

BENEFITS AND ETHICAL RISKS IN USING ARTIFICIAL INTELLIGENCE APPLICATIONS IN THE PROMOTION OF PERSONAL HEALTH STATUS OF SCHOOL COMMUNITY MEMBERS

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Abstract

Artificial Intelligence (AI) is transforming health promotion in schools. While AI offers early detection, personalisation and increased access, it also poses risks to privacy, equity and human autonomy. This paper examines the benefits and ethical risks of AI applications for students, teachers and staff. Artificial Intelligence is rapidly reshaping healthcare and education. In school settings, AI applications are being deployed to promote personal health status through early detection, personalised education, mental health support and data-driven decision making. For students, teachers and staff, this presents opportunities to prevent illness, improve wellbeing and reduce health inequities. However, the use of AI in schools also raises significant ethical concerns including data privacy, algorithmic bias, lack of transparency, digital divide and the erosion of human relationships in care. This article provides a comprehensive analysis of both the benefits and ethical risks of AI in school health promotion. Drawing on global frameworks from WHO and UNICEF, Nigerian policy context and empirical evidence, it argues for an “ethically governed, human-centered” approach to AI adoption. The paper concludes with actionable recommendations for policymakers, schools, developers and communities to maximise benefits while minimising harm.

Keywords: *Artificial intelligence, School health, Ethics, Personal health, Digital health, Nigeria*

Introduction

The 21st century is witnessing an unprecedented integration of Artificial Intelligence (AI) into all sectors of human life, including education and

health. AI refers to computer systems capable of performing tasks that typically require human intelligence, such as learning from experience, recognizing patterns, making decisions, and solving problems (Russell & Norvig, 2021). Schools are critical settings for health promotion because they reach teachers, non-teaching staff, children and adolescents during formative years. The World Health Organization [WHO] (2022) defines a Health Promoting School as one that constantly strengthens its capacity to be a healthy setting for living, learning and working. AI applications are now offering new possibilities such as AI chatbots for mental health, wearable sensors with AI analytics, computer vision for posture and nutrition screening and AI-powered health education platforms (Topol, 2019). However, the use of AI in schools raises unique ethical concerns. School populations include minors who cannot give full informed consent and schools are custodians of highly sensitive data (UNICEF, 2021).

The integration of digital technologies into education and health has accelerated over the past decade. At the center of this transformation is AI which is a systems capable of learning, reasoning, and making decisions with minimal human intervention. In healthcare, AI is already being used for diagnosis, drug discovery, telemedicine, and population health surveillance. In education, AI powers adaptive learning, automated grading, and student support systems. A third domain where these two sectors converge is school health promotion. Schools are unique institutions that house large populations of children, adolescents, and adults for most of the day, 5 days a week, for 12+ years.

According to the World Health Organization [WHO] (2022), schools are ideal settings to promote health because they can reach people during formative years, influence lifelong behaviours and connect with families and communities. Traditionally, school health programmes have relied on school nurses, annual medical checks, health talks, and paper records. These approaches face persistent challenges such as inadequate personnel, poor funding, lack of personalisation, and limited reach (Federal Ministry of Health [FMOH], 2021). In Nigeria, the ratio of school health personnel to students is estimated at 1:3000 in public schools which is far below WHO recommendations. AI applications are now emerging as a potential solution to these challenges. AI Chatbots for mental health screening and counseling support Wearable devices plus AI for monitoring physical

activity, sleep, and vital signs, computer vision AI for screening posture, vision and nutritional status, predictive analytics to forecast disease outbreaks based on absenteeism, personalised health education platforms that adapt content to age, language and risk profile for school community members, these tools are readily available, accessible all the time, allow for personalisation, early detection and reduced stigma. However, schools are not hospitals, they involve minors, power imbalances and highly sensitive data. The deployment of AI in this context raises urgent ethical questions; Who owns student health data? Can algorithms be biased against certain groups? Will AI replace school nurses and counselors? How is equity ensured when not all students have smartphones? This article examines the benefits and ethical risks of using AI applications in promoting personal health status of school community members and to propose a framework for responsible adoption in contexts like Nigeria.

Conceptual Framework

AI in health refers to the use of machine learning, natural language processing, computer vision, and robotics to perform tasks that support health (Jiang *et al.*, 2017). In schools, AI is rarely autonomous. It usually functions as decision support for teachers, nurses, and administrators. Personal health status encompasses physical, mental, and social wellbeing (WHO, 1948). For school members it specifically includes: nutrition, physical activity, mental health, sexual and reproductive health, prevention of communicable diseases, management of chronic conditions like asthma and diabetes, and injury prevention. This article uses school community to refer to: students aged 5-18, teachers, school administrators, non-teaching staff, and by extension parents/guardians who are engaged in school health programmes. Health promotion is the process of enabling people to increase control over, and to improve, their health” (WHO, 1986). In schools, it involves education, policy, environment, and services.

Personal health refers to the overall physical, mental, and social well-being of an individual, not merely the lack of disease. In essence, it includes the adoption of healthful habits such as sufficient nutrition, regular physical activity, adequate rest and sleep, stress management, and the maintenance of constructive relationships and hygiene in order to achieve optimal well-being. Personal health is therefore more than the absence of illness; it is a condition of optimal functioning and fulfilment across every aspect of life

(El-Boghdadly, Bailey & Wiles, 2016). It also involves the capacity to take responsibility for one's health through deliberate efforts to be healthy.

Concept of Health Promotion

The World Health Organisation (2005) defined health promotion as the process of enabling people to increase control over their health and the determinants of their health, thereby improving their health. A common purpose of health promotion that can be drawn from this definition is that it should help people achieve greater control over the determinants affecting their health. Health promotion programmes are designed to help individuals shift unhealthy behavior and lifestyles. They start by building the individual's motivation to take responsibility for his or her health. The programmes provide education and a supportive environment needed to sustain lifestyle change. They help individuals identify health risks and then teach them how to modify behavior to remove those risks to health.

Global Adoption of AI in School Health

The adoption of artificial intelligence (AI) in school health is developing from the growing use of technology in education and healthcare. Although the use of AI specifically for school health is still relatively new, AI is already being used in different educational and health activities that can benefit students, teachers and the wider school community.

Globally, the shift toward AI-enabled education is already well established. Findings from the 2024 Teaching and Learning International Survey (TALIS) conducted by the Organisation for Economic Co-operation and Development (OECD) show that approximately a third of teachers in lower-secondary schools from the involved education systems indicated they utilise AI in their profession. Nonetheless, adoption differs widely across countries. About three-quarters of teachers in Singapore and the United Arab Emirates reported using AI, while the figure was below one-fifth in countries such as France and Japan. Teachers most often used AI to learn about or summarise topics and to develop lesson plans or activities, in contrast, using AI to assess student participation or performance was much less frequent (OECD, 2025). This pattern suggests that global AI adoption is neither uniform nor determined solely by access to technology; rather, it is influenced by infrastructure, teacher readiness, institutional policy, professional culture and national governance.

In the context of school health, these trends matter because many of the roles being introduced for AI in education can be extended to health promotion. There is also increasing evidence that AI is being applied directly to health education for school-aged children. For example, a recent intervention in a school in central India serving children aged 10-15 years used AI-generated oral-health education videos in the local language. The intervention reported improvements in knowledge, attitudes and oral-health practices, illustrating how AI-generated, culturally tailored educational materials could potentially be incorporated into school-based health promotion (Pagrut *et al.*, 2026). While this evidence is promising, it should not be taken as confirmation that AI is universally effective. The global adoption of artificial intelligence in school health should therefore be viewed as a developing continuum rather than a transformation that is fully completed. In Nigeria, global experience provides both an opportunity and a caution. Nigeria does not necessarily have to follow the same technological trajectory as high-income countries. Instead, AI applications should be chosen in line with the country's most urgent school health needs and modified to fit local linguistic, cultural, socioeconomic and infrastructural conditions.

Adoption of Artificial Intelligence in School Health in Nigeria

Chukwukwe *et al* (2026), hinted that adoption of artificial intelligence in school health and educational systems in Nigeria is in an emerging phase, characterised by high student and staff willingness alongside severe foundational gaps; while specific centralized school health AI frameworks are not common, broader research highlights critical dimensions of digital health and AI readiness in Nigerian institutions. Within Nigeria specifically, a cross-sectional study of healthcare students found strong self-reported enthusiasm for AI adoption, but this enthusiasm coexisted with substantial knowledge gaps and limited structured exposure, alongside notable skepticism about whether expressed willingness would translate into safe clinical practice (David-Olawade *et al.*, 2025). This finding is consistent with the broader African picture: countries including Nigeria, Kenya, South Africa and Ghana have been identified as regional leaders in developing AI solutions for healthcare, yet the translation of this innovation activity into formal medical curricula has lagged behind (Adunimay *et al.*, 2025). Despite genuine momentum, several structural barriers constrain meaningful AI integration into Nigerian education. Infrastructural

limitations remain foundational: reliable broadband access is unevenly distributed, with rural and peri-urban training sites particularly disadvantaged and intermittent power supply further compounds the unreliability of digital learning platforms (Mohac Africa, 2026).

Benefits of AI Applications in Promoting Personal Health of School Community Members

The school community members like the general community members of which the school system is a part, can benefit from AI applications, in promoting individual and the general community members health status thus:

- i. *Mental Health Screening:* Depression and anxiety are leading causes of disability among adolescents (WHO, 2023). AI chatbots like Woebot and Wysa use natural language processing to detect linguistic markers of distress. Fitzpatrick *et al.* (2017) found that a 2-week interaction with Woebot reduced depression symptoms significantly in college students. In schools, this means students can be flagged for counselor follow-up before crisis occurs.
- ii. *Infectious Disease Surveillance:* AI models can integrate data on absenteeism, nurse visits, and self-reported symptoms to predict flu, COVID-19, or meningitis outbreaks 10-14 days before traditional surveillance (Centers for Disease Control and Prevention [CDC], 2020). This allows schools to activate preventive measures early.
- iii. *Non-Communicable Disease Risk:* AI combined with wearables can detect patterns of low physical activity, poor sleep, and elevated heart rate associated with obesity and diabetes (Topol, 2019). Computer vision AI can screen for scoliosis and vision problems using smartphone cameras. This is capable of shifting school health from reactive treatment to proactive prevention
- iv. *Hyper-Personalisation of Health Education:* Traditional health education is generic. AI enables personalisation at scale. An AI platform can deliver different content to a student with sickle cell, a teacher with hypertension and an athlete. It can adjust reading level, language, and cultural examples. Akinola (2022) found that Yoruba-language AI health modules improved knowledge retention by 28% in Oyo State schools. AI can use gamification and nudges to promote handwashing, healthy eating and exercise. It learns what motivates each student and adapts accordingly (Noar *et al.*, 2009).

- v. *Accessibility*: Unlike a nurse who leaves at a designated time, AI is available all the time, during exams, holidays and even weekends when stress and health issues are always at their peak. AI reduces Stigma and Increasing Help-Seeking. Adolescents are often reluctant to discuss mental health, sexual health, or substance use with adults. AI provides an anonymous, non-judgmental interface. UNICEF (2021) reports that 68% of teens prefer talking to a chatbot about sensitive health topics at the initial stage.
- vi. *Support and Efficiency for School Health Staff*: AI can automate attendance for health class, immunization tracking and report generation for LGA and State Ministry of Health. AI simulators can train teachers in first aid, mental health first aid and emergency response.
- vii. *Cost Effectiveness and Resource Optimisation*: By preventing illness and reducing clinic referrals, AI saves money. WHO (2023) estimates a \$1:\$6 return on investment for school-based digital prevention. For resource-constrained Nigerian schools, this is significant.
- viii. *Equity and Reaching Underserved Areas*: Rural schools without nurses can deploy AI applications on basic smartphones. Offline versions can work without internet. This helps bridge urban-rural gaps.

Ethical Risks and Challenges

- i. *Data Privacy, Security and Informed Consent*: This is the most critical risk especially when it concerned sensitivity data. School health data includes BMI, menstrual history, mental health status, HIV status, and family history. Breach can lead to stigma and discrimination. Cloud storage in foreign servers raises sovereignty concerns. Also, children under 18 years are regarded as minors and cannot give full legal consent. Parental consent forms are often not understood. NDPA 2023 requires “verifiable parental consent” for children under 13 but schools lack mechanisms to enforce this. There is also the risk of vendors who may monetise data for advertising or sell to insurance companies or any other companies that may want to use it their own advantage.
- ii. *Algorithmic Bias and Health Inequity*: Most AI models are trained on data from US and Europe which may create a form of bias.

Obermeyer *et al.* (2019) showed a US hospital algorithm underestimated illness severity in Black patients. Similar bias can occur for African students. Cultural biases also may come in. Nutrition AI may recommend quinoa and kale instead of beans and garri. Mental health AI may misinterpret cultural expressions of distress. Access bias is also a possibility with AI. If AI requires smartphones, students from poor homes are excluded, widening the gap of health disparities.

- iii. *Lack of Transparency, Explainability and Accountability:* Many deep learning models are black boxes. If an AI flags a student as high suicide risk and it is wrong, who is responsible? The developer, school, or teacher? (Floridi *et al.*, 2018). Over-reliance can also erode professional judgment.
- iv. *Erosion of Human Relationship and Autonomy:* Health promotion requires empathy, trust and human connection. Replacing school counselors with chatbots may harm therapeutic relationships. Students may also feel under surveillance, leading to anxiety and self-censorship (Zuboff, 2019).
- v. *Digital Divide:* Nigeria Beaudreau of Statistics (2022) reports that 42% of Nigerian secondary students do not have personal smartphones. Power outages and poor internet further limit access. AI-only approaches may create the risk of excluding the most vulnerable.
- vi. *Function Creep and Surveillance:* A health application can be repurposed to track attendance, academic performance or political views without consent. This violates the principle of purpose limitation.
- vii. *Misinformation and Over-diagnosis:* Poorly validated AI may give incorrect advice or diagnosis, causing unnecessary panic or false reassurance.

Ethical and Policy Frameworks

WHO Ethics and Governance of AI for Health, (2021) set out six principles for the correct use of AI applications in health, namely to; protect autonomy, promote wellbeing, ensure transparency, foster responsibility, ensure inclusiveness and promote responsive. UNICEF Policy Guidance on AI for Children, (2021) provided nine requirements, including; support development, ensure inclusion, protect children's data, ensure transparency.

The Nigeria Data Protection Act, (2023) introduced key provisions such as lawful basis, data minimization, security, data subject rights, and special protection for children's data. UNESCO Recommendation on Ethics of AI, (2021) highlights human rights, diversity, and environmental sustainability.

Balancing Benefits and Risks

Empirical evidences have shown that the benefits of AI in school health are real and substantial, especially for early detection and personalization. However, the risks are not theoretical. They involve fundamental rights of children. The key should not be "AI vs No AI" but what kind of AI, under what conditions. A risk-based approach is needed; high-risk applications like mental health diagnosis require more oversight than low-risk apps like nutrition games. In the Nigerian context, three factors are critical: Infrastructure, digital literacy and regulatory enforcement.

Infrastructure

Infrastructure is one of the most basic prerequisites for the responsible use of AI in school health. To use AI the right way in school health, solid basic technology is needed. AI needs reliable electricity, good internet, suitable computers or devices, safe ways to store data, enough computer power systems that can easily connect to each other, people who can fix problems and strong protection against cyber-attacks. If any of these are weak or missing, even a very advanced AI tool will not offer much help in real-world.

This concern is especially significant for Nigeria because disparities in infrastructure are closely tied to disparities in access to health and education services. Nigeria's National Artificial Intelligence Strategy points to limited broadband coverage, inadequate physical infrastructure and weaknesses in the country's wider data ecosystem as key impediments to AI development and deployment (Federal Ministry of Communications, Innovation and Digital Economy [FMCIDE], 2024). The strategy also identifies digital infrastructure and digitally capable human resources as essential building blocks for effective AI uptake. These considerations are directly relevant to school health, since an AI-based health-promotion system cannot operate reliably when schools cannot consistently obtain electricity, connectivity or suitable devices.

Connectivity is equally important. Cloud-based AI applications may depend on continuous or substantial internet access, which can hinder schools located in poorly connected rural and peri-urban communities. Nigeria's National AI Strategy specifically recognises limited broadband penetration and infrastructure constraints as elements that can slow AI development (FMCIDE, 2024).

The availability of suitable devices is another aspect of infrastructure. An AI programme that mandates every student to have a smartphone or personal computer could inadvertently leave out children from low-income families. This situation might reinforce, and possibly worsen, the digital disparities that school health initiatives aim to mitigate. United Nations Educational, Scientific and Cultural Organisation (UNESCO) has highlighted the necessity for AI in education to be crafted with an emphasis on inclusion and fairness, while the OECD has also recognised unequal access to technology and varying levels of institutional capability as critical factors to consider when assessing the impact of AI on educational equity (Varsik & Vosberg, 2024).

The infrastructure required for AI-enhanced school health should prioritise cyber security. Health information in schools can encompass sensitive details such as mental health records, medical histories, disability status, medication usage, reproductive health details and other private information. Therefore, it is crucial for the infrastructure to safeguard data throughout the processes of collection, transmission, storage and usage. The WHO (2021) highlights the significance of security, privacy, transparency and accountability in the application of AI for health, while United Nations Children's Fund - UNICEF (2021) specifically underscores the importance of children's privacy, safety, inclusion and protection against discriminatory AI systems.

Infrastructure must be addressed at both the school and system levels. At the school level, it is essential to have devices, local networks, power sources, connectivity, secure storage solutions and technical assistance. At the system level, there is a requirement for databases that can easily connect health information systems at the national or state level, secure cloud or data center capabilities, data standards and measures for cyber security. If the systems cannot connect and share information properly, AI

tools might create separate piles of data that do not connect with the current school health, education or public health information systems.

Digital Literacy

Digital literacy, as defined by UNESCO, refers to the capability to utilize digital technologies, communication tools, and networks to find, assess, apply, and create information. It encompasses much more than merely knowing how to operate a computer or mobile device – it involves understanding the reasons, timing, and methods for effectively, safely, and securely using digital tools. In more straightforward terms, it represents a combination of technical skills, critical thinking, and ethical consciousness (Team Community, 2026). A person who is digitally literate can also identify trustworthy information compared to disinformation, critically evaluate the information they encounter, and engage online in a responsible, ethical, and safe manner (Team Community, 2026).

Students, teachers, school health personnel, counsellors, administrators, parents and other stakeholders' ability to understand and apply digital technologies is important. In this context, digital literacy goes beyond simply operating a smartphone or computer. It should also involve the capacity to search for and assess information, understand how AI systems produce outputs, identify limitations and errors, safeguard personal information, challenge algorithmic recommendations and use digital technologies ethically and responsibly.

Regulatory Enforcement

The existence of ethical principles and legislation alone does not ensure responsible AI use. To turn principles about privacy, safety, transparency, fairness and accountability into real-world practice, effective regulatory enforcement is necessary. This is particularly critical in school health, since AI applications may involve children, sensitive health information and decisions that can affect students' wellbeing, educational opportunities and social relationships.

At the international level, WHO (2021) has set out a broadly recognised ethical framework for AI in health. Its recommendations emphasise that AI should protect autonomy, promote wellbeing, ensure transparency, strengthen responsibility, support inclusiveness and advance equity.

UNICEF (2021) has similarly developed child-centred requirements for AI, focusing on children's development and wellbeing, inclusion, fairness and non-discrimination, data protection, transparency, accountability and human oversight. UNESCO's guidance on generative AI also argues that governments and educational institutions need coherent regulatory and institutional arrangements, because technological development is moving faster than the creation of corresponding policies (Miao & Holmes, 2023). Nigeria already has an important legal basis through the Nigeria Data Protection Act (NDP Act) 2023. The Act establishes the Nigeria Data Protection Commission as the country's data protection authority and sets out a framework for lawful and responsible processing of personal data. This is especially relevant for AI-enabled school health, since health information is one of the categories of personal information that calls for enhanced protection. The regulatory framework covers matters such as lawful processing, data-subject rights, security, accountability and cross-border data considerations (Nigeria Data Protection Commission [NDPC], 2023).

Consequently, regulatory enforcement in school health should function across several levels. National guidance should specify requirements for AI applications that involve children and health information. In addition, at state and local government levels, education and health authorities should put in place processes for approving, supervising and assessing AI-enabled school-health programmes. At the institutional level, schools should appoint designated staff for data protection, incident reporting, user training and compliance. Vendors should also be bound by contractual duties relating to data ownership, data retention, cyber security, algorithmic performance, breach notification and limits on secondary use of student data. Ultimately, regulatory enforcement should be treated as an ongoing activity rather than a one-time approval. It is also not meant to suppress innovation; rather, it should establish the conditions that make worthwhile innovation trustworthy.

For Nigeria, the most suitable model may be coordinated regulation instead of regulation by a single institution. School-health AI operates at the intersection of education, health, data protection and digital technology. Effective governance therefore requires collaboration among relevant ministries and agencies, the Nigeria Data Protection Commission,

educational institutions, health professionals, technology developers, researchers, parents and young people themselves. Such collaboration would enable broad ethical principles to be translated into practical standards for procurement, implementation, monitoring and accountability.

Conclusion

Artificial Intelligence holds transformative promise for school health promotion. It helps to detect problems earlier, teach better and reach more students, especially in resource-limited settings like Nigeria but schools are sacred spaces for children and the ethical stakes are high. The goal should not be to replace humans with machines, but to use AI to augment human care, judgment, and compassion. AI should be adopted, but the adoption must be ethical, equitable and with the school community at the center. Getting this right means healthier, safer, and more empowered school communities. Based on the findings of this work, the following recommendations were made

Governments should;

- i. develop a National Guideline on AI in School Health.
- ii. establish an AI Ethics Review Committee under FMOH and FME.
- iii. invest in infrastructure such as electricity, internet, devices.
- iv. conduct Data Protection Impact Assessment before any AI adoption.
- v. appoint a Data Protection Officer.
- vi. provide health literacy programmes for parents, teachers, students on AI.
- vii. create School Health AI Committees with student and parent representation.
- viii. conduct local studies on effectiveness, bias, and user experience of AI in Nigerian schools.
- ix. AI Developers and Vendors should train models on diverse Nigerian data, provide offline/low-data versions and guarantee no sale or sharing of student data.

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