**The Role of Artificial Intelligence in enhancing Drug Abuse Prevention and Health Communication: Ethical Dilemmas and Solutions**

 **Abstract**

Drug abuse continues to be the major risk behavior among people in the society. Drug abuse is the use of illegal or the use of prescription or over-the-counter drugs for purposes other than those for which they are meant to be used. The problem of drug or substance abuse is a major issue that commands the global attention of governments, nations, and Non-Governmental Organisations. The danger of drug abuse affects people of all ages. In recent years, artificial intelligence (AI) has been increasingly integrated into healthcare, representing a groundbreaking shift in the way that diseases are diagnosed, treated, and managed. AI has the potential to revolutionize the healthcare sector by leveraging advanced algorithms and machine learning techniques to deliver novel capabilities in data analysis, clinical decision-making, and personalized treatment options. Therefore, this study examined Artificial Intelligence, drug abuse, health communication; ethical considerations, and challenges. The study adopted a desktop research methodology. Secondary data or that which can be collected without fieldwork, has been considered. The study relied on already published studies, reports, and statistics. The study revealed that several factors contribute to drug abuse, such as peer group influence, heredity, broken home, and environment. Furthermore, factors that have contributed to the rapid utilization of artificial intelligence in the healthcare sector include big data, improved computing power, advancements in machine learning, imaging and diagnostics, precision medicine, virtual assistants and chatbots, robotic surgery and assistance, predictive analytics and population health. The researcher highlighted the ethical considerations and challenges in using AI in drug abuse issues and health communication. They include; protecting patient data, privacy and security, ethics for healthcare providers, and addressing algorithmic bias among other things. The researcher recommended that artificial intelligence should be used in tackling the issue of drug abuse, and efforts must be made to protect the privacy of the patient and the doctor or the healthcare provider. There should be continued discussion, research, and collaboration among healthcare professionals, policymakers, and AI developers are essential to maximize the benefits of AI while upholding ethical standards in healthcare.

**Key Words:** Artificial Intelligence, Drug Abuse, Health communication; Ethical consideration

**Introduction**

Drug abuse is emerging as a global public health issue. Drug abuse is a prevailing global public health concern that has been identified to have diverse and devastating effects on society. “It commands a compelling and thriving threat to national security with critical implications for public protection, health, and economic establishment” (Ezeaka, Nwodu, & Agbanu, p.1, 2023). Drug abuse is when a drug is used for a different purpose than intended, or in excessive amounts. Drugs are effective substances for good health and are used for beneficent therapeutic purposes but they are being abused by people, especially youths. Drug abuse is also referred to as substance abuse and can be defined as the harmful intake of drugs by individuals in ways or quantities hazardous to them or the people around them, or both Ahmad et al (2022). “Substance Abuse” popularly known as “Drug Abuse” in Nigeria is an act that has bedeviled the present generation universally, especially the youths. In Nigeria today, despite the efforts of the National Drugs Law Enforcement Agency (NDLEA), and other security agencies in the fight against drug trafficking and abuse, the problem persists and is taking an unprecedented upward trend. In Nigeria, drug misuse has grown to be a widespread and complicated public health concern with significant ramifications for security, socioeconomic progress, and individual well-being (Ezeaka, & Ochuba, 2024).

 Reports also had it that in States of the federation like Kano, Delta, Lagos and Rivers, substance abuse has reached an epidemic proportion (Jatau et al., 2021). Frustrated and rejected youths and individuals have taken on to drug abuse as a way out of disappointments and social problems like unemployment, broken homes, failed marriages, family problems, etc. Among the risk users, one out of four drug users in Nigeria is a woman and one out of five users (80,000) inject substances (UNODC, 2018). It is further reported that abandoned young boys by parents, and young ladies in marriages or other relationships are some of the hardest hit by drug abuse in northern Nigeria. “Moreover, the high level of crime rate in the country which include kidnapping, armed robbery, rape, etc. is not unconnected with the increase and rise in substance abuse" (Uche & Obiora, 2023; Kawugana & Faruna, 2018). Haladu (2023) discovered that “65 of secondary school students use drugs. Imagine what will happen by the time they go to higher institutions of learning”.

 In addition, the World Health Organisation (2023) describes “substance abuse as the harmful or hazardous use of psychoactive substances, including alcohol and illicit drugs. The effects of drug abuse differ depending on their mechanism of action, the amount consumed and the history of the user among other factors. However, it has been reported that at a global level, drug abuse has negative effects on the health, wealth, and well-being of nations”, (Abidemi, 2023; Obiora & Chukwuemeka, 2023).

 “ AI denotes the science and engineering of creating intelligent machines using algorithms or rules, which the machine shadows to mimic human cognitive functions, namely, learning and problem-solving” (Bajwa et al., 2021). “AI usually refers to computer technologies that emulate mechanisms supported by human intelligence, namely, adaptation, deep learning, reasoning, engagement, and sensory understanding” (Tagliaferri, et al, 2020). It aims to mimic human cognitive functions. AI can assist in the localization of digital content, ensuring it is tailored to specific cultural contexts (Ezeaka & Umennebuaku, 2024). “It brings a paradigm shift in healthcare, driven by the increasing availability of health data, boosts healthcare interventions”, (Obiora & Adikuru, 2024) and the rapid growth of analytical techniques

“In recent years, artificial intelligence (AI) has been increasingly integrated into healthcare, representing a groundbreaking shift in the way that diseases are diagnosed, treated, and managed. AI has the potential to revolutionize the healthcare sector by leveraging advanced algorithms and machine learning techniques to deliver novel capabilities in data analysis, clinical decision-making, and personalized treatment options. However, this field of science faces various ethical and legal challenges. It should be noted that ethical dilemmas, privacy and data protection, informed consent, social gaps, medical consultation, empathy, and sympathy are various challenges that we face in using AI. Therefore, before integrating artificial intelligence with the healthcare system, practitioners and specialists should consider all four medical ethics principles, including autonomy, beneficence, nonmaleficence, and justice in all aspects of healthcare” (Farhud & Zokaei, 2021). Health Information, no doubt is a very important resource to everyone (Ezeoke, Ezeaka, & Nwodu, 2020). There is a continuous debate regarding whether AI “fits within existing legal categories or whether a new category with its special features and implications should be developed.” “Whether AI systems may be considered legal is not only a legal one but also a politically contentious one” (Naik et al., 2022). This study is important as it sheds light on the ethical issues and considerations regarding the application of AI in drug abuse prevention and health communication. Therefore, this study examined Artificial Intelligence, drug abuse, and health communication: ethical considerations, and challenges.

 **Statement of the Problem**

 “Substance or drug abuse remains a major public health problem all over the world. Drug abuse continues to be the major risk behavior among people, particularly youth and adolescents, with physical and mental health complications. The abuse of drugs and other substances and associated crime have driven the considerable crime have driven a considerable rise in the number of youths or young people imprisoned in recent years. A report by the United Nations Office on Drugs and Crime in Nigeria indicates that 14.4% (14.3% million) of people aged between 15 and 64 years abuse drugs” (Olanrewaju et al., 2022). Again, health communication is “the central social process in the provision of health-care delivery and the promotion of public health”. “However, the communication process is complex and fragile. It often breaks down and can confuse and frustrate some groups, especially when it is not culturally sensitive, appropriate, engaging, and informative. Healthcare providers and health information specialists often underestimate the difficulties inherent in sharing relevant health information with consumers, especially with consumers who come from diverse cultural backgrounds and have limited levels of health literacy” (Kreps & Neuhauser, 2015). The use of Artificial Intelligence can help tackle the issue. Artificial Intelligence and machine learning take center stage when it comes to drugs and addiction. The use of AI has become more prevalent in healthcare. However, ethical questions have arisen and become increasingly critical. For example, questions relating to data privacy and security, potential biases in AI algorithms, the issue of maintaining patient autonomy and informed consent, how the professional responsibilities of healthcare professionals may need to adapt, and what regulations and guidelines will need to be established to ensure the use of AI in healthcare remains ethical. In this paper, an attempt has been made to examine Artificial Intelligence, drug abuse, and health communication: ethical considerations, and challenges.

 **Research Questions**

1. what are the causes or reasons of drug abuse in the society?
2. What are the factors that have contributed to the rapid use of AI in the health sector?
3. What are the ethical challenges in the use of AI for controlling or checking drug abuse?
4. What are the solutions to the ethical challenges in the use of AI for controlling or checking drug abuse?

 **Methodology**

The study adopted a desktop research methodology. Desk research refers to secondary data or that which can be collected without fieldwork. Desk research is involved in collecting data from existing resources hence it is often considered a low-cost technique as compared to field research, as the main cost is involved in executive’s time, telephone charges, and directories. Thus, the study relied on already published studies, reports, and statistics.

**Discussion**

**Understanding what is Drug Abuse or Substance Abuse**

 Drug abuse can be referred to as the excessive use of drugs or taking drugs without a doctor’s prescription while drug addiction exposes drug abusers to habitual use of drugs notwithstanding the trauma they bring about. Drugs can be seen as any substance that influences the system or functioning of a living organism. Many youths are languishing in jails across the globe especially in countries like Malaysia, Indonesia, Singapore, India, Pakistan, Malta, and Spain for ingesting packaged heroin or cocaine and other illicit drugs (Ezeaka, Nwodu, & Agbanu, 2023). According to the World Health Organization (Haladu, 2023), “Substance Abuse is any taking of drugs that harms or threatens to harm the physical or mental health or social well-being of an individual or other individuals or society at large or which is illegal. Drug abuse is the indiscriminate use of drugs by self-administration for non-medical purposes such that the physical, mental, emotional, or social state of the user is adversely affected” (Obiora & Adikuru, 2024; Nnaemeka, 2023; Obiora & Chukwuemeka, 2023).

 From the above definitions, it is clear that substance abuse or drug abuse is the mishandling and misapplication of substances by individuals to derive the pleasure of intoxication. The thing to note here is that drugs or substances are not bad. They are manufactured with good intentions for good purposes. When you take medical substances, for instance, the intention is to effect medical treatment. The problem is some individuals use them as stimulants, depressants, narcotics, intoxicants, etc. The majority of these abusers have no medical illness.

**Types of Substance Abuse or Drug Abuse**

There are many types of substance abuse which are listed below (Haladu, 2023):

**1. Stimulants (Cocaine):** - These are substances that are used by abusers to enhance and boost their performances. Once under its use, the user becomes bolder and braver. It makes them overreact to anything thereby causing harmful damage to victims. They can hardly feel any pain if hurt externally. This type of drug abuse in Nigeria is common among thugs, hooligans, bandits, robbers, etc.

**2. Depressants (Alcohol):** - These drugs are used to cool down tension. Mostly they make the user drowse into oblivion. Users of this type of substance are people who are depressed, disappointed, dejected, rejected, or frustrated. Youths and graduates who could not find employment over a long time, people who have lost their jobs, and children who have been rejected by their families are some of the users of this substance. Once taken it makes most people forget about their problems. In Nigeria, the most common depressants are tramadol, and codeine, found in cough syrups and other pharmaceutical medications.

**3. Opium-Related pain killers (Heroin):** - Just like Cocaine, this substance is a pain killer.

In medical circles, it can be used on patients undergoing operations like cesarean operation or tooth removal to freeze the cells for some period. People take it to have a similar effect to cocaine.

**4. Hallucinogens (LSD):** - According to Haladu(2023), this is a psychoactive agent that often or ordinarily causes perceptual anomalies and other substantial subjective changes in thought, emotion, and consciousness that are not typically experienced to such degrees with other drugs classification. This drug alters perception, thoughts, and feelings. It causes images that seem real but they are not. It affects the brain mostly by stimulating, suppressing, or modulating the activity of the various neurotransmitters in the brain. For instance, people who take it may urinate on themselves thinking they are in the toilet or the bathroom.

**5. Narcotics Analgesics:** - These are psychoactive compounds with numbing or paralyzing properties (Haladu, 2023). It contains elements of morphine, and heroin, as well as derivatives of opium latex. Mostly it is used as a pain killer for pain relief. They have similar medical use and abuse to cocaine and heroin.

**6. Cannabis (Marijuana):** - This is a drug not only common in Nigeria but in the West African sub-region and the entire equatorial rainforest in Central Asia, the Caribbean and the Indian subcontinent. Some school of thought considers this drug as the most popularly abused drug in Nigeria. Even though Marijuana has been used as a drug for both recreational and entheogenic purposes and in various traditional medicines for centuries, it is smoked or consumed generally illegally as a psychoactive or mind-altering drug (Haladu, 2023).

 **Causes or Reasons for Drug Abuse in the Society**

**i. Peer Group Influence**

“A lot of studies have indicated that peer group influences have pushed many youths to engage in antisocial behavior like drug abuse” (Gershon, 2024). “The youth intermingle with others to some extent and have a greater influence on their actions, this is because of the time taken to interact with them be it at home community, at school premises at a playground and so forth living with bad peers who engaged in drug addict make other to emulate from their actions this occurs especially when parents were unable to exercise their traditional obligations on their children” (Udama, 2013). Enamhe & Maxwell-Borjor (2021) found that “more than half (57 percent) of respondents learned about illicit drug intake through intermingling with their friends in the Northwestern states of Nigeria. The study reveals that Jigawa State appears to have rampant misuse of codeine-type expectorants”.

**ii. Broken Home**

The issue of a broken home is one of the factors that cause drug and substance abuse in Nigeria. Some children suffer from prolonged absence of parental affection as a result of divorce and other related matrimonial problems, harsh repression, “parental use of drugs” and prolonged quarrels between parents. Another issue is the decrease in financial gain due to unemployment which may certainly lead to the tendency to abuse drugs. Enamhe & Maxwell-Borjor (2021) found that “children are influenced by their parents to take drugs. It is quite clear that family is the first agent of socialization of the child. Therefore, children learn and exhibit their early learning from their parents and elder siblings or elder family members”.

**iii. Heredity**

 Genetic factors influence drug abuse in Nigeria, just like the environmental factor where people learn criminal behavior through association, so also others inherit it genetically from their parents at birth through chromosomes. Drug addiction like any other deviant and criminal behaviors is inborn among them. According to Stillerman (2015) youth who engage themselves in drug abuse habit may likely inherit it from one of their parents. Stillerman (2015), reveals “the relationship between genetic predispositions to the occurrences of substance abuse-related diseases among youth. Individuals with a heritable tendency are prone to substance abuse. However, it is not all family members will inherit the gene of drug dependency”.

**iv. Environment**

“The environmental factor is another triggering issue that predisposes people to drug abuse, if a person is living in a drug-use-free environment such as ghettos or slums which predominantly dominated by poor housing, and poor environmental hygiene, such places drug business is freely been carried out as a business and means of survival, there likelihood for someone living in that community to inculcate the habit of drug addiction. The use of drugs among parents or family members openly within the family surroundings will influence a greater percentage of the family members especially the siblings within the family to inculcate the habit”. (Osonwa & Arikpo, 2018).

**v. Socioeconomic Status of the Parents**

The socioeconomic status of the parents is another triggering factor that can influence drug addiction among children, especially the low-income families. As most of the parents cannot afford the basic requirements for their livelihood, find themselves in slums and ghettos mostly in the downtowns which appear to be crime-prone areas. Drugs, addiction, and other illegal businesses are the order of the day in these places. These socio-economic factors at a time differ from one country to another, for instance, the children of low-income families are found most likely at greater risk of drug abuse in the middle and low-income countries. However, in high-income countries like England, a study conducted among marijuana users discovered that economically deprived children in other words children who come from low-income families are at less risk of cannabis smoking than those children who come from less economically deprived.

**Factors that have Contributed to the Rapid Utilization of Artificial Intelligence in the Healthcare Sector**

The field of AI in healthcare has witnessed rapid advancement in recent years, driven by technological breakthroughs, increased availability of data, and the growing need for more efficient and accurate healthcare solutions. Recent AI techniques which contribute to knowledge acquisition, representation, inference and validation, data exploration, visual imaging, natural language processing, and decision-making using various data such as bio-medical images, and clinical and genomics data have facilitated the development of new clinical approaches, solutions, and strategies for patient safety and care. So, it is clear that Artificial intelligence (AI) in general and machine learning (ML) in particular have a lot of success and promise in the potential it holds for various sectors, healthcare being one of the most prominent among all (Hassan et al., 2024). Research suggests that “AI algorithms can analyze various data sources, including healthcare records, social media activities, and behavioral patterns, to identify individuals at risk of substance abuse. These systems can detect early warning signs or patterns indicative of potential drug abuse” (Babu et al., 2024).

Several factors have contributed to the accelerated development of AI in healthcare:

**i. Big Data:** The proliferation of electronic health records (EHRs), medical imaging data, genomics data, and other healthcare data sources has provided a vast amount of information for AI systems to analyze. These large datasets enable AI algorithms to learn patterns and make them more accurate (Oluwaseyi, & Daniel, 2024).

**2. Improved Computing Power:** The availability of high-performance computing resources and cloud-based infrastructure has enabled the processing and analysis of massive healthcare datasets in real-time. This enhanced computing power has fueled the development of more complex AI algorithms and models.

**3. Advancements in Machine Learning:** Machine learning techniques, such as deep learning, have revolutionized AI in healthcare. Deep learning algorithms can automatically learn and extract intricate patterns from large amounts of data, leading to more accurate predictions and a better understanding of complex medical conditions (Jaiswal et al., 2021).

**4. Imaging and Diagnostics:** AI has shown significant progress in medical imaging and diagnostics. AI algorithms can analyze medical images, such as X-rays, MRIs, and CT scans, to detect abnormalities, assist in early disease diagnosis, and improve radiologists' efficiency.

**5. Precision Medicine:** AI has the potential to transform precision medicine by leveraging genomic data, biomarkers, and patient-specific information to develop personalized treatment plans. AI algorithms can predict patient responses to specific therapies and aid in the discovery of new targeted treatments.

**6. Virtual Assistants and Chatbots:** AI-powered virtual assistants and chatbots are being used to enhance patient engagement and provide personalized healthcare information. These systems can answer questions, triage patients, and offer basic medical advice, improving access to healthcare services.

**7. Robotic Surgery and Assistance:** AI-enabled robotic systems are used in surgical procedures, allowing for more precise and minimally invasive surgeries. These systems can enhance the capabilities of surgeons, improve surgical outcomes, and reduce recovery times.

**8. Predictive Analytics and Population Health:** AI algorithms can analyze population health data to identify trends, predict disease outbreaks, and optimize resource allocation. This capability is precious for public health organizations and policymakers.

**The Ethical Considerations and Challenges in Using AI in Drug Abuse Issues and Health Communication**

 “The ethical compass is more relevant than in artificial intelligence in no other field. These general-purpose technologies are reshaping the way we work, interact, and live. The world is set to change at a pace not seen since the deployment of the printing press six centuries ago. AI technology brings major benefits in many areas, but without ethical guardrails, it risks reproducing real-world biases and discrimination, fueling divisions, and threatening fundamental human rights and freedoms” (Ramos, 2023). The ethics of integrating AI in the fight against drug abuse must be considered, however, before it can reach its full potential in this industry. The following are some of the issues:

**a. Protecting patient data**

“There are several ethical concerns relating to the collection and handling of patient data in AI-driven healthcare. For example, the confidentiality and security of patient information must be ensured to protect patients from the negative impacts of data breaches and unauthorized access. Additionally, patients must be told about how their data will be used in AI applications, it should not be assumed that they know the implications of sharing their data with AI systems and should be given the option to opt out. With the growing use of AI in healthcare comes the emergence of new roles and responsibilities for those working in healthcare. It must be understood who is accountable for errors in storing and sharing data collected by AI applications. Guidelines must be established and accountability must be understood”. (Moore, 2023).

**b. Addressing algorithmic bias**

“Unfortunately, biases can significantly impact AI algorithms used in healthcare. AI algorithms can exacerbate racial and socioeconomic disparities that already exist in healthcare. If trained on raised data, algorithms can learn to recommend different treatment options for patients based on their membership to a certain group. This can perpetuate the problem of unequal access to healthcare. Some groups will end up being favored, while others will have poorer health outcomes” (Davenport, & Kalakota, 2019).

**c. Informed decision-making**

“There are several challenges involved in ensuring patient autonomy and obtaining informed consent in AI-driven healthcare. First, obtaining informed consent for AI systems demands clear and concise communication about how the AI will be used and what its potential impact may be. Patients may not fully understand how their data will be used by AI applications and this raises concerns surrounding data privacy. Due to the rapid pace at which AI developments can happen, there is a key issue surrounding the expiration of informed consent and how to tackle this” (Ramos, 2023).

**d. Ethics for healthcare providers**

“Healthcare professionals using AI tools have numerous responsibilities, and these may evolve as AI advances. Healthcare professionals must ensure that healthcare decisions driven by AI tools align with the patient’s best interests. Human oversight of AI tools used in healthcare must be maintained, healthcare professionals must critically evaluate the recommendations given by AI tools to ensure they align with clinical expertise. Additionally, healthcare professionals must be transparent about the use of AI in healthcare. Patients must understand how AI tools are being leveraged to influence their care” (Davenport & Kalakota, 2019).

**e. Ethical frameworks**

“Several regulations and ethical frameworks are currently used to help guide the use of AI in healthcare. Ongoing development of these regulations is needed, however, to address the rapidly evolving landscape” (Rodrigues, 2020).

**f. Accountability and transparency are also critical ethical considerations.** Healthcare professionals need to understand how AI systems make decisions to ensure they align with ethical standards and provide the best care for patients. Clear responsibility and accountability for AI outcomes should be established to prevent potential harm or misuse.

**g. Privacy and Security:** Healthcare professionals must prioritize patient privacy and data security when using AI. They should ensure that patient data is collected, stored, and transmitted securely, adhering to relevant data protection regulations. Healthcare professionals should also be aware of the potential risks and vulnerabilities associated with AI systems, taking appropriate measures to safeguard patient information.

**h. Cultural sensitivity:** Health communication strategies must be tailored to the local culture and context to ensure effectiveness and respect for the community.

**i. Language barriers:** Communication materials must be translated into local languages and be easily understandable.

**j. Stigma and discrimination:** Health communication must avoid perpetuating harmful stereotypes and stigmatization of individuals struggling with drug abuse.

**k. Limited resources:** Developing countries often have limited resources, making it challenging to implement comprehensive health communication campaigns.

**l. Balancing harm reduction and abstinence approaches:** Ethical considerations must be made when deciding between harm reduction strategies (e.g., needle exchange programs) and abstinence-based approaches.

**The Solution to the Ethical Challenges in the use of AI for controlling or checking Drug Abuse**

**i. Ethical Guidelines and Standards:** Healthcare professionals can contribute to the development and adoption of ethical guidelines and standards specific to AI in healthcare. These guidelines can provide frameworks for responsible AI use, including considerations of fairness, transparency, accountability, and patient-centered care.

**ii. Continuous Education and Collaboration:** Healthcare professionals should engage in continuous education and interdisciplinary collaboration to stay updated on AI advancements and ethical considerations. Collaboration with AI developers, policymakers, ethicists, and patient advocacy groups can foster a comprehensive approach to addressing challenges and finding solutions.

**iii. Privacy-Preserving Techniques:** Healthcare professionals should implement privacy-preserving techniques, such as anonymization, encryption, and secure data-sharing protocols, to protect patient privacy and ensure compliance with data protection regulations. Implementing robust access controls and regular security audits can help maintain data security (Vemuri, 2024).

**iv. Transfer Learning and External Validation:** Healthcare professionals can enhance the generalizability of AI algorithms by leveraging transfer learning techniques that enable knowledge transfer from one dataset to another. External validation using diverse datasets can also help evaluate algorithm performance across different patient populations and identify potential biases.

**v. Explainable AI:** Healthcare professionals can promote the development and use of explainable AI techniques that provide insights into how AI algorithms make decisions. This can include using interpretable models, generating explanations for AI outputs, and employing techniques such as model-agnostic interpretability and rule-based systems.

**What is** **health communication?**

 “Health Communication is the study and use of communication strategies to inform and influence decisions and actions to improve health” (CDC, 2023). Health communication is the study and practice of communicating promotional health information, such as in public health campaigns, health education, and between doctor and patient. The purpose of disseminating health information is to influence personal health choices by improving health literacy.

**Health Communication Plays a Vital Role in Preventing Drug Abuse in Nigeria by:**

**1. Raising awareness:** Educating people about the dangers and risks associated with drug abuse.

**2. Providing accurate information:** Countering misinformation and myths about drugs.

**3. Influencing attitudes and beliefs:** Encouraging negative attitudes towards drug abuse.

**4. Promoting healthy behaviors:** Encouraging alternative coping mechanisms and healthy lifestyle choices.

**5. Supporting prevention programs:** Reinforcing initiatives like drug education, counseling, and support groups.

**6. Encouraging help-seeking:** Directing individuals to resources for treatment and support.

**7. Reducing stigma:** Encouraging open conversations and reducing judgment towards those struggling with addiction.

**8. Empowering communities:** Mobilizing community leaders and members to take action against drug abuse.

**9. Supporting policy and advocacy:** Informing policies and advocating for effective drug prevention and treatment strategies.

**10. Evaluating and improving:** Assessing the effectiveness of health communication strategies and making data-driven improvements.

 **Conclusions and Recommendations**

The researcher concludes that addressing challenges such as bias mitigation, ethical considerations, and data privacy requires the collective expertise of healthcare professionals, AI researchers, data scientists, ethicists, policymakers, and other stakeholders. Through collaborative research and innovation projects, professionals can work together to develop AI solutions that are both effective and ethically sound and will help to check cases of drug abuse in society. AI that is correctly created and trained with enough data can help uncover clinical best practices from electronic health records. By analyzing clinical practice trends acquired from electronic health data, AI can also assist in developing new clinical practice models of healthcare delivery.

 By implementing these solutions and continuously improving AI practices, healthcare professionals can overcome challenges and ensure the responsible and ethical use of AI in healthcare. There should be continued discussion, research, and collaboration among healthcare professionals, policymakers, and AI developers are essential to maximize the benefits of AI while upholding ethical standards in healthcare. Health communication must also address the root causes of drug abuse, such as poverty, trauma, and mental health. Effective health communication is crucial to address the complex issue of drug abuse in Nigeria, and it requires a collaborative effort from healthcare professionals, policymakers, community leaders, and individuals.

Consent

As per international standards or university standards, Participants’ written consent has been collected and preserved by the author(s).

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

  **References**

Abidemi A. (2023). Optimal cost-effective control of drug abuse by students: insight from mathematical modeling. *Modeling Earth Systems and Environment*, 9(1), 811-829.

Ahmad J, Joel U. C, Talabi F. O, Bibian O. N, Aiyesimoju A. B, Adefemi V. O, Gever V.C. (2022). Impact of social media-based intervention in reducing youths’ propensity to engage in drug abuse in Nigeria. *Evaluation and program planning*, 94, 102-122.

Bajwa, J.; Munir, U.; Nori, A. Williams, B. (2021). Artificial intelligence in healthcare: Transforming the practice of medicine. *Future Healthcare Journal*, 8, e188–e194.

Centers for Disease Control and Prevention (2023). Retrieved from https://www.cdc.gov/healthcommunication/healthbasics/WhatIsHC.html

Davenport, T. and Kalakota, R. (2019). The potential for artificial intelligence in Healthcare. *Future Healthcare Journal*, 6(2), pp. 94–98. doi:10.7861/futurehosp.6-2-94.

Drukker L, Noble J. A, (2020). Papageorghiou AT. Introduction to artificial intelligence in ultrasound imaging in Obstetrics and Gynecology. *Ultrasound Obstetr Gynecol*. 56, 498– 505. 10.1002/uog.22122.

Enamhe, D.C, and Maxwell-Borjor A. E. (2021). Nigeria drug abuse and the Nigerian youth. Jurnal Ilmu Sosiologi Dialektika Kontemporer 8, (1), 1-17.

Ezeaka, N. B., Nwodu, E.G. & Agbanu, V. N. (2023). Awareness and Attitude of Undergraduates to Drug Abuse and Addiction in Anambra State. Retrieved from [https://www.massmediareview.net/paper/awareness-and-attitude-of-undergraduates-to- drug-abuse-and-addiction-in-anambra-state](https://www.massmediareview.net/paper/awareness-and-attitude-of-undergraduates-to-%09drug-abuse-and-addiction-in-anambra-state)

Ezeaka, N. B., Umennebuaku, V. A. (2024), Development Communication in the Artificial

Intelligence (AI) Era: Navigating Cultural Complexity and Technological advancements. *African Journal of Culture, History, Religion and Traditions.* 7(3), 98-107. DOI: 10.52589/AJCHRTHQCS2XJ7

Ezeaka, N.B., Nwodu, E.B. & Agbanu, V.N (2023). Awareness and attitude of

undergraduates to drug abuse and addiction in Anambra State. *Mass Media Review* 5(1) 99-108

Ezeaka, N.B & Nwodu, E.G (2022). *Communication for Partnership in Development*. In

A.N Nwammuo; G.U Nwafor & B.N Ogbonna (eds) Twenty-One Scholars’ Viewpoints on Development Communication. Enugu: Rhyce Kerex Publishers

Ezeaka, N.B., & Ochuba, C.C. (2024). Harnessing AI in Development Communication for

Drug Abuse Prevention: A Nigerian Perspective. *Mass Media Review* Vol 6 (1)

Ezeoke, C.B., Ezeaka, N.B., & Nwodu, G.E. (2020). *Understanding Health Communication*. In C.S. Okunna (ed.), Communication and Media Studies, Multiple Perspective. Enugu: New Generation Educare Ltd.

Gerke S, Minssen T, Cohen G. (2020). Ethical and legal challenges of artificial intelligence- driven healthcare. *Artif Intell Healthcare*, 295–336. 10.1016/B978-0-12-818438- 7.00012-5.

Haladu, A. (2023). A conceptual review of the general causes and consequences of substance abuse in Nigeria. Retrieved from [file:///C:/Users/USER](file:///C%3A/Users/USER) PC/Downloads/ACONCEPTUALREVIEWOFTHEGENERALCAUSESANDCONSEQ UENCESOFSUBSTANCEABUSEINNIGERIA.pdf.

Jaiswal, A., Singh, S., Wu, Y., Natarajan, P., & Natarajan, P. (2021, July). Keypoints-aware object detection. In NeurIPS 2020 Workshop on Pre- registration in Machine Learning (pp. 62- 72). PMLR.

Jatu, A. I., Sha’aban, A.S., Gulma, K.A., Shitu, Z, Khalid, G.M, Isa, A., Wada, A.S, and Mustapha, M. (2021).The Burden of Drug Abuse in Nigeria: A Scoping Review of Epidemiological Studies and Drug Laws. *Public Health Review*, 42. 12-20.

Jaiswal, A., Singh, S., Wu, Y., Natarajan, P., & Natarajan, P. (2021). Key points-aware object detection. In NeurIPS 2020 Workshop on Pre-registration in Machine Learning (pp. 62- 72). PMLR.

Kawugana, A. & Faruna, F. S. (2018), Effects of drug abuse on the Nigerian economy. *International Journal of Innovative Psychology & Social Development*, 6(4); 31-38.

Moore, S. (2023). Ethical considerations in AI-Driven Healthcare NewsGuard 100/100 Score. Retrieved fromhttps://www.news-medical.net/health/ethical-considerations-in-AI- drivenhealthcare.aspx.

Morley J, and Floridi L. (2020). An ethically mindful approach to AI for Health Care. *SSRN* *Electron Journal*, 395, 254–255. Doi.10.2139/ssrn.3830536

Nyabuti, S. and Mohammed, M. (2024). AI’s Potential in The Fight Against Alcohol and Drug Abuse. Retrieved from [https://nacada.go.ke/ais-potential-fight-against-alcohol-and-drug- abuse](https://nacada.go.ke/ais-potential-fight-against-alcohol-and-drug-%09abuse).

Nnaemeka, O.F. (2023). Drug abuse and its influence on undergraduates students of COOU. Retrieved from <https://www.massmediareview.net>.

Naik, et al (2022). Legal and Ethical Consideration in Artificial Intelligence in Healthcare: Who Takes Responsibility? Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8963864/>

Obiora, A.V., & Adikuru, C.C. (2024). Intervention communication strategy: Boosting fight against drug abuse among Nigerian youth through artificial intelligence generated memes on social media. *Advance Journal of Arts, Humanities and Social Sciences,* Volume: *7*(4), 57–72. <https://aspjournals.org/ajahss/index.php/ajahss/article/view/112>

Obiora, A. V., & Chukwuemeka. G. N. (2023). Nollywood productions and campaign against drug abuse: Undergraduates perception of teens characterization in “Far from home” movie*. International Journal of Social Sciences and Management Research*, 9(8), 75–86.

Oluwaseyi, J. & Daniel, S. (2024). Impact of AI on healthcare workforce and ethical considerations for healthcare professionals authors. Retrieved from [file:///C:/Users/USER-](file:///C%3A/Users/USER-) PC/Downloads/ImpactofAIonhealthcareworkforceandethicalconsiderationsforhealthcarep rofessionals.pdf.

Ramos, G. (2023). Ethics of Artificial Intelligence https://unesdoc.unesco.org/ark:/48223/pf0000385082.page=4.

Rodrigues R. (2020). Legal and human rights issues of AI: gaps, challenges and vulnerabilities. *Journal Respons Technol,*  4, 100005. 10.1016/j.jrt.2020.100005.

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

Stephenson J. (2021). Who offers guidance on use of Artificial Intelligence in medicine. *JAMA Health Forum*. 2, 18-24. doi.212467. 10.1001/jamahealthforum.2021.2467

Stillerman, J. (2015). *The Sociology of Consumption: a global approach.* John Wiley & Sons.

Tagliaferri, S.D, Angelova, M., Zhao, X.; Owen, P.J, Miller, C.T., Wilkin, T., Belavy, D.L. (2020). Artificial intelligence to improve backpain outcomes and lessons learnt from clinical classification approaches: Three systematic reviews. *Npj Digit. Med*., 3, 1–16.

Vemuri, N. (2024). Ethical AI Integration in Health. *Devops Strategies and Cloud Implementations.* Doi.10.5281/zenodo.10578079.

Uche, A. O., & Obiora, A. V. (2023). *EgoMbute* phenonmenon and the challenges of insecurity in Nigeria. *ANSU Journal of Arts and Social Sciences, 10(2)*, (Special Edition) 101 – 113. . <https://www.ajol.info/index.php/ajass>

United Nations Office on Drugs and Crime (UNODC) (2018), Drug use in Nigeria. Vienna, Austria.

WHO (2023). Substance abuse. WHO regional office for Africa. Retrieved from <https://www.afro.who.int/health-topics/substance-abuse>.

Kreps, G. L., & Neuhauser, L. (2015). Designing health information programs to promote the health and well-being of vulnerable populations: The benefits of evidence-based strategic health communication. In C. A. Smith & A. Keselman (Eds.), *Meeting health information needs outside of healthcare* (pp. 3-17). Chandos Publishing.

Farhud, D. D., & Zokaei, S. (2021). Ethical issues of artificial intelligence in medicine and healthcare. *Iranian journal of public health*, *50*(11), i.

Naik, N., Hameed, B. M., Shetty, D. K., Swain, D., Shah, M., Paul, R., ... & Somani, B. K. (2022). Legal and ethical consideration in artificial intelligence in healthcare: who takes responsibility?. *Frontiers in surgery*, *9*, 862322.

Jatau, A. I., Sha’aban, A., Gulma, K. A., Shitu, Z., Khalid, G. M., Isa, A., ... & Mustapha, M. (2021). The burden of drug abuse in Nigeria: a scoping review of epidemiological studies and drug laws. *Public health reviews*, *42*, 1603960.

Olanrewaju, J. A., Hamzat, E. O., Enya, J. I., Udekwu, M. O., Osuoya, Q., Bamidele, R., ... & Owolabi, J. O. (2022). An assessment of drug and substance abuse prevalence: a cross-sectional study among undergraduates in selected southwestern universities in Nigeria. *Journal of international medical research*, *50*(10), 03000605221130039.

Gershon, O. K. (2024). A review of peer influence and teenagers’ antisocial behaviours in Africa. *African Journal of Social Work*, *14*(4), 194-206.

Hassan, S. A. D. H., Rashid, M. K., Sammany, M., & Banoon, S. R. (2024). Artificial Intelligence as a Predictive Tool in Drug Addiction: A Comprehensive Review. *Journal of Misan Researches*, *19*(39-3).

Babu, B.K., Pilli, D., Sandeep, V.S.N., & Deepthi, K. (2024). AI-powered Interventions: Revolutionizing Drug Abuse Prevention*. Journal of Drug and Alcohol Research, 13.*