INTEGRATING ARTIFICIAL INTELLIGENCE IN COMMUNITY-BASED HEALTH EDUCATION PROGRAMMES FOR IMPROVED DISEASE PREVENTION IN BAYELSA STATE, NIGERIA

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Abstract

This study investigated the effect of artificial intelligence integration on community-based health education programmes aimed at disease prevention in Bayelsa State, Nigeria. This study was carried out in an attempt to determine the effect of AI-integrated health education platforms on community health literacy regarding disease prevention, and the effect of the level of artificial intelligence integration in community-based health education programmes on community participation level in some Selected PHCs. The study made use of a descriptive survey research design and was carried out in five randomly selected PHCs within Yenagoa, Bayelsa State. Data was collected using structured questionnaires and 294 respondents comprising of healthcare practitioners and patients were sampled using a stratified random sampling method. The data collected were analyzed using descriptive statistics and Pearson correlation. The result obtained indicates a positive and significant relationship between AI integrated platforms and community health literacy ($r= 0.76$, $p<0.05$), as well as between level of AI integration and community participation level ($r= 0.83$, $p<0.05$). The study concluded that AI integration increases disease prevention health literacy and the rate of community participation in health education programs. It is therefore recommended that resources should be invested in establishing AI-based health education infrastructures and developing community focused AI integration strategies. The study is relevant in that it provides empirical evidence of the relationship between artificial intelligence integration and preventive health literacy as well as the community participation rate at primary healthcare level.

Keywords: Artificial intelligence, Health education, Disease prevention, Community engagement, Health literacy

Introduction

AI has rapidly become a disruptive innovation within the global health sector, contributing to advancements in disease prevention, diagnostics, treatment, and overall health outcomes. With the widespread application of technologies such as machine learning (ML), natural language processing (NLP), and expert systems in modern health systems, health professionals are increasingly assisted with effective disease surveillance, clinical

decision support, and personalized healthcare. Research indicates that machine learning represents the dominant application of AI in healthcare (45% of applications), followed by NLP and expert systems. These applications enable improved diagnostics and early detection of diseases; a study reported that the performance of an AI-assisted diagnostic system was 95% accurate, increasing the efficiency of health workers at the point of care (Obe, Destiny, & Balogun, 2023; Rahimi, Abbasgholizadeh, & Rahimi, 2021; Nivethitha et al., 2025). Thus, AI has become an indispensable part of contemporary health systems due to its ability to improve accessibility, decrease human error and ensure evidence-based healthcare practice.

Community-based health education (CBHE) plays a critical role in promoting the awareness and prevention of diseases, fostering health consciousness, and promoting community engagement in developing nations where access to formal health facilities is limited. As such, the implementation of AI in CBHE programs provides the opportunity for tailored and adaptable health communications that cater to the diverse needs and challenges posed by varied geographical locations and population characteristics. Various forms of AI, including chatbots, virtual assistants, automated messages, and interactive health education applications are being used to enhance the communication of health information and increase awareness, as well as to support learning processes for public health awareness campaigns. They are able to overcome the barriers presented by the digital divide and provide health education in a locally relevant and user-friendly format. A study in Nigeria indicated that the use of an AI-powered communication system for CBHE increased users' knowledge about disease prevention and improved awareness of health issues (Farzaneh Yousefi et al., 2025; Opesemowo et al., 2024). Therefore, the integration of AI into community health education systems carries enormous potential for increasing public health literacy and empowering the populace with accurate and timely information.

The healthcare challenges present in African nations, including Nigeria further buttress the imperative for AI integration into both healthcare delivery and education systems. Nigerian healthcare systems continue to face a dearth of drugs, medical equipment, health facilities and the shortage of health professionals (especially in the rural areas). This has hampered effective healthcare delivery in Nigeria and increased poor health outcomes among the vulnerable population groups. AI technologies have been proposed to tackle the shortage of health facilities in rural areas and improve various health service delivery system functions such as surveillance, health information management, predictive diagnosis and policy planning. The application of machine learning, neural network and intelligent health systems for health management in Nigeria, has received increased research interest, and has been found to address local health issues within the continent. These health applications may be limited by infrastructure and resources in a number of low-resource settings, but the benefits may outweigh these short-comings, as indicated by the improvement of health services rendered to patients by health workers when employing an AI-assisted health delivery system (Enekai&Oguche, 2025; Obe et al., 2023). The implications of this to Nigeria’s healthcare delivery system cannot be overlooked.

The prospects of AI adoption in Nigeria for health communication and education remain optimistic, especially concerning its use in boosting public health campaigns, educating patients and public. AI-powered health communication can make delivery of relevant health information in form of automated messages a reality, enabling easy information flow to the community and hence increasing awareness on health issues and encouraging preventive healthcare actions. Nevertheless, there are barriers to effective AI adoption in Nigeria; including limited access to modern health facilities and health-related infrastructure, insufficient availability of electricity and internet connectivity, lack of well-structured data management systems, limited access to expert human resources with appropriate technical skills, and lack of funding. Other barriers contributing to poor digital literacy and low awareness on the application of AI in the health sector within the Nigerian context include education inequalities, and institutional and social factors such as the presence of insecurity, corruption and lack of institutional commitment to the development and use of AI in healthcare systems, influencing the integration of the technology among both the healthcare providers and the community members in general (Ezeaka et al., 2024; Opesemowo et al., 2024). Hence it becomes necessary to surmount the institutional and technical challenges that impede AI development in Nigeria's health sector to harness its full potential.

In the case of Bayelsa State in Nigeria, integration of AI into community-based health education possesses its own opportunities and threats because of socio-economic and health-related peculiarities of the state. While the state is oil producing and possesses potentials to harness technological developments, literature reveals very low awareness and understanding of AI applications in health among health workers and the general public in Bayelsa State. A study carried out in the state revealed a high lack of knowledge on the application of AI for biomedical purposes and great concerns regarding the ethical, psychological and social implications of AI usage especially for areas like health counseling or as a support system for clinical decision making due to the lack of trust that can be placed on automated systems, privacy concerns and so on (Marie Therese Teibowei et al., 2023; B. Teibowei et al., 2025). These concerns imply that successful integration of AI into Bayelsa's health care settings not only requires technological and infrastructure developments but also increases in awareness, stakeholder education, adequate safeguards, and context specific implementation approach.

Conceptually, AI integration into health care is defined in this study as the incorporation of intelligent systems such as machine learning, natural language processing, expert systems and neural networks into the health sector to enhance service delivery, disease prevention, diagnosis, health care outcome and public health outcomes. Through the integration of AI into community-based health education programmes, smart systems are utilized to analyze health data, provide personalized health guidance, automate communication and provide effective disease detection and surveillance mechanisms. Machine learning, natural language processing and expert systems are some of the most commonly implemented AI techniques in primary healthcare interventions in general and particularly diagnostic and preventive health care services (Rahimi et al., 2021). Community-based health education programmes on the other hand

are intervention programmes designed to enhance the knowledge of the community, their attitudes towards the intervention and preventive practices using a culturally sensitive approach and delivering education to the community members. These are highly important in resource limited settings such as Nigeria due to infrastructural limitations, lack of health care personnel, insecurity and educational deficits which hinder accessibility to institution-based health care services (Obe et al., 2023; Opesemowo et al., 2024). While there is enormous potential for the enhancement of the access and efficiency of healthcare delivery by AI-integrated health education programmes, it is still challenging in Nigeria due to lack of infrastructure, poor health data management systems, digital illiteracy and technical personnel (Enekai et al., 2025).

The impact of AI-integrated health education platforms are manifested as improvements in service delivery, health communication, community engagement and health prevention outcome through the use of intelligent digital tools. The impact can be demonstrated through improved diagnostic accuracies, enhanced access to preventive health information and greater community participation in health programmes. Levels of integration of AI into health services can range from automated messaging services like chatbots and reminder systems to sophisticated predictive models and personalized recommendation systems; advanced AI systems, including neural networks, offer higher clinical accuracy and assist the health care professional to make improved health care decisions (Rahimi et al., 2022). Similarly, in the community, AI-supported health education platforms could assist in the improvement of health literacy within the community and assist in obtaining, understanding and applying health information needed to keep healthy and prevent illness; improved health literacy can result in earlier diagnoses, better treatment adherence and disease prevention strategies (Nivethitha et al., 2025). Community participation, in terms of attendance, involvement and continued interaction, in health education interventions can be influenced through smart communication systems, but such platforms must be culturally acceptable, user friendly and adequately supported by robust infrastructure (Yousefi et al., 2025; Opesemowo et al., 2024). Under the context of this research, PHCs are the central point of AI-integrated community health education in Nigeria, but depends on the provision of trained personnel, equipments and adequate infrastructure (Enekai et al., 2025; Obe et al., 2023).

The study was guided by the Technology Acceptance Model (TAM) developed by Fred Davis. The TAM theorizes that the perceived usefulness and perceived ease of use of technology are the main constructs that lead to the acceptance and adoption of any technology. Thus people will be more willing to adopt the technology if they perceive it is going to be useful to them and that the system is easy to operate. Factors like adequate infrastructure, organization readiness, user awareness, Technical support, and Perceived Usefulness are identified as being crucial for acceptance of AI-based health systems. However, factors like lack of infrastructure, low digital literacy among users, lack of adequately skilled personnel and lack of adequate data management infrastructure, make the adoption of the technology by health professionals in Bayelsa State to be low. This suggests technology adoption is a multiple perspective approach influenced by human, environmental, institutional, and technical factors (Marie Therese Teibowei et al., 2023;

EnekaiOguche et al., 2025). Therefore TAM is an appropriate theoretical framework to use in the study.

Research has indicated that using AI-driven health education platforms has positively impacted community health literacy and program participation. For example, Mokmin et al. (2021) and Baglivo et al. (2023) showed that AI chatbots improved users' understanding of preventative health practices and their trust in health information, and also debunked misinformation regarding vaccination and disease prevention. Research by Rahimi et al. (2021) suggested that AI-based educational and decision-support systems facilitated provision of preventative health care services as they are used in conjunction with community health worker tasks. Additionally, other research concluded that voice based AI has successfully increased the ability of front-line workers to communicate preventative health information effectively to rural community members thereby increasing community health literacy implicitly (PATH, 2025). Moreover, stronger relationships were observed between higher levels of AI integration, community-centered program development, native language usage and health worker training and community participation/engagement (Yousefi et al., 2025; Abejirinde et al., 2025). While the evidence base thus far is encouraging, gaps persist in the literature since many of these studies are conducted in high-income countries and heavily rely on qualitative or experimental study designs; minimal quantitative evidence from low-income contexts such as Bayelsa State is available regarding the effect of AI integration on community health literacy and program participation levels. This study therefore aims to address these contextual and methodological gaps through a survey design which will provide broader empirical evidence to inform policy and programmes.

Despite the evidence of the efficacy of AI in community-based health education globally and the presence of compelling health issues in Nigeria that could be solved by AI, there is still little awareness regarding the specific effects of integrating AI into community-based health education in Bayelsa State. While numerous reviews on the effective use of AI applications in community based primary healthcare contexts exist globally (Samira, et al., 2021), and some research on the use of AI in Nigerian health sector is available (Enekai&Oguche, 2025); there is still no available empirical data on the impact of AI integration into community based health education programs in Bayelsa State that examine disease prevention outcomes and health education effectiveness in a context of unique local characteristics. Studies in Bayelsa have only focused on awareness of AI use in medicine and psychological effects.

Furthermore, the implementation of AI systems in Nigerian health care settings, among other countries in Africa are constrained by poor data quality, low level infrastructure and lack of adequate funds to develop low cost, user-friendly, AI powered tools specific to the context of use (David EnekaiOguche et al., 2025). A substantial part of the knowledge gap lies in the lack of understanding of the potential implications that the poor AI usage at the medical institution level (Marie Therese Teibowei et al., 2023) could have on the successful implementation of AI in community-based health education programs and, therefore, impact on community health indicators and disease prevention efforts.

Methodology

This study adopted a descriptive survey research design. Descriptive survey is appropriate for collecting data on opinion, views and experiences of the respondents to the integration of AI in community based health education. The research design is appropriate to provide a descriptive data of the relationship between the degree of AI integration and its impact on community health literacy and participation in disease prevention in the selected primary health centers.

The area selected for the study is Yenagoa, the capital city of Bayelsa state. Yenagoa is one of the major states in theNiger- Delta region with multi socio-economic and multi cultural contexts and stands as the administrative and health center of the state. It is also house to sixteen (16) primary health centers (PHC). Five PHCs out of the sixteen centers were selected for the study, namely: Ayama Primary Health Centre Gbaranu 2, Gbarantoru Primary Health Centre, Ekpetiama II, Yenizue- Gene Primary Health Centre Epie II, Polaku Primary Health care Centre and Nedugo Primary Health care centre, Gbaranu 1. The area was selected because the PHCs within the area are the point of delivery of community based health education and present the opportunity to study digital and AI integrated health promotion intervention.

Primary data and secondary data were the source of data. Primary data were collected directly from the respondents while the secondary data were collected from journals, books and other public documentations that deal with AI, community based health education and disease prevention.

The population of the study comprise of 1232 health workers working in the selected PHCs in Yenagoa Bayelsa state according to record available from the Ministry of Health, Bayelsa state, include nurses, community health extension workers and public health officers that are involved in community based health education programs.

Table 1Population of the Study

PHCs	**Primary Care Providers**	**%**
Ayama Primary Health Centre, Gbaranu 2	332	26.95
Gbarantoru Primary Health Centre, Ekpetiama II	253	20.54
Yenizue-Gene Primary Health Centre	226	18.34
Polaku Primary Health Care Centre	183	14.85
Nedugo Primary Health Care Centre, Gbaranu 1	238	19.32
Total	**1,232**	**100**

Sample Size Determination

To determine the adequate sample size, the researcher used Freund and William's statistic formula as quoted by (Uzoagulu 2011).

$$n = \frac{Z^2Npq}{Ne^2 + Z^2pq}$$

Where n = Sample Size
N = The population
p = Probability of success/proportion
q = Probability of failure/proportion
Z = Standard error of the mean
e = Limit of tolerable error (or level of significance)
N = 1232
p = .5
q = (1 – .5) = .5
Z = 95 percent = 1.96
e = 0.05 percent
= **294**

The study sample size was two hundred and ninety-four (294) respondents. This sample size was justified because the population is huge and such a sample would be sufficient to address the research problem.

Using Bowley's (1976) proportional allocation formula for stratified sampling:

nh =

Where:

Nh = Group population from each stratum
n = overall sample size
N = the overall population

nh = sample size from each stratum, in this case each state.

Table 2 Computation/Allocation of Sample Size

NO	NAMES	SAMPLE SIZE	
1.	Ayama Primary Health Centre, Gbaranu 2	$\frac{332 \times 294}{1232}$	= 79
2	Gbarantoru Primary Health Centre, Ekpetiama II	$\frac{253 \times 294}{1232}$	= 60
3	Yenizue-Gene Primary Health Centre	$\frac{226 \times 294}{1232}$	= 54
4	Polaku Primary Health Care Centre	$\frac{183 \times 294}{1232}$	= 44
5	Nedugo Primary Health Care Centre, Gbaranu 1	$\frac{238 \times 294}{1232}$	= 57
	Total		**294**

Source: *Field Survey, 2025*

The sample size was calculated using Yamane's (1967) formula; a method which uses statistical rules to enable the researcher select representative sample from known population. The calculation was to make sure that health care provider and patients are representatively covered at the different PHCs for increased reliability and generalization.
A stratified random sampling technique was used. The PHCs were first stratified according to the locations within Yenagoa. From each stratum, proportional random sample was taken for health care providers and patients which was to ensure adequate representation from each center.

Data was collected by using a structured questionnaire which was developed based on study objectives and literature review. This consisted of items rated in a Likert type format and included quantitative aspects. A team of trained research assistants administered questionnaires personally with each participant, which helps in clarity of questions and ensured the rate of response.

Data collected was analyzed by descriptive and inferential statistical methods. Descriptive statistics (frequency, percentage, mean and standard deviation) were used to summarize the demographic characteristics and respondents' replies whereas inferential statistics like Pearson correlation and regression analysis was to test the hypotheses and examine the influence of integration of AI on the levels of community health literacy and rate of community engagement. Statistical Package for Social Sciences (SPSS) version 24 was used for the analysis.

Approval was received from the Bayelsa State Ministry of Health Research Ethics Committee for the study. Informed consent was sought from the participants following an explanation of the study's purpose and anonymity of information. They were informed they are free to participate and will never be identified or their opinions used in any form outside of the context of this academic research. They were guaranteed privacy, dignity and integrity of their opinions throughout the entire research period of February to September 2025.

Result

Table 3 AI-integrated health education platforms on community health literacy on disease prevention.

		5 SA	4 A	3 N	2 DA	1 SD	∑FX	- X	SD	Decision
1	AI-integrated health education platforms have improved my understanding of how to prevent common diseases.	120 (40.8%)	110 (37.4%)	30 (10.2%)	20 (6.8%)	14 (4.8%)	1184	4.03	1.10	Agree
2	I find it easier to access reliable disease prevention information through AI-supported health education systems.	118 (40.1%)	112 (38.1%)	32 (10.9%)	18 (6.1%)	14 (4.8%)	1184	4.03	1.09	Agree
3	Using AI tools (e.g., chatbots, mobile apps) in health education helps me remember preventive health practices.	110 (37.4%)	116 (39.5%)	36 (12.2%)	20 (6.8%)	12 (4.1%)	1174	3.99	1.07	Agree
4	AI-driven platforms provide clearer and more accurate health information than traditional health talks.	105 (35.7%)	118 (40.1%)	40 (13.6%)	18 (6.1%)	13 (4.4%)	1166	3.97	1.07	Agree
5	The introduction of AI-assisted education programs has increased my confidence in making healthy lifestyle choices	112 (38.1%)	114 (38.8%)	38 (12.9%)	18 (6.1%)	12 (4.1%)	1178	4.01	1.06	Agree
	Grand Mean and Standard deviation							**4.00**	**1.08**	**Agree**

Source: *Field Survey, 2025*

The mean score (4.00) with standard deviation (1.08) in Table 4.2.1, assesses how artificial intelligence integrated health education platform affects the community health literacy of the respondents on disease prevention in some Selected PHC, Bayelsa State. Generally, there appears to be a consensus amongst respondents on how AI integrated health education platform enhances community health literacy as most respondents stated they are able to acquire a deeper and better knowledge of how to prevent diseases through AI integrated health education platforms (mean=4.03, SD=1.10) and can readily access relevant and current information of disease prevention without having to search through many sources (mean=4.03, SD=1.09) and the usage of AI tool such as chatbots and mobile application help in effective retention of preventive health actions (mean=3.99, SD=1.07). Respondents also agrees that there are much clearer and up to date health information and guidance from AI driven platform than the conventional health talks (mean=3.97, SD=1.07) and they are able to feel more confident in making good and

healthy choices regarding their lifestyles (mean=4.01, SD=1.06). The fact that a higher number of respondents agreed strongly or agreed to each item, where a range of 35.7%-40.8%, further justifies the belief that AI enabled educational strategies effectively enhance health literacy.

Table 5: AI integration level in community-based health education programs on community engagement rates

		5 SA	4 A	3 N	2 DA	1 SD	∑FX	- X	SD	Decision
1	The use of AI technologies in health education programs has encouraged more community members to participate.	122 (41.5%)	108 (36.7%)	32 (10.9%)	20 (6.8%)	12 (4.1%)	1190	4.05	1.08	Agree
2	AI-enabled communication channels (e.g., SMS reminders, virtual sessions) have increased community attendance at health education activities.	118 (40.1%)	112 (38.1%)	34 (11.6%)	18 (6.1%)	12 (4.1%)	1188	4.04	1.06	Agree
3	Communities with higher levels of AI integration show greater interest in participating in health awareness programs.	115 (39.1%)	114 (38.8%)	36 (12.2%)	17 (5.8%)	12 (4.1%)	1185	4.03	1.06	Agree
4	The integration of AI tools has improved interaction between healthcare providers and community members during health campaigns.	120 (40.8%)	110 (37.4%)	33 (11.2%)	19 (6.5%)	12 (4.1%)	1189	4.04	1.07	Agree
5	AI-supported community programs are more engaging and motivating than traditional, non-digital health education methods	116 (39.5%)	112 (38.1%)	35 (11.9%)	19 (6.5%)	12 (4.1%)	1183	4.02	1.07	Agree
	Grand mean and standard deviation							**4.04**	**1.07**	**Agree**

Source: *Field Survey, 2025*

In Table 4.2.2 the effect of the level of the AI used in community-based health education program has on the rate of participation of people within selected Primary Health Centers within Bayelsa State. The result from the overall data gives the grand mean of 4.04 and standard deviation of 1.07 which showed a high level of consensus by the respondents that increasing the integration of AI in the health education program can increase community participation rate. Highest rated item has a mean of 4.05 and std dev of 1.08 which clearly implies that use of AI based technologies in health education programs increase people's willingness to participate in health programs. This further indicates that

AI based communicating techniques such as SMS and virtual meetings in health education programs are beneficial to community participation. All items show a strong level of respondents' consensus, which also includes effective use of AI based technology to increase participation of the community in health awareness programs. The data implies that the rate of community participation increase due to AI integration. This also indicates that with the integration of the higher levels of AI into health education program, there would be higher public participation rate. Respondents showed agreement on that use of AI based technology improves communication between health service providers and members of the community. It is interesting to note the consistency in the means that indicate that the respondents largely agree that use of AI in community health education programs has a very significant effect. The data implies that if community health education programs are based on AI integration of all four levels discussed in Table 4.2.2. The high mean response from the respondents' shows that if AI is integrated in the health education program, the community participate rate will definitely increase.

Hypothesis 1:AI-integrated health education platforms will have a significant influence on community health literacy on disease prevention in selected communities in selected Primary Health Centers in Bayelsa, Nigeria

Correlations

		AI-integrated health education platforms	community health literacy
Pearson Correlation	AI-integrated health education platforms	1.000	.763
	community health literacy	.763	1.000
Sig. (1-tailed)	AI-integrated health education platforms	.	.041
	community health literacy	.041	.
N	AI-integrated health education platforms	294	294
	community health literacy	294	294

The Pearson r result shows that there is a positive significant relationship between AI-integrated health education platforms and community health literacy on disease prevention in selected communities in selected Primary Health Centers in Bayelsa, Nigeria. It is statistically significant (r= 0.76, p> .05), because the significance level is less than .05.

4.3.2 Hypothesis 2: AI integration level in community-based health education programs will have a significant influence on community engagement rates in selected Primary Health Centers in Bayelsa, Nigeria

Correlations

		AI integration level in community-based health education programs	community engagement rates
Pearson Correlation	AI integration level in community-based health education programs	1.000	.834
	community engagement rates	.834	1.000
Sig. (1-tailed)	AI integration level in community-based health education programs	.	.023
	community engagement rates	.023	.
N	AI integration level in community-based health education programs	294	294
	community engagement rates	294	294

The Pearson r result shows that there is a positive significant relationship between AI integration level in community-based health education programs and community engagement rates in selected Primary Health Centers in Bayelsa, Nigeria. It is statistically significant (r= 0.83, p> .05), because the significance level is less than .05

Discussion of Finding

The findings of the first hypothesis (significant and strong positive relationship was found between AI integrated health education platforms and community health literacy (r=0.76, p<0.05)) support the evidence presented by numerous reviewed literature on how AI-based health education tools could help strengthen preventive health knowledge and literacy among communities. In their work, Mokmin et al (2021) showed that AI-based chatbots improve understanding of disease prevention behavior through interactions. Similarly, Baglivo et al (2023) demonstrated how AI chatbots were capable of addressing users' questions regarding vaccine-related issues thereby boosting users' confidence and reducing misinformation which is critical in health literacy in the community. Rahimi et al (2021) proved that AI tools in community based care were capable of strengthening

preventive health knowledge in the communities when incorporated in community health worker's routine. Field trial results of the PATH (2025) project in Nigeria indicated that voice system of AI could significantly enhance prevention information conveyed by frontline workers and thereby increase the literacy among the community. In line with these findings Ciecierski-Holmes et al (2022) agreed on the relevance of AI based educational tools to LMICs though they urged for standardization in terms of outcome metrics for literacy in communities. It can therefore be concluded from the numerous findings that there is a significant and strong relationship between the AI integrated health education platform and community health literacy as observed in this study.

Similarly, the result of the second hypothesis (significant and strong positive relationship was observed between the level of AI integration in community-based health education programs and community engagement rates ($r=0.83$, $p<0.05$)) align with several studies that show digital integration leads to enhanced health engagement. Yousefi et al (2025) showed that community programs with higher level of AI integration i.e. Localized, relevant and practically focused functionalities reported increased level of community as well as health worker engagement. Abejirinde et al (2025) established that community engagement is higher in community-centric co-designed AI intervention than a top-down design process of AI tool usage. Orion Journals (2024) study also showed an increase in the rate of outreach and attendance at education programs after community health workers were trained to operate AI tools in the communities. According to the 2025 telemedicine review report, higher integration of AI in programs i.e. Use of localized and adaptive features, multilingual user interface compared to low tech design increased user engagement rates. A 2025 scoping review of digital health technologies in Nigeria found that infrastructural readiness and policy enablement were determinants of higher community participation rates of AI based interventions. It is conclusive from the evidence presented above that higher level of AI integration in community based health education programs lead to increased level of community engagement.

Conclusion

In conclusion, this study revealed the positive influence of AI integration on community health literacy and engagement in primary healthcare centers in Bayelsa State, Nigeria. A significant and strong positive relationship was found between AI integrated health education platforms and community health literacy, and the level of AI integration in community-based health education programs and community engagement. This indicates that utilization of AI-integrated health education tools, such as chatbots, mobile health apps and interactive virtual learning systems effectively promote and strengthen the understanding of disease prevention among individuals and facilitate informed decision-making of the community members. In general, these findings suggest that the strategic application of AI into health education system-inclusive of considerations like cultural contexts, accessibility and local capacity-can not only increase preventive health awareness but also build the capacity of the communities as well as ensure continued participation in health-promoting initiatives. The application of AI in promoting inclusive,

data-driven and sustainable community health development in Nigeria is thus impressive. Based on the outcome of this study, It was thus recommended:

i. Primary health centers in Bayelsa should adopt and implement integrated AI-based platforms such as chatbots, mobile learning applications, and voice-activated tools for increasing awareness about preventable health issues and improving community health literacy.
ii. Health planners should involve local communities and healthcare workers in design and deployment of AI-assisted health education initiatives for sustained engagement, high participation and increased trust.

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