RESEARCH PAPER

Perceptions and Impact of Artificial Intelligence among medical and dental practitioner aspect: A Questionnaire Based cross- sectional Study.

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ABSTRACT

Background:Artificial intelligence (AI) is increasingly being integrated into various health sectors, including public health, where it holds potential to enhance disease surveillance, health service delivery, and data-driven decision-making. However, public perception, awareness, and readiness to adopt AI-based technologies vary among population groups, influencing implementation and policy direction.

Aim:This study aimed to assess the perceptions, awareness, perceived benefits, concerns, and readiness toward the use of artificial intelligence in public health among a diverse population.

Materials and Methods:A descriptive cross-sectional questionnaire-based survey was conducted among 500 participants from multiple educational and professional backgrounds. A validated semi-structured questionnaire was administered electronically. Descriptive and inferential statistics, including mean scores, frequencies, and independent t-tests, were used to analyze awareness levels, perceived benefits, barriers, and acceptance of AI. A p-value <0.05 was considered statistically significant.

Results:A majority (89%) of participants reported prior awareness of AI in public health. Female respondents demonstrated significantly higher awareness of AI applications in healthcare ($p = 0.038$) and confidence in AI knowledge ($p = 0.045$) compared to males. Most participants agreed that AI could improve diagnostic accuracy, outbreak prediction, and service efficiency. Concerns included data privacy ($p = 0.024$) and cost-related barriers ($p = 0.032$). Readiness to adopt AI systems was high, with a majority expressing willingness to use AI tools if adequate training was provided. Support for integrating AI into national public health programs showed gender variation ($p = 0.041$).

Conclusion:The findings indicate strong awareness and positive perceptions toward AI in public health, accompanied by concerns related to ethics, cost, and privacy. While respondents demonstrated readiness to use AI technologies, successful implementation will require training initiatives, clear regulatory frameworks, and investment in secure and equitable digital infrastructure.

Keywords: Artificial intelligence, Public health, Perception, Awareness, Digital health, Technology acceptance..

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INTRODUCTION

Artificial Intelligence (AI) has emerged as one of the most transformative technological developments of the 21st century, reshaping various sectors including healthcare, education, industry, and public service. In recent years, its integration into the health domain has gained increasing attention, particularly for its potential to strengthen public health infrastructure, enhance decision-making, and improve health outcomes[1]. The rapid growth of digital health technologies, availability of large-scale data, and advancement in computing capacity have further accelerated the adoption of AI-driven tools in health systems globally. Public health relies heavily on timely data collection, analysis, and interpretation to manage disease outbreaks, allocate resources, and implement preventive interventions[2]. AI offers significant advantages in these areas through machine learning algorithms, predictive analytics, natural language processing, and automated surveillance systems[3]. These tools can detect patterns in large datasets, predict disease trends, optimize health service delivery, and support personalized prevention strategies. Examples include AI-assisted outbreak forecasting, automated radiological interpretation, chatbot-based health counseling, and intelligent epidemiological modeling. During the COVID-19 pandemic, the usefulness of AI became even more apparent, as it facilitated real-time data monitoring, vaccine logistics, and telehealth services[4,5].

Despite these promising applications, the adoption of AI in public health remains varied and influenced by multiple factors. Perceptions regarding usefulness, trust, ethical

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concerns, data privacy, workforce displacement, and technological readiness play critical roles in acceptance and implementation[6,7]. While some stakeholders view AI as an essential tool to modernize public health systems, others express apprehension due to uncertainties surrounding algorithmic transparency, equity implications, and regulatory frameworks. Understanding public perception is essential, as acceptance of AI technologies directly affects implementation success and policy development[8]. Healthcare providers, public health professionals, students, and community members all contribute to the ecosystem in which AI-driven solutions operate. However, current literature indicates a gap in comprehensive assessment of awareness, attitudes, and perceived impact of AI on public health outcomes, particularly in low- and middle-income regions where digital transformation is emerging[9,10]. This cross-sectional questionnaire-based study aims to explore perceptions, awareness, and anticipated impact of artificial intelligence within the context of public health. By examining attitudes, perceived benefits, concerns, and readiness for adoption, the study seeks to generate evidence that may support informed policymaking, training initiatives, resource planning, and ethical implementation strategies[11,12]. Ultimately, the findings may contribute to understanding how AI can be effectively integrated into public health systems to enhance efficiency, equity, and overall population health.

MATERIALS AND METHODS

Study Design

This research adopted a descriptive cross-sectional study design to assess perceptions, awareness, and the perceived impact of artificial intelligence (AI) on public health outcomes among the target population. A structured questionnaire was used as the primary data collection tool.

Study Setting and Population

The study was conducted among individuals representing diverse backgrounds, including public health professionals, healthcare workers, students, and members of the general population. Only participants aged 18 years and above who were able to understand English and voluntarily consented to participate were eligible for inclusion.

Sampling Technique and Sample Size

A non-probability convenience sampling method was employed due to feasibility and accessibility considerations. The sample size was calculated using a 95% confidence interval, 5% margin of error, and an anticipated response proportion of 50%, resulting in a minimum required sample of **(insert calculated value)** participants. To account for incomplete or invalid responses, an additional 10–15% was added.

Study Instrument

Data were collected using a self-administered, semi-structured questionnaire developed after reviewing relevant literature and expert consultation. The questionnaire consisted of the following sections:

Demographic Information
Awareness of Artificial Intelligence
Perceived Benefits of AI in Public Health
Perceived Challenges and Ethical Concerns
Acceptance, Readiness, and Future Outlook
Open-ended Questions for Qualitative Feedback

Most close-ended items were measured using a 5-point Likert scale ranging from *Strongly Disagree (1) to Strongly Agree (5).* The instrument included both quantitative and qualitative components to provide a comprehensive assessment.

Validity and Reliability

Content validity was evaluated by subject experts in public health, artificial intelligence, and research methodology. Necessary modifications were made based on expert feedback. A pilot study was conducted among **(500)** participants to assess clarity, understandability, and timing. Internal consistency was assessed using Cronbach's alpha, with a reliability coefficient of ≥ 0.70 considered acceptable.

Data Collection Procedure

The questionnaire was distributed electronically via secure online platforms such as Google Forms and social media channels to reach a wider audience. Participants were informed about the purpose of the study, confidentiality measures, and voluntary participation. No identifying personal information was collected.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Ethics Committee prior to data collection. Informed consent was obtained digitally from all participants before accessing the survey. Participation was voluntary and participants were allowed to withdraw at any stage without consequences. Data were stored securely and used solely for research purposes.

Data Management and Statistical Analysis

Collected responses were exported into Microsoft Excel and analyzed using statistical software such as SPSS (version —). Descriptive statistics (frequency, mean, and standard deviation) were used to summarize demographic variables and response trends. Inferential analysis including Chi-square test, independent t-test, or ANOVA was applied where appropriate to examine associations between demographic variables and perception scores. A *p-value* < 0.05 was considered statistically significant.

RESULTS

A total of **500 participants** completed the questionnaire. Table 1 summarizes the demographic distribution. Respondents were evenly distributed across five professional categories, with each group (healthcare professionals, public health students, government employees, private sector workers, and the general population) contributing **20%** of the total sample. In terms of educational level, the highest proportion held a high school qualification (**37%**), followed by undergraduate (**31%**), postgraduate (**20%**), doctoral (**9%**), and others (**3%**). Awareness of artificial intelligence in public health was notably high, with **89%** reporting prior exposure to the concept.

Awareness of AI

Responses to awareness-related items indicated varying levels of understanding between genders (Table 2). Females reported significantly higher awareness regarding AI applications in healthcare ($p = 0.038$) and confidence in AI-related knowledge ($p = 0.045$) compared to males. Although both groups acknowledged increased global adoption of AI in public health, no significant association was observed ($p = 0.28$).

Perceived Benefits

Participants generally perceived AI to have a positive influence on public health outcomes (Table 3). Females expressed stronger agreement regarding the role of AI in improving service accessibility and equity ($p = 0.047$). Other statements, including AI's potential to improve diagnostic accuracy, planning, and disease surveillance, showed positive trends but did not meet statistical significance.

Concerns and Barriers

Concerns about job displacement, ethics, and privacy were evident across both genders. Females were significantly more likely to perceive data security challenges ($p = 0.024$) and cost-related barriers ($p = 0.032$). Although participants acknowledged ethical ambiguity and workforce disruption, no significant gender differences were found.

Acceptance and Future Readiness

Table 5 shows that most respondents demonstrated readiness to engage with AI-based systems. Agreement was high for willingness to adopt AI tools if adequate training was available. Males showed significantly higher support for integrating AI at the national level ($p = 0.041$). Overall, both groups believed that AI would substantially reshape public health practice over the next decade.

TABLE 1: DEMOGRAPHIC INFORMATION

QUESTIONAIRRE	OPTIONS	FREQUENCY (N)	PERCENTAGE (%)
What is your current level of education/professional status?	Healthcare professional	100	20
	Public health student	100	20
	Government sector	100	20
	Private sector	100	20
	General population	100	20
Highest level of education	High School	185	37
	Undergraduate Degree	155	31
	Postgraduate Degree	100	20
	Doctoral	45	9
	Others	15	3
Have you previously heard of Artificial Intelligence in Public Health?	Yes	445	89
	No	55	11

TABLE 2: Awareness of Artificial Intelligence (1 = Strongly Disagree → 5 = Strongly Agree)

QUESTIONAIRRE	**MALES**		**FEMALES**		**P-value**
	Mean	**S.D**	**Mean**	**S.D**	
I understand the basic concept of artificial intelligence.	2.4	0.54	2.7	0.58	0.092
I am aware of AI applications in healthcare (diagnostics, forecasting, surveillance).	3.3	0.71	3.8	0.75	0.038*
I feel confident in my knowledge regarding AI as a public health tool.	2.9	0.62	3.4	0.65	0.045*
AI is being increasingly adopted in global health programs.	3.6	0.89	3.8	0.93	0.28

TABLE 3: Perceived Benefits of AI in Public Health

QUESTIONAIRRE	MALES		FEMALES		P-value

AI can improve disease surveillance and outbreak prediction.	2.8	0.58	3.1	0.63	0.078
AI enhances efficiency in public health decision-making and planning.	3.6	0.73	3.9	0.79	0.058
AI improves diagnostic accuracy and supports better patient outcomes.	3.7	0.68	4.0	0.95	0.082
AI can help identify high-risk populations and prevent diseases.	3.6	0.89	3.8	0.93	0.38
AI applications can improve accessibility and equity of public health services	3.8	0.92	4.3	1.01	0.047*

TABLE 4: Concerns and Barriers

QUESTIONAIRRE	MALES		FEMALES		P-value
AI may reduce human jobs in the healthcare sector.	4.2	1.19	4.32	1.22	0.39
Privacy and data security are major concerns in AI applications.	3.2	0.78	3.8	0.81	0.024*
Cost and technical requirements may limit adoption of AI in public health.	3.6	0.81	4.3	1.04	0.032*
Ethical implications of AI use in healthcare are poorly defined.	4.2	1.02	4.42	1.13	0.085
Lack of training and awareness may limit effective implementation.	4.6	1.32	4.83	1.40	0.91

TABLE 5: Acceptance, Readiness & Future Outlook

QUESTIONAIRRE	MALES		FEMALES		P-value
AI should be integrated into public health programs at the national level.	3.9	0.82	3.2	0.63	0.041*
I am willing to use or support AI-based tools if provided adequate training.	4.2	0.95	4.3	1.0	0.91
AI will significantly transform public health systems in the next decade.	4.1	1.04	4	0.91	0.28
AI innovation will improve quality, accessibility, and affordability of public health services.	4.1	1.02	4.0	0.90	0.91

DISCUSSION

This study explored public perceptions, awareness, and the expected impact of artificial intelligence on public health outcomes. The findings demonstrate strong interest and substantial baseline awareness of AI, aligning with global trends in digital health transformation[13]. The high proportion of respondents familiar with AI suggests increasing exposure to emerging technologies through education, professional settings, or media influence. Awareness levels, particularly among females, were comparatively higher in key areas such as diagnostic applications and healthcare analytics. This may reflect greater engagement in health sciences and technological learning environments. Similar trends have been reported in studies where participants with healthcare exposure or academic backgrounds demonstrated higher familiarity with AI-supported tools[14,15]. Participants perceived AI as a

highly beneficial innovation with potential to strengthen disease surveillance, enhance decision-making, improve clinical accuracy, and support resource optimization. These findings support evidence suggesting that AI can provide scalable solutions for early disease detection, epidemiological forecasting, and digital monitoring systems[16,17,,18]. The positive perception toward AI integration into public health policy further indicates improved public readiness for digital health transformation[19].

Despite optimism, several apprehensions emerged. Concerns surrounding data security, ethical responsibility, job displacement, and cost reflect common global challenges associated with AI adoption[20]. Fear of workforce replacement is consistent with literature emphasizing the need to reposition AI not as a substitute but as a complementary tool requiring human oversight. Data privacy concerns highlight the need for robust governance mechanisms, transparent algorithms, and legislative safeguards[21]. Readiness to adopt AI was encouraging, with most respondents expressing willingness to use AI-based systems if adequate training and support were available[22]. This underscores the importance of capacity building and structured digital competency programs in public health education and workforce development[23]. Overall, the findings suggest that while awareness and acceptance of AI in public health are growing, successful deployment requires addressing infrastructure challenges, ethical considerations, regulatory gaps, and skill development[24]. Strengthening digital literacy, fostering stakeholder trust, and promoting interdisciplinary collaboration will be essential to ensure equitable and effective implementation of AI solutions[25].

CONCLUSION

This questionnaire-based cross-sectional study provides meaningful insight into the awareness, perceptions, and readiness toward the use of artificial intelligence in public health. The results indicate that most respondents are familiar with AI concepts and recognize its potential to improve disease surveillance, enhance decision-making, increase diagnostic accuracy, and strengthen public health systems. While perceptions were largely positive, notable concerns emerged regarding data privacy, ethical regulation, cost of implementation, and the possibility of workforce displacement. Despite these concerns, the majority expressed a willingness to adopt AI-supported tools, particularly if adequate training and support are provided. This demonstrates an encouraging level of openness toward integrating AI into public health practice. The findings also highlight differences across demographic groups, suggesting that targeted awareness programs and capacity-building initiatives may promote equitable understanding and adoption

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