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Maternal near-miss classification tools: a systematic review protocol

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ADMINISTRATIVE INFORMATION

Support - This review received no specific grant from any funding agency in the public, commercial or not-for-profit sectors. The study is being conducted as part of an academic research initiative.

Review Stage at time of this submission - Formal screening of search results against eligibility criteria.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 22 February 2026 and was last updated on 22 February 2026.

INTRODUCTION

Review question / Objective The main aim of this systematic review is to identify and describe existing maternal near-miss classification tools and criteria used globally. To this end, the proposed systematic review will address the question: What classification tools have been developed or used to identify and categorize maternal near-miss (MNM) cases in healthcare settings?

Rationale Maternal near-misses (MNM) are widely recognized as an important indicator of maternal health and the quality of obstetric care (Gliozheni & Gliozheni, 2020; Kurjak et al., 2023). Unlike maternal mortality, which occurs less frequently, near-miss cases are more common (Heitkamp et al., 2021; Leitao et al., 2022). To support the global monitoring efforts, the World Health Organization (WHO) developed and established a standardized maternal near-miss tool

and criteria, which have been widely adopted and adapted in different settings (W.H.O., 2009; Heemelaar et al., 2019). However, the universal application of the WHO tool remains challenging, especially in low-resource settings where necessary laboratory tests or organ dysfunction indicators are unavailable (Tura et al., 2019). Studies (Nelissen et al., 2013; van den Akker et al., 2013) also indicate that certain severe complications that commonly contribute to MNM in specific regions are also not fully captured by the WHO criteria. As a result, some countries and researchers have adapted the WHO framework to better align with local contexts and resource constraints (Tura et al., 2019).

Despite the existence of the WHO maternal near-miss classification tool and its context-specific adaptations, there is no comprehensive systematic review that consolidates and critically evaluates all the available MNM classification tools. This gap in evidence limits understanding of their methodological variations, contextual

appropriateness and practical usability. Therefore, this systematic review seeks to identify, compare and appraise all available maternal near-miss classification tools to inform research, policy and future efforts toward standardization.

Condition being studied Maternal near-miss refers to a woman who nearly died but survived a life-threatening complication during pregnancy, childbirth or within 42 days of termination of pregnancy (W.H.O., 2009; Heemelaar et al., 2019; Tura et al., 2019). These severe complications may include hemorrhage, hypertensive disorders, sepsis, obstructed labor or organ dysfunction (Nelissen et al., 2013; van den Akker et al., 2013). Maternal near-miss cases are increasingly used as an alternative or complementary indicator to maternal mortality because they occur more frequently and allow direct assessment of healthcare quality and responsiveness (Tura et al., 2019). Identification of MNM cases depends on specific classification criteria, which include clinical, laboratory or management-based indicators (Nelissen et al., 2013). This review focuses on the classification tools used to define and categorize maternal near-miss cases in healthcare and research settings.

METHODS

Search strategy A comprehensive systematic search was conducted across multiple electronic databases to identify relevant studies on maternal near-miss classification tools. The databases searched included PubMed/MEDLINE, EBSCOhost, CINAHL Complete, Scopus, ScienceDirect, Wiley Online Library, African Journals Online (AJOL), Springer Nature Link, Taylor & Francis Online and Google Scholar. The search strategy was developed in accordance with the PRISMA-S guideline. Key concepts informing the search included maternal near-miss, severe maternal morbidity, classification, criteria, tool and validation. Relevant keywords, synonyms and spelling variations were identified and combined using Boolean operators (AND, OR). Controlled vocabulary terms such as Medical Subject Headings (MeSH) were incorporated where applicable. The initial search strategy was developed in PubMed and subsequently adapted to the syntax requirements of the other databases. Truncation, phrase searching and appropriate field tags were applied where necessary. Searches covered studies published from database inception to December 2025. The full search strategies were documented to ensure transparency and reproducibility. A comprehensive search strategy

was developed using keywords and controlled vocabulary related to maternal near-miss and classification tools. Grey literature and reference lists of included studies will also be screened.

Participant or population The population includes pregnant women, women in childbirth or women within 42 days postpartum who experienced severe maternal complications classified as maternal near-miss according to the established classification tool. The review focuses on classification tools developed or applied to identify and categorize maternal near-miss cases in this population. Studies conducted in hospital-based, community-based or national surveillance settings will be considered.

Intervention The intervention of interest is the maternal near-miss (MNM) classification tool or criteria used to identify and categorize severe maternal morbidity cases. This includes the World Health Organization (WHO) maternal near-miss criteria, adapted versions of the WHO tool and alternative classification approaches developed or applied in different settings.

Comparator No specific comparator is predefined. However, where studies report comparisons between different maternal near-miss classification tools or criteria, these comparisons will be extracted and explored.

Study designs to be included This review will include observational studies, methodological or validation studies, tool development studies, surveillance reports and mixed-method studies that describe or apply maternal near-miss classification criteria. Systematic reviews will be screened for relevant references but will not be included in the final synthesis.

Eligibility criteria

Inclusion criteria:

1. Studies describing, developing, validating, adapting or applying maternal near-miss classification tools or criteria.
2. Studies conducted in healthcare or surveillance settings involving maternal near-miss cases.
3. Peer-reviewed articles and relevant grey literature.

Exclusion criteria:

1. Studies focusing solely on maternal mortality without reference to maternal near-miss criteria.
2. Editorials, commentaries, conference abstracts without full text and opinion papers.
3. Animal studies.

Information sources The following electronic databases were searched: PubMed/MEDLINE, EBSCOhost, CINAHL Complete, Scopus, ScienceDirect, Wiley Online Library, African Journals Online (AJOL), Springer Nature Link, Taylor & Francis Online, and Google Scholar. Grey literature sources were also considered, including reports from international organizations such as the World Health Organization and institutional repositories. Reference lists of all included studies will be manually screened to identify additional relevant articles. Where necessary, corresponding authors will be contacted to clarify methodological details or obtain missing information.

Main outcome(s) The primary outcomes of this review are the identification and characterization of maternal near-miss (MNM) classification tools and criteria. Specifically, the review will extract and synthesize information on the name and origin of the tool; conceptual framework (e.g., organ dysfunction-based, disease-specific or management-based criteria); required clinical, laboratory and management indicators; diagnostic thresholds and the context of development or application. Where available, measures of validity, reliability, sensitivity, specificity, or agreement will be documented. Outcomes are descriptive and methodological in nature, focusing on the structure, components and application of the classification tools rather than clinical effect measures.

Additional outcome(s) Additional outcomes will include the feasibility and applicability of maternal near-miss classification tools in different resource settings, particularly in low- and middle-income countries. Reported strengths and limitations of each tool will be documented, including practical challenges related to laboratory requirements, data availability and implementation constraints.

Data management All identified records will be imported into Zotero reference management software for deduplication. Deduplicated records will be subsequently exported to Rayyan to facilitate the screening process. Two independent reviewers will conduct title/abstract screening followed by full-text review to determine eligibility. Data extraction will be performed independently by the two reviewers using a standardized and piloted data extraction form. Extracted data will include the study characteristics, type of maternal near-miss classification tool, conceptual framework and specific indicators and thresholds used. Any discrepancies between reviewers will be resolved

through discussion and where necessary, consultation with a third reviewer.

Quality assessment / Risk of bias analysis

Methodological quality will be assessed using appraisal tools appropriate to each study design from the Joanna Briggs Institute. For tool development or validation studies, relevant methodological appraisal frameworks will be applied to assess rigor, clarity of criteria and reporting quality. Two reviewers will independently conduct the quality assessment, with disagreements resolved through discussion or by consulting a third reviewer.

Strategy of data synthesis A narrative synthesis approach will be employed due to anticipated heterogeneity in study designs, settings, and classification criteria. Findings will be summarized in structured tables detailing tool name, year of development, conceptual framework, criteria used, context of application, and validation status. Similarities and differences between tools will be critically compared. A meta-analysis is not planned, as the review focuses on methodological and structural characteristics rather than pooled quantitative effect estimates. A systematic review of peer-reviewed literature on maternal near-miss tools which includes published and unpublished studies will be conducted.

Subgroup analysis Where sufficient data are available, subgroup analyses will be conducted based on geographic region, type of classification approach and healthcare setting.

Sensitivity analysis Sensitivity analysis will be conducted by excluding studies assessed as having low methodological quality to evaluate the robustness and consistency of the findings.

Language restriction No language restrictions will be applied. Studies published in any language will be considered eligible for inclusion. Where necessary, professional translation services or native speakers will be consulted.

Country(ies) involved Ghana.

Other relevant information This review will be conducted and reported in accordance with the PRISMA 2020 guidelines. Registering this protocol promotes methodological transparency, reduces duplication of efforts and strengthens the credibility of the review process.

Keywords Maternal near-miss, Severe maternal morbidity, Classification tools, Criteria.

Dissemination plans Findings will be submitted for publication in a peer-reviewed journal and presented at relevant maternal health and public health conferences. Results will also be disseminated to policymakers, clinicians and maternal health stakeholders to inform evidence-based practice and future development or standardization of maternal near-miss classification tools.

Contributions of each author

Author 1 - Daisy Afra Lumor - Conceived the study, developed the protocol, designed the search strategy, conducted the literature search and drafted the manuscript.

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Author 4 - Veronica Millicent Dzomeku - Provided subject-matter expertise in maternal health, supervised the study and critically reviewed the manuscript.

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