

Exploring Pregnant Women's Experiences in Recognizing the Signs and Symptoms of Preeclampsia: A Qualitative Study

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ABSTRACT

Background: Preeclampsia remains a major cause of maternal and perinatal morbidity and mortality. Early detection depends not only on clinical screening but also on pregnant women's ability to recognise and interpret warning signs. However, symptoms may be normalised as ordinary pregnancy discomforts, potentially delaying timely care.

Research Objective: This study explored pregnant women's experiences of recognising, interpreting, and responding to the signs and symptoms of preeclampsia.

Methods: A descriptive phenomenological study was conducted in the working area of Katobengke Community Health Centre, Baubau, Indonesia, from April to June 2025. Twenty pregnant women were recruited through criterion-based purposive sampling. Data were collected through individual, in-depth semi-structured interviews, supported by field notes and observations. Colaizzi's method guided the analysis. Credibility was supported through member checking, peer debriefing, triangulation, reflexivity, and an audit trail.

Results: Four themes were identified: interpreting ambiguous bodily changes, constructing knowledge about preeclampsia, negotiating decisions within the family, and moving from uncertainty to professional care. Participants frequently considered headaches, swelling, and visual disturbances normal pregnancy experiences until the symptoms persisted or worsened. Fragmented health information, family interpretations, access barriers, and healthcare professionals' responses shaped care-seeking decisions. Data saturation was achieved when later interviews produced no new thematic insights.

Conclusion: Recognition of preeclampsia is a socially situated interpretive process rather than simple factual knowledge. Antenatal services should provide repeated, understandable, action-oriented education, involve influential family members, and ensure responsive referral pathways while maintaining routine clinical screening.

Keywords: Early Diagnosis; Health Knowledge, Attitudes, Practice; Pre-Eclampsia; Pregnant Women; Qualitative Research

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BACKGROUND

Preeclampsia remains a major threat to maternal and perinatal survival because it can progress rapidly from an apparently normal pregnancy to severe hypertension, organ dysfunction, eclampsia, stroke, placental abruption, or death. The condition affects approximately 3–8% of women giving birth worldwide. Hypertensive disorders of pregnancy account for about 16% of global maternal deaths, equivalent to approximately 42,000 deaths in 2023 (Sirisomboon et al., 2024). Their consequences also extend to the fetus through impaired placental perfusion, fetal growth restriction, preterm birth, stillbirth, and neonatal mortality (Lamma et al., 2021). These outcomes make timely recognition more than a question of maternal knowledge; it is a critical point in the pathway between the onset of symptoms, the decision to seek care, and the provision of life-saving treatment (Ma et al., 2022).

In Indonesia, the problem remains especially relevant. The Ministry of Health recorded 4,482 maternal deaths in 2023, an increase from 4,192 in 2022, with hypertension consistently identified among the three leading causes (De Rosa et al., 2022). Although antenatal care includes blood-pressure measurement and risk screening, clinical surveillance cannot fully protect women when symptoms develop between scheduled visits (R. W. K. Lee et al., 2023). Pregnant women must first notice bodily changes, interpret their seriousness, decide whether professional assessment is necessary, and overcome practical or social barriers to seeking care. Failure at any stage may produce the first delay in obstetric care, allowing a manageable condition to become an emergency (Feroz et al., 2022).

Recognition is complicated by the clinical ambiguity of preeclampsia. Some women remain asymptomatic despite elevated blood pressure, whereas others experience headache, blurred vision, epigastric pain, sudden swelling, nausea, or reduced fetal movement (Vadsaria et al., 2025). These manifestations may be normalized as ordinary discomforts of pregnancy. Symptom recognition is therefore not a simple recall of information delivered during antenatal education. It is an interpretive process shaped by previous pregnancies, perceived vulnerability, family advice, cultural explanations, access to information, interactions with health professionals, and trust in health services. A woman may know that headache is a warning sign yet delay seeking help because the pain is intermittent, relatives consider it normal, or previous complaints were dismissed (Hill et al., 2023).

Existing literature demonstrates persistent weaknesses in this recognition process. Carter et al.'s qualitative investigation found that women and their families often had limited knowledge of preeclampsia before diagnosis and experienced uncertainty when deciding whether early symptoms justified contacting maternity services (Borneskog et al., 2023). Other qualitative evidence indicates that women may understand raised blood pressure as an isolated measurement without connecting it to organ complications or fetal risk. Communication during antenatal care can also be overly technical, concentrated on numerical blood-pressure values, or provided only after the condition has developed. Conversely, provider counselling is associated with better preeclampsia knowledge, suggesting that communication quality—not merely service attendance—affects preparedness to respond (Borneskog et al., 2023).

Nevertheless, much of the available evidence measures awareness through questionnaires, knowledge scores, or predetermined lists of warning signs. Such studies can establish how many women correctly identify headache, oedema, or visual disturbance, but they cannot adequately explain how women distinguish dangerous symptoms from normal pregnancy experiences in everyday life. Previous qualitative studies have often focused on women after diagnosis, survivors of severe preeclampsia, experiences of hospitalization, or psychological consequences following emergency birth (Garti et al.,

2024a). This emphasis produces an explicit research gap limited evidence explains the pre-diagnostic experience how pregnant women notice, interpret, negotiate, and act upon possible signs and symptoms before preeclampsia is clinically confirmed, particularly within health systems and sociocultural environments in which family influence and unequal access to care shape decision-making (Nguyen et al., 2022).

The novelty of this study lies in examining symptom recognition as a dynamic, socially situated process rather than treating it as a fixed level of knowledge. It will connect women's bodily experiences with their interpretations of risk, sources of information, family responses, encounters with antenatal providers, and decisions to seek or postpone care. This perspective can reveal why standard health messages are accepted, reinterpreted, or ignored and identify points at which communication and referral pathways fail.

Accordingly, this study aims to explore pregnant women's experiences in recognizing the signs and symptoms of preeclampsia, including how they interpret bodily changes, obtain and evaluate information, involve family members, interact with healthcare providers, and decide when to seek professional care. The findings are expected to inform context-sensitive antenatal education and woman-centred early-warning strategies that promote timely detection and reduce preventable maternal and perinatal complications.

METHODS

This study employed a qualitative approach with a descriptive phenomenological design (Garti et al., 2024a) to explore pregnant women's lived experiences in recognizing, interpreting, and responding to signs and symptoms of preeclampsia. This design was appropriate because the study focused on the meanings women attributed to bodily changes during pregnancy rather than measuring predetermined variables. The study was conducted in the working area of Katobengke Community Health Centre, Baubau City, from April to June 2025. This setting was selected because the community health centre provided antenatal services and served as the first point of professional contact for pregnant women in the surrounding communities. Twenty pregnant women were recruited using criterion-based purposive sampling. Eligible participants were aged 18 years or older, had reached at least 20 weeks of gestation, resided within the health centre's working area, had experienced or recognized bodily changes potentially associated with preeclampsia, were clinically stable, and could communicate their experiences in Indonesian. Women requiring emergency obstetric care or unable to participate meaningfully in an interview were excluded.

The number of participants was determined by information adequacy and data saturation rather than statistical calculation. The researcher acted as the primary research instrument, supported by a semi-structured interview guide, audio recorder, field notes, observation sheet, and relevant documentation. The interview guide was developed from the research objectives and relevant literature and was reviewed for clarity, sensitivity, and consistency with the phenomenological approach. Eligible women received a clear explanation of the study and provided written informed consent before participation. Face-to-face, in-depth interviews were conducted individually in a quiet and private location agreed upon with each participant.

Open-ended and probing questions explored the first bodily changes noticed, interpretations of symptom severity, sources of information, family responses, interactions with healthcare professionals, and decisions to seek or delay care. Interviews were audio-recorded with permission, while contextual observations and non-verbal responses were documented in field notes. Data collection continued until subsequent interviews produced no substantially new information. Data were analysed using Colaizzi's descriptive phenomenological method. Recordings were transcribed verbatim, anonymised, checked for accuracy, and read repeatedly. Significant statements were identified, coded, and

formulated into meanings, which were then grouped into categories and thematic clusters. The themes were reviewed, refined, named, and integrated into a comprehensive description of the phenomenon. Trustworthiness was maintained through member checking, peer debriefing, triangulation of interview data and field notes, an audit trail, and researcher reflexivity. Detailed descriptions of the participants and research context were provided to support transferability, while reporting was guided by the Consolidated Criteria for Reporting Qualitative Research.

RESULTS

Characteristics of Respondents

Twenty pregnant women participated in the study. Analysis of their accounts generated four overarching themes and eight interconnected subthemes. Data saturation was considered achieved when the final interviews produced no substantively new codes, meanings, or thematic categories. The themes reflected a gradual process through which participants noticed bodily changes, interpreted their seriousness, sought social confirmation, and decided whether to obtain professional care.

Table 1.
Themes and Subthemes of Pregnant Women's Experiences in Recognising Preeclampsia

Main theme	Subthemes
1. Interpreting ambiguous bodily changes	Normalising symptoms as part of pregnancy; recognising changes that felt unusual
2. Constructing knowledge about preeclampsia	Fragmented understanding of warning signs; learning through experience and antenatal care
3. Negotiating decisions within the family	Family reassurance and delayed care; family support as a trigger for action
4. Moving from uncertainty to professional care	Encounters that validated women's concerns; barriers to timely care-seeking

Theme 1: Interpreting Ambiguous Bodily Changes

Most participants initially understood headaches, swelling, nausea, fatigue, and visual disturbances as ordinary discomforts of pregnancy. Symptoms became concerning when they were persistent, increasingly severe, or different from previous pregnancy experiences.

"At first, I thought the headache was caused by tiredness because pregnant women often feel unwell. I became worried when it did not disappear and my vision became blurred."
(Participant [A1])

Some women relied on visible bodily changes, particularly swelling of the face and hands, to decide whether their condition was unusual. However, swelling of the feet was frequently normalised, resulting in uncertainty about when it constituted a warning sign.

"My feet had been swollen before, so I thought it was normal. When my face and fingers also became swollen, I felt that something was different." (Participant [A4])

Theme 2: Constructing Knowledge About Preeclampsia

Participants' knowledge was generally fragmented. Several women recognised individual symptoms but were unable to connect them with preeclampsia or its possible consequences. Blood-pressure measurements were often understood as numerical information without a clear explanation of their implications for maternal and fetal health.

"The midwife said that my blood pressure was high, but I did not understand what could happen. I only knew that I needed to rest and return for another examination." (Participant [A6])

Antenatal counselling helped some participants reinterpret previously normalised symptoms as potential danger signs. Previous pregnancy complications and the experiences of relatives also functioned as important sources of knowledge.

"After the midwife explained the warning signs, I remembered that I had experienced a severe headache and pain in my upper abdomen. Before that explanation, I did not think those symptoms were related." (Participant [A8])

Theme 3: Negotiating Decisions Within the Family

Symptom recognition did not automatically lead to care-seeking. Participants commonly discussed their symptoms with husbands, mothers, or other relatives before visiting a health facility. Family members sometimes reassured women that their symptoms were normal, leading them to wait, rest, or use home remedies.

"My family told me to lie down because they thought I was simply tired. I followed their advice and waited, although the headache continued."
(Participant [A9])

Conversely, family members who recognised the seriousness of the symptoms provided transportation, financial assistance, and emotional encouragement. Such support shortened the interval between noticing symptoms and contacting healthcare professionals.

"My husband saw that my face was swollen and immediately took me to the health centre. I might have waited longer if he had not insisted." (Participant [A11])

Theme 4: Moving From Uncertainty to Professional Care

Professional assessment transformed vague concern into recognition of risk. Clear explanations from midwives helped participants understand the relationship between elevated blood pressure, symptoms, and possible complications. Women felt more confident seeking care when healthcare professionals listened to their concerns and provided understandable instructions.

"When the midwife explained why the headache and blurred vision were dangerous, I realised that I should not wait for the symptoms to become worse."
(Participant [A15])

Nevertheless, care-seeking was influenced by transportation difficulties, household responsibilities, treatment costs, uncertainty about symptom severity, and fear of being considered overly anxious. Participants emphasised the need for clear, repeated, and practical information that included family members.

"Sometimes I hesitated because I did not know whether the symptom was serious enough to visit the health centre. I was afraid they would say it was only a normal pregnancy complaint." (Participant [A17])

Overall, recognising preeclampsia was not a single act of identifying symptoms. It was a socially negotiated process shaped by bodily experience, health information, family responses, access to services, and communication with healthcare professionals. Saturation was reached after the participants' accounts consistently reproduced these patterns without generating additional themes.

DISCUSSION

This study indicates that recognizing preeclampsia was not a straightforward act of recalling a list of warning signs. Instead, recognition developed through a gradual interpretive process in which pregnant women compared bodily changes with what they believed to be normal pregnancy experiences. Headache, nausea, fatigue, swelling, and visual disturbances were initially tolerated because these symptoms overlapped with common pregnancy discomforts. Concern emerged only when symptoms persisted, intensified, appeared in combination, or differed from a woman's previous pregnancy experience. This finding suggests that the critical problem is not simply an absence of knowledge but the ambiguity involved in translating general health information into decisions within real-life circumstances.

Conceptually, the findings distinguish between symptom awareness and symptom appraisal. Awareness refers to knowing that a symptom may be associated with preeclampsia, whereas appraisal involves deciding whether a personally experienced symptom is sufficiently unusual or severe to require professional assessment. A woman may correctly identify headache as a warning sign but still postpone care because headaches are common, temporary relief occurs after resting, or relatives interpret the symptom as fatigue (Nguyen et al., 2022). Consequently, antenatal education that only names warning signs may increase factual knowledge without necessarily improving timely care-seeking. Women also require practical guidance about persistence, severity, symptom combinations, and the appropriate action to take when uncertainty remains (Sundas et al., 2024).

The findings further show that knowledge about preeclampsia was constructed through multiple sources rather than received exclusively from healthcare professionals. Previous pregnancy experiences, stories from relatives, advice from family members, antenatal encounters, and observations of bodily changes all contributed to women's interpretations. However, these sources did not always provide consistent explanations (Carter et al., 2021). Clinical information was sometimes remembered as an isolated blood-pressure value rather than as an understandable account of maternal and fetal risk. This separation between measurement and meaning is important: knowing that blood pressure is "high" does not necessarily explain why immediate assessment, continued monitoring, or referral is required (C.-C. Lee et al., 2024).

Family involvement emerged as a central component of symptom recognition and healthcare-seeking. Family members could normalise symptoms and encourage waiting, but they could also recognise deterioration, provide transportation, mobilise financial resources, and persuade women to seek care. Decisions were therefore relational rather than exclusively individual (Th Thorgeirsdottir et al., 2023). This finding challenges educational approaches that treat pregnant women as autonomous recipients of information while overlooking the social environment in which healthcare decisions are made. In the Katobengke context, the practical effectiveness of maternal education may depend partly on whether husbands and other influential relatives understand the same warning signs and know how to respond (Wang et al., 2024).

The transition from uncertainty to action was also shaped by women's encounters with healthcare services. Respectful listening and clear explanations validated women's concerns and strengthened their confidence to seek care. In contrast, fear of being judged

as overly anxious could discourage early contact (Jones et al., 2024). This reveals a systemic paradox: women are advised to seek care when warning signs appear, yet they may hesitate if previous encounters have taught them that symptoms considered insufficiently severe will be dismissed. Timely detection therefore depends not only on women's ability to recognise symptoms but also on whether the health system creates a credible and welcoming pathway for uncertain cases (Chen et al., 2024).

The difficulty of distinguishing preeclampsia symptoms from normal pregnancy experiences is consistent with (Hurrell et al., 2024), who found that some women did not experience "classic" warning signs or could not differentiate them from ordinary pregnancy changes. Their study also demonstrated that women's risk assessments, self-monitoring practices, and organisational constraints influenced help-seeking. Women identified as being at increased risk were sometimes given substantial information, but this information could facilitate earlier recognition when it was linked to clear instructions about whom to contact (Shi et al., 2024). The present findings extend this argument by showing that symptom interpretation is a socially negotiated process in which family reassurance or concern can modify a woman's initial appraisal.

The uncertainty experienced by participants also corresponds with the findings of (Deitch et al., 2024). Women in their study described diffuse symptoms, contradictory information, and insufficient explanations about the severity and prognosis of preeclampsia. They consequently recommended detailed, continuous, and consistent information for women and their partners throughout antenatal, inpatient, and postpartum care (Kenny et al., 2023). The current study reinforces this need but suggests that consistency alone is insufficient. Information must also be actionable and understandable. Communication should connect symptoms with risk, explain what women should do, identify the appropriate point of contact, and clarify that seeking assessment is justified even when a woman is uncertain (Ma'ayeh et al., 2024).

Evidence from Indonesia supports the relevance of these communication gaps. A phenomenological study of Indonesian women with a history of preeclampsia identified limited awareness of physical changes, psychological distress following diagnosis, a preference for practical and visual education, and a need for emotional support. Some participants considered the information they received too technical or impersonal (Vinogradov et al., 2023). The present findings are consistent with those observations, particularly regarding fragmented knowledge and the importance of respectful communication. However, this study contributes a more explicit focus on the period before clinical confirmation, when women are still deciding whether bodily changes warrant professional attention.

The findings are also comparable with qualitative research from Ghana, where women reported difficulty understanding blood-pressure information and connecting clinical measurements to the meaning and consequences of preeclampsia. This suggests that the communication problem is not merely a shortage of information but a failure to translate biomedical concepts into forms that women can use in daily decision-making. A broader scoping review of women's experiences of hypertensive disorders of pregnancy similarly concluded that women's voices are essential for developing more effective counselling and supportive relationships with healthcare providers (Garti et al., 2024b).

The influence of financial, logistical, cultural, and family conditions reported in this study corresponds with (Kivelä et al., 2023). Their qualitative investigation identified limited knowledge, financial constraints, misconceptions, medicine availability, and sociocultural beliefs as barriers to early care-seeking, while social support and perceived quality of healthcare acted as enablers (Cui et al., 2024). These similarities indicate that maternal response to preeclampsia cannot be adequately explained by individual health literacy alone. Delayed care may result from the interaction of ambiguous symptoms, household

negotiations, transport availability, financial capacity, and previous experiences with health services.

The principal conceptual contribution of this study is therefore to frame preeclampsia recognition as a distributed socio-clinical process. Recognition is “distributed” because it occurs across the pregnant woman, her family, community information sources, and healthcare professionals. It is “socio-clinical” because subjective bodily interpretation and social negotiation interact with clinical measurements such as blood pressure and proteinuria (Tiruneh et al., 2024). This perspective shifts responsibility away from blaming women for failing to identify symptoms and towards designing systems that support interpretation, validation, and rapid access to assessment.

From a service perspective, antenatal counselling should move beyond one-time information delivery. Repeated, stage-appropriate education could combine plain-language explanations, visual materials, symptom scenarios, and explicit safety-netting instructions. Rather than telling women only to seek care for “severe headache,” providers should explain what persistence or recurrence may mean, what accompanying symptoms require urgent assessment, and where women can obtain help outside scheduled visits (Aulitzky et al., 2023). Family-inclusive counselling may be particularly useful when husbands or older relatives influence transportation, finances, or decisions about whether symptoms are serious.

Community health centres could also establish a clearly communicated pathway for unscheduled maternal concerns. A brief triage protocol, consistent messages across healthcare workers, and documentation of counselling could reduce contradictory advice. Nevertheless, symptom education must not be treated as a substitute for routine clinical surveillance. Preeclampsia may develop without noticeable symptoms; therefore, blood-pressure monitoring, urine assessment when indicated, risk evaluation, and appropriate referral remain indispensable.

These findings should be interpreted within several limitations. The study was conducted in one community health centre working area, and experiences in Katobengke may differ from those of women in rural, hospital-based, or geographically isolated settings. Purposive sampling supported experiential relevance but did not produce a representative sample. The findings should therefore be understood in terms of transferability rather than statistical generalisation.

The study relied mainly on women’s self-reported experiences. Accounts may have been affected by recall limitations, emotional experiences, or a desire to present decisions in socially acceptable ways. Interviews captured experiences at a particular point in pregnancy and could not fully examine how interpretations changed before diagnosis, during referral, and after delivery. The exclusion of husbands, relatives, midwives, and referral providers also meant that family and health-system influences were described primarily from women’s perspectives.

Researcher involvement in interviewing and phenomenological interpretation may have influenced coding and theme development, although reflexive notes, peer discussion, member checking, and an audit trail were used to strengthen analytic transparency. Finally, the symptoms discussed are not specific to preeclampsia. Normalising every symptom may delay care, but presenting every common discomfort as an emergency could increase anxiety and unnecessary service use. Clinical recommendations must therefore balance vigilance with proportionate, professionally guided assessment.

Future studies should include multiple community health centres and referral facilities to examine how geographical access, service capacity, culture, and referral organisation influence symptom recognition. Longitudinal qualitative research following women from antenatal care through birth and the postpartum period could clarify how interpretations evolve across clinical transitions. Including husbands, relatives, midwives,

community health workers, and hospital providers would enable a more complete analysis of distributed decision-making.

Intervention research should co-design preeclampsia education with pregnant women and families rather than merely testing standard information materials. Potential interventions could include visual decision aids, family-oriented counselling, symptom-response cards, structured safety-netting, and supported blood-pressure self-monitoring where feasible. Their evaluation should assess not only knowledge but also comprehension, confidence in seeking care, time from symptom onset to assessment, referral completion, acceptability, and unintended anxiety. Implementation studies are also needed to determine whether consistent counselling and rapid triage can be integrated into routine community-based antenatal services without increasing staff burden. Such research would translate women's experiences into system-level strategies for earlier detection, safer referral, and more responsive maternity care.

CONCLUSION

This study found that pregnant women's recognition of preeclampsia was a gradual and socially influenced process rather than a simple matter of knowing its warning signs. Headache, swelling, visual disturbances, and other bodily changes were frequently interpreted as normal pregnancy discomforts until they became persistent or severe. Women's decisions to seek care were shaped by previous pregnancy experiences, the clarity of information received during antenatal care, family responses, accessibility of health services, and their interactions with healthcare professionals. Family members could either delay care by normalising symptoms or facilitate timely assessment through emotional, financial, and practical support. These findings highlight the need for repeated, understandable, and action-oriented preeclampsia education throughout pregnancy. Antenatal counselling should involve influential family members, use practical examples and visual materials, and clearly explain when and where women should seek help. Katobengke Community Health Centre should also strengthen responsive triage and referral pathways for pregnant women reporting possible warning signs. Nevertheless, symptom education should complement not replace routine blood-pressure monitoring, clinical assessment, and timely referral because preeclampsia may develop without noticeable symptoms.

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DAFTAR PUSTAKA

- Aulitzky, A., Lanbach, J., Falkensteiner, S., Maier, S., Ulmer, H., Toth, B., & Seeber, B. (2023). High concentration of first-measured HCG after embryo transfer is associated with subsequent development of pre-eclampsia. *Reproductive BioMedicine Online*, 46(1), 196–202. <https://doi.org/https://doi.org/10.1016/j.rbmo.2022.10.007>
- Borneskog, C., Engström, G., Islam, N., Byrskog, U., Pedersen, C., Stromsöe, A., & Erlandsson, K. (2023). Midwife Educators' perceptions of the efficacy of the Objective Structured clinical assessment of life-saving interventions - a qualitative interview study in Bangladesh. *Sexual & Reproductive Healthcare*, 37, 100861.

- <https://doi.org/https://doi.org/10.1016/j.srhc.2023.100861>
- Carter, W., Bick, D., Mackintosh, N., & Sandall, J. (2021). Maternal help seeking about early warning signs and symptoms of pre-eclampsia: A qualitative study of experiences of women and their families. *Midwifery*, 98, 102992. <https://doi.org/https://doi.org/10.1016/j.midw.2021.102992>
- Chen, H., Luo, S., Deng, X., Li, S., Mao, Y., Yan, J., Cheng, Y., Liu, X., Pan, J., & Huang, H. (2024). Pre-eclamptic foetal programming predisposes offspring to hepatic steatosis via DNA methylation. *Biochimica et Biophysica Acta (BBA) - Molecular Basis of Disease*, 1870(5), 167189. <https://doi.org/https://doi.org/10.1016/j.bbadis.2024.167189>
- Cui, H., Zhang, N., An, J., Zeng, X., Zhao, Y., Sun, X., Bu, H., & Wang, H. (2024). Maternal folic acid supplementation to prevent preeclampsia: a systematic review and meta-analysis. *Complementary Therapies in Medicine*, 82, 103052. <https://doi.org/https://doi.org/10.1016/j.ctim.2024.103052>
- De Rosa, E., Person, B., Knopp, S., Muhsin, J., Lyimo, J. H., Kabole, F., & Rollinson, D. (2022). A descriptive qualitative case study of the experiences, perceptions and attitudes of pregnant women on Unguja island, Zanzibar, towards antischistosomal treatment. *Acta Tropica*, 225, 106143. <https://doi.org/https://doi.org/10.1016/j.actatropica.2021.106143>
- Deitch, J. M., Lee, I.-L., Yates, C. J., Kathpal, E., Lawton, P., Shahid, I., Hamblin, P. S., Dutta, D., Krishnamurthy, B., Said, J. M., Steele, C., Teale, G. R., & Kevat, D. (2024). Simplified gestational diabetes screening with a triaging fasting plasma glucose reduces the burden of oral glucose tolerance tests during pregnancy - A large tertiary comparative cohort study. *Diabetes Research and Clinical Practice*, 209, 111120. <https://doi.org/https://doi.org/10.1016/j.diabres.2024.111120>
- Feroz, A. S., De Vera, K., D Bragagnolo, N., Saleem, S., Bhutta, Z., & Seto, E. (2022). Understanding the Needs of a Mobile Phone-Based Telemonitoring Program for Pregnant Women at High Risk for Pre-Eclampsia: Interpretive Qualitative Description Study. *JMIR Formative Research*, 6(2). <https://doi.org/https://doi.org/10.2196/32428>
- Garti, I., Gray, M., Bromley, A., & Tan, J.-Y. (Benjamin). (2024a). Midwives' experiences of providing pre-eclampsia care in a low- and middle-income country - A qualitative study. *Women and Birth*, 37(2), 332-339. <https://doi.org/https://doi.org/10.1016/j.wombi.2023.11.001>
- Garti, I., Gray, M., Bromley, A., & Tan, J.-Y. (Benjamin). (2024b). Pre-eclampsia training needs of midwives in a Ghanaian tertiary hospital: A cross-sectional study. *Nurse Education in Practice*, 75, 103872. <https://doi.org/https://doi.org/10.1016/j.nepr.2024.103872>
- Hill, A. V., Balascio, P., Moore, M., Hossain, F., Dwarkanath, M., & De Genna, N. M. (2023). Young black women's desired pregnancy and birthing support during coronavirus disease 2019 pandemic. *SSM - Qualitative Research in Health*, 4, 100333. <https://doi.org/https://doi.org/10.1016/j.ssmqr.2023.100333>
- Hurrell, A., Webster, L., Sparkes, J., Battersby, C., Brockbank, A., Clark, K., Duhig, K. E., Gill, C., Green, M., Hunter, R. M., Seed, P. T., Vowles, Z., Myers, J., Shennan, A. H., Chappell, L. C., Ahuja, A., Alexander, H., Arya, R., Bahl, R., ... Yulia, A. (2024). Repeat placental growth factor-based testing in women with suspected preterm pre-eclampsia (PARROT-2): a multicentre, parallel-group, superiority, randomised controlled trial. *The Lancet*, 403(10427), 619-631. [https://doi.org/https://doi.org/10.1016/S0140-6736\(23\)02357-7](https://doi.org/https://doi.org/10.1016/S0140-6736(23)02357-7)
- Jones, O., Ormesher, L., Duhig, K. E., Peacock, L., & Myers, J. E. (2024). Pre-eclampsia and future cardiovascular disease risk: Assessing British clinicians' knowledge and practice. *Pregnancy Hypertension*, 37, 101145. <https://doi.org/https://doi.org/10.1016/j.preghy.2024.101145>
- Kenny, L. C., Brown, L. W., Ortea, P., Tuytten, R., & Kell, D. B. (2023). Relationship between

- the concentration of ergothioneine in plasma and the likelihood of developing pre-eclampsia. *Bioscience Reports*, 43(7). <https://doi.org/https://doi.org/10.1042/BSR20230160>
- Kivelä, A., Heinonen, S., Kivinen, K., Kere, J., Kajantie, E., Jääskeläinen, T., & Laivuori, H. (2023). Hypertensive pregnancy complications and maternal characteristics as predictors of cardiovascular health within ten years after delivery. *Pregnancy Hypertension*, 34, 5-12. <https://doi.org/https://doi.org/10.1016/j.preghy.2023.09.001>
- Lamma, L. S., Massi, M. N., Wahyuni, S., Prihantono, & Widaningsih, Y. (2021). Preeclampsia and normotensive pregnancy with tribal differences in South Sulawesi: Comparison of serum interleukin-10 (IL-10) levels. *Gaceta Sanitaria*, 35, S314-S318. <https://doi.org/https://doi.org/10.1016/j.gaceta.2021.10.043>
- Lee, C.-C., Chen, C.-P., Chen, C.-Y., Wang, L.-K., & Chen, Y.-Y. (2024). Clinical and sonographic risk factors for developing pre-eclampsia refractory to aspirin prophylaxis. *Taiwanese Journal of Obstetrics and Gynecology*, 63(6), 874-879. <https://doi.org/https://doi.org/10.1016/j.tjog.2024.01.038>
- Lee, R. W. K., Chng, A. L. Bin, Tan, K. H., Shub, A., Tan, T., Hian, T. K., Kheong Lee, R. W., Ling, L. S., Kuma, K., Siew, C. Y., Ting, W., Myint, S. S., Dewi Judistiani, R. T., Shah, M., Madulid-Sison, L., Andres-Palencia, B., Pagilagan-Palma, E., Banu, L. A., Boriboonhirunsarn, D., & Daminda Dias, P. T. (2023). Clinical practice of vitamin D screening and supplementation in pregnancy in Asia-pacific countries: A cross-sectional study. *Heliyon*, 9(11), e21186. <https://doi.org/https://doi.org/10.1016/j.heliyon.2023.e21186>
- Ma'ayeh, M., Cavus, O., Hassen, L. J., Johnson, M., Summerfield, T., Begom, M., Cai, A., Mehta, L., Rood, K., & Bradley, E. A. (2024). Study of heart function in PRE-Eclampsia during and after PreGnancy (SHePREG): The pilot cohort. *American Heart Journal*, 269, 45-55. <https://doi.org/https://doi.org/10.1016/j.ahj.2023.12.003>
- Ma, T., Chang, K., Alyusuf, A., Bajracharya, E., Washio, Y., Kelly, P. J., Bellad, R. M., Mahantashetti, N. S., Charantimath, U., Short, V. L., Lalakia, P., Jaeger, F., Goudar, S., & Derman, R. (2022). Design, Development, and Testing of BEST4Baby, an mHealth Technology to Support Exclusive Breastfeeding in India: Pilot Study. *JMIR Formative Research*, 6(9). <https://doi.org/https://doi.org/10.2196/32795>
- Nguyen, A. D., Duong, G. T. T., Do, D. T., Nguyen, D. T., Tran, D. A., Phan, T. T. H., Nguyen, T. K., & Nguyen, H. T. T. (2022). Primary cesarean section rate among full-term pregnant women with non-previous uterine scar in a hospital of Vietnam. *Heliyon*, 8(12), e12222. <https://doi.org/https://doi.org/10.1016/j.heliyon.2022.e12222>
- Shi, H., Wang, W., Li, F., Guo, A., & Liu, T. (2024). Model construction and application for predicting pre-eclampsia by Sonoclot coagulation analyzer. *Non-Coding RNA Research*, 9(2), 288-293. <https://doi.org/https://doi.org/10.1016/j.ncrna.2024.02.008>
- Sirisomboon, R., Nuampa, S., Leetheeragul, J., Sudphet, M., Pimol, K., Sirithemmontree, S., & Silavong, L. (2024). Enhancing the competencies of obstetrical nurses and midwives in high-risk pregnancy management through simulation-based training in Lao people's democratic republic: A pilot study. *Midwifery*, 137, 104132. <https://doi.org/https://doi.org/10.1016/j.midw.2024.104132>
- Sundas, A., Azhar, S., Ahmed, J., Chaudhry, B., Gajdács, M., & Jamshed, S. (2024). Knowledge, attitudes and practices of pregnant women regarding urinary tract infections living in peripheral areas of Pakistan: A questionnaire-based cross-sectional study. *Clinical Epidemiology and Global Health*, 28, 101591. <https://doi.org/https://doi.org/10.1016/j.cegh.2024.101591>
- Th Thorgeirsdottir, L., Linden, K., Bergman, L., Sengpiel, V., Nyman, V., & Elden, H. (2023). The experience of being a partner to a childbearing woman whose pregnancy is complicated by pre-eclampsia: A Swedish qualitative study. *Sexual & Reproductive Healthcare*, 36, 100847. <https://doi.org/https://doi.org/10.1016/j.srhc.2023.100847>

- Tiruneh, S. A., Rolnik, D. L., Teede, H. J., & Enticott, J. (2024). Prediction of pre-eclampsia with machine learning approaches: Leveraging important information from routinely collected data. *International Journal of Medical Informatics*, 192, 105645. <https://doi.org/https://doi.org/10.1016/j.ijmedinf.2024.105645>
- Vadsaria, K., Nuruddin, R., Mohammed, N., Azam, I., & Sayani, S. (2025). Efficacy of a Personalized mHealth App in Improving Micronutrient Supplement Use Among Pregnant Women in Karachi, Pakistan: Parallel-Group Randomized Controlled Trial. *Journal of Medical Internet Research*, 27. <https://doi.org/https://doi.org/10.2196/67166>
- Vinogradov, R., Smith, V., Hiu, S., McParlin, C., Farnworth, A., & Araújo-Soares, V. (2023). Let's talk aspirin: A survey of barriers and facilitators faced by midwives when engaging in conversations about aspirin with women at risk of pre-eclampsia. *Midwifery*, 127, 103860. <https://doi.org/https://doi.org/10.1016/j.midw.2023.103860>
- Wang, W., Zhang, W., Chen, L., Wu, X., Gu, J., Yang, F., Wang, B., Qin, S., & Tang, P. (2024). Identification of differentially expressed miRNAs in plasma exosomes from patients with early-onset pre-eclampsia using next generation sequencing. *Heliyon*, 10(3), e24543. <https://doi.org/https://doi.org/10.1016/j.heliyon.2024.e24543>