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ARTIFICIAL INTELLIGENCE AND THE TRANSFORMATION OF RADIO PUBLIC HEALTH CAMPAIGN STRATEGIES IN NIGERIA

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Abstract

Artificial intelligence (AI) is increasingly transforming communication practices by enabling large-scale data analysis, automated content generation, personalization and interactive engagement. In Nigeria, radio remains an important medium for public health communication because of its accessibility, affordability, geographical reach and

capacity to communicate through diverse languages and formats. However, conventional radio public health campaigns continue to face challenges involving generalized messaging, limited audience intelligence, language diversity, restricted interactivity and difficulties in obtaining timely feedback. This paper examines how AI can transform radio public health campaign strategies in Nigeria. The study is anchored on Agenda-Setting Theory and the Health Belief Model and adopts a qualitative documentary research design. Relevant scholarly publications, empirical studies and institutional documents were reviewed and thematically analyzed around four objectives: AI applications in campaign design and production; AI-enabled audience targeting, personalization, dissemination and engagement; ethical, cultural, technological and professional challenges; and strategies for responsible adoption. The review indicates that AI can support script development, content adaptation, translation, transcription, audience segmentation, feedback analysis, personalized messaging and campaign monitoring. Nigerian evidence further demonstrates that exposure to radio health messages does not necessarily translate into behavioural adoption, reinforcing the need for audience-responsive communication. However, AI adoption also presents risks involving misinformation, algorithmic bias, privacy, cultural and linguistic misrepresentation, professional accountability and digital inequality. The paper concludes that AI should complement rather than replace broadcasters and health professionals. A human-AI collaborative model, supported by ethical governance, professional verification, local-language capacity, appropriate infrastructure and continuous evaluation, offers the most sustainable pathway for transforming Nigerian radio public health campaigns.

Keywords: Artificial intelligence, radio broadcasting, public health campaigns, health communication, audience engagement, message personalization

Background to the Study

Public health communication is central to health promotion, disease prevention and the improvement of population health. Its effectiveness depends not merely on transmitting information but on developing messages that audiences can understand, trust and translate into appropriate health decisions. In settings characterized by differences in literacy, socioeconomic conditions, access to healthcare and digital technologies, mass media remain important channels for reaching diverse populations.

Radio occupies a particularly important position in Nigeria's media environment. Its relative affordability, portability and geographical reach enable it to serve audiences that may have limited access to print, television or internet-based communication. Its capacity to use English, Nigerian Pidgin and indigenous languages also makes it suitable for communicating health information across culturally diverse communities. Radio has consequently been employed in campaigns concerning infectious diseases, maternal and child health, immunization, COVID-19, malaria and other public health concerns.

Empirical evidence demonstrates the continuing relevance of radio to Nigerian health communication. Talabi et al. (2022) found that residents in selected South-Western states were exposed to Nigeria Centre for Disease Control radio campaign messages during COVID-19 and perceived the messages as contributing to awareness and adoption of preventive measures. The authors recommended continued use of radio because of its reach and reliability. Similarly, Oko-Epelle and

Talabi (2024) found substantial exposure to radio malaria-prevention messages among rural dwellers in Oyo State. However, their findings showed that awareness alone did not determine adoption of preventive measures; positive attitudes towards the messages were more closely associated with adoption. They therefore recommended messages that respond to audience circumstances, cultural beliefs and practical difficulties.

These findings reveal an important limitation of conventional public health broadcasting: message exposure does not automatically produce behavioural change. Radio campaigns may reach large audiences but still have limited impact when messages are overly generalized, insufficiently participatory or poorly adapted to audience beliefs and circumstances. This challenge becomes more significant in Nigeria because health audiences differ considerably in language, location, age, education, socioeconomic circumstances and perceptions of health risks.

The changing communication environment provides new possibilities for addressing these limitations. Radio increasingly interacts with audiences through mobile phones, text messaging, social media, websites and other digital platforms. Consequently, radio is no longer necessarily restricted to a linear sender-message-receiver model. It can participate in a wider communication ecosystem in which audience feedback and digital interaction inform subsequent programming.

It is within this context that artificial intelligence has become increasingly relevant. AI refers broadly to computational systems capable of performing tasks associated with human cognitive functions, including pattern recognition, language processing, prediction, classification and content generation. Generative AI has further expanded these capabilities to

include the production and transformation of text, speech and other forms of media.

The potential application of AI to radio public health campaigns extends across the campaign cycle. During planning, AI can assist in processing available information and identifying audience concerns. During production, it can support script drafting, transcription, translation, content adaptation and some aspects of audio production. During dissemination, AI can support content personalization and integration with digital platforms. During evaluation, AI can process large volumes of audience feedback and identify recurring questions, misconceptions and information needs.

The relevance of these possibilities to health communication is supported by Weingott and Parkinson's (2025) scoping review, which examined the application of AI in health communication development and identified growing opportunities for integrating AI with communication, behavioural and social theories. Their review suggests that AI should not be viewed simply as a technical production instrument but as a technology capable of influencing how health communication interventions are designed and implemented.

Nigerian scholarship is also beginning to examine this emerging relationship. Amanawa and Amanawa (2024) discuss the potential of AI to support public health communication through automated data processing, information generation and health education. Ezeaka (2024) similarly identifies opportunities for AI-supported health information dissemination and public awareness while noting limitations involving infrastructure, data management and professional capacity.

The transformation of radio through AI is therefore particularly significant in Nigeria's multilingual and culturally diverse environment. AI-assisted translation and content adaptation could potentially enable broadcasters to produce multiple versions of a campaign for different linguistic groups. Similarly, AI-assisted audience analysis could help broadcasters distinguish between groups with different information needs. However, such applications require human validation because automated systems may produce inaccurate translations or culturally inappropriate expressions.

Ethical considerations are equally important. Health communication involves information that can directly influence individual decisions and behaviours. AI-generated content may contain factual errors, reproduce biases in training data or create misleading synthetic voices and messages. The World Health Organization (WHO, 2021) therefore emphasizes human autonomy, safety, transparency, accountability, inclusiveness and equity as essential principles for the responsible use of AI in health.

The central issue for Nigerian radio is consequently not whether AI can technically be introduced into broadcasting but how it can be integrated to improve the strategic effectiveness of public health campaigns without undermining accuracy, cultural relevance, professional accountability and public trust.

Statement of the Problem

Despite extensive public health communication efforts in Nigeria, translating health information into sustained awareness, positive attitudes and appropriate behaviour remains a challenge. Radio continues to be an important channel for reaching large and underserved audiences, but conventional campaign strategies have limitations in audience

segmentation, personalization, interaction and continuous evaluation.

A major problem is the tendency to design generalized messages for heterogeneous audiences. Listeners differ in language, health beliefs, socio-economic circumstances and perceived vulnerability to health problems. Evidence from Oyo State demonstrates that radio exposure alone does not necessarily result in the adoption of preventive behaviour (Oko-Epelle& Talabi, 2024). This raises questions about the adequacy of one-size-fits-all approaches to health campaigning.

Problem concerns limited audience intelligence. Although phone-in programmes, SMS and social media have increased interaction, many radio campaigns still have limited capacity to systematically process audience responses and use them to refine messages. Consequently, broadcasters may know that an audience has been reached without fully understanding how different groups interpreted or responded to the campaign.

Language and cultural diversity constitute an additional challenge. Producing high-quality health messages in several Nigerian languages requires time, expertise and resources. AI-assisted translation and speech technologies offer potential solutions, but poorly trained or culturally insensitive systems may distort meanings and undermine audience trust.

There is also a significant knowledge gap concerning the specific application of AI to radio public health campaign strategy in Nigeria. Existing Nigerian studies discuss AI and health communication generally, but there remains comparatively limited attention to the complete radio campaign process—audience research, health-issue

prioritization, message development, production, localization, dissemination, engagement and evaluation.

Finally, AI introduces ethical and professional risks. Inaccurate generated information, algorithmic bias, privacy concerns, inadequate representation of Nigerian languages and cultures, and unclear accountability could undermine rather than improve health communication. The WHO (2021) emphasizes that health-related AI must be governed through principles of safety, transparency, accountability, human oversight and equity.

The problem addressed by this paper is therefore the gap between the emerging capabilities of AI and the predominantly conventional strategies used in Nigerian radio public health campaigns. The study examines how AI can transform these strategies while identifying the conditions necessary for responsible and effective adoption.

Objectives of the Study

The general objective is to examine how artificial intelligence is transforming radio public health campaign strategies in Nigeria.

The specific objectives are to:

1. Examine the application of AI in the design and production of radio public health campaigns in Nigeria.

2. Assess how AI enhances audience targeting, message personalization, dissemination and engagement in radio public health campaigns.

3. Identify the ethical, cultural, technological and professional challenges associated with integrating AI into radio public health campaigns.

4. Propose strategic approaches for the responsible and effective adoption of AI in transforming radio public health campaign strategies in Nigeria.

Conceptual Framework

The conceptual framework positions AI as a transformative technological mechanism that can influence the major stages of radio public health campaigning: planning, production, targeting, dissemination, engagement and evaluation. It does not regard AI as an independent communicator capable of replacing professionals. Instead, it conceptualizes AI as an assistive technology whose effectiveness depends on human expertise, reliable information, ethical governance and appropriate infrastructure.

AI and Campaign Design and Production

AI can support campaign planning by processing large quantities of information and identifying patterns in audience concerns and available health information. Generative AI can assist in preparing preliminary scripts, developing alternative message versions and simplifying complex health information. Natural language processing can support transcription and translation, while AI-assisted production technologies can facilitate aspects of audio editing and content adaptation.

This capability is particularly relevant to Nigerian radio because campaigns often need to be adapted across linguistic and cultural contexts. AI could increase the efficiency with which stations produce multiple versions of evidence-based

messages. Nevertheless, human professionals must verify AI-generated content for medical accuracy, language appropriateness and cultural meaning.

AI-Enhanced Audience Targeting and Personalization

A second dimension is audience targeting. Conventional radio communicates to broad audiences, but AI can potentially analyze available audience interaction data to identify patterns in interests, questions and information needs. This could assist broadcasters in developing more targeted messages.

The relevance of this capability is supported by Oko-Epelle and Talabi (2024), whose findings indicate that awareness alone did not guarantee malaria-prevention behaviour. Their findings suggest that campaigns need to consider audience attitudes and circumstances rather than merely maximize exposure. AI-assisted segmentation may therefore help broadcasters develop message variations that address different audience perceptions and needs.

AI can also support dissemination across radio, SMS, social media, podcasts and websites. Audience responses from these channels can be analyzed and used to refine subsequent programming, creating a continuous communication cycle rather than a purely one-way process.

AI and Monitoring and Evaluation

AI can potentially transform campaign evaluation by processing large amounts of audience-generated information. Transcripts of phone-in programmes, text responses and social-media comments can be examined for recurring questions, misconceptions and reactions. This may enable campaign managers to identify problems during a campaign rather than waiting until its conclusion.

The conceptual model is therefore:

Audience and health information → AI-assisted analysis → campaign planning → message production → targeted dissemination → audience response → AI-assisted feedback analysis → campaign refinement.

This iterative process potentially makes radio health campaigns more adaptive and audience-responsive.

Moderating Factors

The relationship between AI adoption and campaign effectiveness is moderated by ethical, professional, cultural and technological factors. These include accuracy, privacy, algorithmic bias, local-language representation, professional skills, digital infrastructure and regulatory standards.

The WHO (2021) emphasizes that AI in health should protect human autonomy, promote safety, ensure transparency and accountability, and advance inclusiveness and equity. Consequently, human oversight is conceptualized as a necessary condition rather than an optional addition.

The framework ultimately proposes a human-AI collaborative model. AI can assist with data processing, content generation, translation, transcription and feedback analysis, while broadcasters, health professionals and communication specialists retain responsibility for editorial judgement, medical verification, cultural appropriateness and ethical accountability.

Theoretical Framework

This study is anchored on Agenda-Setting Theory and the Health Belief Model (HBM). The theories complement each

other by explaining the media and audience dimensions of public health communication.

Agenda-Setting Theory, developed by McCombs and Shaw (1972), proposes that the media influence the importance audiences attach to issues by giving some issues greater prominence and attention than others. In radio public health communication, this is relevant because broadcasters determine which health problems receive sustained attention through news, interviews, jingles, dramas and health programmes.

AI may strengthen this function by assisting broadcasters in identifying emerging health concerns and analyzing audience feedback. It can therefore support more informed decisions about which health issues require attention. However, algorithms should not independently determine public health priorities because popularity in available data does not necessarily correspond to public health importance.

The Health Belief Model provides the audience-level perspective. Rosenstock et al. (1988) identify perceived susceptibility, perceived severity, perceived benefits, perceived barriers and self-efficacy as important elements in understanding health behaviour. AI-assisted audience analysis may help campaign planners develop message variations that address different perceptions. For example, some audiences may underestimate their vulnerability to a disease, whereas others may recognize the risk but perceive preventive action as difficult.

The two theories therefore operate at different but interconnected levels. Agenda-Setting Theory explains how AI may help radio identify and prioritize health issues, while the HBM explains how AI-assisted personalization may help radio address audience perceptions and encourage health-

related action. Together, they support the central argument that AI can transform radio health campaigns from generalized and largely linear communication into a more data-informed, audience-responsive and adaptive process.

Empirical Review

Evidence from Nigerian radio health communication provides an important foundation for understanding the potential transformation of campaign strategies.

Talabi et al. (2022) examined public perception of NCDC radio campaign messages during COVID-19 in selected South-Western Nigerian states. The study used a survey design and found that respondents reported exposure to radio campaign messages concerning preventive measures and perceived the messages as influencing awareness and adoption. The authors recommended continued use of radio because of its reach and reliability.

Oko-Epelle and Talabi (2024) examined audience awareness of radio messages on malaria prevention among rural dwellers in Oyo State. Their study combined surveys with focus-group discussions. Although 86.5% of respondents were exposed to malaria-prevention radio messages, awareness alone did not determine adoption of preventive measures. Positive attitudes towards the messages were associated with adoption. The researchers recommended messages that reflect audience difficulties, culture and beliefs.

These studies demonstrate that radio remains useful for public health communication but also reveal the limitation of treating exposure as the primary measure of effectiveness. The findings provide empirical support for the present study's emphasis on audience targeting, personalization and engagement.

At the broader AI-health communication level, Weingott and Parkinson (2025) reviewed studies examining AI in health communication development. Their review identified growing use of AI technologies in health communication and behavioural interventions while emphasizing the importance of integrating AI with established communication and behavioural theories.

Amanawa and Amanawa (2024) examined the application of AI to medicine with particular attention to public health communication in Nigeria. They identify AI's potential for automated data processing and public health education while acknowledging infrastructural and implementation limitations. Ezeaka (2024) similarly argues that AI can support health information dissemination and public awareness campaigns in Nigeria but identifies infrastructure, data management and shortages of skilled personnel as significant challenges.

The empirical literature therefore points in two directions. First, radio possesses established strengths in reach and health information dissemination. Second, conventional campaigns require stronger audience responsiveness, personalization and evaluation. AI potentially provides tools for addressing these limitations, but the existing Nigerian evidence remains insufficient on the direct application of AI to radio public health campaigns. This gap justifies the present paper.

Methodology

The study adopted a qualitative documentary research design. Documentary research is appropriate where existing scholarly and institutional materials constitute the primary sources of evidence. Bowen (2009) explains that document analysis provides a systematic approach to examining documents as qualitative data and can be used to identify patterns and themes relevant to a research problem.

Materials reviewed included peer-reviewed journal articles, empirical studies, scholarly publications and authoritative institutional documents addressing AI, health communication, radio broadcasting, public health campaigns, audience engagement and AI ethics. Recent literature was emphasized to capture developments in AI, while seminal works were retained for the theoretical framework.

Purposive selection was used to identify materials directly relevant to the four objectives. The documents were subjected to thematic analysis and organized around four themes: AI applications in campaign design and production; audience targeting, personalization, dissemination and engagement; ethical, cultural, technological and professional challenges; and strategies for responsible AI adoption.

The reviewed evidence was subsequently interpreted through Agenda-Setting Theory and the Health Belief Model. The approach enabled the study to synthesize existing knowledge and identify the opportunities and limitations associated with AI-enabled radio public health communication in Nigeria.

Discussion of Findings

The first major finding is that AI can enhance the design and production of radio public health campaigns. Generative AI, natural language processing, speech recognition and automated translation can support script preparation, transcription, and message adaptation and production workflows. These capabilities may reduce production time and facilitate the development of multiple versions of a campaign.

This is particularly useful in Nigeria's multilingual environment. However, AI-generated health information cannot be broadcast without professional verification. The

WHO (2021) emphasizes safety, accountability and human oversight in AI applications for health. AI should therefore function as a production assistant rather than an autonomous health communicator.

The second finding is that AI can improve audience targeting, personalization, dissemination and engagement. Audience information and interaction data can potentially be processed to identify different communication needs. This could enable radio stations to develop more audience-sensitive messages.

The finding is consistent with the Nigerian malaria evidence. Oko-Epelle and Talabi (2024) demonstrated that exposure alone did not guarantee preventive behaviour, while positive attitudes towards messages were associated with adoption. AI-assisted personalization could therefore contribute to campaigns that address audience beliefs, concerns and practical barriers rather than simply increasing message frequency.

AI can also support interaction by analyzing questions and feedback received through phone-ins, SMS and social media. This can create a feedback loop through which audience responses inform subsequent content. Radio could consequently become more adaptive and participatory.

The third finding concerns ethical, cultural, technological and professional challenges. AI-generated misinformation is a major concern because health audiences may act on inaccurate information. Algorithmic bias may also arise where training data inadequately represent Nigerian populations, languages and cultural contexts. Privacy and data governance become important when audience information is processed for personalization.

These concerns reinforce the WHO's (2021) position that AI in health should be governed through human rights, safety, transparency, accountability, inclusiveness and equity. AI adoption must therefore be accompanied by professional review, data protection and cultural validation.

The fourth finding is that responsible adoption requires a human-AI collaborative model. Radio stations need professionals who understand both broadcasting and AI. Health practitioners should verify medical information, while broadcasters should retain editorial responsibility. Language and cultural experts should also participate in validating localized content.

Infrastructure and training are equally important. AI-enabled broadcasting requires appropriate digital systems, connectivity, skilled personnel and organizational readiness. Without these conditions, AI may increase rather than reduce inequalities in access to health information.

Overall, the findings demonstrate that AI can transform Nigerian radio public health campaigns from predominantly generalized and linear communication into a more data-informed, personalized, interactive and adaptive system. However, such transformation depends on the responsible integration of technology with human expertise and public health principles.

Summary of Major Findings

The study's major findings, aligned with its four objectives, are as follows:

1. **AI can enhance campaign design and production** through script development, translation, transcription, content adaptation and production support. However,

human verification is essential for accuracy and cultural appropriateness.

2. **AI can strengthen audience targeting, personalization, dissemination and engagement** by assisting broadcasters to analyze audience information, identify communication needs and process feedback from interactive and digital platforms. This can make radio health campaigns more responsive to audience perceptions and circumstances.

3. **AI adoption introduces ethical, cultural, technological and professional challenges**, including misinformation, algorithmic bias, privacy concerns, inadequate representation of Nigerian languages and cultures, limited infrastructure and professional accountability.

4. **Responsible adoption requires a human-AI collaborative strategy** involving professional training, human verification, ethical guidelines, local-language development, infrastructure investment, stakeholder collaboration and continuous campaign evaluation.

Conclusion

Artificial intelligence has significant potential to transform radio public health campaign strategies in Nigeria. Its value lies not simply in automating production but in strengthening the entire campaign process—from audience research and issue identification to message development, personalization, dissemination, engagement and evaluation.

The evidence demonstrates that radio remains an important public health medium, but exposure to health messages alone may not produce behavioural change. AI offers opportunities to make campaigns more audience-responsive by supporting segmentation, personalization and continuous feedback analysis.

However, technological capability does not automatically translate into communication effectiveness. Inaccurate information, algorithmic bias, privacy concerns, cultural misrepresentation and digital inequality could undermine public trust if AI is adopted without adequate safeguards.

The future of Nigerian radio health communication should therefore be based on human-AI collaboration. AI can provide computational and production capabilities, while broadcasters, health professionals and communication specialists retain responsibility for accuracy, cultural sensitivity, editorial judgement and ethical accountability. When supported by appropriate infrastructure, professional capacity, local-language resources and responsible governance, AI can help reposition radio public health communication as a more intelligent, inclusive, interactive and evidence-informed system.

Recommendations

1. **AI should be integrated into campaign design and production responsibly.** Radio stations should employ AI for script development, translation, transcription, content adaptation and production assistance, while all health content should undergo professional and medical verification before broadcast.

2. **Radio stations should strengthen AI-assisted audience targeting and personalization.** Available audience feedback should be analysed to identify different information needs, beliefs and concerns, enabling the development of more relevant and culturally appropriate health messages.

3. **Ethical and professional safeguards should guide AI adoption.** Radio organizations should establish clear procedures for accuracy, privacy, data protection, transparency, accountability and cultural validation. Broadcasters and health communication professionals should receive continuous AI-related training.

4. **AI adoption should be supported through collaboration, infrastructure and evaluation.** Partnerships among broadcasters, health institutions, technology developers and researchers should be encouraged. Investment in digital infrastructure and Nigerian-language AI resources should accompany regular evaluation of AI-assisted campaigns to determine their effects on awareness, engagement and health behaviour.

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