

## Integration of Artificial Intelligence in Midwifery Care: A Systematic Review

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**Received:** March 27, 2025; **Accepted:** April 05, 2025; **Published:** April 09, 2025**ABSTRACT**

**Introduction:** Maternal and child health provide critical indicators of the health status of a country. Despite gains made over the decades, challenges continue to plague health care systems, especially in some developing countries. The integration of Artificial Intelligence (AI) into midwifery practice can potentially offer innovative opportunities which can revolutionize the way care is delivered. This review aims to identify evidence of the use of AI to enhance midwifery practice thereby reducing maternal morbidity and mortality.

**Objective:** To determine the applicability of AI in midwifery practice to reduce maternal morbidity and mortality.

**Methods:** Ninety-one articles were obtained using key words artificial intelligence, artificial intelligence in midwifery practice, maternal morbidity and mortality, midwifery practice. Sources of data include Google Scholar and EBSCO host. A total of eight (23) articles met inclusion criteria using key terms.

**Results:** After inclusion/exclusion criteria was applied, 23 articles were selected. Seven (30.4%) addressed AI in midwifery, 7 (30.4%) health care, 4 (17.3%) use of AI in medicine, 2 (9%) AI, 1 (4.3%) deep learning, 1 (4.3%) International Federation of Midwives and 1 (4.3%) World Health Organization Fact Sheet

**Conclusion:** The literature is sparse with evidence of the application of AI in midwifery practice to aid in the reduction of maternal morbidity and mortality as well as its application in low-resourced countries of the Caribbean region. Based on the use of artificial intelligence by other professions such as medicine to identify and prevent maternal morbidity, its use in by midwives is likely to enhance midwifery practice.

**Keywords:** Artificial Intelligence in Midwifery Practice, Maternal Morbidity and Mortality, Midwifery Care, Ethics and Artificial Intelligence, Artificial Intelligence and Ethics.

**Introduction**

Maternal and child health provide critical indicators of the health status of a country. In spite of gains made over the decades, challenges continue to plague health care systems, especially in some developing countries. Two specific strategies of the Sustainable Development Goals which addresses maternal and child health include the reduction of global maternal mortality ratio to less than 70/1000,000 live births by 2030 and reducing neonatal mortality to 12/1,000 live births. The situation is made more complex due to the changing health landscape which was brought about by chronic communicable and non-communicable

diseases and the increasing use of digital health technologies have placed unprecedented challenges on health care systems [1]. Integrating Artificial Intelligence (AI) into maternal and neonatal health can potentially offer innovative opportunities which can revolutionize the manner in which care is delivered, thereby improving the short- and long-term outcome of mothers and neonates.

AI is defined as “a broad field of science encompassing not only computer science but also psychology, philosophy, linguistics and other areas” [2]. “The theory and development of computer systems able to perform tasks normally requiring human intelligence such as, visual perception, speech recognition, learning, decision-making, and natural language processing” [3,4]. AI, therefore, could be the appropriate mechanism to

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accomplish tasks which are normally performed by the natural human intelligence of the midwife resulting in effective decision making. The State of the World Midwifery Report informed that there is a global shortage of 900,000 midwives to deliver maternal and child health services WHO. This acute shortage of midwives can result in preventable maternal and neonatal deaths. Evidence relating to AI and maternal and neonatal health suggests that this technology can supplement the efforts of midwives in preventing preventable morbidity and mortality through timely and accurate interventions.

### Aims of Study

1. The aim of this study was to identify the extent to which artificial intelligence is integrated into midwifery practice.
2. To identify best practice which can be applied to midwifery services in a low-resourced Caribbean island

### Questions

1. Is AI integrated in midwifery care by midwives to reduce maternal morbidity and mortality?
2. Are midwives involved in the development of AI tools to be used in midwifery care?
3. What are the ethical considerations for the use of AI in midwifery care?

### Methodology

A systematic review uses repeatable, analytical methods to collect secondary data and analyze it. [5]. According to Islam, Mustafna, Mahmud and Khan, systematic reviews summarize, analyze and evaluate existing studies on particular research topics.

### Search strategy

The PRISMA checklist was used to guide the review. Seventy-six articles were obtained using key words artificial intelligence, artificial intelligence in midwifery practice, maternal morbidity and mortality, midwifery practice. Sources of data include Google Scholar and EBSCO host. Key words included artificial intelligence, midwifery care and artificial intelligence and ethics and artificial intelligence.

### Inclusion/exclusion criteria

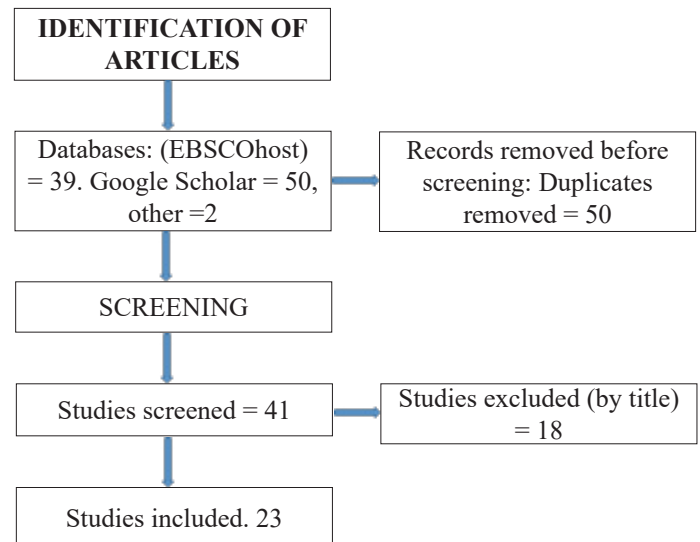
Only studies published within the past five years were included. After applying the eligibility criteria, 23 studies were considered eligible. Only studies related to the integration of AI in midwifery care, health care and obstetrics were included. Excluded were studies related to artificial intelligence in other disciplines not related to nursing and health care. These included systematic reviews and peer reviewed articles and reference material from the International Confederation of Midwives and the World Health Organization.

### Results

#### Midwifery care

The International Confederation of Midwives, defines the midwife as someone who successfully completed a midwifery course of study, acquired the essential competencies and is recognized as a midwife in the country [6]. This indicates that midwives must be educated in order to demonstrate clinical competence and critical thinking skills required in order to deliver quality midwifery care.

### Data Extraction



The international Confederation of Midwives outlined the philosophical underpinnings of midwifery care [6]. These inform that.

1. Pregnancy and childbearing are normal physiological processes and that the processes are personal to the woman and family the community and that the care given takes into consideration the socio-economic, physiological, and mental state of the family.
2. The midwife is best suited to deliver maternal and child-health services.
3. Midwifery care is planned in conjunction with the woman, it is respectful and non-dictatorial.

Subramanya concluded that the midwife has a unique role caring for new-borns and mothers [7]. The midwife provides supervisory functions to pregnant women during the prenatal, labor and the post-partum periods. Nove stated that midwives have the skill and competence to preserve the lives of women and children “at a scale unmatched by other health interventions” [8]. They supported this claim by stating that health care staff who are not trained in midwifery are unable to deliver quality midwifery services at an acceptable international standard [8].

In strengthening midwifery and childcare services, the World Health Organization issued the following key messages.

1. Midwives must be educated at international standards, licensed, regulated and forms part of the interdisciplinary team.
2. Midwives are integral to the improvement in health in areas such as immunization, reproductive and sexual health, communicable diseases and postpartum care.
3. Midwives provide care to women and their newborns under any circumstance.

Between 2000 and 2022, because of the intervention of midwives globally, maternal mortality ratio was reduced by 34% (WHO), Stoodley, agreed that midwives are supremely placed to assist in the bonding relationship between mother and infant because the duties of the midwife begin with pregnancy and ends 6-8 weeks postpartum.

In spite of the gallant effort of the midwife to deliver care to the pregnant family, the WHO highlighted challenges which occur globally but with greater frequency in developing countries. Challenges include.

1. In 2020, almost 800 women died from preventable causes related to pregnancy and childbirth daily.
2. A maternal death occurred almost every two minutes in 2020.
3. Almost 95% of all maternal deaths occurred in low and lower middle-income countries in 2020

According to the ICM “Midwives are the most appropriate providers of care to childbearing women [6]. With the advent of Artificial Intelligence and its rapid advancement, with the capacity to mimic human intelligence, are midwives still the most appropriate to deliver maternal and child health services? How efficient is AI to reduce maternal morbidity and mortality in midwifery practice?”

### **Integration of AI in Midwifery Care to Reduce Maternal Morbidity and Mortality**

Maternal health addresses the state of health of women during pregnancy, intranatal period and the postnatal period [9]. During these three phases, midwives work collaboratively with the pregnant family to safeguard the health of the woman and child. The midwife utilizes her knowledge and skills and work collaboratively with other members of the health team to reduce maternal and neonatal morbidity and mortality. Maternal mortality and morbidity are public health concerns. Maternal mortality is “the death of a woman while pregnant up to 42 days of termination of pregnancy [10]. Maternal complications which result in 75% of maternal death include, post-partum hemorrhage, elevated blood pressure, unsafe abortions, obstructed labor and infection [10]. Maternal morbidity ranges from most severe in cases where the woman survived a near death experience or complication during pregnancy to non-life-threatening conditions [11].

The literature is littered with information on the integration of AI to reduce maternal morbidity and mortality in medical practice, however, few articles addressed its integration in midwifery care. The scarcity of resources including adequate numbers of midwives to deliver quality midwifery care places maternal and child health services and by extension, countries, at risk. Sensor-based technologies can enhance capacities to deliver care and monitor patients [4]. AI can analyze data at a faster pace thereby identifying pre-existing health problems which place women who are at risk for complications. Digital devices are used to perform complex tasks and analyze clinical, medication, environmental and behavioral data [12]. Other areas of integration of AI in health care include the selection of sperm cell to assess the quality of oocytes [13].

### **The Involvement of Midwives in the Development of AI Tools**

In order to reduce the incidence of perinatal mortality, traditional midwives in Guatemala were involved in a low-cost technology using smart phones to for data collection during patient wellness visitation. A doppler transducer is connected to the smartphone and allowed the monitoring of the foetus. The signals generated accurately estimated gestational age as well as foetal heart rate

[14]. Because of the critical role midwives play in maternal and child health, it is deemed that they must possess applicable skills in order to identify complications of pregnancy and child birth. To aid the midwives of India and ultimately midwives in low-resourced countries, to acquire necessary skills, a safe delivery App was developed by the International Maternity Foundation and Neuvo Inc [15].

Nurses and midwives generate large volumes of data. They should be familiar with the data generated and the technologies they are using [16]. It now becomes necessary to acquire minimum competencies to validate algorithms thereby ensuring that AI technologies align with the best evidence-based midwifery practice [16]. In a systematic review Giaxi concluded that the use of AI in obstetrics and midwifery has predictive capabilities to identify pregnancy complications and to monitor fetal well-being when compared with traditional methods [17]. However, Giaxi further noted limitations such as biased with the algorithms and the need for standardized integration in clinical practice [17].

### **Ethical Implications of AI in Healthcare**

Although the application of AI in clinical practice has tremendous benefits, there are ethical issues for consideration [1]. One of these ethical concerns is the potential for bias in data algorithms which can ultimately discriminate against demographics. An algorithm used in healthcare in the United States, discriminated against black patients. The algorithm indicated that only 17.7% of black patients were high-risk resulting in much lower financial allocation to that demographic than the allocation for white patients. It was found however, that 46.5% were in the high-risk category [18]. This is not only an administrative and policy issue; it is of ethical concern [19]. AI will be beneficial to public health if ethical and human rights principles are upheld during the design and development of technologies and if existing health care biases such as race, ethnicity, age and gender are not injected into algorithms [1]. Findings of the EPRS indicated that the risks of using AI in health care includes the sharing of personal information without obtaining consent, repurposing data without the knowledge of patients, exposure of personal and sensitive data and cyberattacks [19].

### **Conclusion**

Midwives utilize knowledge and skills to reduce morbidity and mortality, however, based on the use of artificial intelligence by other professions such as medicine to identify and prevent maternal morbidity, hence prevent progression to mortality, its use in midwifery is likely to enhance midwifery practice. There is a gap in the literature and very little evidence of the application of AI in midwifery practice to aid in the reduction of maternal morbidity and mortality. No literature was found on AI in midwifery practice in the Caribbean, indicating the need to improve on the body of knowledge in that region. This is an indication that midwives are mainly consumers of evidence relating to AI rather than seeking, through research, to understand how care can be enhanced using the technology. This is important especially in an era of limited resources. The use of AI has the potential to revolutionize midwifery care by offering opportunities to further enhance maternal and child-health outcomes.

**References**

1. Naik N, Hameed BMZ, Shetty DK, Swain D, Shah M, et al. Legal and Ethical Consideration in Artificial Intelligence in Healthcare: Who Takes Responsibility? *Front. Surg.* 2022. 9: 862322.
2. Deolitte, Hilton G. *Deep Learning- A Technology with Potential to Transform Health Care.* 2018.
3. Office of Educational Technology. *Artificial Intelligence and the Future of Teaching and Learning.* 2018.
4. Mohamed M, Abuzaid M, Elshami W, Mc Fadden S. Integration of artificial intelligence into nursing practice. *Health and Technology.* 2022. 12: 1109-1115.
5. Nunn J, Chang S. What are Systematic Reviews? *Journal of Medicine.* 2020. 7: 5.
6. Kranz A, Abele H. The Impact of Artificial Intelligence (AI) on Midwifery Education. A Scoping Review *Healthcare (Basel).* 2024. 12: 1082.
7. Subramaniva G. Role of Nurses in Midwifery and Obstetrical Nursing. *Journal of Nursing Practices and Research (JNPR).* 2021. 1.
8. Novel A, Hoop-Bender P, Boyce M, Sarah Bar-Zeev S, Geeta Lal G, et al. The State of the World's Midwifery 2021 report: findings to drive global policy and practice. 2021. 19.
9. Khan M, Khurshid M, Vatsa M, Singh R, Duggal M, et al. On AI Approaches for Promoting Maternal and Neonatal Health in Low Resource Settings: A Review. *Front. Public Health.* 2022. 10: 880034.
10. World Health Organization. *Maternal Mortality.* 2024.
11. Leitao S, Manning E, Greene RA, Corcoran P. On behalf of the Maternal Morbidity Advisory Group. Maternal morbidity and mortality: an iceberg phenomenon. *International Journal of Obstetrics and Gynaecology.* 2022. 129: 402-411.
12. Hinton G. *Deep Learning-A Technology with the Potential to Transform Health Care.* *Journal of the American Journal Association.* 2018. 320: 1101-1102.
13. Bansod AR, Jha RK, More A, Rupa A, Fadnavis R. *Artificial Intelligence in Reproductive Medicine.* 2022.
14. Motie-Shirazi M, Sameni R, Rohloff P, Kawoq W, Katebi N, et al. Point-of-Care Real-Time Signal Quality for Fetal Doppler Ultrasound Using a Deep Learning Approach. *Machine Learning for Health.* 2023.
15. Frelsen A, Nyman T. How AI can aid safer births in resource-limited environments. *Health and Healthcare Systems.* 2024.
16. Bichel-Findlay J, Scanlon A. *Artificial intelligence in clinical practice – are nurses/midwives leading the way?* Australian Institute of Digital Health. 2024.
17. Giaxi P, Vivilaki V, Sarella A. *Artificial Intelligence and Machine Learning: An Updated Systematic Review of Their Role in Obstetrics and Midwifery.* *Cureus.* 2025. 17: 80394.
18. Takshi S. Unexpected Inequality: Disparate-Impact from Artificial Intelligence in Healthcare Decisions. *Journal of Law and Health.* 2021. 34.
19. European Parliamentary Research Service (EPRS) Scientific Foresight Unit (STOA). *Artificial intelligence in healthcare. Applications, Risks, and ethical and societal impacts.* Panel for the Future of Science and Technology. 2022.
20. O'Connor S, Yan Y, Thilo FJS, Felzmann H, Dowding D, et al. Artificial intelligence in nursing and midwifery: A systematic review. *J Clin Nurs.* 2023. 32: 2951-2968.
21. Stoodley C, McKellar L, Ziaian T, Steen M, Fereday J, et al. The role of midwives in supporting the development of the mother-infant relationship: a scoping review. *BMC Psychol.* 2023. 11: 71.
22. The Royal College of Midwives. *High Quality Midwifery Care.* 2014