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INTERSECTION OF ARTIFICIAL INTELLIGENCE AND LIFESTYLE MODIFICATION AMONG WOMEN OF REPRODUCTIVE AGE

Udukhomose Suleiman Omokhabi Ph.D.[1], Mofoluke Abidemi. Omilani Ph.D.[2] Olajumoke Oyetola Adegbite [3]and Taiwo Oluwaseyifunmi Olunubi [4]

[1] Department of Adult Education, Faculty of Education, Federal University Oye Ekiti, Ekiti State, Nigeria Email: suleiman.omokhabi@fuoye.edu.ng ORCID ID: https://doi.org/0000-0002-9700-5216
[2] Department of Adult Education, Faculty of Education, University of Ibadan, Ibadan, Oyo State, Nigeria mofolukeabidemi@gmai.com, ORCID ID: https://orcid.org/0009-0006-8117-8880
[3] General Studies Department, Federal College of Animal Health and Production Technology Moor Plantation Apata Ibadan Oyo State, Nigeria Email: wiaisjummy@gmail.com, ORCID ID: https://orcid.org/0009-0001-5311-7929
[4] Department of Adult Education, Faculty of Education, University of Ibadan, Ibadan, Oyo State, Nigeria, olunubitaiwo@gmail.com, ORCID ID: https://orcid.org/0009-0004-0232-4065

ABSTRACT

AI-driven applications are increasingly being used to promote healthy behaviours like stress reduction, physical activity, balanced diet and adherence to reproductive health plans. Examples of these applications include health monitoring, virtual health assistants and predictive analytics. The increasing use of AI in healthcare has opened up new opportunities for customized health interventions especially for women of reproductive age. Concerning women's psychological and physiological needs during their reproductive years, this article focuses on how AI supports early health risk detection, tailored intervention programs and individualised health tracking. The study also examines the challenges associated with implementing AI-driven lifestyle interventions because of data privacy, digital literacy, accessibility, and sociocultural acceptance. Although research suggests that a multidisciplinary approach involving policymakers, healthcare professionals, and technology developers is necessary for the equitable and successful application of AI it has the potential to completely transform lifestyle changes and health outcomes. The study concludes by suggesting inclusive AI design and focused health education to maximize the benefits of AI-enabled lifestyle modification for women of reproductive age.

Keywords: Artificial Intelligence, Lifestyle Modification, Reproductive Health, Women of Reproductive age

Introduction

Artificial intelligence (AI) has revolutionised the healthcare sector by offering innovative methods for disease prevention, diagnosis and health management, among the many populations that stand to benefit from AI-

driven advancements women of reproductive age represent a critical group due to their unique physiological, psychological and reproductive health requirements. A number of health problems commonly affect this group including hormonal fluctuations, problems with fertility, maternal health issues and the combined strain of work and family obligations. These problems may be influenced by lifestyle choices but new developments in AI technologies such as wearables virtual health assistants and predictive analytics have made it feasible to manage health in a more personalised and data-driven manner. These tools track behavioural factors like stress levels, eating habits, physical activity and other variables in real-time allowing them to provide personalised prescriptions that support healthy living. The promotion of lifestyle modifications that enhance fertility, promote maternal health and enhance the general well-being of women of reproductive age can be greatly aided by such technologies. Even though there is hope for changing lifestyles there are still certain barriers. Issues like digital literacy, data privacy, socioeconomic inequality and cultural perceptions continue to impede the successful application of AI-driven interventions especially in settings with limited resources. It is also necessary for policymakers, tech developers and healthcare professionals to collaborate in order to ensure that AI solutions are moral inclusive and considerate of the particular needs of women. This study highlights the ways in which AI are provided for women of reproductive age to change their lifestyles as well as the challenges involved.

Women Reproductive Health

Each household's reproductive behaviour is significant because it affects their reproductive anatomy (Olajide & Omokhabi 2014). Due to their lack of opportunity to express their opinions on matters pertaining to their own lives, women in Nigeria and other parts of the world felt vulnerable and were at a disadvantage (Omokhabi 2014). As development agents they usually face challenges like limited access to credit healthcare and education (Omokhabi & Fajimi 2023). The World Health Organisation (WHO 2010) states that sexual health is a component of reproductive health. It is a state of complete reproductive system health including mental social and physical well-being. Omokhabi (2016) asserts that development depends on ensuring and advancing women's health particularly reproductive health. Essential elements of women's reproductive health include menarche menstruation fertility pregnancy childbirth gynecological problems cancer STDs sexuality and sexual health and function (Omokhabi, 2024). In every household reproductive behaviour is important because it reflects on their reproductive anatomy. Women felt vulnerable and disadvantaged in Nigeria and other parts of the world because they were not allowed to express their opinions on matters pertaining to their own lives (Omokhabi, 2014). Women must be able to reproduce and have the autonomy to decide whether when and how frequently to become pregnant in order to have a fulfilling and safe sexual life. One of the primary benefits of this crucial aspect of health services is the well-being of

mothers their husband's families and the country as a whole (Mosha Mgimwa & Msuya 2017 in Omokhabi 2020).

Women Health, Reproductive Health and Lifestyle Modification through AI

AI is one of the most advanced technologies of the fourth industrial revolution (4lR) and it is used extensively in human activities along with robotics, Web3 blockchain, cloud computing, quantum computing, the Internet of Things (IoT) ,3D printing virtual reality (VR), augmented reality and biotechnology (Ojokheta & Omokhabi,2023). The delivery of health services has undergone a paradigm shift as a result of the incorporation of Artificial Intelligence (AI) into healthcare systems, especially in the area of personalised health interventions (Akkus, Cai, Boonrod, Zeinoddini, Weston, Philbrick & Erickson, 2019). AI has demonstrated great promise in supporting lifestyle changes necessary for preserving optimum health and reproductive functioning for women of reproductive age who undergo dynamic physiological and psychological changes. AI applications have grown in importance in the field of women's health particularly in fields like mental health support, prenatal monitoring and fertility tracking (Lee, Dupuis, Chen, Smith, & Kim, 2018). AI-powered wearable technology and mobile health (mHealth) applications allow for the ongoing monitoring of important health indicators like ovulation cycles, heart rate variability, sleep patterns, and eating habits (Zammit, 2023). With the use of these resources, women are better equipped to make decisions regarding their lifestyle and health. The delivery efficiency and personalisation of medical services are being improved by artificial intelligence (AI), which is quickly changing the healthcare landscape. AI is significantly improving early detection diagnostics and tailored health interventions in the context of women's health especially for women who are of reproductive age.

Reproductive and maternal health is one of the main fields where AI has had a significant influence. Recent technological developments in this area include the use of wearable devices (Zhu et *al* ,2021; Alzueta *at al* ,2022; Nulty et *al*,2022) to detect menstruation and fertility based on temperature changes (Grant, Newman & Kriegsfeld ,2020) and heart rate variability (HRV). For instance the Oura Ring monitors temperature heart rate (HR) and sleep cycle variations to track menstruation (Maijala, Kinnunen, Koskimäki , Jämsä & Kangas 2019). Another innovative wearable smart jewelry device that predicts fertility by measuring HRV is the Ava bracelet (Nulty et *al*,2022). These wearable gadgets distinguish between the luteal phase ovulation and menstruation among other physiological changes to forecast the stages of the menstrual cycle. Thus, enhancing awareness and prompt action regarding reproductive milestones, these technologies enable women to take an active role in their health decisions. AI-enabled algorithms can examine electronic health records (EHRs) to identify women who may be at risk for pregnancy complications like gestational, diabetes, preeclampsia and premature birth. Large-

scale dataset-trained machine learning models can anticipate health risks early, facilitating better attention during prenatal visits thus, promoting mental and emotional health of women.

Additionally, chatbots have been used in weight loss diet and physical activity interventions. According to a systematic review of nine studies chatbots were successful in boosting physical activity indicating that they could be used as a physical health intervention (Oh, Zhang, Fang & Fukuoka ,2021). In the context of sex education (Maeda et *al*,2020) and for particular populations such as pregnant women (Chung, Cho, & Park ,2021) recent studies have started to investigate chatbot interventions. According to the World Health Organisation (WHO) addressing issues of violence mental health, infertility, cancer and reproductive health is essential to enhancing women's health worldwide. The WHO stated in 2023 that a woman still dies from pregnancy or childbirth-related complications every two minutes AI chatbots can help women with particular health issues by providing individualized health education prompt reminders for health-related tasks and private consultations on delicate topics (WHO, 2021).

According to Stein and Brooks (2017) using an AI health coach is linked to weight loss that is on par with in-person lifestyle modifications. By using behavioural therapy, medication lifestyle modifications and if required surgery healthcare professionals can help people achieve and maintain a healthy weight while reducing their risk of obesity-related issues (Durrer Schutz *et al* 2019: Perdomo, Cohen, Sumithran, Clément & Frühbeck 2023) Artificial intelligence has the potential to revolutionise the treatment and management of obesity by putting creative approaches to this complex health issue into practice. AI algorithms are being used to develop personalised interventions, prediction models and decision support systems for healthcare professionals (Nashwan Abdi Hassan & AlBarakat, 2024). Large databases are used by these technologies to identify patterns forecast risk factors for obesity and provide individualized treatment plans based on user characteristics and medical history (Azmi *et al.*,2025). AI-powered solutions also make it possible to remotely monitor patients facilitating quick interventions and treatment plan modifications. Better patient outcomes and reduced healthcare costs can be achieved by healthcare professionals using AI to manage obesity more effectively and efficiently (Bays *et al*., 2023).

Furthermore the predictive capabilities provided by AI have the potential to address the following important issues: the lack of human resources and the need for focused health interventions such as in the areas of Sexually Transmitted Infections (STI) management and maternal health care (Young,Crowley & Vermund,2021). Furthermore there is a chance to advance access to diagnostic tools like blood pressure monitors (Festo *et al*. ,2023)and ultrasounds (Shen , Chen , Yue & Xu ,2021)by using AI to power software as a medical device

(Angehrn *et al.* ,2020) This is also evident in the rise of fertility and contraceptive software applications (McMillan ,2023 in Tamrat, Zhao, Schalet, AlSalamah, Pujari & Say, 2024).

AI systems have been widely proposed to offer individualised dietary advice particularly in the field of nutrition. A healthy lifestyle is essential for preventing the development of major non-communicable diseases (NCDs) including obesity cardiovascular disease (CVD) and type-2 diabetes (T2D) (Hyseni *et al*, 2017). Furthermore, healthy well-balanced meals are frequently included in treatment regimens to lessen the effects or prevent the progression of a number of diseases (Ford *et al*, 2018; Marsall, Engelmann, Teufel, & Bäuerle, 2023). In this sense AI programmes that are able to automatically suggest customised meal plans can greatly improve user's health. (Papastratis, *et al.*, 2024)

Research on AI-assisted invitro fertilization (IVF) is expanding quickly with the potential to enhance IVF efficiency and results through controlled ovarian stimulation (Letterie & Mac Donald, 2020) Additionally, AI is being used to personalize in vitro fertilization (IVF) treatments and enhance the accuracy of fertility assessments. Large-scale datasets can be analyzed by AI-driven tools to forecast the best stimulation schedules which could increase fertilization rates and oocyte quality (Olawade *et al* ,2025). Artificial intelligence (AI) can provide accurate objective analyses in sperm and oocyte quality assessment lowering subjectivity and standardizing inspections. AI can be used in embryo selection to evaluate morphological and time-lapse imaging data to help predict the viability of the embryo and possibly improve implantation results. AIs potential to enhance clinical outcomes however has not yet been validated by extensive carefully planned clinical trials. AI can also improve quality control and workflow optimization in IVF labs by enabling effective resource use and continuously tracking key performance indicators (KPIs) (Olawade *et al* ,2025).

Chatbots and virtual assistants driven by AI are incredibly helpful tools for women providing tailored support and information about menopausal symptoms. These AI systems support women in making well-informed choices about lifestyle changes and available treatments. AI is able to provide tailored advice for managing particular menopausal symptoms by analyzing enormous volumes of data from wearable technology personal health records and self-reported symptoms (Garg & Munshi, 2024). For instance, an AI-powered system called the MenoBot created by Smith *et al.* (2021) in Garg and Munshi (2024) can monitor a woman's sleep habits mood swings and hot flash frequency in order to recommend tailored interventions like dietary modifications lifestyle changes or hormone therapy. This idea is best illustrated which uses natural language processing to provide personalised recommendations on hormone therapy, alternative therapies and symptom management based on personal preferences and medical history.

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In a variety of ways including evaluating co-morbidities estimating the risk of chronic illnesses monitoring symptoms and assisting in treatment selection artificial intelligence (AI) holds promise for supporting menopause and post-reproductive health management (Ang & Hillard,2025)AI may be able to predict future risk of long-term complications like osteoporosis and cardiovascular disease for example by using genetic lifestyle and clinical data (Garg & Munshi ,2024) .Along with monitoring heart rate variability skin temperature sleep patterns mood swings and activity levels AI can also use data from wearable technology and symptom applications to give women real-time feedback about their health and possible menopausal symptom triggers. Consequently this can enable women to modify their individualized treatment plans including lifestyle changes cognitive behavioral therapy or therapeutic interventions thereby enhancing their quality of life (Garg & Munshi , 2024)

- With its individualised insights and tools artificial intelligence is transforming women's reproductive health especially in the area of lifestyle changes. AI-powered applications can help with fertility prediction, tracking menstrual cycles and even managing conditions like endometriosis and polycystic ovary syndrome (PCOS). Large user datasets are gathered and analysed by AI-powered menstrual tracking apps. To make highly accurate predictions about future menstrual cycles, machine learning models analyse past cycle data symptoms, basal body temperature and hormonal fluctuations. Sanyal (2025) lists the following as key methodologies:
- Data Aggregation: Users enter information about their symptoms mood swings lifestyle factors and the dates of their cycles start and end. Additional physiological data is provided by wearable technology (Bull , *et al*, 2019)
- Pattern Recognition: AI is able to identify anomalies in menstrual cycles and notify users of potential underlying medical conditions such as thyroid issues endometriosis or polycystic ovarian syndrome (PCOS). In order to seek prompt medical intervention this early detection is essential. Artificial intelligence detects trends and anomalies in menstrual cycles over time (Bhavana 2024)
- Predictive Analytics: AI forecasts future period's ovulation windows and possible fertility windows based on historical data and machine learning models. Over time more accurate predictions are produced by sophisticated algorithms that adjust to individual variances (Bhavana, 2024).

Barriers to AI Adoption for Women of Reproductive Age

The uptake of AI-driven health technologies by women of reproductive age is fraught with difficulties despite the technological

increasing benefits in encouraging lifestyle changes and enhancing health outcomes. The access acceptance and long-term use of AI tools are influenced by a variety of factors including systemic healthcare issues sociocultural dynamics technological limitations and financial constraints

- A major obstacle in the reproductive field is figuring out how to use AI in clinical settings most effectively, Neural networks, Decision Tree (DT), Support vector machines (SVMs) and other Machine Learning algorithms have been applied extensively and have produced positive outcomes. Modern machine learning algorithms like deep learning are still in their infancy and have not yet received enough research attention. Defects are linked to the use of AI in clinical settings. The inner workings of machine learning models are largely unknown making them a black box. Patients and clinicians' mistrust of AI may result from this opacity's ethical legal and liability concerns (Wang *et al* ,2019). The results should be attributable to the organisations and medical professionals who developed verified and oversaw the machine learning algorithms (Kohli et al. (2017).
- Risk of harm according to Mlodzinski *et al*. (2023) and Vijayakumar *et al.* (2023) reported negative consequences related to patient safety. Because the algorithm may produce false negative results in certain situations giving patients an incorrect sense of reassurance and delaying treatment the lack of accuracy in AI output was also viewed as a potential risk of harm by both patients and clinicians. The algorithm may however increase the amount of work and expenses involved in the treatment process if it is overly sensitive and produces false positive results (Chen *et al* ,2021: Choudhury ,2022).
- Regulatory barriers such as liability regulation governance and policy (Haider,2020; Zemplényi *et al*, 2023)
- data-related barriers such as the quality and availability of health data (Watson *et al*,2020; Zemplényi *et al*, 2023)
- the lack of system interoperability human factors such as lack of knowledge and skills (Klarenbeek 2020; Winter & Chico ,2023)
- Lack of explainability (Balch & Loftus 2023; and perceived substitution crisis (Hameed *et al.*,2023) are among the reported barriers influencing AI implementation.

Solutions through Policy and Multidisciplinary Approach

In order to solve this problem and guarantee that AI systems are fair and free of prejudice comprehensive approaches are needed and develop inclusive AI models, one crucial strategy is to actively gather data from underrepresented groups and use

representative and diverse datasets (Garcia-Saisoet al 2024). Implementing strong bias detection and correction techniques like fairness-aware machine learning also aids in locating and addressing biases in algorithms and data. More accountability is ensured by improving explainability and transparency which enables stakeholders to comprehend AI decision-making processes, when sociologist's, ethicists and representatives from underrepresented groups participate in inclusive development practices they offer insightful solutions to possible biases. (Garcia-Saisoet al 2024).

- Addressing concerns like data privacy, informed consent, algorithmic transparency and accountability requires the establishment of thorough ethical frameworks and guidelines (Obermeyer, Powers, Vogeli &, Mullainathan 2019: Mehrabi, Morstatter , Saxena , Lerman , & Galstyan ,2021)
- Trust-building factors included the technology's support from academically supported clinicians and experts including government regulators, proof of output accuracy based on AI evaluations and favourable comments from reputable thought leaders in the relevant clinical domains (Temsah, *et al*, 2023; Helenason , Ekström , Falk & Papachristou 2024)
- The involvement of patients in AI development is another way to foster trust. In addition to addressing worries about trust in data sharing this could promote public trust (Hickman, Baxter &Gilbert, 2021)
- Most notably governance was identified as a crucial enabling element that contributed to the full AI cycle. It is imperative to establish a governance framework to supervise the creation and application of AI from inception to execution with governance instruments offering direction on different phases of the procedure. Diverse professionals who can articulate accountability clearly including subtleties in responses to it should be part of governance (Wang, Asan & Mansouri ,2023; Helenason , Ekström , Falk & Papachristou 2024). Isbanner *et al.* (2022) emphasised how crucial it is to define accountability. Because ethical and governance challenges matter to the public this is particularly crucial in the healthcare industry. The governance body should comprise software developers, government officials ,health care medical practitioners and advocacy for patient groups according to Sunarti *et al.* (2021)

Conclusion

A promising area for enhancing the health and wellbeing of women of reproductive age is the nexus of lifestyle modification and artificial intelligence (AI). AI-driven tools and platforms are being used more and more to track daily routines offer personalised health insights and promote healthy behavioural changes in areas like mental

health, physical activity, nutrition and reproductive health management. In addition to providing scalable and easily accessible solutions these technologies facilitate early health risk identification which encourages preventive care. Though AI holds promise for transforming women's health it also brings up important issues related to algorithmic bias, data privacy, digital literacy and fair access. For AI interventions to be successfully incorporated into healthcare systems it is imperative that they be inclusive, ethically designed and culturally sensitive. To fully realize AIs potential to enable women of reproductive age to live healthier, there is need for cooperation among healthcare professionals, technologists and legislators.

Suggestions

While artificial intelligence (AI) has the potential to significantly improve women's health especially for those of reproductive age its effects depend heavily on data inclusivity ethical AI design and equitable distribution of digital resources. Future advancements must concentrate on addressing these disparities while leveraging AIs potential for personalised health management early diagnosis and preventive care. AI-driven lifestyle interventions have potential but there are still challenges to be solved. These include disparities in access to digital tools, a lack of culturally relevant content and the risk of relying too heavily on technology without adequate human oversight. Additionally, AI applications often require regular user participation and data input which can be hindered by privacy concerns and digital fatigue. AI technologies enable proactive convenient and customised health interventions and they offer helpful tools for modifying the lifestyle of women of reproductive age. However, in order to optimize their impact issues of accessibility equity and user engagement must be addressed and these tools must be supportively and ethically integrated into larger health systems. However, to ensure that these tools are effective and equitable steps must be taken to address the underlying infrastructure and data ethics issues. Legislators, medical professionals and data scientists must collaborate across disciplinary boundaries to translate predictive insights into meaningful and sustainable health outcomes. Many barriers stand in the way of the widespread adoption of artificial intelligence (AI) despite the fact that it has the potential to completely transform the lives of women of reproductive age. A comprehensive and inclusive approach is required to get past these challenges one that places a high priority on multi-sector collaboration inclusive AI design equitable access, digital empowerment and strong data protection frameworks. Such coordinated efforts are necessary before AI can be a truly empowering tool for women's health and well-being.

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