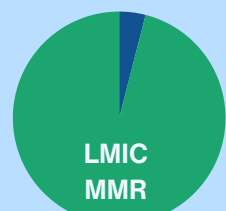


UTILISATION OF ARTIFICIAL INTELLIGENCE IN MATERNAL CARE: A SCOPING REVIEW IN LOW- AND MIDDLE-INCOME COUNTRIES

1. Muhammad Rizky Widodo
Master of Public Health Program Student, Faculty of Medicine Nursing and Health Science, Monash University, Indonesia
2. Muhammad Fahmi Gozal Henggardhani
Master of Data Science Program Student, Faculty of Information Technology, Monash University, Indonesia
3. Ardelia Bertha Prastika
Midwifery Study Program Student, Faculty of Medicine, Universitas Airlangga, Indonesia
Contact: mwid0009@student.monash.edu

Presented on Prince Mahidol Award Conference | Bangkok, 31 January - 2 February 2025

INTRODUCTION



- 94% of maternal deaths occur in low and middle-income countries (LMICs)
- 810 daily preventable fatalities occurred



- The emergence of digital technology and e-health initiatives creates vast health data reservoirs
- The application of artificial intelligence (AI) in this domain remains sporadic



This scoping review aims to compile and synthesize existing research on AI in maternal health within LMIC context

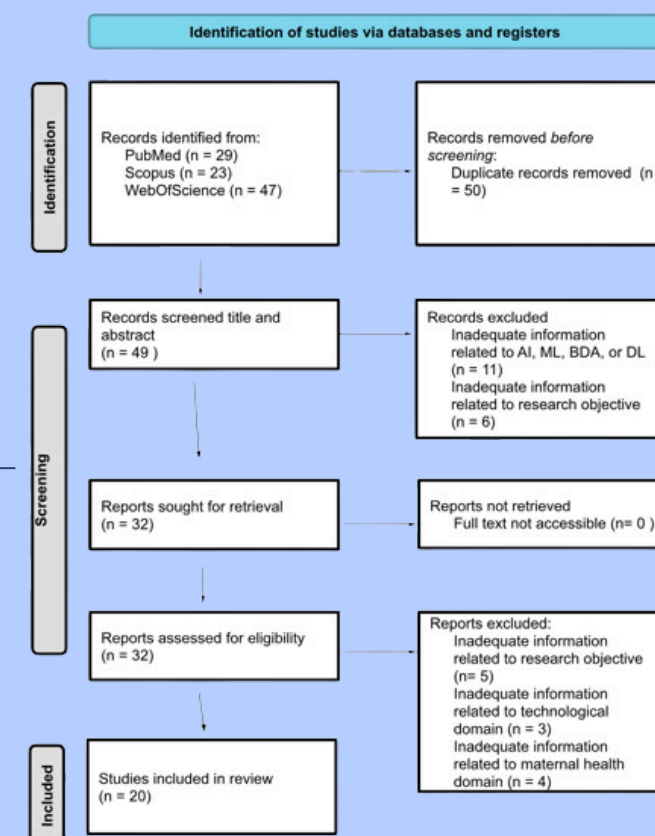
METHODS

Evidence Search Strategy

- Concept 1:** Artificial Intelligence, Big Data Analytics, Machine Learning, Deep Learning, and its synonyms
- Concept 2:** Public Health and its synonyms
- Concept 3:** Maternal Health and its synonyms
- Concept 4:** Low-middle-income countries list
- Database:** Scopus, Web of Science, and PubMed
- Process:** Using PRISMA ScR Guideline
 - Quality Assessment --> Data Extraction --> Analysis

Inclusion Criteria

Criteria	Inclusion Descriptor
Population	Women in Prenatal, Antenatal, and Postnatal Period
Concept	Technological domain: AI, BDA, ML, and DL Maternal domain: Pre, ante, and postnatal
Context	LMICs
Types of evidence sources	All type of studies except review studies
Language	English
Publication Year	2000 and onwards



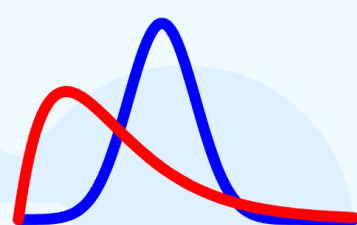
RESULTS : 20 Articles Included in Review

1. Maternal Risk Prediction

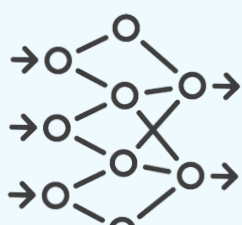
- Nine articles focused on predicting maternal outcomes using AI.
- Seven studies demonstrated that AI outperformed traditional methods by considering interactions among various features.

PROPHET

- Prophet Model**
- Analyze time series data
- successfully forecasting maternal mortality rates despite missing data.



- Bayesian Analysis**
- to reveal regional inequities guiding policymakers in tailoring interventions.



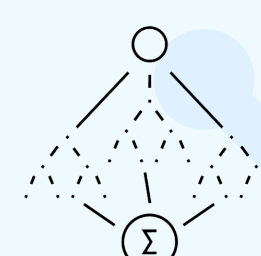
- Hybrid model**
- Combining artificial neural networks (ANN) and Random Forest
- Showed improved accuracy in risk classification

2. Healthcare Utilisation

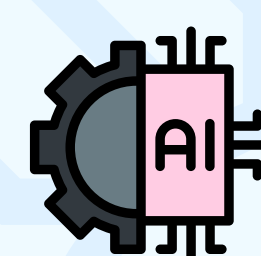
- Seven articles examined the use of AI to assess maternal care utilization.



- CART analysis**
- Identified vulnerable sub-groups
- based on a combination of social determinant factors

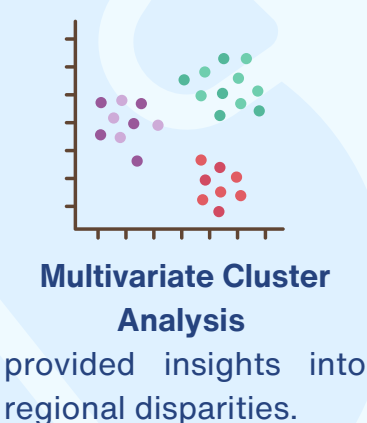


- Random Forest**
- Exhibited higher precision in predicting dropout rates in MNCH services.
- These models uncovered previously hidden relationships in demographic health survey data

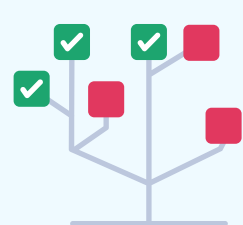


- Logistic, Random Forest, and Neural Network**
- predicted delivery locations with 68-77% accuracy, facilitating timely support for at-risk women.

3. Program Evaluation



- Multivariate Cluster Analysis**
- provided insights into regional disparities.



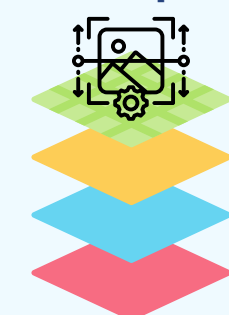
- Classification trees**
- were employed to select appropriate variables for regression models, addressing the complexity of maternal health evaluations



- High-resolution mapping**
- revealed significant geographic disparities in maternal and child health (MCH) service coverage

4. Low-resource Diagnosis

- One article focused on low-resource diagnostics, presenting a deep learning approach

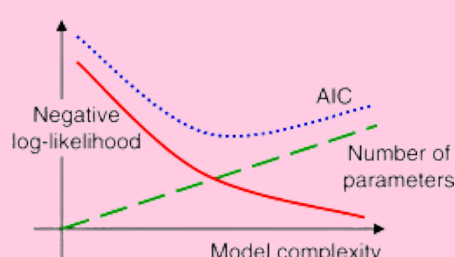


- Deep learning approach** was utilised for automated fetal head detection and circumference estimation using free-hand ultrasound.
- This method addresses the shortage of trained sonographers in resource-limited settings
- Enhancing fetal monitoring capabilities with low specification of computer needed to processing

DISCUSSION

60% - 90%

Accuracy



- This scoping review underscores the potential of artificial intelligence (AI).
- AI particularly machine learning (ML) models were used in creating prediction model, with accuracy rates ranging from 60% to 90%.
- Key considerations for successful AI implementation include the principle of parsimony, favoring simpler models
- Careful consideration must be put in aligning algorithm selection with data scale and transformation processes
- The findings also highlight the implications for SatuSehat system, health data repository opportunity
- The Indonesian government should facilitate access to this data, enabling interventions that leverage AI and big data to enhance maternal health outcomes



CONCLUSION

This review highlights significant progress in using digital technology to enhance maternal healthcare in LMIC. The focus on ML models reveals opportunities for advancements in predictive modelling, indicating a promising future for digital maternal health.

REFERENCES AND MISCELLANEOUS



Please access list of references and full presentation by scanning this QR Code

Contact: mwid0009@student.monash.edu