ORIGINAL

Knowledge and perception of healthcare workers towards the adoption of artificial intelligence in healthcare service delivery in Nigeria

Conocimiento y percepción del personal sanitario hacia la adopción de la inteligencia artificial en la prestación sanitaria en Nigeria

Michael Promise Ogolodom[1] ✉, Awajimijan Nathaniel Mbaba[2], Joy Johnson[3], Hyacienth Uche Chiegwu[4], Kenneth .S. Ordu[5], Mark .C. Okeji[6], Nengi Alazigha[2], Elizabeth O. Balogun[7], Abdul Fatai K. Bakre[8], Dlama Zira Joseph[9], Musa Y. Dambele[10], Clement U. Nyenke[3], Anelechi Kenneth Madume[11], Catherine Ugwem Jeremiah[12], Egop Brownson Egop[13], Anna Daniel Ochong[14], Victor Kelechi Nwodo[4]

[1]Department of Radiography, Faculty of Basic Medical Sciences, College of Medical Sciences, Rivers State University. Port Harcourt, Nigeria.

[2]Department of Radiology, Rivers State University Teaching Hospital. Port Harcourt, Nigeria.

[3]Department of Medical Laboratory Sciences, PAMO University of Medical Sciences. Rivers State, Port Harcourt, Nigeria.

[4]Department of Radiography and Radiological Sciences, Faculty of Health Sciences and Technology, Nnamdi Azikwe University, Nnewi Campus. Anambra State, Nigeria.

[5]Department of Anatomy, Faculty of Basic Medical Sciences, College of Medical Sciences, Rivers State University. Port Harcourt, Nigeria.

[6]Department of Medical Radiography, University of Nigeria. Nsukka, Nigeria.

[7]Department of Radiography and Radiation Sciences, Faculty of Basic Medical Sciences, Ajayi Crowther University. Oyo, Oyo State, Ibadan, Nigeria.

[8]Department of Radiography and Radiation Sciences, Faculty of Basic Medical Sciences, Osun
State University. Oshogbo, Nigeria.

[9]Department of Radiography and Radiation Sciences, Federal University Lafia. Nigeria.

[10]Department of Medical Radiography, Bayero University Kano. Kano State, Nigeria.

[11]Department of Physiotherapy, Faculty of Basic Medical Sciences, College of Medical Sciences, Rivers State University. Port Harcourt, Nigeria.

[12]Department of Nurse Sciences, Rivers State School of Nursing Sciences. Port Harcourt, Nigeria.

[13]Department of Radiology, Rivers State Government House Clinic. Port Harcourt, Nigeria.

[14]Department of Radiology, Asi Ukpo Hospital. Calabar, Cross River State, Nigeria.

ABSTRACT

Background: artificial Intelligence (AI) is seen as the machine that replaces human labour to work for men with a more effective and speedier result. There is a paucity of data on the knowledge and perception of healthcare workers regarding AI technology. This study aims to assess the knowledge and perception of healthcare workers towards the application of AI in healthcare services in Nigeria.

Materials and methods: cross-sectional questionnaire-based survey design was used to achieve the aim of this study. Both electronic (Google form) and hardcopy version of the questionnaire were distributed to healthcare workers in Nigeria and their responses were retrieved and statistically analyzed.

Results: out of 263 respondents, most 51,3 % (n=135) were females. Greater percentage 25,5 % (n=67) of the respondents were radiographers, followed by medical consultants 14,8 % (n=39) and the least 1,5 %(n=4) were pharmacists. Greater proportion 61 %(n=160) of the respondents have the opinion that AI can be incorporated into all medical specialties. Out of 263 respondents, 51,7 % (n=136) had good knowledge of AI and the least 6,4 %(n=16) had very poor knowledge of AI. Greater proportion 78,7 % (n=207) of the respondents, agreed

that AI can help to reduce the number of medical errors. Majority 29,3 % (n=77) of the respondents agreed that human specialists will be replaced by AI in the near future. A large proportion 40,3 % (n=106) of the respondents agreed that some employers may prefer AI to humanspecialists because AI has no emotional exhaustion or physical limitation. **Conclusion:** the respondents in this study showed good knowledge of both the medical areas of applications of AIas well as the benefits of AI application in healthcare services. However, most of the respondentswere afraid that their jobs would be taken over by AI in the near future.

Keywords: Artificial Intelligence; Healthcare Workers; Professions.

RESUMEN

Antecedentes: la Inteligencia Artificial (IA) se considera la máquina que sustituye a la mano de obra humana para trabajar por el hombre con un resultado más eficaz y rápido. Hay escasez de datos sobre los conocimientos y la percepción del personal sanitario en relación con la tecnología de IA. El objetivo de este estudio es evaluar los conocimientos y la percepción del personal sanitario sobre la aplicación de la IA en los servicios sanitarios de Nigeria.

Materiales y métodos: para lograr el objetivo de este estudio se utilizó un diseño de encuesta transversal basada en un cuestionario. El cuestionario se distribuyó en formato electrónico (formulario de Google) e impreso a los profesionales sanitarios de Nigeria, cuyas respuestas se recuperaron y analizaron estadísticamente.

Resultados: de los 263 encuestados, la mayoría, el 51,3 % (n=135), eran mujeres. El mayor porcentaje, 25,5 % (n=67), eran radiógrafos, seguidos de consultores médicos, 14,8 % (n=39), y el menor, 1,5 % (n=4), farmacéuticos. El 61 % (n=160) de los encuestados opina que la IA puede incorporarse a todas las especialidades médicas. De los 263 encuestados, el 51,7 % (n=136) tenía un buen conocimiento de la IA y el menor 6,4 % (n=16) tenía un conocimiento muy pobre de la IA. El 78,7 % (n=207) de los encuestados estaba de acuerdo en que la IA puede ayudar a reducir el número de errores médicos. El 29,3 % (n=77) de los encuestados está de acuerdo en que los especialistas humanos serán sustituidos por la IA en un futuro próximo. Un gran porciento 40,3 % (n=106) de los encuestados está de acuerdo en que algunos empresarios pueden preferir la IA a los especialistas humanos porque la IA no tiene agotamiento emocional ni limitaciones físicas.

Conclusión: los encuestados en este estudio mostraron un buen conocimiento tanto de las áreas médicas de aplicación de la IA como de los beneficios de la aplicación de la IA en los servicios sanitarios. Sin embargo, la mayoría de los encuestados temían que sus puestos de trabajo fueran ocupados por la IA en un futuro próximo.

Palabras clave: Inteligencia Artificial; Personal sanitario; Profesiones.

INTRODUCTION

Artificial intelligence (AI) technology has advanced rapidly in recent years and has the potential of finding application in almost every sphere of human endeavour. Artificial intelligence, the science and engineering of making intelligent computers officially gained public prominence in 1956.[1] Alan Turing, one of the founders of computers and AI, in 1950 described AI as the ability of a computer to reach human-level performance in cognitive-based task.[2] The Dartmouth Research Project in 1955 defined AI as 'making a machine behave in ways that would be called intelligence if a human were so behaving.[3] Others see AI as the machine that replaces human labour to work for men with a more effective and speedier result.[3] Simply put, AI is intelligencedesigned by human and demonstrated by machines.[4] AI is a term used to describe these functionsof human-made tool that emulate the cognitive abilities of the natural intelligence of human mind.[4]

AI-powered technology represents one of the fastest growing technologies during the last few years and has been usefully employed in different fields including finance, law, cybersecurity, manufacturing, computer science and medicine.[3] The fields of application of AI technology are expanding. In recent years, AI has become a relevant topic in social debate and politicians, economists, scientists as well as lay people are talking controversially about this unique subject.[3] The positive impacts of AI in our daily lives are so enormous that they are no longer regarded as AI because we are very used to it.[4] Some examples of AI include autonomous vehicles such as drones and self driving cars, medical diagnosis, search engines such as Google search, optical character recognition such as the Siri speech interpretation and recognition interface, image recognition in photographs, spam filtering etc.[4]

Recently, AI is widely employed in the healthcare industry.[4] AI in medicine can be divided intotwo categories - virtual and physical AI.[1,5] In medicine, the virtual part ranges from applications such as health record systems to neural network based guidance in treatment decisions.[1,5] The physical part deals with robots assisting in

performing surgeries, intelligent prostheses for handicapped people and elderly care.[1,5] AI has been assisting doctors to diagnose, finding the sources of disease, suggesting various ways of treatment and also predicting if the illness is life-threatening.[4] Modern medicine is rapidly evolving and many fields have already integratedAI into clinical practice.[2]

Even though AI technology is rapidly gaining momentum in the medical fields, the major stakeholders are concerned about the safety of AI. They are often concerned about the ethical implications of AI, the management of data, the disruption of the patient-physician relationship and the development of professional knowledge.[6,7,8] Patients on the other hand are concernedthat they might not have the choice to refuse an AI usage for their personal treatment, rising costsand problems with insurance coverage.[3,9] Others fear that with the progressive development ofAI human labour will no longer be needed as everything can be done mechanically.[4]

Recently, healthcare systems in several countries have begun to rely on storage of patientinformation to provide the best quality of health care. AI technology is rapidly revolutionizing healthcare delivery as a whole in developed clime but in Nigeria AI in medicine remains limited.The level of public knowledge about AI is not known and its perception is yet to be determined. In order for AI to fully deliver its potential benefits for healthcare, healthcare professionals need to understand and embrace the AI technology. Equally, patients need to entrust aspects of their healthcare to AI systems. AI technology uptake in Nigeria will largely be managed by healthcareprofessionals, and there is paucity of data on the knowledge and perception of healthcare workers regarding this new technology. This study aims to assess the knowledge and perception of healthcare workers towards the application of AI in healthcare services in Nigeria.

MATERIALS AND METHODS

This was a questionnaire-based cross-sectional survey design aimed at evaluating the knowledge and perception of healthcare workers towards the adoption of Artificial Intelligence in Healthcareservice delivery in Nigeria. The consent of the respondents were duly sought and obtained. No information that revealed the identity of the respondents was included in this study. The nature ofparticipation was entirely voluntary and nobody was harmed in any way due to this research. All information that was obtained was held in strict confidence. The study lasted for a period of two months (August and September 2023). Only healthcare workers who consented to participate in this study were included in this study.

Both online and hard copy self-administered questionnaire constructed in English Language based on the objectives of the study was used as the instrument for data collection. The questions were adopted from previous studies carried out by Abdullah et al.[10], Scheetz et al.[11] and Doumat et al.[2] but modified to meet the objectives of this study.

The questionnaire consisted of three sections, A, B and C. Section A contained questions about the respondents' socio-demographic variables. Section B captured questions relating to the respondents knowledge of Artificial Intelligence and section C captured questions relating to the respondents' perception of the adoption of AI in healthcare service delivery in Nigeria.

The validity of the questionnaire was measured using the Index of item Objective Congruence (IOC) technique previously used by Turner et al.[12], Mbaba et al.[13], Ogolodom et al.[14] and Ogolodom[15]. This was done by calculating the index of item-objective congruence (IOC). According to the index parameters, an IOC score higher than 0,6 was assumed to show adequate content validity , and all the scores obtained in this study for all the items of the questionnaire after IOC analysis were higher than 0,6

The questionnaire was constructed in electronic and hardcopy versions. The electronic version wasdesigned using Google form, which was distributed electronically to the following WhatApp platforms; Radiography Lecturers Association of Nigeria (RLAN), Association of Radiographers of Nigeria (ARN) Rivers State Chapter, University of Calabar Alummi, Nnamdi Azikiwe University Radiography Postgraduate, Department of Physiotherapy College of Medicine, University of Lagos Alummus, Association of Clinical and Academic Physiotherapists of Nigeria,Physiotherapy Educators, Nigerian Physiotherapy, Medical and Dental Consultants, Rivers State, Rivers State Hospital Management Board, Heads of Hospitals and Labs, and the email addresses of some individuals. The completed electronic version of the questionnaire was retrievedelectronically. The hardcopy version was distributed to the respondents using one-to-one method and the completed copies were retrieved immediately. A total of 263 respondents participated in the survey and their responses were collected using data capture sheet.

Method of data analysis

The obtained data were analyzed using Statistical Package of Social Science (SPSS), SPSS version21.0(IBM Corp, Armonk, NY, USA, 2012) and both descriptive (frequencies, percentages and bar charts) and inferential (One way ANOVA) were used to test if there were differences in the knowledge and perceptions of AI based on the respondents' socio-demographic variables. Probability values of $p < 0,05$ or lower was considered if statistically significant.

RESULTS

Socio-demographic variables of the respondents

Out of 263 respondents, the majority 41,8 % (n=110) were within the age group of > 50years, followed by 31-40 years of 28,1 % (n=74) and the least 21-30years of age, 8,7 % (n=23).Most 51,3 % (n=135) of the respondents were females while the males accounted for 48,7 % (n=128). Married respondents were highest, 77,9 % (n=205). Greater number, 67(25,5 %) of the respondentswere radiographers, followed by medical doctors 21,3 % (n=56) and the least 3,8 % (n=10) were pharmacists (Table 1).

Responses on sources of information and medical specialties of the application of AI

The results of the sources of information about the artificial intelligence and the medical specialtiesin which the AI can be applied, revealed that most 53 % (n=140) of the respondents got the information via the internet and followed by social media, 19 % (n=50) (Figure 1). Greater proportion 61 %(n=160) of the respondents accepted that AI can be incorporated into all medical specialties, followed by those that said that AI can only be applied in surgery 11 %(n=28) and theleast 1,1 % (n=3) of the respondents, said it can be incorporated into ophthalmology only (Figure 2).

Respondents' knowledge of artificial intelligence

Out of 263 respondents, 51,7 % (n=136) had good knowledge of AI and the least 6,4 % (n=16) hadvery poor knowledge of AI. The majority of 89,4 % (n= 235) of the respondents, knew that AI makes use of labeled data and the least 4,6 % (n=12) were not sure. Greater number 78,7 % (n=207)of the respondents, knew that AI can help to reduce the number of medical errors. Most 81 %(n=213) of the respondents knew that the application of AI will improve diagnostic confidenceand 15,2 % (n=40) of respondents were not sure (Table 2).

Respondents' perception of artificial intelligence

The majority 29,3 % (n=77) of the respondents agreed that human specialist will be replaced by AIin the near future and 24 %(n=63) of the respondents were not sure. Out of 263 respondents, the highest number, 87 (33,1 %) agreed that most healthcare workers are at risk of being replaced by AI. Large proportion 40,3 % (n=106) of the respondents agreed that some employers may preferredAI to human specialist because AI has no emotional exhaustion or physical limitation and the least6,1 % (n=16) strongly disagreed (Table 3a). Of the 263 respondents, 53,2 % (n=140) agreed that the application of AI will improve the field of practice and the least 1,9 % (n=5) disagreed. Large number, 82 (31,2 %) of the respondents agreed that AI in contrast to human cannot be use to provide opinion in unexpected situations. The majority 38,4 % (n=101) of the respondents agreedthat AI cannot think like humans and hence cannot be applied to controversial subjects and the least 4,6 % (n=12), strongly disagreed (Table 3b).

Socio-demographic variables and knowledge of AI

The ANOVA results revealed that there were no statistically significance mean differences in therespondents' responses on their knowledge of AI across their socio-demographic variables such asage group(F=0,183, df= 3, p= 0,91), gender (F=0,102, df= 1, p=0,75) and profession (F=0,361, df=8, p=0,94)(Table 4).

Socio-demographic variables and perception of AI

The ANOVA test of significance based on perception of AI and socio-demographic variables results, shows that there were statistically significant mean differences in the respondents perception of AI across age groups (F=12,027, df=3, p=0,00) and profession (F=6,188, df=9, p=0,00). There was no statistically mean difference in the respondents' perception of AI among the gender (F=0,814, df=1, p=0,37)(Table 5).
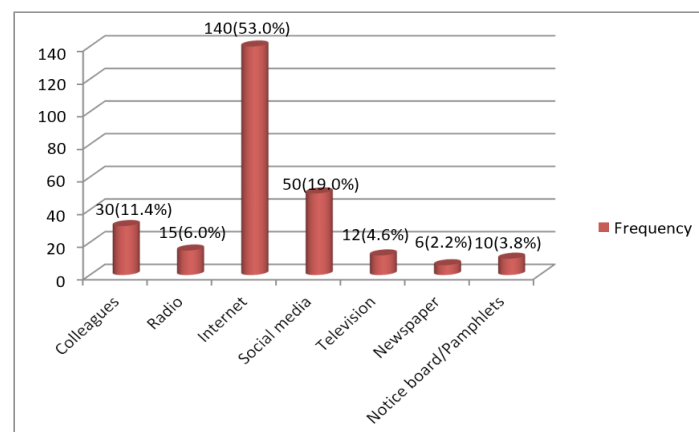

Figure 1. Chart showing frequency distribution of Sources of information on AI

| Table 1. Frequency distribution of socio-demographics	
Variables	**Frequency, N (%)**
Age Group	
21-30 Years	23(8,8)
31-40 Years	74(28,1)
41-50 Years	56(21,3)
> 50 Years	110(41,8)
Total	263 (100)
Gender	
Male	128(48,7)
Female	135(51,3)
Total	263(100)
Marital Status	
Single	53(20,2)
Married	205(77,9)
Divorced/Separated	5(1,9)
Total	263(100)
Profession	
Medical Doctors	56 (21,3)
Nurse/Midwives	33 (12,6)
Radiographers	67 (25,5)
Optometrists	
Pharmacists	19 (7,2)
Medical Laboratory	10 (3,8)
Scientists	21 (8,0)
Primary Health Care Worker	28 (10,6)
Others	29 (11,0)
Total	263(100)
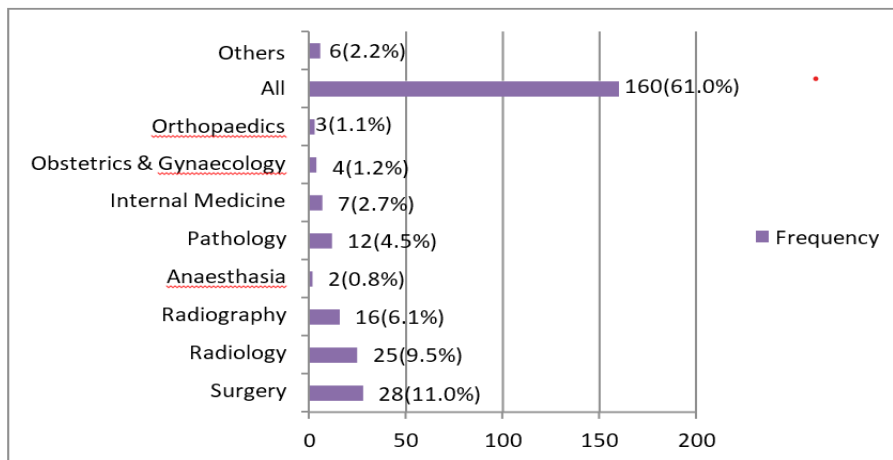
Figure 2. Bar chart showing frequency distribution of Medical Specialties that accepted application of AI

Table 2. Frequency distribution of the respondents' knowledge of Artificial Intelligence	
Variables	**Frequency (%)**
How would you rate your knowledge of AI?	
Very poor	16(6,1)
Poor	34(12,9)
Good	136(51,7)
Very good	43(16,3)
Excellent	34(12,9)
Do you know that AI makes use of labeled data, ie information alreadyprocessed by humans and clearly labeled?	
Yes	235(89,4)
No	16(6,1)
Not Sure	12(4,6)

Do you know that AI is good at pattern recognition?	
Yes	212(80,6)
No	28(10,6)
Not Sure	23(8,7)
Do you know that AI can help to reduce number of medical errors?	
Yes	207(78,7
No	22(8,4)
Not Sure	34(12,9)
Do you think application of AI will improve diagnostic confidence?	
Yes	213(81,0)
No	10(3,8)
Not Sure	40(15,2)
Do you know that AI will reduce the time spent by specialist on monotonoustask?	
Yes	240(91,3)
No	5(1,9)
Not Sure	18(6,8)
Total	263(100,0 %)

Table 3a. Frequency distribution of the respondents' perception on Artificial Intelligence	
Variables	**Frequency (%)**
Human specialist will be replaced by AI in the near futureStrongly	
Disagree	62(23,6)
Disagree	56(21,3)
Not sure	63(24,0)
Agree	77(29,3)
Strongly Agree	5(1,9)
Most healthcare workers are at risk of being replaced by AIStrongly	
Disagree	51(19,4)
Disagree	57(21,7)
Not sure	52(19,8)
Agree	87(33,1)
Strongly Agree	16(6,1)
Some employers may prefer AI to human specialist because AI has noemotional exhaustion or physical limitation	16(6,1)
Strongly Disagree	58(22,1)
Disagree	52(19,8)
Not sure	106(40,3)
Agree	31(11,8)
Strongly Agree	
Some employers may prefer AI to human specialist because AI can deliverclinically, large amount of high data in real time	
Strongly Disagree	5(1,9)
Disagree	50(19,0)
Not sure	23(8,7)
Agree	154(58,6)
Strongly Agree	31(11)
AI abilities are superior to human experience	
Strongly Disagree	78(29,7)
Disagree	119(45,2)
Not sure	34(12,9)
Agree	32(12,2)
Strongly Agree	0(0,0)
Total	263(100,0)

Table 3b. Frequency distribution of the respondents' perception on Artificial Intelligence	
Variables	**Frequency (%)**
The application of AI would improve the field of practiceStrongly Disagree	22(8,4)
Disagree	5(1,9)
Not sure	28(10,6)
Agree	140(53,2)
Strongly Agree	68(25,9)
AI in contrast to human cannot be used to provide opinion in unexpectedsituations Strongly Disagree	0(0,0)
Disagree	40(15,2)
Not sure	67(25,5)
Agree	82(31,2)
Strongly Agree	74(28,1)
AI is not flexible enough to be applied to every patientStrongly Disagree	18(6,8)
Disagree	33(12,5)
Not sure	40(15,2)
Agree	123(46,8)
Strongly Agree	49(18,6)
AI cannot think like humans and hence cannot be applied to controversialsubjects Strongly Disagree	12(4,6)
Disagree	45(17,1)
Not sure	43(16,3)
Agree	101(38,4)
Strongly Agree	62(23,6)
Total	263(100,0)

Table 4. ANOVA test of significance based on Knowledge and Socio-demographics		
Variables	**F-value (df)**	**p-value**
Age	0,183 (3)	0,91
Gender	0,102 (1)	0,75
Marital Status	0,122 (2)	0,85
Profession	0,361 (8)	0,94

Table 5. ANOVA test of significance based Perception and Socio-demographics		
Variables	**F-value(df)**	**p-value**
Age	12,027 (3)	0,00*
Gender	0,814 (1)	0,37
Marital Status	8,941 (2)	0,00*
Profession	6,188 (9)	0,00*
*Significance		

DISCUSSION

The introductions of artificial intelligence and machine learning into medical practice have witnessed significant progress and utilizations.[16,17] Inspite of this, a good number of individuals may notbe knowledgeable of the technological benefits of AI in medicine especially in the locality of thisstudy. This study evaluated the knowledge and perception of healthcare workers towards the adoption of artificial intelligence in healthcare service delivery in Nigeria. This study found that the respondents had high level of knowledge, when asked which of the medical specialties AI canbe applied to. This finding is in agreement with the result of the study conducted by Doumat et al.[2], which also reported high level of knowledge of the respondents about the areas of medical application of AI. Contrary to this our finding, is the result of the study done by Wittal et al.[17], which was conducted to evaluate the perception and knowledge of AI in healthcare, therapy and diagnostics among German population, which reported low knowledge of the medical applications of AI (only 6 % of their respondents). The discrepancies in our findings could be ascribed to the categories of the respondents. In this

present study, only healthcare workers who might have used any of the robotic softwares before were included whereas Wittal et al.[17] study involved the general German public.

Most of the respondents in this study have good knowledge of the benefits of AI usage in healthcare service delivery, which include but not limited to reducing the number of medical errors, improve diagnostic confidence and reducing time spent by specialists on monotonous tasks. This finding is in keeping with the reports of Gao et al.[18] and Miller et al.[19], which also documented that with recent technological advancement in AI, diagnosis will be simplify, diseases would be predicted and there would be reductions in the numbers of medical errors as well as improved decision-making and therapy. Contrary to the finding of our study, is the result of Abdullah et al.[10] in Saudi Arabia. In Abdullah et al.[10] study, which was conducted to evaluate the healthcare employee's perception of the use of artificial intelligence, reported that most of the respondents were unaware of the advantages of the application of AI in health sector. The differences in our results could be attributed to the differences in our sample sizes and our studies' geographical variations.

With regards to the respondents' perception towards the adoption of AI in healthcare service delivery, most of the respondents perceived their jobs would be taken over by AI in the near future. This finding is in agreement with the result of the study carried out in Saudi Arabia by Abdullah et al.[10], which also reported the respondents, indicated concern that their jobs would be taken over by AI. This finding in this study is inconsistent with the finding of the study conducted by Oh et al.[20], which reported that doctors do not agree that their jobs will be replaced by AI.

Most of the respondents in this present study, perceived that application of AI in healthcare service delivery will improve the field of practice by performing large volume of tasks within a short period of time. This is inconsistent with the findings of the research works done by Abdullah et al.[10] and Shameer et al.[21].

Artificial Intelligence cannot think like humans and hence cannot be applied in controversial areas was the most common challenge perceived by the respondents in this study. Also, they perceived that AI in contrast to human cannot be used to provide opinion in unexpected situations. These findings are in keeping with the results from studies conducted by Abdullah et al.[10] in German and Oh et al.[20] in Korean.

There were no statistically significant mean differences in the respondents' responses on their knowledge of AI across their socio-demographic variables such as age groups, gender and profession. This means that the responses on knowledge of AI across the various age groups, gender and professions are similar as the individual unit of each aforementioned variable does not have any statistically significant influence on the respondents' level of knowledge of AI. This finding with respect to age and gender is in agreement with the results of Abdullah et al.[10], which equally reported that there were no statistically significant mean differences in their respondents' responses across age groups and gender. However, we observed disagreements in our findings in the area of type of job (profession) in which they reported that there were statistically significant differences in the responses of the professionals. According to them, some group especially the technicians might have had adequate knowledge of the AI than the nurses and the doctors.

The ANOVA test of significance based on perception of AI and socio-demographic variables results, shows that there were statistically significant mean differences in the respondent's perception of AI across age groups and profession. There was no statistically mean difference in the respondents' perception of AI among the gender. These imply that the respondent's perception towards the adoption of AI in healthcare service delivery in Nigeria differs across the different age groups and professions, whereas their perception of the adoption of AI in healthcare service delivery in Nigeria was not different among male and female respondents. This finding in the areas of age groups and profession are in agreement with the finding of the study conducted by Abdullah et al.[10].

CONCLUSION

The respondents in this study showed good knowledge of both the medical areas of applications of AI as well as the benefits of AI application in healthcare services. However, most of the respondents were afraid that their jobs would be taken over by AI in the near future, even as they agreed that the application of AI in healthcare service delivery will improve the field of practice by performing large volume of tasks within a short period of time.

The age groups, gender and professions does not have any statistically significant influence on the respondents' level of knowledge of AI. There were statistically significant mean differences in the respondent's perception of AI across age groups and profession. There was no statistically mean difference in the respondents' perception of AI among the gender.

REFERENCE

1. Hamet P and Tremblay J. Artificial intelligence in medicine. Metabolism. 2017; 69S:S36-S40.

2. Doumat G, Daher D, Ghanem N, Khater B (2022) Knowledge and attitudes of medical students in Lebanon

toward artificial intelligence: A national survey study. Front. Artif. Intell. 5:1015418.

3. Fritsch S. J, Blankenheim A, Wahl A, Hetfeld P, Maassen O, Deffge S, Kunse J et al, Attitudes and perception of artificial intelligence in healthcare: A cross- sectional survey among patients. 2022: Digital Health Volume 8: 1–16

4. Tai MC. The impact of artificial intelligence on human society and bioethics. Tzu Chi Med 2020; 32(4): 339-43.

5. Amisha, Malik P, Pathania M, Rathaur VK. Overview of artificial intelligence in medicine. J Family Med Prim Care 2019;8:2328-31.

6. Shinners L, Grace S, Smith S, Stephens A, Aggar C; Exploring healthcare professionals' perceptions of artificial intelligence: Piloting the Shinners Artificial Intelligence Perception tool; 2022: Digital Health Volume 8: 1–8

7. Laï MC, Brian M and Mamzer MF. Perceptions of artificial intelligence in healthcare: findings from a qualitative survey study among actors in France. J Transl Med 2020; 18: 14

8. Collado-Mesa F, Alvarez E and Arheart K. The role of artificial intelligence in diagnostic radiology: a survey at a single radiology residency training program. J Am Coll Radiol 2018; 15: 1753–1757

9. Richardson JP, Smith C, Curtis S, et al. Patient apprehensions about the use of artificial intelligence in healthcare. NPJ Digital Medicine 2021; 4: 40.

10. Abdullah R, Fakieh B. Health Care Employees' Perceptions of the Use of Artificial Intelligence Applications: Survey Study. J Med Internet Res 2020;22(5):e17620)

11. Scheetz J, Rotthschild P, McGuinnesss M, Hadoux X, Soye HP, Janda M, Condon JJJ, Oakden-Rayner L, Palmer LJ, Keel S, van Wijngaarden P. A survey of clinicians on the use of artificial intelligence in Opthalmology, Dermatology, radiology and radiation oncology. Scientific Reports.2021, 11:5193.

12. Turner R C, Carlson L. Indexes of item-objective congruence for multidimensional items. International Journal of   Test   2003;3:163-171. https://doi.org/10.1207/S15327574IJT0302_5.

13. Mbaba, A.N., Ogolodom, M.P., Abam, R., Akram, M., Alazigha, N., et al.(2021). Willingness of Health Care Workers to Respond to Covid-19 Pandemic in Port Harcourt, Nigeria. Health Sciences Journal 15 (1), 802.

14. Ogolodom, M.P., Mbaba, A.N., Alazigha, N., Erondu, O.F., Egbe, N.O., et al. (2020) Knowledge, Attitudes and Fears of HealthCare Workers towards the Corona Virus Disease (COVID-19) Pandemic in South-South, Nigeria. Health Sciences Journal 1:002

15. Ogolodom MP, Okankwu EA, Chiegwu HU, Okeke JS, Joseph DZ, Ugwuanyi DC et al. Occupational stress level and associated factors among intern radiographers in Anambra State, Nigeria. Trop JMed Res. 2022(1):219-227.

16. Briganti G, Le Moine O. Artificial Intelligence in Medicine: Today and Tomorrow. Front Med (Lausanne) 7 (2020): 27

17. Wittal CG, Hammer D, Klein F, Rittchen J. Perception and Knowledge of Artificial Intelligence in Healthcare, Therapy and Diagnostics: A PopulationRepresentative Survey. Journal of Biotechnology and Biomedicine. 6 (2023): 129-139.

18. Gao S, He L, Chen Y, et al. Public Perception of Artificial Intelligence in Medical Care: Content Analysis of Social Media. J Med Internet Res 22 (2020): e16649.

19. Miller DD, Brown EW. Artificial Intelligence in Medical Practice: The Question to the Answer? The American journal of medicine 131 (2018): 129-133.

20. Oh S, Kim JH, Choi S, Lee HJ, Hong J, Kwon SH. Physician Confidence in Artificial Intelligence: An Online

MobileSurvey. J Med Internet Res 2019 Mar 25;21(3):e12422. [doi: 10.2196/12422]

21. Shameer K, Johnson KW, Glicksberg BS, Dudley JT, Sengupta PP. Machine learning in cardiovascular medicine: are we there yet? Heart 2018 Jan 19;104(14):1156-1164. [doi: 10.1136/heartjnl-2017-311198]

FINANCING

CONFLICT OF INTEREST
The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION
Conceptualization: Michael Promise Ogolodom, Awajimijan Nathaniel Mbaba, Joy Johnson, Hyacienth Uche Chiegw, Kenneth S. Ordu, Mark .C.Okeji, Nengi Alazigha, Elizabeth O. Balogun, Abdul Fatai K. Bakre, Dlama Zira Joseph, Musa Y. Dambele, Clement U. Nyenke, Anelechi Kenneth Madume, Catherine Ugwem Jeremiah, Egop Brownson Egop, Anna Daniel Ochong, Victor Kelechi Nwodo.

Research: Michael Promise Ogolodom, Awajimijan Nathaniel Mbaba, Joy Johnson, Hyacienth Uche Chiegw, Kenneth S. Ordu, Mark .C.Okeji, Nengi Alazigha, Elizabeth O. Balogun, Abdul Fatai K. Bakre, Dlama Zira Joseph, Musa Y. Dambele, Clement U. Nyenke, Anelechi Kenneth Madume, Catherine Ugwem Jeremiah, Egop Brownson Egop, Anna Daniel Ochong, Victor Kelechi Nwodo.

Methodology: Michael Promise Ogolodom, Awajimijan Nathaniel Mbaba, Joy Johnson, Hyacienth Uche Chiegw, Kenneth S. Ordu, Mark .C.Okeji, Nengi Alazigha, Elizabeth O. Balogun, Abdul Fatai K. Bakre, Dlama Zira Joseph, Musa Y. Dambele, Clement U. Nyenke, Anelechi Kenneth Madume, Catherine Ugwem Jeremiah, Egop Brownson Egop, Anna Daniel Ochong, Victor Kelechi Nwodo.

Project administration: Michael Promise Ogolodom, Awajimijan Nathaniel Mbaba, Joy Johnson, Hyacienth Uche Chiegw, Kenneth S. Ordu, Mark .C.Okeji, Nengi Alazigha, Elizabeth O. Balogun, Abdul Fatai K. Bakre, Dlama Zira Joseph, Musa Y. Dambele, Clement U. Nyenke, Anelechi Kenneth Madume, Catherine Ugwem Jeremiah, Egop Brownson Egop, Anna Daniel Ochong, Victor Kelechi Nwodo.

Original writing-drafting: Michael Promise Ogolodom, Awajimijan Nathaniel Mbaba, Joy Johnson, Hyacienth Uche Chiegw, Kenneth S. Ordu, Mark .C.Okeji, Nengi Alazigha, Elizabeth O. Balogun, Abdul Fatai K. Bakre, Dlama Zira Joseph, Musa Y. Dambele, Clement U. Nyenke, Anelechi Kenneth Madume, Catherine Ugwem Jeremiah, Egop Brownson Egop, Anna Daniel Ochong, Victor Kelechi Nwodo.

Writing-revision and editing: Michael Promise Ogolodom, Awajimijan Nathaniel Mbaba, Joy Johnson, Hyacienth Uche Chiegw, Kenneth S. Ordu, Mark .C.Okeji, Nengi Alazigha, Elizabeth O. Balogun, Abdul Fatai K. Bakre, Dlama Zira Joseph, Musa Y. Dambele, Clement U. Nyenke, Anelechi Kenneth Madume, Catherine Ugwem Jeremiah, Egop Brownson Egop, Anna Daniel Ochong, Victor Kelechi Nwodo.