
PREGNANT AND POSTPARTUM WOMEN'S PREPAREDNESS FOR FLOOD DISASTERS IN THE CONTEXT OF CLIMATE CHANGE

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ABSTRACT

Climate change is increasing the frequency of hydrometeorological hazards such as floods, with important implications for maternal and neonatal health, yet the lived experiences of pregnant and postpartum women in flood-prone Indonesian communities remain insufficiently described. This qualitative exploratory study aimed to examine disaster preparedness, self-efficacy, and social support among pregnant and postpartum women and relevant community stakeholders in flood-prone sub-districts of Sukoharjo Regency, Central Java, Indonesia. Data were generated through in-depth interviews, small-group discussions, and field observations with seventeen participants, including disaster-management officers, health authorities, primary healthcare staff, a village midwife, a health cadre, community volunteers, and seven pregnant or postpartum women, then analyzed thematically with source triangulation. The findings show that preparedness was associated with cumulative community experience of flooding, while shelters often lacked maternal-specific supplies such as sanitary pads, diapers, and infant formula. Self-efficacy appeared strengthened by experience but constrained by the physical limitations of pregnancy and early postpartum recovery, and social support extended beyond husbands to mothers, mothers-in-law, extended family, volunteers, and health cadres. These findings support the development of maternal-responsive preparedness, physically assisted evacuation, and multilevel social support within disaster risk reduction and antenatal care services

KEYWORDS

Climate change; flood disaster; maternal health; self-efficacy; social support.



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INTRODUCTION

Climate change is altering weather patterns and increasing concern about hydrometeorological hazards, including floods. Flood exposure during pregnancy has been associated in previous studies with adverse outcomes such as preterm birth, low birth weight, pregnancy loss, and other maternal or neonatal risks (Li et al., 2026; Zheng et al., 2026; Liu et al., 2026; He et al., 2024; Lawler et al., 2025; Mendrinos et al., 2025). Floods can also disrupt access to antenatal care (ANC), safe delivery facilities, clean water, nutritious food, medicines, and adequate shelter (Callaghan et al., 2007; Lafarga-Previdi et al., 2022).

Evidence from Bangladesh, Zambia, and Pakistan indicates that flooding can reduce access to maternal and newborn health services and make travel to health facilities difficult during peak flood periods (Baten et al., 2020; Mroz et al., 2023; Sadia et al., 2016). Disaster-related displacement and loss of housing may also intensify psychological distress, including post-traumatic stress, anxiety, and depression, among pregnant women (Wendt Viola et al., 2025; Xiong et al., 2010; Giarratano et al., 2019; Silva-Suarez et al., 2021; Severson et al., 2023; Jeffers et al., 2022; Pike et al., 2022). These risks may be compounded by poverty, limited education, restricted decision-making autonomy, and gender-based violence during crises (Soomar et al., 2023; Goldin et al., 2019; Ullah et al., 2024; Shope et al., 2025; Jerin et al., 2023; Tran & Downes, 2023; Shah et al., 2025).

Disaster preparedness involves more than knowledge of hazards. It includes practical planning, emergency contact and referral arrangements, access to essential medicines and documents, preparation of maternal and infant supplies, and knowledge of evacuation routes and procedures (Ewing et al., 2008; ACOG, 2017; Hapsari et al., 2020). Previous intervention studies suggest that structured education and training can improve disaster-related knowledge and preparedness among pregnant women (Cangöl & Yıldırım, 2026; Arikan et al., 2026). Timely information, family and community support, and the integration of maternal needs into disaster policies are also central to resilience (Ewing et al., 2008; ACOG, 2017; Hapsari et al., 2020; Ha, 2022; Davis et al., 2023).

Despite this evidence, the lived experiences and support arrangements of pregnant and postpartum women in flood-prone Indonesian communities remain insufficiently described. This study therefore explored three domains—flood-specific preparedness, self-efficacy, and social support—to inform the preliminary development of a community-based Climate-Resilient Maternal Care (CRMCM) model. The study specifically sought to identify practical needs and mechanisms that can be addressed through antenatal care, community disaster structures, and cross-sectoral response planning.

RESEARCH METHOD

This qualitative exploratory study constituted the first-year analysis phase of a broader two-year mixed-methods sequential exploratory project to develop a CRMCM model, designed to identify empirical needs and lived experiences before expert validation. The study was conducted in the flood-prone sub-districts of Grogol, Mojolaban, and Baki in Sukoharjo Regency, Central Java, Indonesia, areas with a documented history of annual or recurrent seasonal flooding (Mroz et al., 2023; Ha, 2022).

Purposive sampling was used to recruit participants from seven stakeholder categories: Regional Disaster Management Agency (BPBD) officers, District Health Office

personnel, primary healthcare centre (Puskesmas) staff, a village midwife, a health cadre, community disaster volunteers, and pregnant or postpartum women together with members of their support networks. Data were generated through in-depth interviews, small-group discussions, and field observations conducted between May and August 2026. The final sample comprised 17 participants: seven pregnant women, one husband, three community disaster volunteers, one village midwife, one health cadre, one BPBD officer, and three District Health Office personnel. An illustrative case of a woman interviewed on the fifth postpartum day after an emergency caesarean section performed during flood evacuation was included among the seven pregnant-women respondents. The interview guide addressed the three proposed CRMCM domains: flood-specific preparedness, self-efficacy, and social support. Interviews and group discussions were audio-recorded with participants' consent and transcribed verbatim; quotations originally given in Javanese or Indonesian were translated into English with care taken to preserve their original meaning, and identifying details were minimized to protect participant identities.

Data were analyzed using thematic analysis, following a hybrid deductive-inductive coding process. Two members of the research team independently familiarized themselves with the audio recordings and verbatim transcripts before coding began. Line-by-line open coding was then conducted manually using a coding matrix in Microsoft Excel, combining deductive codes derived from the three a priori CRMCM domains with inductive sub-codes emerging directly from participants' accounts. Codes were iteratively clustered into candidate sub-themes and discussed in team debriefing sessions to resolve coding discrepancies, functioning as a form of investigator triangulation, and emerging themes were compared across informant types (source triangulation) before being synthesized into draft model components for later expert validation using the Delphi technique. Ethical approval was granted by the Health Research Ethics Committee of Universitas Muhammadiyah PKU (UMPKU) Surakarta, Indonesia (Ethical Clearance No. 222/LPPM/UMPKU/IV/2026; Protocol ID 26/04/218; issued 30 April 2026). All participants provided informed consent, and identities were protected through anonymized reporting.

RESULT AND DISCUSSION

Flood-specific disaster preparedness. Field accounts suggest that preparedness differed between villages with longer and shorter histories of recurrent flooding. In villages where community-based disaster preparedness structures (Destana/Disaster-Resilient Village) had operated since 2018, participants described more established informal procedures, including flood-water-level indicators, designated evacuation points, and rescue boats positioned near known flood-prone locations. Participants from villages with more recent flood exposure described greater uncertainty about evacuation points during their first flood event.

A recurring concern across informant accounts was the limited availability of maternal-specific supplies in shelters. Sanitary pads, diapers, and infant formula were reportedly not always included in shelter aid packages, even when general food assistance was available, and families sometimes had to purchase these items independently. This gap is notable because the Ministry of Health's Minimum Initial Service Package, locally referred to as the PPAM disaster kit, is designed to include bathing supplies, maternal and infant clothing, sanitary pads, diapers, and vitamins, although distribution was reported to vary between villages within the same district. These accounts are consistent with evidence that floods can disrupt maternal healthcare and essential supplies (Callaghan et al., 2007; Lafarga-Previdi et al., 2022; Baten et al., 2020; Mroz et al., 2023) and support calls for

obstetric and postpartum preparedness protocols at hospital and community levels (Ewing et al., 2008; ACOG, 2017).

One participant, interviewed during early postpartum recovery after an emergency caesarean section, recalled: “For food, there was plenty of aid from the shelter and the church community kitchen. But for personal needs like sanitary pads, diapers, and infant formula—there was no aid for those. In the end we had to buy them ourselves.” Her husband gave a similar account: “What worried us most was illness in the baby and the other children, like skin rashes and diarrhea... diapers were not part of the aid from the shelter, so I had to run out and buy them myself at the minimart.” The village midwife likewise described uneven distribution of the disaster kit across villages: “Kwarasan always receives it, but I do not know about other areas.” (Quotations were translated from Javanese/Indonesian into English; original meaning was preserved and identifying details minimized.)

Self-efficacy and physical capacity. Participants from villages with more established flood experience described pregnant women as capable of making evacuation or care-seeking decisions without waiting for permission from husbands or authorities. Several participants explicitly linked this confidence to accumulated experience across successive pregnancies rather than a fixed personal trait. This pattern does not imply that prior disaster exposure is uniformly beneficial: previous studies have also documented anxiety and trauma after disasters (Wendt Viola et al., 2025; Severson et al., 2023). Rather, the findings suggest that vigilance and practical self-efficacy may coexist.

One participant described how her confidence grew directly from experience across pregnancies: “I am fairly independent now. With my first pregnancy I could not do anything, but with this second pregnancy I can go anywhere, I am used to it now.” Another described maintaining composure as a deliberate strategy: “Just do not panic, and prioritize safety first—what matters is safety and health.” A third described active risk assessment when her husband was unavailable: “What is certain is I would think about safety—the priority is the baby in the womb. I would try to find a safer place than where I am now.” These accounts, drawn from three participants beyond the illustrative postpartum case, indicate that experience-based confidence and deliberate emotional regulation were recurring features of self-efficacy across the wider sample.

Participants also distinguished cognitive readiness from the physical ability to evacuate quickly. This issue was illustrated by a woman evacuated on the fifth day after caesarean section who reported pain and restricted movement while being moved to a relative’s elevated home: “Sometimes when they find a case, they take her straight to the referral facility and only then tell me: ‘Ma’am, I found this case earlier, but I’ve already taken her to the Puskesmas.’ So then I just go and check on her there,” the village midwife explained. By contrast, one pregnant participant highlighted the physical constraints of pregnancy itself: “When you’re pregnant... moving around anywhere is hard, you can’t be as agile as when you’re not pregnant... If a disaster happens, you’d be held back, you can’t run.” As the postpartum case is a single illustrative account, it should not be generalized; it does, however, indicate that preparedness education should be accompanied by plans for physically assisted evacuation rather than assuming independent mobility, a distinction existing training approaches may need to address more explicitly (Cangöl & Yıldırım, 2026; Arikan et al., 2026).

Social support. Support was described as layered across the nuclear family, extended kin, and formal community structures, including husbands, mothers, mothers-in-law, other relatives, village disaster volunteers, health cadres, and primary healthcare rapid-response teams. In households where husbands worked away from home, mothers and mothers-in-law were described as important sources of daily assistance and influence

regarding ANC attendance and local prenatal practices. Relatives' elevated homes were also used as informal evacuation destinations and could be more accessible than formal shelters.

A community health cadre described the evacuation arrangement made for pregnant women: "For pregnant women we usually arrange it ourselves—we pick her up and take her to the sub-district office because it is on higher ground. She is kept separate there, and the midwife comes to accompany her. The cadre, the midwife, and the sub-district office coordinate quickly by phone." Reflecting the role of extended family when husbands work away, one participant explained: "My mother. At home it's just me and my mother, since my husband works in Jakarta. But when he's home, then it's with him—on his days off he takes me for check-ups." These accounts are consistent with evidence emphasizing family and community support in maternal resilience during climate-related disasters (Giarratano et al., 2019; Jeffers et al., 2022; Ha, 2022), and they also draw attention to extended family members who may be overlooked when preparedness programs focus primarily on husbands, particularly in households where men migrate for work, consistent with evidence on women's adaptive capacity in migrant-sending households more generally (Banerjee et al., 2019).

Implications for the draft CRMCM model. Taken together, the findings indicate that maternal resilience may require more than general risk communication. The draft CRMCM model should consider four linked operational elements: community mapping of pregnant and postpartum women; maternal-responsive shelter supplies; referral protocols stratified by obstetric and postpartum risk; and support plans involving both nuclear and extended family members. The reported variation in maternal aid distribution between villages also indicates that implementation equity should be monitored, not merely the existence of a policy or supply package (ACOG, 2017; Datta et al., 2026).

CONCLUSION

This qualitative analysis suggests that preparedness for floods among pregnant and postpartum women is closely connected to cumulative community experience, while maternal-specific supplies may remain insufficient in shelters. Self-efficacy appeared strengthened through experience but constrained by the physical limitations of pregnancy and early postpartum recovery, and social support extended beyond husbands to include mothers, mothers-in-law, extended family, volunteers, and health cadres. The findings inform a draft CRMCM model with three core pillars: flood-specific preparedness, including maternal emergency kits and tiered referral protocols; self-efficacy strengthening through simulation-based education combined with physically assisted evacuation; and multilevel social support that recognizes extended family and connects maternal care with existing community disaster structures.

This analysis has important limitations. Although the study included 17 participants and met the planned sample target, seven were pregnant women, and the purposive sample was drawn from selected flood-prone sub-districts and may not represent all pregnant or postpartum women in Sukoharjo Regency or elsewhere. The postpartum case was a single account and should be interpreted as illustrative rather than representative, and findings describe perceived patterns rather than prevalence or causal relationships. Subsequent research should prioritize transparent reporting of the analytic process and expert validation through the Delphi technique, followed by cross-sectoral collaboration between health services and disaster-management agencies to integrate disaster education into routine ANC and improve the equitable distribution of maternal-specific assistance

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