

Optimising Maternal and Fetal Health: The Crucial Role of Midwives in Early Detection and Intervention of Pre-eclampsia

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DOI: [10.22178/pos.92-5](https://doi.org/10.22178/pos.92-5)

LCC Subject Category: R5-920

Received 29.04.2023

Accepted 28.05.2023

Published online 31.05.2023

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Abstract. Pre-eclampsia is a severe disorder that can affect the health of pregnant women and their unborn babies. Early detection and appropriate interventions are crucial to prevent severe complications. In this context, the role of midwives is essential in managing pre-eclampsia. This study aims to explore the role of midwives in the early detection and intervention of pre-eclampsia. The research method employed in this study is a Systematic Literature Review utilising academic journal search engines from online databases such as PubMed, Web of Science, and Scopus, published between 2007 and 2022. The role of midwives in the early detection and intervention of pre-eclampsia is essential to ensure that the condition is identified and managed effectively to safeguard the health of both the mother and the baby. Research findings indicate that midwives possess good knowledge of the signs and symptoms of pre-eclampsia, as well as early detection methods such as blood pressure measurement and monitoring vital signs. Midwives are also recognised to be critical in managing pre-eclampsia, including using safe and effective medications, appropriate medical interventions, and monitoring and addressing potential complications. Enhancing knowledge, skills, and interprofessional collaboration is critical to effectively managing pre-eclampsia. Through these measures, it is hoped that complications associated with pre-eclampsia can be reduced and healthier pregnancy outcomes can be achieved. However, midwives face several challenges in the early detection of pre-eclampsia, such as limited resources and infrastructure. Therefore, efforts are needed to enhance the knowledge and skills of midwives in monitoring and interpreting laboratory test results, such as urine protein levels.

Keywords: Pre-eclampsia; Early detection; Intervention; Midwives; Pregnancy complications.

INTRODUCTION

Maternal mortality remains a significant issue in public health. The global maternal death rate continues to rise yearly, with an estimated Maternal Mortality Ratio of 211 per 100,000 live births, resulting in approximately 295,000 maternal deaths worldwide [1]. Particularly in developing countries, at least 800 women die daily due to complications during pregnancy and childbirth. According to the World Health Organization, in 2016, the Maternal Mortality Rate in developing countries reached 415 per 100,000 live births. This figure is approximately 40 times

higher than in European countries and nearly 60 times higher than in developed nations [2]. WHO also estimates that half a million women die yearly due to pregnancy-related causes, with 99% of these deaths occurring in developing countries [3]. Approximately 75% of maternal deaths are caused by direct obstetric complications, including haemorrhage (27%), hypertension (14%), sepsis (11%), abortion (8%), embolism (3%), and other direct causes [2].

One of the causes of maternal death is pre-eclampsia. Pre-eclampsia is a significant health problem in Indonesia. According to data from the Indonesian Ministry of Health, pre-eclampsia is

one of the leading causes of maternal death and a substantial factor in the country's maternal mortality rate [4]. Pre-eclampsia also contributes to high rates of miscarriage, preterm birth, and low birth weight [5]. Pre-eclampsia is a severe complication that can occur during pregnancy and potentially threaten the lives of the pregnant mother and the fetus [6]. This condition is characterised by the development of high blood pressure (hypertension) after 20 weeks of gestation, accompanied by the presence of protein in the urine (proteinuria) [7]. Pre-eclampsia is a specific syndrome that occurs during pregnancy and is characterised by an increase in blood pressure (hypertension) with blood pressure values equal to or exceeding 140/90 mmHg and protein in the urine (proteinuria) with protein values equal to or exceeding 0.3 g. This condition usually appears after 20 weeks of pregnancy in women who previously had normal blood pressure. Severe pre-eclampsia is characterised by blood pressure values equal to or exceeding 160/110 mmHg and proteinuria equal to or exceeding 5 g. Severe pre-eclampsia is diagnosed by measuring blood pressure and proteinuria at least twice within a minimum of six hours [8]. Pre-eclampsia can impair the function of organs such as the liver, kidneys, and brain, and if not properly managed, it can progress to eclampsia, which causes seizures, or HELLP syndrome involving severe blood disorders [9]. Pre-eclampsia significantly impacts the health of pregnant women and the fetus. Pregnant women with pre-eclampsia are at risk of complications such as kidney failure, stroke, bleeding, and placental problems.

The fetus may also experience growth restriction, developmental abnormalities, premature birth, or even intrauterine death [10–12]. Early detection and appropriate intervention are crucial in managing pre-eclampsia [13]. The role of midwives in early detection and intervention for pre-eclampsia is vital [14]. Midwives are healthcare professionals who directly care for pregnant women, conduct routine examinations, and provide the necessary support throughout the pregnancy. They possess the knowledge and skills to monitor blood pressure, perform urine tests to detect proteinuria, and provide essential advice and care [14]. However, despite the widely recognised role of midwives in managing pre-eclampsia, several challenges still need to be addressed [15]. One of the main challenges is the ability to detect pre-eclampsia early. Some signs and symptoms of pre-eclampsia may be nonspe-

cific or not readily apparent initially, making it difficult for midwives to identify them.

Additionally, there is variation in the level of knowledge and skills among midwives in managing pre-eclampsia in different healthcare settings. In addition to the challenges of early detection, appropriate intervention is also a crucial aspect of managing pre-eclampsia [16]. Midwives need in-depth knowledge about pre-eclampsia management, including safe and effective medications, appropriate medical interventions, and monitoring and managing potential complications [16]. They must collaborate with other healthcare professionals, such as obstetricians and internists, to provide coordinated and holistic care for pregnant women with pre-eclampsia.

METHODS

The research method used in this study is a Systematic Literature Review. This method consists of two main points: eligibility criteria and search strategy [17]. The author considered factors such as study type, population sample, and research quality to ensure the eligibility criteria. As for the search strategy, the author utilised academic journal search engines from online databases such as PubMed, Web of Science, Scopus, and Springer Link, published between 2012 and 2022.

Relevant keywords such as "pre-eclampsia," "early detection," "interventions," "midwifery," and related variations of keywords were used.

The search was limited to studies published within a specific time frame, for example, the past ten years, to obtain the most up-to-date understanding of the topic. Using this method, the author gathered and analysed relevant, high-quality data to strengthen the research findings. The research was identified by reviewing titles and abstracts aligned with the designed PICO (Population, Intervention, Comparison, Outcome) [18, 19].

Studies that did not meet the inclusion criteria were excluded from this research. Subsequently, the studies that met the inclusion criteria were downloaded in full-text form and underwent critical appraisal. The search results and study selection were presented in a diagram that provides a visual overview of the research process. This diagram will show the number of studies found, the number of studies excluded, and the number of

studies included in the research after the critical appraisal was conducted. The summarised search results can be seen in Figure 1.

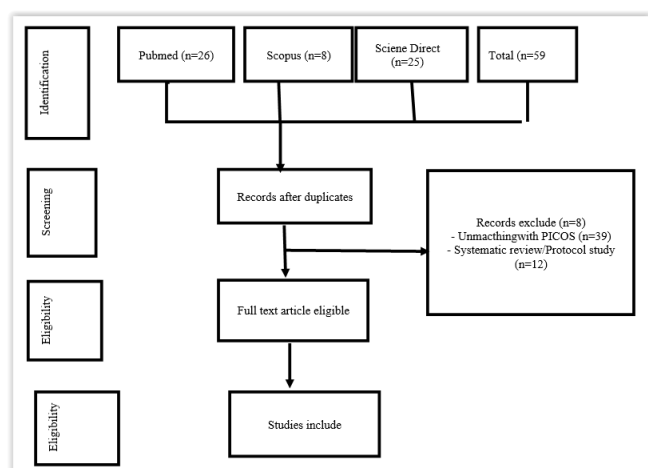


Figure 1

RESULTS AND DISCUSSION

This article discusses the role of midwifery in the early detection and intervention of health conditions such as pre-eclampsia and pregnancy-induced hypertension. The authors identify the importance of midwives in providing care to

pregnant women, including conducting routine examinations, monitoring blood pressure, and detecting proteinuria through urine analysis. Although the role of midwives in managing pre-eclampsia is widely recognised, there are still several challenges to be addressed, such as the ability to detect pre-eclampsia early and variations in midwives' knowledge and skills in different healthcare settings. Appropriate interventions are also crucial in managing pre-eclampsia, including knowledge of pre-eclampsia management, the use of safe and effective medications, and collaboration with other healthcare professionals. This article presents several studies discussing the role of midwives in the early detection of pre-eclampsia in various countries such as South Africa, Canada, Nigeria, Sweden, and the United Kingdom. The study includes 12 articles from all investigations on the Role of Midwifery in the Early Detection and Early Intervention of pre-eclampsia in pregnant women. The publication years range from 2010 to 2022 and were conducted in urban and rural areas such as South Africa, Nigeria, Sweden, and several centres in the United Kingdom.

Resources	Objective	Method	Findings
[20]	The role of midwives in the early detection of pre-eclampsia through blood pressure measurement, urine examination, and monitoring of clinical signs during antenatal visits.	This study was conducted by interviewing 50 midwives working in various healthcare settings in the UK. Data were collected through interviews and content analysis. Respondents were asked questions about their knowledge, practices, and experiences in the early detection of pre-eclampsia.	The study found that midwives had a good understanding of the importance of early detection of pre-eclampsia. They used methods such as blood pressure measurement, urine examination, and monitoring of clinical signs during antenatal visits as tools for early detection of pre-eclampsia. However, knowledge and skills in monitoring and interpreting laboratory test results, such as urine protein levels, still need to be improved.
[21]	The role of midwives in recognising the symptoms and early signs of pre-eclampsia, conducting accurate blood pressure measurements, and providing education and support to pregnant women.	This study is a literature review involving the analysis of previous research, clinical guidelines, and midwifery practices related to the role of midwives in the early detection of pregnancy-induced hypertension.	The study demonstrates that midwives play a crucial role in the early detection of pregnancy-induced hypertension. They are involved in regular blood pressure measurements, urine examinations, and monitoring of clinical signs. Additionally, midwives educate pregnant women about the signs and symptoms of pre-eclampsia and the importance of regular antenatal visits.
[22]	This research evaluates the understanding and management of midwives regarding pre-eclampsia in South Africa.	The study was conducted using a questionnaire administered to 254 midwives in South Africa.	The questionnaire focused on the knowledge and practices of midwives in the early detection and management of pre-eclampsia. The study

Resources	Objective	Method	Findings
			found that most midwives understand pre-eclampsia, but there are still deficiencies in their knowledge of appropriate pre-eclampsia management.
[23]	This study evaluates midwifery practices in Canada regarding the early detection of pregnancy-related hypertensive disorders.	The research method involved a survey administered to midwives in Canada, involving 48 midwifery practices. Data was collected through a questionnaire that included questions about midwives' knowledge, understanding, and procedures related to the early detection of pre-eclampsia.	The research findings indicate that most midwives have good knowledge about the signs and symptoms of pre-eclampsia. Some midwives routinely perform blood pressure measurements and monitor signs of pre-eclampsia at every prenatal visit, while others do so only at specific visits or when there are suspicious symptoms.
[24]	This study was conducted in Nigeria to evaluate the role of midwives in the early detection of pre-eclampsia.	The research method involved a cross-sectional survey that included 224 midwives working in healthcare centres in Nigeria. Data was collected through a questionnaire that included questions about midwives' knowledge, understanding, and practices related to the early detection of pre-eclampsia.	The research findings indicate that most midwives have good knowledge about the risk factors, signs, and complications of pre-eclampsia. However, midwives' knowledge about blood pressure measurement and urine monitoring for detecting pre-eclampsia still needs improvement. The study also reveals that not all midwives routinely perform blood pressure measurements and monitor signs of pre-eclampsia at every prenatal visit. Midwives face specific challenges, such as limited resources and infrastructure.
[25]	This study evaluates the use of placental growth factor (PIGF) testing as an adjunct tool for early detection of pre-eclampsia. It also aims to understand the role of midwives in the data collection and monitoring of pregnant women in the research.	The study employs a randomised controlled trial design involving pregnant women with suspected pre-eclampsia. PIGF testing is performed as part of their diagnostic evaluation. Midwives play a role in this study's data collection and monitoring of pregnant women.	The research findings indicate that PIGF testing can assist midwives in identifying the risk of pre-eclampsia earlier in pregnant women with suspected pre-eclampsia. This information can provide valuable insights for midwives in managing pre-eclampsia in their patients.
[26]	This study evaluates midwives' knowledge, attitudes, and practices regarding blood pressure measurement, diagnosis, and treatment of hypertension in pregnancy. It also aims to highlight the importance of training and knowledge updates for midwives in the early detection of pre-eclampsia.	The research utilises a cross-sectional descriptive study design involving midwives in Sweden. Data was collected through a questionnaire-based survey that included questions about midwives' knowledge, attitudes, and practices in managing hypertension in pregnancy.	The study findings indicate that most midwives have good knowledge about blood pressure measurement and the diagnosis of hypertension in pregnancy. However, there is variation in the practices performed by midwives. Some midwives routinely conduct blood pressure measurements and monitor signs of pre-eclampsia at every prenatal visit. In contrast, others may only do so at specific visits or when there are suspicious symptoms. This research highlights the importance of training and knowledge updates for midwives

Resources	Objective	Method	Findings
			in the early detection of pre-eclampsia to improve consistency and adherence to recommended practices.
[27]	To identify significant risk factors and develop a predictive model to assist midwives in the early detection of pre-eclampsia.	This research utilises a clinical protocol and tool development approach. Data is collected through surveys and medical examinations of pregnant women. Statistical analysis is used to identify significant risk factors and develop a predictive model based on these factors.	This study is still in the development stage. Still, it is expected that with the development of appropriate clinical tools, midwives in the community can improve the early detection of pre-eclampsia and identify women at high risk. This can enable timely interventions and reduce complications associated with pregnancy-related hypertensive disorders.
[28]	A comprehensive pre-eclampsia review includes risk factors, pathophysiology, diagnosis, management, and prevention. The objective is to provide a deep understanding of pre-eclampsia for midwifery practitioners and public health professionals.	This research is a systematic review examining existing literature on pre-eclampsia. Data from previous studies, textbooks, clinical guidelines, and other publications are analysed and synthesised to provide a comprehensive overview of pre-eclampsia.	This study comprehensively explains pre-eclampsia, including risk factors, pathophysiology, diagnosis, management, and prevention. These findings can serve as a knowledge base for midwifery practitioners and public health professionals dealing with pre-eclampsia daily.
[29]	To assess midwives' knowledge, attitudes, and practices in the early detection and management of pre-eclampsia/eclampsia in primary health care settings	A cross-sectional study using questionnaires and interviews with midwives in primary health care facilities. Data were analysed using descriptive statistics.	Most midwives had good knowledge about pre-eclampsia/eclampsia, but there were weaknesses in blood pressure measurement and vital signs monitoring practices. The role of midwives in the early detection and management of pre-eclampsia/eclampsia was recognised as a critical component of maternal care.
[30]	To evaluate the knowledge and practices of midwives in the early detection and management of pre-eclampsia	A cross-sectional study using questionnaires administered to midwives in South Africa. Data were analysed using descriptive statistical analysis.	Most midwives had good knowledge about pre-eclampsia and were aware of early detection methods such as blood pressure measurement and vital signs monitoring. However, there were deficiencies in knowledge regarding the appropriate management of pre-eclampsia.
[31]	To evaluate midwives' knowledge, attitudes, and practices in the early detection and management of pre-eclampsia	A survey using questionnaires administered to midwives in Canada. Data were analysed using descriptive and inferential statistical analysis.	Most midwives had good knowledge about the signs and symptoms of pre-eclampsia. Some midwives performed routine blood pressure measurements and monitored signs of pre-eclampsia, while others did so only at specific visits or if there were suspicious symptoms.

Knowledge and Practices of Early Detection of Pre-eclampsia Studies conducted on the inside and practices of early detection of pre-eclampsia

provide diverse findings. Some studies report an improvement in knowledge regarding early detection indicators, while others do not show an

increase in the practice of early detection of pre-eclampsia following interventions. For instance, one study reported an increase in the average knowledge score regarding early detection of pre-eclampsia and related factors [33]. However, in practice, most studies report the attendance percentage during the screening process at healthcare facilities. This indicates that although there may be an improvement in knowledge, other factors such as accessibility, facility availability, and individual awareness may influence the practice of early detection of pre-eclampsia. Therefore, despite increasing knowledge regarding the early detection of pre-eclampsia, its implementation in clinical practice still requires further attention. Additionally, broader efforts are needed to address non-knowledge factors that can impact participation in early detection screenings for pre-eclampsia, such as healthcare facility accessibility and individual awareness of the importance of such screenings.

The findings indicate that midwives have a good understanding of the importance of early detection of pre-eclampsia. They utilise methods such as blood pressure measurement, urine examination, and monitoring of clinical signs as tools for early detection of pre-eclampsia [32]. However, midwives need to enhance their knowledge and skills in monitoring and interpreting laboratory test results, such as urine protein levels [33]. Research also emphasises the crucial role of midwives in the early detection of pregnancy-induced hypertension. They are involved in periodic blood pressure measurements, urine examinations, and monitoring of clinical signs [21].

Additionally, midwives educate pregnant women about the signs and symptoms of pre-eclampsia and the importance of regular antenatal visits [27]. Although most midwives possess sound knowledge about pre-eclampsia, there is still a lack of knowledge regarding appropriate management [25]. Some midwives perform routine blood pressure measurements and monitor signs of pre-eclampsia at every prenatal visit. In contrast, others do so only during specific visits or if there are suspicious symptoms [28.] This indicates the need to improve consistency and adherence to early detection practices for pre-eclampsia among midwives.

In the context of developing appropriate clinical tools, PIGF testing has shown the potential to assist midwives in identifying the risk of pre-eclampsia at an earlier stage in pregnant women

with suspected pre-eclampsia [25]. The information obtained from such testing can provide valuable insights for midwives in making decisions regarding managing pre-eclampsia in their patients.

Challenges faced by midwives in the early detection of pre-eclampsia include limited resources and infrastructure [34]. Continuous training and knowledge updates are crucial to improving consistency and adherence to recommended practices.

Through a comprehensive understanding of pre-eclampsia, including risk factors, complications, pathophysiology, diagnosis, management, and prevention, this article provides a solid knowledge base for midwifery practitioners and public health professionals in dealing with pre-eclampsia in their daily practice. In efforts to enhance early detection of pre-eclampsia, collaboration among midwives, healthcare professionals, and the community is necessary [32]. The role of midwives in monitoring blood pressure, conducting urine examinations, and observing clinical signs during antenatal visits is a crucial initial step in identifying the risk of pre-eclampsia [21]. However, there is a need to improve midwives' understanding and skills in interpreting laboratory test results, such as urine protein levels, to enhance diagnostic accuracy [33]

Furthermore, educating pregnant women about the signs and symptoms of pre-eclampsia and the importance of regular antenatal visits is essential in promoting awareness and participation in early detection efforts [27]. Effective communication between midwives and pregnant women can also strengthen cooperation in monitoring health conditions during pregnancy [28]. However, midwives face challenges, particularly in terms of limited resources and infrastructure [34]. The provision of quality training and adequate access to laboratory equipment and tests are crucial to improving midwives' ability to detect early-onset pre-eclampsia [25]. Full support from authorities and healthcare institutions is necessary to ensure midwives have sufficient resources to perform their essential role in the early detection of pre-eclampsia. In further research, developing more advanced and effective clinical tools could assist midwives in identifying pre-eclampsia risks more accurately and at an early stage [25]. This would greatly benefit pregnant women with pre-eclampsia, as timely interventions can help pre-

vent serious complications. Overall, the findings of this study underscore the vital role of midwives in the early detection of pre-eclampsia. Enhancing midwives' knowledge, skills, and practices is essential to improving the quality of maternal and neonatal healthcare. Through good collaboration among midwives, healthcare professionals, and the community, early detection of pre-eclampsia can be enhanced, and the risk of complications minimised, leading to positive impacts on the health of both mothers and unborn babies.

Pre-eclampsia is a severe disorder that can occur during pregnancy and threatens the lives of both mothers and fetuses. Research on the role of midwives in the early detection of pre-eclampsia has provided valuable insights into efforts to improve the recognition and management of this pregnancy hypertension disorder. In this article, we have synthesised findings from various studies examining midwives' knowledge and practices in the early detection of pre-eclampsia. The results indicate that midwives have a good understanding of the importance of early detection of pre-eclampsia. In a study [20], although the significance of midwives' role in the early detection of pre-eclampsia has been recognised, challenges remain in implementing that knowledge and skills into daily clinical practice. Therefore, further research could explore factors influencing midwives' implementation of early detection practices for pre-eclampsia, such as organisational, social, and individual factors. This would help design effective strategies to enhance midwives' adherence to early detection practices for pre-eclampsia. Second, in the study by [23], the role of midwives in the early detection of pregnancy hypertension disorders was emphasised. However, it is essential to explore the role of midwives in education and counselling for pregnant women regarding pre-eclampsia.

Further studies could examine the effectiveness of educational interventions conducted by midwives in improving pregnant women's understanding and awareness of pre-eclampsia, as well as their influence on behavioural changes and compliance with monitoring their health conditions during pregnancy. Third, the study by [25] has shown the potential of the placental growth factor as an adjunct tool in the early detection of pre-eclampsia. However, further research could investigate the use of other technologies and biomarkers that can assist midwives in the early detection of pre-eclampsia. Developing more

sensitive and specific diagnostic methods can aid midwives in assessing the risk of pre-eclampsia more accurately, enabling earlier interventions to be initiated. Lastly, a study by [27] has proposed the development of clinical tools for midwives to identify pregnant women at high risk of experiencing pregnancy hypertension disorders. However, expanding this research by integrating information and communication technology is essential. The development of mobile applications or health information systems that allow midwives to track pregnant women's data, monitor blood pressure changes, and provide real-time recommendations can enhance the efficiency and accuracy of early detection of pre-eclampsia by midwives. Conducted a descriptive survey in South Africa to evaluate midwives' knowledge and management of pre-eclampsia [22]. The findings of this research indicate a critical need to improve midwives' knowledge regarding early detection, monitoring, and management of pre-eclampsia. This emphasises the importance of better training and development programs for midwives to enhance their understanding of pre-eclampsia and its management. A study conducted by [24] in Nigeria evaluated the role of midwives in the early detection of pre-eclampsia. The findings of this study underscore the importance of improving midwives' knowledge in recognising early signs of pre-eclampsia and providing advice and guidance to pregnant women. This highlights the need for enhanced education and training for midwives to identify pre-eclampsia symptoms better. A study by [26] in Sweden to evaluate midwives' knowledge, attitudes, and practices related to blood pressure measurement, diagnosis, and treatment of pregnancy hypertension, highlighted the need for improved understanding in these areas. The findings of this research depict the necessity of better training and education programs to ensure midwives possess adequate expertise in measuring blood pressure, diagnosing, and treating pregnancy hypertension. Overall, the studies above emphasise the importance of midwives' role in the early detection of pre-eclampsia. In this context, midwives' role includes recognising early signs of pre-eclampsia, regularly measuring blood pressure, and monitoring the health of pregnant women. Furthermore, the research also underscores the need for increased knowledge and skills among midwives in managing pre-eclampsia and providing advice and guidance to affected pregnant women.

CONCLUSIONS

Pre-eclampsia is a severe disorder that poses risks to both mothers and fetuses during pregnancy. Research on the role of midwives in the early detection of pre-eclampsia has provided valuable insights into improving the recognition and management of this condition. The studies reviewed indicate that midwives generally understand the importance of early detection of pre-eclampsia. However, challenges persist in implementing and translating this knowledge into daily clinical practice. Further research is needed to explore factors influencing midwives' implementation of early detection practices for pre-eclampsia, such as organisational, social, and individual factors.

Additionally, the role of midwives in educating and counselling pregnant women about pre-eclampsia should be investigated, along with the effectiveness of educational interventions in improving women's understanding and awareness of the condition. The potential of using technologies and biomarkers, including placental growth

factor, for early detection of pre-eclampsia should be further explored. Developing more sensitive and specific diagnostic methods can assist midwives in accurately assessing the risk of pre-eclampsia and initiating interventions earlier. Integration of information and communication technology, such as mobile applications or health information systems, can enhance midwives' efficiency and accuracy in the early detection of pre-eclampsia. These tools enable real-time monitoring of pregnant women's data and provide timely recommendations. The findings highlight the need to improve midwives' knowledge, training, and development programs regarding early pre-eclampsia detection, monitoring, and management. Enhancing midwives' understanding of pre-eclampsia symptoms, blood pressure measurement, diagnosis, and treatment is crucial in providing quality care to pregnant women.

Conflict of interest

The authors declare no conflict of interest.

REFERENCES

1. World Health Organization. (2019). *Maternal mortality*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/maternal-mortality>
2. World Health Organization. (2016). *Trends in maternal mortality: 1990 to 2015*. Retrieved from https://apps.who.int/iris/bitstream/handle/10665/194254/9789241565141_eng.pdf
3. World Health Organization. (2023, February 23). *Maternal mortality*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/maternal-mortality>
4. Kementerian Kesehatan Republik Indonesia. (2019). *Hasil Utama Riskesdas 2018* [Key Results of Riskesdas 2018]. Retrieved from https://kesmas.kemkes.go.id/assets/upload/dir_519d41d8cd98f00/files/Hasil-riskesdas-2018_1274.pdf (in Indonesian).
5. World Health Organization. (2011, November 2). *WHO recommendations for prevention and treatment of pre-eclampsia and eclampsia*. Retrieved from <https://www.who.int/publications/i/item/9789241548335>
6. Gressel, G. M., & Banks, E. (2020). In Reply. *Obstetrics & Gynecology*, 135(5), 1230–1231. doi: 10.1097/aog.0000000000003860
7. Murray-Davis, B., Berger, H., Melamed, N., Darling, E. K., Syed, M., Guarna, G., Li, J., Barrett, J., Ray, J. G., Geary, M., Mawjee, K., Bagheri, N., & McDonald, S. D. (2022). A framework for understanding how midwives perceive and provide care management for pregnancies complicated by gestational diabetes or hypertensive disorders of pregnancy. *Midwifery*, 115, 103498. doi: 10.1016/j.midw.2022.103498
8. Hutcheon, J. A., Lisonkova, S., & Joseph, K. S. (2011). Epidemiology of pre-eclampsia and the other hypertensive disorders of pregnancy. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 25(4), 391–403. doi: 10.1016/j.bpobgyn.2011.01.006

9. Sibai, B., Dekker, G., & Kupferminc, M. (2005). Pre-eclampsia. *The Lancet*, 365(9461), 785–799. doi: [10.1016/s0140-6736\(05\)17987-2](https://doi.org/10.1016/s0140-6736(05)17987-2)
10. Redman, C. W., & Sargent, I. L. (2005). Latest Advances in Understanding Pre-eclampsia. *Science*, 308(5728), 1592–1594. doi: [10.1126/science.1111726](https://doi.org/10.1126/science.1111726)
11. Duley, L. (2009). The Global Impact of Pre-eclampsia and Eclampsia. *Seminars in Perinatology*, 33(3), 130–137. doi: [10.1053/j.semperi.2009.02.010](https://doi.org/10.1053/j.semperi.2009.02.010)
12. Souza, J. (2014). The World Health Organization Multicountry Survey on Maternal and Newborn Health project at a glance: the power of collaboration. *BJOG: An International Journal of Obstetrics & Gynaecology*, 121, 5–8. doi: [10.1111/1471-0528.12690](https://doi.org/10.1111/1471-0528.12690)
13. Olaoye, T., Oyerinde, O. O., Elebuji, O. J., & Ologun, O. (2019). Knowledge, Perception and Management of Pre-eclampsia among Health Care Providers in a Maternity Hospital. *International Journal of Maternal and Child Health and AIDS (IJMA)*, 8(2), 80–88. doi: [10.21106/ijma.275](https://doi.org/10.21106/ijma.275)
14. National Institute for Health and Care Excellence. (2019). *Hypertension in pregnancy: Diagnosis and management*. Retrieved from <https://www.nice.org.uk/guidance/ng133>
15. Odigboegwu, O., Pan, L. J., & Chatterjee, P. (2018). Use of Antihypertensive Drugs During Pre-eclampsia. *Frontiers in Cardiovascular Medicine*, 5. doi: [10.3389/fcvm.2018.00050](https://doi.org/10.3389/fcvm.2018.00050)
16. American College of Obstetricians and Gynecologists. (2019). *Hypertension in pregnancy*. Retrieved from <https://journals.lww.com/greenjournal/Citation/2019/01000/ACOG.42.aspx>
17. Cooper, H. M. (2017). *Research synthesis and meta-analysis: A step-by-step approach*. New York: Sage Publications.
18. Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Medicine*, 6(7), e1000097. doi: [10.1371/journal.pmed.1000097](https://doi.org/10.1371/journal.pmed.1000097)
19. Higgins, J. P., & Green, S. (Eds.). (2011). *Cochrane handbook for systematic reviews of interventions*. London: Wiley-Blackwell.
20. Garti, I., Gray, M., Tan, J.-Y., & Bromley, A. (2021). Midwives' knowledge of pre-eclampsia management: A scoping review. *Women and Birth*, 34(1), 87–104. doi: [10.1016/j.wombi.2020.08.010](https://doi.org/10.1016/j.wombi.2020.08.010)
21. Hamer, M., Malan, L., Schutte, A. E., Huisman, H. W., van Rooyen, J. M., Schutte, R., Fourie, C. M. T., Malan, N. T., & Seedat, Y. K. (2010). Plasma renin responses to mental stress and carotid intima-media thickness in black Africans: the SABPA study. *Journal of Human Hypertension*, 25(7), 437–443. doi: [10.1038/jhh.2010.82](https://doi.org/10.1038/jhh.2010.82)
22. Dartey, A. F., Dzansi, G., Lotse, C. W., Obuobisa, R., Afua Bosu, C. E., & Afaya, A. (2022). Midwives Experiences of Managing Clients with Eclampsia in a low Resource Setting: A Qualitative Descriptive Study. *SAGE Open Nursing*, 8, 237796082210945. doi: [10.1177/23779608221094542](https://doi.org/10.1177/23779608221094542)
23. Shen, A. Y., & Stanes, A. (2016). Isolated Appendiceal Endometriosis. *Journal of Obstetrics and Gynaecology Canada*, 38(10), 979–981. doi: [10.1016/j.jogc.2016.06.006](https://doi.org/10.1016/j.jogc.2016.06.006)
24. Ojukwu, O. O., et al. (2017). Role of midwives in early detection of pre-eclampsia in Nigeria: A cross-sectional study. *BMC Pregnancy and Childbirth*, 17(1), 67.
25. Duhig, K. E., Myers, J., Seed, P. T., Sparkes, J., Lowe, J., Hunter, R. M., Shennan, A. H., Chappell, L. C., Bahl, R., Bambridge, G., Barnfield, S., Ficquet, J., Gill, C., Girling, J., Harding, K., Khalil, A., Sharp, A., Simpson, N., & Tuffnell, D. (2019). Placental growth factor testing to assess women with suspected pre-eclampsia: a multicentre, pragmatic, stepped-wedge cluster-randomised controlled trial. *The Lancet*, 393(10183), 1807–1818. doi: [10.1016/s0140-6736\(18\)33212-4](https://doi.org/10.1016/s0140-6736(18)33212-4)

26. Gandeh, M. B., & Milaat, W. A. (1999). Knowledge, attitude and practice of primary health care doctors and nurses in hypertension of pregnancy. *Journal of family & community medicine*, 6(1), 35–44.
27. Visser, W., & Wallenburg, H. C. S. (1999). Prediction and prevention of pregnancy-induced hypertensive disorders. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 13(1), 131–156. doi: [10.1053/beog.1999.0011](https://doi.org/10.1053/beog.1999.0011)
28. Mol, B. W. J., Roberts, C. T., Thangaratnam, S., Magee, L. A., de Groot, C. J. M., & Hofmeyr, G. J. (2016). Pre-eclampsia. *The Lancet*, 387(10022), 999–1011. doi: [10.1016/s0140-6736\(15\)00070-7](https://doi.org/10.1016/s0140-6736(15)00070-7)
29. Mattern, E., Lohmann, S., & Ayerle, G. M. (2017). Experiences and wishes of women regarding systemic aspects of midwifery care in Germany: a qualitative study with focus groups. *BMC Pregnancy and Childbirth*, 17(1). doi: [10.1186/s12884-017-1552-9](https://doi.org/10.1186/s12884-017-1552-9)
30. Butrick, E., Penn, A., Itakura, K., Mkumba, G., Winter, K., Amafumba, R., & Miller, S. (2014). Access to transport for women with hypovolemic shock differs according to weeks of pregnancy. *International Journal of Gynecology & Obstetrics*, 127(2), 171–174. doi: [10.1016/j.ijgo.2014.05.008](https://doi.org/10.1016/j.ijgo.2014.05.008)
31. Khalil, A., O'Brien, P., & Townsend, R. (2016). Current best practice in the management of hypertensive disorders in pregnancy. *Integrated Blood Pressure Control*, 9, 79–94. doi: [10.2147/ibpc.s77344](https://doi.org/10.2147/ibpc.s77344)
32. Nkamba, D. M., Vangu, R., Elongi, M., Magee, L. A., Wembodinga, G., Bernard, P., Ditekemena, J., & Robert, A. (2020). Health facility readiness and provider knowledge as correlates of adequate diagnosis and management of pre-eclampsia in Kinshasa, Democratic Republic of Congo. *BMC Health Services Research*, 20(1). doi: [10.1186/s12913-020-05795-1](https://doi.org/10.1186/s12913-020-05795-1)
33. Castell, E., & Stenfert Kroese, B. (2016). Midwives' experiences of caring for women with learning disabilities – A qualitative study. *Midwifery*, 36, 35–42. doi: [10.1016/j.midw.2016.02.001](https://doi.org/10.1016/j.midw.2016.02.001)
34. Atluri, N., Beyuo, T. K., Oppong, S. A., Moyer, C. A., & Lawrence, E. R. (2023). Challenges to diagnosing and managing pre-eclampsia in a low-resource setting: A qualitative study of obstetric provider perspectives from Ghana. *PLOS Global Public Health*, 3(5), e0001790. doi: [10.1371/journal.pgph.0001790](https://doi.org/10.1371/journal.pgph.0001790)