

Combined Supporting Information

Artificial Intelligence-Enabled Maternal and Fetal Monitoring Devices in Pregnancy: A Global Scoping Review and Evidence Mapping

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Supplementary File S1. Full database-specific search strategies

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Supplementary File S1. Full database-specific search strategies

The electronic searches covered PubMed/MEDLINE, Web of Science Core Collection, and Dimensions from 1 January 2010 through 31 May 2026, and Scopus from 1 January 2010 through 31 December 2025. No language restriction was applied during database searching. Reference lists and forward citations of included studies and relevant reviews were also screened.

PubMed/MEDLINE

("artificial intelligence"[MeSH Terms] OR "machine learning"[MeSH Terms] OR "deep learning"[Title/Abstract] OR "neural network*" [Title/Abstract] OR "convolutional neural network*" [Title/Abstract] OR "computer vision"[Title/Abstract] OR "artificial intelligence"[Title/Abstract] OR "machine learning"[Title/Abstract] OR "algorithm*" [Title/Abstract] OR "automated interpretation"[Title/Abstract] OR "AI-enabled"[Title/Abstract] OR "AI-powered"[Title/Abstract] OR "AI-assisted"[Title/Abstract] OR "AI-augmented"[Title/Abstract]) AND ("fetal monitor*" [Title/Abstract] OR "foetal monitor*" [Title/Abstract] OR "maternal monitor*" [Title/Abstract] OR "cardiotocograph*" [MeSH Terms] OR "cardiotocograph*" [Title/Abstract] OR "CTG"[Title/Abstract] OR "electronic fetal monitor*" [Title/Abstract] OR "fetal heart rate"[MeSH Terms] OR "fetal heart rate"[Title/Abstract] OR "fetal surveillance"[Title/Abstract] OR "obstetric ultrasound"[Title/Abstract] OR "point-of-care ultrasound"[Title/Abstract] OR "POCUS"[Title/Abstract] OR "wearable monitor*" [Title/Abstract] OR "wearable sensor*" [Title/Abstract] OR "remote fetal monitor*" [Title/Abstract] OR "antepartum monitor*" [Title/Abstract] OR "intrapartum monitor*" [Title/Abstract] OR "non-stress test*" [Title/Abstract] OR "uterine contraction monitor*" [Title/Abstract] OR "preeclampsia monitor*" [Title/Abstract] OR "handheld ultrasound"[Title/Abstract]) AND ("pregnancy"[MeSH Terms] OR "pregnancy"[Title/Abstract] OR "pregnant wom*" [Title/Abstract] OR "obstetric*" [Title/Abstract] OR "prenatal"[Title/Abstract] OR "antenatal"[Title/Abstract] OR "intrapartum"[Title/Abstract] OR "maternal"[Title/Abstract] OR "perinatal"[Title/Abstract])

Scopus

TITLE-ABS-KEY("artificial intelligence" OR "machine learning" OR "deep learning" OR "neural network*" OR "convolutional neural network*" OR "computer vision" OR "automated interpretation" OR "AI-enabled" OR "AI-powered" OR "AI-assisted" OR "AI-augmented") AND TITLE-ABS-KEY("fetal monitor*" OR "foetal monitor*" OR "maternal monitor*" OR "cardiotocograph*" OR "CTG" OR "electronic fetal monitor*" OR "fetal heart rate" OR "fetal surveillance" OR "obstetric ultrasound" OR "point-of-care ultrasound" OR "POCUS" OR "wearable monitor*" OR "wearable sensor*" OR "remote fetal monitor*" OR "antepartum monitor*" OR "intrapartum monitor*" OR "non-stress test*" OR "uterine contraction monitor*" OR "preeclampsia monitor*" OR "handheld ultrasound") AND TITLE-ABS-KEY("pregnancy" OR "pregnant wom*" OR "obstetric*" OR "prenatal" OR "antenatal" OR "intrapartum" OR "maternal" OR "perinatal") AND PUBYEAR > 2009 AND PUBYEAR < 2026

Web of Science Core Collection and Dimensions

("artificial intelligence" OR "machine learning" OR "deep learning" OR "computer vision" OR "AI-assisted" OR "AI-enabled") AND ("fetal monitor" OR "electronic fetal monitoring" OR "cardiotocography" OR "CTG" OR "fetal heart rate monitoring" OR "obstetric ultrasound" OR "point-of-care ultrasound" OR "POCUS" OR "wearable monitor" OR "wearable sensor" OR "remote monitoring") AND (pregnancy OR antenatal OR obstetric* OR maternal)

Additional searching: reference lists of included studies and relevant reviews were screened, and forward citation searching was undertaken.

Supplementary File S2. Completed PRISMA-ScR checklist

Primary reporting checklist for this scoping review. Page numbers refer to the revised manuscript submitted with this supporting-information file.

Section	Topic	Item	Checklist requirement	Reported location
TITLE	Title	1	Identify the report as a scoping review.	p. 1
ABSTRACT	Structured summary	2	Summarize background, objectives, eligibility, sources, charting, results, and conclusions.	pp. 1-2
INTRODUCTION	Rationale	3	Explain the rationale and why a scoping review approach fits the question.	pp. 2-4
INTRODUCTION	Objectives	4	State the review questions and objectives with their key elements.	p. 5
METHODS	Protocol and registration	5	State whether a protocol or registration exists and where it is available.	p. 5, Review design. Retrospective OSF registration: 10.17605/OSF.IO/EPK73
METHODS	Eligibility criteria	6	Specify eligibility characteristics, including dates, language, publication status, and rationale.	pp. 6-7
METHODS	Information sources	7	Describe all information sources, coverage dates, and the most recent search.	p. 7
METHODS	Search	8	Provide a reproducible electronic search strategy and limits.	Supplementary File S1
METHODS	Selection of sources of evidence	9	Describe screening and eligibility procedures.	p. 7, Study selection
METHODS	Data charting process	10	Describe data charting, verification, disagreement resolution, and investigator contact where relevant.	p. 8, Data collection process
METHODS	Data items	11	List the variables sought and relevant assumptions or simplifications.	p. 8, Data collection process
METHODS	Critical appraisal of individual sources	12	If appraisal was done, explain why, how, and how it informed synthesis.	p. 9, Critical appraisal. No formal quality-based exclusion was undertaken.
METHODS	Synthesis of results	13	Describe how charted data were handled and summarized.	pp. 8-9, Evidence synthesis
RESULTS	Selection of sources of evidence	14	Report numbers screened, assessed, excluded, and included, ideally with a flow diagram.	pp. 9-10 and Figure 1
RESULTS	Characteristics of sources of evidence	15	Present characteristics of each included source with citations.	pp. 11-13, Table 1
RESULTS	Critical appraisal within sources	16	If formal appraisal was done, present its results.	Not applicable. No formal critical-appraisal score or risk-of-bias assessment was undertaken.
RESULTS	Results of individual sources	17	Present relevant charted results for each included source.	pp. 11-18, Table 1 and narrative results
RESULTS	Synthesis of results	18	Present the charted results in relation to the review questions and objectives.	pp. 19-21, Tables 2-3, Figure 2, and narrative synthesis
DISCUSSION	Summary of evidence	19	Summarize the main evidence and its relevance to the review questions and key groups.	pp. 21-26
DISCUSSION	Limitations	20	Discuss limitations of the scoping-review process.	pp. 26-27, Strengths and limitations
DISCUSSION	Conclusions	21	Interpret the findings and describe implications or next steps.	p. 27
FUNDING	Funding	22	Describe review funding and, where charted, funding of included sources and funder roles.	p. 28, Funding. The review received no external funding.

Checklist source: Tricco AC, Lillie E, Zarin W, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med*. 2018;169:467-473. doi:10.7326/M18-0850.

Supplementary File S3. Completed PRISMA 2020 checklist

PRISMA 2020 was used as a supplementary reporting cross-check. PRISMA-ScR is the primary reporting guideline for this scoping review. Items specific to meta-analysis, formal risk-of-bias assessment, reporting-bias assessment, and certainty grading are marked not applicable where those procedures were not undertaken.

Section	Topic	Item	Checklist requirement	Reported location
TITLE	Title	1	Identify the report as a review.	p. 1, identified specifically as a scoping review
ABSTRACT	Abstract	2	Report the PRISMA abstract elements.	pp. 1-2
INTRODUCTION	Rationale	3	Describe the rationale in the context of existing knowledge.	pp. 2-4
INTRODUCTION	Objectives	4	State the review objectives or questions explicitly.	p. 5
METHODS	Eligibility criteria	5	Specify inclusion and exclusion criteria and grouping used for synthesis.	pp. 6-7
METHODS	Information sources	6	List all sources searched and the date or coverage of the searches.	p. 7
METHODS	Search strategy	7	Present full search strategies, filters, and limits.	Supplementary File S1
METHODS	Selection process	8	Describe how eligibility decisions were made and reviewer involvement.	p. 7, Study selection
METHODS	Data collection process	9	Describe data collection, reviewer involvement, verification, and investigator contact.	p. 8, Data collection process
METHODS	Data items: outcomes	10a	List and define outcomes or implementation domains sought.	p. 8, Data collection process
METHODS	Data items: other variables	10b	List other variables sought and any assumptions for unclear information.	p. 8, Data collection process
METHODS	Study risk of bias assessment	11	Describe formal risk-of-bias methods if used.	Not applicable. No formal risk-of-bias assessment was undertaken in this scoping review; see p. 9, Critical appraisal.
METHODS	Effect measures	12	Specify effect measures used for outcome synthesis.	Not applicable. No meta-analysis or pooled effect estimation was undertaken.
METHODS	Synthesis methods	13a	Describe how studies were assigned to each synthesis.	pp. 8-9, Evidence synthesis
METHODS	Synthesis methods	13b	Describe data preparation or conversions used before synthesis.	pp. 8-9; descriptive synthesis only
METHODS	Synthesis methods	13c	Describe tabulation and visual-display methods.	pp. 10-21, Figures 1-2 and Tables 1-3
METHODS	Synthesis methods	13d	Describe synthesis methods and rationale, including meta-analysis methods if relevant.	pp. 8-9, Evidence synthesis; meta-analysis was not performed
METHODS	Synthesis methods	13e	Describe methods used to explore heterogeneity.	Not applicable. No quantitative heterogeneity analysis was undertaken.
METHODS	Synthesis methods	13f	Describe sensitivity analyses.	Not applicable. No sensitivity analysis was undertaken.
METHODS	Reporting bias assessment	14	Describe assessment of bias from missing results if performed.	Not applicable. No formal reporting-bias assessment was undertaken.
METHODS	Certainty assessment	15	Describe certainty or confidence assessment if performed.	Not applicable. No formal certainty grading was undertaken.
RESULTS	Study selection	16a	Report the search and selection results, ideally with a flow diagram.	pp. 9-10 and Figure 1
RESULTS	Study selection	16b	Cite and explain apparently eligible studies that were excluded.	p. 22, discussion of Stringer et al. as contextual evidence excluded from the review
RESULTS	Study characteristics	17	Cite each included study and present its characteristics.	pp. 11-13, Table 1
RESULTS	Risk of bias in studies	18	Present formal risk-of-bias assessments if performed.	Not applicable. No formal risk-of-bias assessment was undertaken.
RESULTS	Results of individual studies	19	Present relevant results for each included study.	pp. 11-18, Table 1 and narrative results
RESULTS	Results of syntheses	20a	Summarize characteristics and limitations of studies contributing to each synthesis.	pp. 19-21 and pp. 21-26
RESULTS	Results of syntheses	20b	Present results of statistical syntheses.	Not applicable. No meta-analysis was undertaken.
RESULTS	Results of syntheses	20c	Present investigations of causes of heterogeneity.	Not applicable.
RESULTS	Results of syntheses	20d	Present sensitivity-analysis results.	Not applicable.
RESULTS	Reporting biases	21	Present reporting-bias assessments if performed.	Not applicable.
RESULTS	Certainty of evidence	22	Present certainty assessments if performed.	Not applicable.
DISCUSSION	Discussion	23a	Interpret results in the context of other evidence.	pp. 21-26
DISCUSSION	Discussion	23b	Discuss limitations of the included evidence.	pp. 21-27
DISCUSSION	Discussion	23c	Discuss limitations of the review process.	pp. 26-27, Strengths and limitations
DISCUSSION	Discussion	23d	Discuss implications for practice, policy, and future research.	pp. 25-27
OTHER INFORMATION	Registration and protocol	24a	Provide review registration information or state that the review was not registered.	p. 5, retrospective OSF registration: 10.17605/OSF.IO/EPK73
OTHER INFORMATION	Registration and protocol	24b	State where the protocol is available or whether no separate protocol was prepared.	p. 5. Retrospective OSF registration is reported; no separate prospective protocol is described in the manuscript.
OTHER INFORMATION	Registration and protocol	24c	Describe amendments to registration or protocol information.	Not applicable. No amendments are reported.
OTHER INFORMATION	Support	25	Describe financial or non-financial support and funder roles.	p. 28, Funding
OTHER INFORMATION	Competing interests	26	Declare competing interests of review authors.	p. 29, Conflicts of Interest

Section	Topic	Item	Checklist requirement	Reported location
OTHER INFORMATION	Availability of data, code and materials	27	State which review materials are available and where.	p. 29, Data Availability Statement and Supplementary Materials; Supplementary Files S1-S3

Checklist source: Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. 2021;372:n71. doi:10.1136/bmj.n71. PRISMA 2020 checklist licensed under CC BY 4.0.