Determinants of Artificial Intelligence Adoption in Disease Diagnosis for Improving Health Sector Services in Tanzania: A Case of Muhimbili National Hospitals

Amri Ahmada Omary ✉ ID

Master's Degree, Department of Information Technology, College of Business Education (CBE), Tanzania

Abstract:

The study was conducted at Muhimbili national Hospitals to assess the use of Artificial Intelligence in Disease Diagnosis for Improving Health Sector Services in Tanzania. Specifically, the study was interested to assess factors affecting AI adoption in public hospital, examine health workers perception on AI adoption in public hospital and find out effectiveness of AI adoption in proper diagnostic of diseases for improving patient health in public hospitals. The study guided by Technology Acceptance Model. It employed quantitative research approach and survey research design. A sample size of 47 respondents was used where questionnaire were used in data collection. The study revealed that artificial intelligence was useful in diseases diagnosis as it provides accurate information pertaining to patient health; it is quicker in diseases diagnosis and quicker in predicting and diagnosis of patient health. The findings also posited that artificial intelligence is effective in monitoring heart attack and asthma in real time, AI is effective in managing health services, AI is also effective in improving diagnostic and patient. The study recommends the government to provide health workers with training regularly on how to use AI in diseases diagnosis.

Keywords: *Artificial Intelligence, disease diagnosis, health services.*

Introduction

Background of Research

Artificial Intelligence (AI) technologies and strategies are beneficial in almost every aspect of behavioral and healthcare, including clinical-decision making, healthcare management as well as patient monitoring (Tiwari et al, 2021). Despite a number of its benefits, AI adoption in hospitals in emerging economies still faces challenges. Some of the challenges are technology adoption, security, privacy, data quantity/quality, expertise and ethical issues are the barriers on AI adoption in most public organizations including hospital (Vasilieios and Ntalaianis, 2019). Unless remedial measures taken implementation of AI in hospital remains a challenge in developing countries

Artificial intelligence (AI) refers to a situation in which machines simulate human minds in learning and analysis, and thus may work in problem solving (Rong et al, 2020). It is simply represent the intelligence of machines and the separation of computer science that targets to generate (Murali and Sivakumaran, 2018). Evolution of AI has created new technology that can tackle large data sets, solving complex problems that previously required human intelligence. Currently, healthcare organizations are poised to use either machine learning (ML)

or Deep Learning (DL) AI to align their outcomes with achieving the triple aim including improved care experiences, improved population health, and reduced per capita costs of care Papa Nicolas et al, 2018). The technology used to improve diagnostic accuracy and facilitate disease management so as to reduce burden on personnel. For example, Kansas City Missouri in United State of America has implemented chronic condition management programs using machine learning predictive models to monitor patient with heart failure and diabetes health problem.

Besides, the use of AI smart robots in India Hospital assist healthcare staff being more efficiency in patient care and treatment, in turn reduce burden on healthcare staff (Sharma, 2021). AI has also been used in integrated management of cancer, support the diagnosis and predictions of function changes in urinary bladder control, stroke prediction as well as cardiovascular diseases and to support the decision-making process of diagnosis (Sakai and Yamada, 2019, Bou Ass et al, 2018 and Haque et al, 2002).However, limited access to high-quality and unbiased data sets, internet connectivity problem, lack of systems and process that enable adoption, mindset and knowledge gap prevents decision makers from making AI technologies a key priority in Netherland (Marcel et al, 2020).

Africa continent presents a tremendous opportunity to influence the use of AI to accelerate solutions to fundamental problems like quality access to healthcare. The AI technology has been adopted at the mid of 1980s to enhance health worker-patient interaction, manage huge data and improve health care services. In Nigeria for example begin using signal processing machine learning to improve the diagnosis of birth asphyxia in low resource setting. In Kenya AI is commonly used to determine optimal interventions for eradicating malaria specific to a given location (Akinwande, 2018). In healthcare application of AI has only seen a few pilot and test case. For instance, in South Africa, a multinomial logistic classifier-based system applied in human resource planning specially to predict how long health workers might stay in public services (Moyo et

al, 2018). In Nigeria, Ubenwa is start-up that is using signal processing and machine learning to improve the diagnosis of birth asphyxia in low-resource settings.

AI reforms in health sector adopted in other countries including Rwanda, Kenya, Tunisia, Uganda, Tanzania, and Cameroon as there is rapid growth mobile phone ownership and use. However, a gap remains on digital health ecosystem that may shape its utilization (Ibeneme et al, 2021). Realizing AI potentialities requires attention to policy and the regulatory environment, system infrastructure, sustainable financing, technical safeguards and workforce capacity, and diversity of the stakeholders (Ibid).

MAI was piloted in Africa in the mid-1980s. MAI deployed in Kenya improved health Worker –patient interaction quality with evidence of increased number of symptoms elicited (6).To improve the detection of common and potentially blinding eye disorders, MAI (successfully Implemented in the US) was piloted in Egypt some time in 1986 Moreover, major factor limiting the speed of development of AI technology in Africa is inadequate infrastructure evident by low internet penetration (39%) and social cultural factors impairing adoption (Helsey, 2017). There is also spread of inaccessibility to electricity across the continent as about half of Africa does not have electricity and this has made it difficult to execute and sustain digital approaches in different sector of economy including health (Odekunle and Shankar, 2017). Adair-Rohani et al (2013) commented that less than 30% of health facilities in Africa had access to reliable electricity.

In Tanzania, AI technology is still at the immature stage because AI startups facing challenges related to data and experts (Tupokigwe, 2019). Thus, for effective and efficient implementation and adoption of AI private sectors, NGOs in collaboration with government efforts is needed to invest in existing startups and motivate them to complete their projects. The support may include but not limited to the provision of funds, data acquisition and commitment to bring experts who can build

the in-house capacity of the startups. Mtambalike (2021) reported that AI adopted and applied in health sector including Ifakara Health Institute (IHI) on rapid assessment of blood-feeding histories and parasite infection rates in the field-collected malaria mosquitoes. One of the health institutes opined that machine-learning and mid-infrared spectroscopy. Emanuel Mwanga from Ifakara health institute posts that the approach allows a cheaper, quicker, and non-invasive alternative for predicting age and species of mosquitoes, and detecting pathogens.

Tanzania has made deliberate efforts to improve healthcare services. Among the strategies include adoption of AI, National Digital Health Strategy 2019-2024 to promote the effective use of digital technologies to improve provision of high-quality health services, client experience, health systems strengthening, and health outcomes by facilitating changes and improvements at all levels of the healthcare system. However, unreliable electric power supply, limited financial resources, inadequate skilled ICT personnel, limited e-Health skills amongst users and decision-makers and resistance to the adoption of e-Health solution simple efficiency and effective use of AI in healthcare. Study by Ndalahwa and Mkumbo (2020)revealed that government has no policies, funding, strategic plan or allocation for the implementation of open access AI in Tanzania.

The assumption of this study is that integration of AI into the healthcare space can help check the rising medical diagnosis costs, making treatments more affordable (WHO, 2018). There is scanty study related to the adoption of AI in hospital and perception of health providers and patient about the use of AI intelligence in public hospital in provision to diagnose patient health problem. The study therefore, examines AI adoption in public hospital (MNH) and establishes relationship between AI and healthcare services provision in Tanzania.

Literature Review

Alhashmi, et al (2019) did a study on implementing artificial intelligence in the United Arab Emirates healthcare sector. The study develops and tests a modified Technology Acceptance Model (TAM) to explore critical success factors (CSFs) for the adoption of AI in the healthcare sector. The most widely used CSF variables for TAM are Perceived Usefulness (PU), Perceived Ease of Use (PEU), Attitudes toward Use (ATU) and Behavioral Intention to Use (BIU). An extended model was developed (ETAM) and tested using a qualitative study comprising 53 employees working in the Dubai IT and healthcare sectors. The study showed that managerial, organizational, and operational and IT infrastructure factors have a positive effect on PU and PEU and, hence, should be included as CSFs in determining the implementation of AI in the healthcare sector

Study by Khanijahani et al (2022), on Organizational, professional, and patient characteristics associated with artificial intelligence adoption in health care: a systematic review revealed that Psychosocial factors such as perceived ease of use or usefulness, performance or effort expectancy, and social influence were major influential factors among healthcare professionals and patients. However, the perceived threat to autonomy was negatively associated with AI adoption. Structural factors such as the organization's size, workflow, training, and security play a crucial role in adopting AI technologies.

Rina and Bahjee (2020) investigate health employees' Perceptions of applied AI in Saud Arabia. The aim of this study was to explore health care employee perceptions and attitudes toward the implementation of artificial intelligence technologies in health care institutions in Saudi Arabia. An online questionnaire was published, and responses were collected from 250 employees, including doctors, nurses, and technicians at 4 of the largest hospitals in Riyadh, Saudi Arabia. Results: The results of this study showed that 3.11 of 4 respondents' feared artificial intelligence would replace employees and had a general lack of knowledge regarding AI. In addition, most respondents were unaware of the advantages and most common challenges to artificial intelligence applications in the health sector, indicating a

need for training. The results also showed that technicians were the most frequently impacted by AI applications due to the nature of their jobs, which do not require much direct human interaction.

Jha and Topol (2016), did a study on adopting to artificial intelligence. The study developed a survey instrument to measure American physicians' perceptions about the impact of health information systems on primary care delivery, and found that physicians were skeptical about its ability to perform better than humans. Similarly, Turja et al (2019) carry out an investigation on robot use self-efficacy in healthcare work. The study adopts qualitative study measuring psychiatrists' perceptions of AI role replacement. Based on their healthcare workforce more broadly and developed a theoretical questionnaire to measure perceived self-efficacy in task-specific robot use. They found healthcare professionals were confident in their use of the technology and on average were very interested in its application.

According to Lewis (2013) awareness about cyber threats and readiness to counteract them not only does it have the potential to reduce the cost of cyber security but it also has the ability to reduce by over a half the number of successive attacks. In developing the conceptual model the assumption made is that both awareness and preparedness to deal with cyber threats has an effect on online behavior which in turn determines the frequency of cyber incidences an individual experiences. The aim of this framework is to clarify the range of factors that need to be considered in order to appropriately conceptualize the issues relating to awareness and preparedness.

From the framework developed by Enders (2001), the independent variables are: knowledge about Cyber complexity's; Attitude to risks of computer complexity; preparation to respond to threats of computer based complexity.

Figure 1. Conceptual Framework
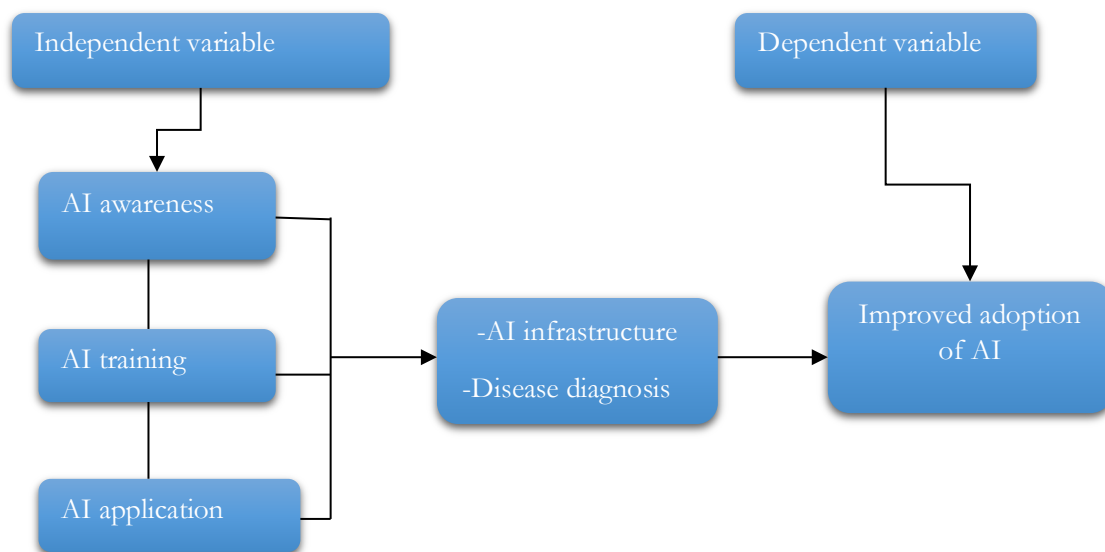**Source:** The Author, 2023

Methodology

Research Design

In this study survey research design used as it tapes information from a large population at once. Survey design is a form of planned collection of data for the purpose of description as a guide to action or for the purpose of analyzing the relationship between certain variables. The design is to examining adoption

of AI and the associated factors in Tanzania public hospital with reference to Muhimbili National hospital

Study Population

The hospital has a total of 500 health workers distributed from different directorate including, Directorate of Medical Services, Directorate of Surgical Services, Directorate of Clinical Support Services, Directorate of Nursing and Housekeeping Service departments To add the study also involve Surgical Services and Clinical Support Services based on job position, experience and knowledge relating to AI adoption in health service provision

Sample Size and sampling technique

The sample representative of that population of interest, a requirement addressed by prescribing the correct sampling frame and by using an appropriate sampling method. In this study therefore, a total of (47) Health workers out of (80) involved in data gathering. In this study probability and non-probability through random and purposive sampling used to select area of study as well as respondents.

Data Analysis and Presentation

Data that captured through the use of questionnaire, analyzed through quantitatively with the aid Statistical Package for Social Sciences (SPSS) computer software tool and presented in table and graph. Descriptive data analysis such as frequencies, percentages and graphic tables were used to describe the variable characteristics emanated from health workers

Results

Factors affecting AI Adoption in Public Hospital

The objective intended to collect information about respondents understanding on the factors affecting the adoption of artificial intelligence in public hospital. The data were collected through questionnaires. In attempt the respondents asked to rate the factors affecting AI adoption in public hospital in five likers scale. Responses presented in table 4.5 to 4.11 below whereas, 1=

SA- Strongly Agree, 2= A-Agree, 3= N- Not Sure, 4= SD-Strongly disagree, 5=D- Disagree.

Table 1. Perceived Ease of Use AI

Variable	Frequency	Percent, %
Strongly agree	22	47
Agree	17	37
Not sure	6	12
Strongly disagree	2	4
Total	47	100

Source: Field data, 2022

Data from table 1 above shows that 22 (47%) of respondents strongly agree that artificial intelligence is ease to use, 17 (37%) agree with the statement, 6 (12%) were not sure and 2 (4%) strongly disagree. Cumulatively 83% agree that AI is ease to use as it provides respondents with accurate information pertaining to patient health. Study by Khanijahani et al (2022), reveal the same that Psychosocial factors such as perceived ease of use or usefulness of AI, performance or effort expectancy, and social influence were major influential factors among healthcare professionals and patients on the adoption of artificial intelligence machine in health service provision.

Table 2. Professional Training

Variable	Frequency	Percent, %
Strongly agree	25	54
Agree	12	26
Not sure	6	12
Strongly disagree	4	8
Total	47	100

Source: Field data, 2022

Table 2 above present information pertaining to professional training as the factor affects the adoption of AI in healthcare services provision. The study revealed that 25 (54%) of respondents strongly agree that professional training influence the adoption of AI in healthcare provision, 12 (26%) were in agreement, 6 (12%) neither agree nor disagree with the statement and 4 (8%) strongly disagree. Apparently the study revealed that majority (78%) were in agreement

that adoption of AI influenced by professional training offered to employee regularly. This signifies that improvement of healthcare provision require professional training related to the wide application of artificial intelligence in monitoring patient progress and diagnosis of patient diseases.

Table 3. Accuracy and Effectiveness of AI in Diseases Diagnosis

Variable	Frequency	Percent, %
Strongly agree	24	51
Agree	14	29
Not sure	5	10
Strongly disagree	2	4
Disagree	2	4
Total	47	100

Source: Field data, 2022

The study further revealed that 24 (51%) of respondents strongly agree on the statement that adoption of AI system in public hospital influenced by its accuracy and effectiveness in diseases diagnosis, 14 (29%) agree on the statement, 5 (10%) neither agree nor disagree and 2 (4%) strongly disagree and disagree with the statement respectively. Cumulatively 81% of respondents' that adoption of AI affected by accuracy and effectiveness of AI in disease diagnosis. The implication here is that AI paved the way in diseases diagnosis and provides reliable and accurate information on how patient could be treated.

Table 4. Quicker in Predicting and Diagnosis of Patient Health

Variable	Frequency	Percent, %
Strongly agree	16	34
Agree	17	36
Not sure	11	23
Strongly disagree	2	4
Disagree	1	2
Total	47	100

Source: Field data, 2022

The study findings shows that 17 (36%) of respondents were in agreement that adoption of

artificial intelligence influenced by its quicker in predicting and diagnosis of patient health, 16 (34%) strongly agree, 11 (23%) not sure, 2 (4%) strongly disagree and 1 (2%) disagree with the statement. It is clearly noticeable that majority 70% of respondents agreed that adoption of AI associated with its quicker in predicting and diagnosis of patient health.

Table 5. Cheaper in Diseases Diagnosis Unlike Traditional Mode

Variable	Frequency	Percent, %
Strongly agree	8	17
Agree	17	36
Not sure	10	21
Strongly disagree	9	19
Disagree	3	6
Total	47	100

Source: Field data, 2022

The study findings from table 5 above indicated that 17 (36%) of respondents were in agreement that AI is cheaper in diseases diagnosis unlike traditional mode, 10 (21%) were neither agree nor disagree, 9 (19%) strongly disagree with the assertion, 8 (17%) strongly agree and 3 (6%) disagree. Collectively the study revealed that many 53% of the respondents agree that cheaper in disease diagnosis contribute to the adoption and use of AI system in public hospital.

Table 6. Useful in predicting age and species of mosquitos

Variable	Frequency	Percent, %
Strongly agree	6	12
Agree	6	12
Not sure	23	48
Strongly disagree	10	21
Disagree	2	4
Total	47	100

Source: Field data, 2022

Table 6 above shows that 23 (48%) of respondents were not sure if AI is useful in predicting age and species of mosquitoes or not, 10 (21%) strongly disagree, 6 (12%) agree and strongly agree with the statement respectively

and 2 (4%) disagree. The finding signifies that adoption of artificial intelligence can be associated with its usefulness in predicting age and species of mosquitos or other factors.

Table 7. Organizations' size

Variable	Frequency	Percent, %
Strongly agree	17	36
Agree	14	29
Not sure	12	25
Strongly disagree	3	6
Disagree	1	2
Total	47	100

Source: Field data, 2022

Result from table 7 indicates that 17 (36%) of respondents strongly agree that organization size contribute the adoption of artificial intelligence in public hospital, 14 (29%) were in agreement with the assertion, 12 (25%) neither agree nor disagree, 3 (6%) strongly disagree and 1 (2%) disagree with the statement that adoption of AI system in hospital does not associated with organization size. Cumulatively many 66% of the respondents were in agreement that organization size affects the adoption of artificial intelligence in hospital, meaning that as an organization grow innovation of technology is more significant and unavoidable as the organization become more complex.

Table 8. AI Contribute to Replacement of Health Workers

Variable	Frequency	Percent
Strongly agree	12	25
Agree	25	53
Not sure	4	8
Strongly disagree	3	6
Disagree	3	6
Total	47	100

Source: Field data, 2022

Result from table 8 above indicate that 25 (53%) of respondents were in agreement that AI contribute to replacement of health workers, 12 (25%) strongly agree with the statement, 4 (8%) neither agree nor disagree, 3 (6%) strongly

disagree and disagree respectively. Collectively majority 78% believe AI contribute positively to replacement of health workers as most activities which was supposes to be carried out by human being performed by machines.

Table 9. AI Reduce Human Interactions

Variable	Frequency	Percent, %
Strongly agree	7	14
Agree	22	46
Not sure	11	23
Strongly disagree	3	6
Disagree	4	8
Total	47	100

Source: Field data, 2022

Table 9 above shows that 22 (46%) of respondents agree with the assertion that artificial intelligence reduce human interactions, 11 (46%) neither agree nor disagree, 7 (14%) strongly agree, 4 (8%) disagree and 3 (6%) strongly disagree with the statement. Cumulatively the study revealed that 61% of respondents were in agreement that with the introduction of AI human interactions reduced to the maximum as the machine used to diagnoses patient diseases while at home.

Table 10. AI Perform Better than Human in Diagnosis of Patient Diseases

Variable	Frequency	Percent, %
Strongly agree	11	23
Agree	19	40
Not sure	12	25
Strongly disagree	3	6
Disagree	2	4
Total	47	100

Source: Field data, 2022

The study findings further revealed that 19 (40%) of respondents agree on the statement that AI perform better than human in diagnosis of patient diseases, 12 (25%) were not sure, 11 (23%) strongly agree with the statement, 3 (6%) strongly disagree and 2 (4%) disagree with the statement. Collectively many 63% of the respondents believe that with the inception of

AI the whole process of patient diseases diagnosis performed much better than using traditional means.

Table 11. AI Improve Patient Experiences

Variable	Frequency	Percent, %
Strongly agree	13	27
Agree	19	40
Not sure	6	12
Strongly disagree	6	12
Disagree	3	6
Total	47	100

Source: Field data, 2022

Result from table 11 above shows that 19 (40%) of respondents agree that AI improve patient experience, 13 (27%) strongly agree, 6 (12%) were not sure and strongly disagree with the statement respectively and 3 (6%) disagree with the assertion. It is clearly noticeable that many 68% of the respondents were in agreement that AI improve patient experience as it powered diagnosis tools that can analyze medical images such as X-rays, CT scans, MRIs more quickly and accurate than human expertise.

Table 12. AI Protect Sensitive Patient Data

Variable	Frequency	Percent, %
Strongly agree	20	42
Agree	16	34
Not sure	6	12
Strongly disagree	4	8
Disagree	1	2
Total	47	100

Source: Field data, 2022

The study further found out that AI protect sensitive patient data as 20 (42%) strongly agree with the assertion, 16 (34%) agree with the declarative, 6 (12%) were neither agree nor disagree, 4(8%) and 1 (2%) disagree. Collectively majority 76% believed that AI is useful in protecting sensitive patient data unlike traditional mode as most of these information secured by the system user.

Table 13. AI Eliminate Human Errors

Variable	Frequency	Percent, %
Strongly agree	14	29
Agree	20	42
Not sure	8	17
Strongly disagree	4	8
Disagree	1	2.1
Total	47	100

Source: Field data, 2022

Result from table 13 this study indicates that 20 (42%) of the respondents agree that AI eliminate human errors, 14 (29%) strongly agree with the statement, 8 (17%) neither agree nor disagree, 4 (8%) strongly disagree and 1 (2%) disagree. Cumulatively majority 72% of the respondents agreed that with the inception of AI human errors has been eliminated as AI systems analyze the data for rapid visualization, risk prevention and predictive analysis.

Table 14. AI Support Timely Decision-Making and Action

Variable	Frequency	Percent, %
Strongly agree	20	42
Agree	20	42
Not sure	3	6
Strongly disagree	2	4
Disagree	2	4
Total	47	100

Source: Field data, 2022

Table 14 above presents information pertaining to perception on the use of AI in public hospital. The study found out that 20 (42%) of the respondents strongly agree and agreed that AI support timely decision-making and action, 3 (6%) neither agree nor disagree, 2 (4%) strongly disagree and disagree that AI cannot support timely decision-making and action. Collectively majority 85% agreed on the statement that AI support timely decision-making and action to be taken into consideration when treating a prediction and medical treatment ought to be provided with.

Table 15. AI Effective in Managing Health Services

Variable	Frequency	Percent, %
Strongly agree	21	44
Agree	18	38
Not sure	6	12
Strongly disagree	2	4
Total	47	100

Source: Field data, 2022

Table 15 above present information about effectiveness of AI in diagnose in human health. Results shows that 21 (44%) of respondents strongly agree with the assertion, 18 (38%), 6 (12%) neither agree nor disagree with the statement, while 2 (4%) strongly disagree with the statement. Collectively, majority 83% of the respondents were in agreement that AI system is effective in managing health services as patient as developers cooperate to collate and analyze the relevant datasets for AI performance, clinical and safety-related risks.

Table 16. AI is Effective in Improving Diagnostic and Patient Treatment

Variable	Frequency	Percent, %
Strongly agree	19	41
Agree	21	45
Not sure	2	4
Strongly disagree	3	6
Disagree	2	4
Total	47	100

Source: Field data, 2022

Findings from table 16 above indicates that 21 (45%) of respondents agree on the statement that AI is effective in improving diagnostic and patient treatment, 19 (41%) strongly agree, 3 (6%) strongly disagree, 2 (4%) were neither agree nor disagree and disagree with the statement respectively. Collectively, majority 85% of respondents agreed that AI is effective in improving diagnostic and patient treatment through the use of x-rays, MRIs, ultrasounds and CT scans which is more accurate and efficient. Lee and Yoon (2021) found out that rapid advances of AI and related technologies help care providers create new value for their patients

and improve the efficiency of their operational processes.

Table 17. Increase Cost Efficiency and Equality in Health Services Provision

Variable	Frequency	Percent, %
Strongly agree	16	34
Agree	19	41
Not sure	10	21
Strongly disagree	2	4
Total	47	100

Source: Field data, 2022

Result from table 17 shows that 19 (41%) agree on the statement that AI increase cost efficiency and equality in health services provision, 16 (34%) strongly agree, 10 (21.3%) neither agree nor disagree with the statement and 2 (4%) strongly disagree. Cumulatively, majority 74% of the respondents agreed that AI increase cost efficiency and equality in health services provision because it is used to streamlining diagnoses and improve clinical outcome. Sunarti et al (2021) found out that the application of AI improves diagnostics, prevention, and treatment of patients, increasing cost efficiency and equality in health services.

Table 18. AI is Effective in Monitoring Heart Attack and Asthma in Real Time

Variable	Frequency	Percent, %
Strongly agree	9	20
Agree	12	26
Not sure	16	34
Strongly disagree	7	14
Disagree	3	6
Total	47	100

Source: Field data, 2022

Table 18 presents information about effectiveness of AI in monitoring heart attack and asthma in real time. Findings shows that 16 (34%) were not sure if AI is effective in monitoring heart attack and asthma in real time or not, 12 (26%) agree with the statement, 9 (20%) strongly agree, 7 (14%) strongly disagree and 3 (6%) disagree with the statement. The

implication here is that AI can be effective in monitoring heart attack and asthma in real time or not.

Table 19. AI Preventing Hacking of Patient Information

Variable	Frequency	Percent, %
Strongly agree	19	41
Agree	13	28
Not sure	11	23
Strongly disagree	1	2
Disagree	3	6
Total	47	100

Source: Field data, 2022

Results in table 19 indicates that 19 (41%) of respondents strongly agree that AI preventing hacking of patient information, 13 (28%) agree on the statement, 11 (23%) neither agree nor disagree, 3 (6%) disagree and 1 (2.1) strongly disagree with the statement. The study observed that many 68% of respondents agreed that AI play a significant role in preventing hacking of patient information since patient information is highly privacy and patient information controlled through the use of computer system unlike traditional model. Similarly study by Xie, et al (2021) revealed that AI including blockchain improve healthcare services by authorizing decentralized data sharing, protecting the privacy of users, providing data empowerment, and ensuring the reliability of data management.

Table 20. AI is Helping Human Live Longer

Strongly agree	6	12
Agree	6	12
Not sure	20	44
Strongly disagree	10	22
Disagree	5	10
Total	47	100

Source: Field data, 2022

Findings in table 20 above shows that 20 (44%) of respondents neither agree nor disagree that AI is helping human live longer, 10 (22%) strongly disagree, 6 (12%) strongly agree and agree respectively, while 5 (10%) disagree with the statement. Base on the findings there is an implication that most of respondents asked were not sure if AI was helping human live longer.

Discussion

The study was carried out to examine the AI adoption in the diseases diagnosis in Tanzania public hospitals (Muhimbili National hospital). Specifically the study examine factors affecting AI adoption in public hospital, examine health workers perception on AI adoption in public hospital and find out effectiveness of AI adoption in proper diagnostic of diseases for improving patient health in public hospitals.

In respect to factors affecting AI adoption in public hospital the study findings revealed that perceive ease of use, professional training, AI accuracy and effectiveness in diseases diagnosis and quicker in predicting and diagnosis of patient health contribute positively on AI adoption from the study area. Since the inception of electronic health record (EHR) systems, volumes of patient data have been collected, creating an atmosphere suitable for translating data into actionable intelligence. The growing field of artificial intelligence (AI) has created new technology that can tackle large data sets, solving complex problems that previously required human intelligence. As healthcare stakeholders search for innovative solutions to support clinical decision-making and manage patient information across the continuum, AI has the potential to transform care delivery.

In examining health workers perception on AI adoption this particular study found out that employee had positive attitude on the use of AI in diseases diagnosis. The observed positive attitude on AI associated with the perceived benefit use of AI including eradicate human errors, perform better than human in diagnosis of patient diseases, protect sensitive patient data as well as reduce human interaction unlike traditional mode.

The study further revealed that adoption of AI in public hospital brought about effectiveness in managing health services, improving diagnostic

and patient treatment, increase cost efficiency and quality in health service provision. To add application of AI promotes greater accessibility and action ability of healthcare information, which can result in more clinical breakthroughs, developments in cyber security, advances in radiology and the early detection of chronic conditions. Currently, healthcare organizations are poised to use AI to align their outcomes with achieving the triple aim – improved care experiences, improved population health and reduced per capita costs of care.

Conclusions

Based on research findings it concluded that AI adoption is important to health workers because it plays a significant role in transformative changes in health and healthcare, both in and out of the clinical setting. AI is shaping the future of public health, community health and healthcare delivery from a personal level to a system level.

AI adoption conducted at Muhimbili National hospital in Tanzania has positive implication on the provision and improvement of healthcare service provision. The positive implication associated with its effectiveness in diseases control and monitoring patient health, work flow assistance, increase cost efficiency and quality in health services provision. AI also lower operational costs and make patient care more efficient and collective in a single period of time. In addition to imaging and workflows, Forbes believes AI most beneficial in three other areas, physician's clinical judgment and diagnosis, AI-assisted robotic surgery and virtual nursing assistants.

IA adoption in health sector is identifying patients at risk of disease, readmissions and hospitalizations; deciphering appropriate interventions based on clinical information; exploring alternative care plans; monitoring and supporting the management of high-risk populations; and detecting correlative risk factors for better disease management are all areas intelligence can greatly impact. Intelligence affords the ability to spot trends and patterns across certain groups, monitor overall plan performance across populations and take advantage of a variety of data types, such as social determinants of health, environmental, genomic and behavioural health. Predictive and descriptive analytics, in particular, can improve efficiency of care and population and disease management.

Recommendations

There is a need to conduct short course training so as to attract a large number of health workers to undergo training related to AI in health provision. This can be provided within the authority or outside the organization where employee can learn the way other organizations perform their duty.

There is a need to develop a machine learning model to identify patients at risk for unplanned 30-day readmission. The tool enables MNH care management staff, physicians and others on the care team to proactively focus on patients categorized as having a high or moderate risk of being readmitted, prior to their initial hospital discharge.

There is a need to have comprehensive and detailed strategy to emphasizing the adoption and use of AI in public hospital to widen the scope of health service provision. This can be achieved if the government provides enough funds to meet with the cost of running course and facilities.

There is need to reduce regulatory barriers that prohibit health workers to attend training related to AI use in health service provision. This can be achieved if the government allocate enough funds to support indoor and outdoor training.

Staff needs to be encouraged to undergo AI training regularly so as to be more efficient and effective in service provision. Instead of depending on employing the student from UDOM who take the course of Health information system (HIS), and who take BIO INFORMATIC COURSE.

The management should request enough fund from the central government and nongovernmental organizations to support AI

training for employee program and facilities to be used in service delivery.

No one study can answer all questions about a given topic. Although this study made good step in understanding how Determinants of Artificial Intelligence Adoption in Disease Diagnosis for Improving Health Sector Services in Tanzania: A Case of Muhimbili National Hospitals" it was just that first step. Additional research is needed to address some of the questions raised by the current study. Future research should look at the longitudinal process IA Performance and how impact to the National, global and society in Health sector to adding the life expectance of the people as reflected in longitudinal follow-up data rather than cross-sectional data only. Furthermore, the analyses should follow longitudinal regression such as time series analysis equations according to selected variables of AI performance and time period.

Having conducted the research study on the Determinants of Artificial Intelligence Adoption in Disease Diagnosis for Improving Health Sector Services in Tanzania: A Case of Muhimbili National Hospitals The study recommends further research be conducted on the factors affecting the AI systems in the population of patient census of Ministry of health in Tanzania. This study create a comprehensive and general understanding of the challenges which can affect the performance of the AI systems in undertaking the population of Patient care in Health sector in Tanzania Especial Public Hospital

References

Abdullah, R., & Fakieh, B. (2020). Health Care Employees' Perceptions of the Use of Artificial Intelligence Applications: Survey Study. *Journal of medical Internet research*, *22*(5), e17620. https://doi.org/10.2196/17620

Bou Assi, E., Gagliano, L., Rihana, S., Nguyen, D. K., & Sawan, M. (2018). Bispectrum Features and Multilayer Perceptron Classifier to Enhance Seizure Prediction. *Scientific reports*, *8*(1), 15491. https://doi.org/10.1038/s41598-018-33969-9

Creswell, J. W. (2012). *Education Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research*. University of Nebraska, Lincoln.

Gravetter, F. J., &Wallnau, L. B. (2017). *Statistics for the behavioral sciences* (10th ed.). Wadsworth.

Halsey. ED. (2017). What does AI actually cost? Medium. Retrieved from https://medium.com/source-institute/what-does-ai-actually-cost-af6a3e5a1795

Ibeneme, S., Okeibunor, J., Muneene, D., Husain, I., Bento, P., Gaju, C., ...&Makubalo, L. (2021). *Data revolution, health status transformation and the role of artificial intelligence for health and pandemic preparedness in the African context*. In BMC proceedings. BioMed Central.

Jacobs. L. C., & Sorensen, C. (2010). *Introduction to Research in Education*, (8th Ed). California: Wadsworth.

Jha, S., & Topol, E.J. (2016). Adapting to artificial intelligence: radiologists and pathologists as information specialists. *Innovations in Health Care Delivery, 316*, 2353–2354.

Khanijahani, A., Iezadi, S., Dudley, S., Goettler, M., Kroetsch, P., & Wise, J. (2022). Organizational, professional, and patient characteristics associated with artificial intelligence adoption in healthcare: A systematic review. *Health Policy and Technology*, 100602

Kombo, K.D. & Tromp, L.A.D. (2006). *Proposal and Thesis Writing: An Introduction*. Paulines Publishers, Nairobi, Kenya.

Kothari, C.R. (2004) *Research Methodology: Methods and Techniques,* (2nd Ed). New Age International Publishers, New Delhi.

Marcel, W. & Schweitzer, A. (2020). AI adoption challenges for healthcare in the Netherlands. AI adoption challenges for healthcare in the Netherlands. Retrieved from https://www.pwc.nl/nl/actueel-publicaties/assets/pdfs/pwc-from-potential-to-performance.pdf

Minsky, M. (1982). *Semantic information processing*. The MIT Press.

Odekunle, F. F., Odekunle, R. O., & Shankar, S. (2017). Why sub-Saharan Africa lags in electronic health record adoption and possible strategies to increase its adoption in this region. *International journal of health sciences*, *11*(4), 59–64.

Papanicolas, I., Woskie, L. R., & Jha, A. K. (2018). Health Care Spending in the United States and Other High-Income Countries. *JAMA*, *319*(10), 1024–1039. https://doi.org/10.1001/jama.2018.1150

Rong, G., Mendez, A., Assi, E. B., Zhao, B., &Sawan, M. (2020). Artificial intelligence in healthcare: review and prediction case studies. *Engineering*, *6*(3), 291-301. https://doi.org/10.1016/j.eng.2019.08.015

Sakai, K., & Yamada, K. (2019). Machine learning studies on major brain diseases: 5-year trends of 2014–2018. *Japanese journal of radiology, 37*(1), 34-72.

Saunders, M., Lewis, P., &Thornhill, A. (2009). *Research methods for business students*. FT Prentice Hall

Shaikha, S.F., Salloum, S. A., & Mhamdi, C. (2019). Implementing artificial intelligence in the United Arab Emirates healthcare sector: an extended technology acceptance model. Int. J. Inf. Technol. Lang. Stud, 3(3), 27-42.

Sharma, A. (2021). Artificial Intelligence in Health Care. *International Journal of Humanities, Arts, Medicine and Science, 5*(1), 106-109.

Shukla, S. (2020). *Concept of Population and Sample.* Conference: How to write a Research Paper? At:Indore, M.P. India.

Sunarti, S., Fadzlul Rahman, F., Naufal, M., Risky, M., Febriyanto, K., & Masnina, R. (2021). Artificial intelligence in healthcare: opportunities and risk for future. *Gaceta sanitaria*, *35 Suppl 1*, S67–S70. https://doi.org/10.1016/j.gaceta.2020.12.019

Turja, T., Rantanen, T., & Oksanen, A. (2019). Robot use self-efficacy in healthcare work (RUSH): development and validation of a new measure. *AI & Society, 34*, 137–143. https://doi.org/10.1007/s00146-017-0751-2

Vasileios.YF. and Ntalianis.K. (2019). Exploring the Adoption of the Artificial Intelligence in Public Sector. International Journal of Machine Learning and Network Collaborative Engineering, 3(4). https://doi.org/10.30991/IJMLNCE.2019v03i04.003

Yamane's (1967). *Statistics, an Introductory Analysis,* (2nd Ed). New York: Harper and Row.