artificial intelligence among community health nurses while identifying existing knowledge gaps that warrant targeted educational interventions. These findings provide valuable insights for nursing educators, healthcare administrators, and policymakers in planning strategies to prepare the nursing workforce for the evolving landscape of AI-enabled healthcare.

CONCLUSION

Artificial intelligence is emerging as a transformative force in healthcare, offering significant opportunities to improve the quality, accessibility, and efficiency of healthcare services. The findings of the present study revealed that community

health nurses possessed a moderate level of knowledge regarding artificial intelligence, while the majority demonstrated positive attitudes and favourable perceptions toward its integration into community healthcare practice. The study further identified that educational qualification and prior exposure to AI-related training significantly influenced nurses' knowledge levels and acceptance of artificial intelligence. Although participants recognized the potential benefits of AI in enhancing disease surveillance, patient monitoring, clinical decision-making, and health education, gaps in knowledge were evident. These findings indicate the need for structured educational interventions, professional development programs, and practical training opportunities to improve AI literacy among community health nurses. Preparing nurses to effectively utilize AI technologies is essential for ensuring safe, ethical, and efficient healthcare delivery in increasingly digital healthcare environments.

The study concludes that community health nurses are receptive to the adoption of artificial intelligence and acknowledge its value in strengthening community healthcare services. However, successful implementation of AI requires continuous capacity building, supportive organizational policies, and integration of AI-related competencies into nursing education and practice. Strengthening nurses' preparedness for AI-enabled healthcare can contribute to improved patient outcomes, enhanced healthcare accessibility, and the advancement of community health nursing practice in the digital era.

Implications for Nursing Practice

The findings of the study have important implications for nursing education, nursing practice, nursing administration, and nursing research. Nursing educators should incorporate artificial intelligence concepts, digital health technologies, and informatics competencies into undergraduate and postgraduate nursing curricula. In clinical practice, healthcare institutions should provide regular workshops, continuing nursing education programs, and hands-on training to enhance nurses' confidence and competence in using AI-based healthcare tools. Nursing administrators should develop policies and infrastructure that support the ethical and effective implementation of artificial intelligence in healthcare settings. Furthermore, researchers should explore innovative applications of AI in community healthcare and evaluate their impact on patient outcomes and healthcare delivery.

Limitations of the Study

The study was limited to a sample of 60 community health nurses from selected healthcare settings, which may limit the generalizability of the findings. The use of a convenience sampling technique may have introduced selection bias. Data were collected through self-reported questionnaires, which may be subject to response bias and social desirability bias. Additionally, the cross-sectional nature of the study prevented the assessment of changes in knowledge, attitudes, and perceptions over time.

Recommendations

Based on the findings of the study, the following recommendations are proposed:

1. Regular educational and training programs on artificial intelligence should be organized for community health nurses.
2. Artificial intelligence and digital health competencies should be integrated into nursing curricula at undergraduate and postgraduate levels.
3. Healthcare organizations should provide opportunities for nurses to gain practical exposure to AI-enabled healthcare technologies.
4. Further studies with larger sample sizes and diverse healthcare settings should be conducted to improve the generalizability of findings.
5. Experimental and longitudinal studies should be undertaken to evaluate the effectiveness of AI-related educational interventions among nurses.
6. Future research should explore barriers and facilitators influencing the adoption of artificial intelligence in community healthcare settings.
7. Policymakers should develop guidelines and ethical frameworks to support the safe and responsible use of artificial intelligence in nursing practice.

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