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Perinatal depression and anxiety in Ghana: a qualitative study of women's perspectives on AI-driven interventions

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Abstract

Background The perinatal period is critical for maternal and child health, yet many women experience perinatal mental illnesses, particularly perinatal depression and anxiety. In Ghana, the burden of perinatal depression and anxiety is exacerbated by socioeconomic challenges and limited access to mental health services. This study explores the perceptions and experiences of pregnant women and new mothers regarding the role of artificial intelligence in addressing perinatal depression and anxiety.

Methods A qualitative approach utilizing focus group discussions was employed to gather insights from 15 participants, including 8 pregnant women and 7 new mothers, in Accra, Ghana. Thematic analysis was used to identify key themes related to experiences with perinatal depression and anxiety and attitudes toward artificial intelligence technologies.

Results Four main themes emerged: awareness of perinatal depression and anxiety and its emotional impact, scepticism and fear regarding artificial intelligence's ability to provide emotional support, perceived benefits and significant barriers associated with artificial intelligence tools. The participants acknowledged the potential for artificial intelligence to aid in self-monitoring and education but expressed concerns about privacy, trust, and the fear of losing human interaction in care.

Conclusion This study highlights the complex interplay of awareness, emotional experiences, and attitudes toward artificial intelligence among perinatal women in Ghana. This highlights the need for culturally sensitive educational initiatives and ethical guidelines for artificial intelligence integration in maternal health, aiming to enhance mental health outcomes for women and their families in low- and middle-income contexts.

Keywords Perinatal depression and anxiety, Artificial intelligence, Maternal mental health, Ghana, Low- and middle-income countries

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Background

The perinatal period, as defined by the World Health Organisation (WHO), begins at 22 completed weeks of gestation and ends seven completed days after birth [1], primarily for perinatal mortality statistics [2]. However, from a mental health perspective, this period is more broadly understood to span from conception to 12 months post-partum [3, 4]. During this period, many women experience a range of mental health conditions collectively known as perinatal mental illnesses [5]. Globally, approximately 10% of pregnant women and 13% of postpartum women suffer from these conditions, with significantly higher rates observed in Low- and middle-income countries (LMICs) [6]**.** In developing countries, the prevalence rates are estimated at 15.6% during pregnancy and 19.8% after childbirth [6, 7], with approximately one in five women affected. Perinatal mental health conditions range from depression and anxiety, commonly referred to as Perinatal depression and anxiety (PDA), to more severe disorders such as psychosis and suicidal ideation. Among these conditions, PDA is the most common [6]. In this study, PDA refers to depressive and/or anxiety symptoms occurring during pregnancy and up to twelve months postpartum, consistent with WHO definitions [3, 4, 6]. These conditions are characterized by persistent sadness, worry, or loss of interest that interferes with daily functioning and maternal-infant bonding. This operational definition guides the study's focus on women's lived experiences and perceptions of AI-enabled approaches to PDA management in Ghana.

PDA affects 10–20% of women worldwide [5, 6], with even higher rates reported in LMICs [8]. For example, Dennis and colleagues [9] reported that nearly one in three women in LMICs experience perinatal anxiety. These disorders significantly compromise maternal health and well-being, increasing the risk of chronic illness and emotional distress, which complicates parenting [6]. They also contribute to poor child health outcomes, such as low birth weight and developmental and behavioural problems [10]. PDA further strains family dynamics and imposes economic burdens on both households and healthcare systems [6]. Addressing PDA is therefore essential not only for improving maternal and child health outcomes but also for fostering more resilient families and healthier communities.

In Ghana, as in many LMICs, the burden of PDA is exacerbated by intersecting factors, including poverty, limited access to healthcare, and cultural stigma [11, 12]. The country continues to face high maternal mortality rates, whereas mental health services remain underresourced and largely inaccessible [13, 14]. These gaps contribute to adverse maternal and neonatal outcomes, such as preterm birth, low birth weight, and impaired infant cognitive and emotional development [15, 16]. Addressing PDA in Ghana is particularly urgent, as it reflects broader systemic challenges across LMICs and underscores the need for effective, culturally appropriate, and scalable interventions to mitigate this global health crisis.

Given these inequities, this study seeks to contribute to addressing health disparities in Ghana by examining how AI-enabled mental health tools could expand access to care among underserved women, particularly those facing geographic, economic, or social barriers. By exploring how pregnant women and new mothers perceive and engage with AI-driven perinatal mental health interventions, this research aims to generate insights that can inform equitable, context-sensitive innovations for maternal mental health care.

The lack of accessible and affordable mental health services in Ghana leaves millions of women without necessary care, perpetuating cycles of poor maternal and child health outcomes [17, 18]. In many LMICs, including Ghana, the ratio of mental health professionals to the population can be as low as one per million people, making timely and effective care nearly impossible for those experiencing PDA [19, 20]; This critical gap in care has profound consequences, as untreated PDA not only jeopardizes maternal well-being but also increases the risk of preterm birth, low birth weight, and long-term developmental challenges in children [15, 16]. Recent advances in artificial intelligence (AI) have emerged as transformative forces in healthcare, particularly in the field of mental health [21]. AI-driven digital health technologies, such as machine learning algorithms, natural language processing, and mobile health (mHealth) applications, are increasingly used to predict, diagnose, and manage conditions [22, 23]. These tools have shown potential for identifying at-risk individuals, delivering personalized interventions, and expanding access to mental healthcare [24, 25]. Examples include AI-powered chatbots and wearable devices that monitor mood and offer real-time support for individuals with depression and anxiety [26, 27]. While emerging digital and AI-based interventions hold promise for improving access to perinatal mental health care, little is known about how women in Ghana perceive such technologies and whether they would be willing to engage with them.

In Ghana, where health systems are overburdened and stigma hinders help-seeking, AI technologies could play a pivotal role in providing cost-effective, accessible, and non-stigmatizing care [21, 28]. However, the application of AI to perinatal mental health remains largely underexplored in Ghana and other LMICs, emphasizing the need for context-specific innovative solutions in these settings. The absence of context-specific research constrains the development of culturally appropriate, equitable, and sustainable solutions for perinatal depression

and anxiety. This study therefore seeks to address this gap by examining Ghanaian women's perceptions and experiences regarding the use of AI to support perinatal mental health.

Nevertheless, its integration into perinatal mental health care remains fraught with challenges. Ethical concerns related to data privacy and algorithmic bias are particularly pressing in culturally and socioeconomically diverse and resource-limited settings [21, 29, 30]. There is a risk that AI tools may reinforce existing health inequities if not developed in collaboration with the communities they intend to serve [31]. The health belief model (HBM) [32] suggests that women's perceptions of their susceptibility to and severity of PDA influence their willingness to engage with AI-enabled technologies. Similarly, the Technology Acceptance Model (TAM) emphasizes that perceived usefulness and ease of use are key determinants of user adoption [33, 34]. However, few studies have examined how perinatal women in LMICs, including Ghana, perceive and engage with AI-enabled health interventions, especially given cultural norms, trust in technology, and infrastructural constraints.

This study addresses this critical knowledge gap by exploring how pregnant women and new mothers in Ghana perceive the role of AI technologies in addressing PDA. This study is guided by the following research question: How do pregnant women and new mothers in Ghana perceive the role of AI technologies in addressing PDA? To answer this question, this study has three key objectives: (1) to explore perinatal women's experiences with PDA; (2) to assess their attitudes toward using AI for PDA management; and (3) to identify the perceived benefits of AI in predicting, diagnosing, and treating PDA.

This research is particularly timely, given the accelerating pace of AI innovation and the growing recognition of perinatal mental health as a global public health priority [6, 21]. By centring on the voices of women with lived experience with PDA, this study aims to generate evidence-based insights that can inform the design of culturally sensitive, user-centred AI solutions. By identifying how AI can be leveraged to overcome barriers of access, stigma, and affordability, the study directly contributes to efforts to narrow maternal mental health disparities in Ghana and across other LMICs facing similar systemic challenges.

Theoretical framework

PDAs are increasingly recognized as critical public health issues in LMICs [35, 36]. In Ghana, the true burden of PDA is likely underreported [37] because of systemic challenges such as limited funding [38], an underdeveloped mental healthcare infrastructure [13, 14], and pervasive cultural stigma [39, 40]. These challenges call for a multidimensional theoretical lens of maternal mental health that can illuminate individual beliefs as well as structural and sociocultural constraints to emerging interventions, particularly those involving technological innovations. This study integrates two complementary frameworks, the HBM of behaviour change, which was developed by Hochbaum [41] and Rosenstock, 1974, as cited in [42], and the TAM [33, 43], to explore women's receptivity to AI-driven interventions for PDA.

The HBM can explain women's perceptions of emotional distress during pregnancy and the postpartum period and illuminate how personal beliefs and sociocultural norms can shape awareness and recognition as well as response to PDA. The model is grounded in six constructs that help explain what motivates individuals to engage or refrain from engaging in prevention, screening, and/or controlling disease or health conditions. These include perceived susceptibility to a disease or health condition, perceived severity of the disease or condition, perceived benefits of positive aspects of a health action, perceived barriers to the negative aspect of a particular health action, cues to action, and self-efficacy [44]. The HBM has been widely applied to explain a wide range of maternal health behaviours, such as antenatal care attendance [45], skilled health personnel for delivery [46], mode of delivery [47], preventive interventions during pregnancy [48], healthcare seeking during pregnancy [49] and postpartum [50], child immunization uptake [51], and mental health help seeking [52–57].

In the context of PDA, *perceived susceptibility* refers to whether women believe they are at risk of experiencing psychological distress during or after pregnancy [53]. In Ghana, as in other African contexts, many women normalize psychological symptoms such as sadness, fatigue, or social withdrawal, perceiving them as a natural part of motherhood rather than signs of a mental health condition [58]. This misperception may lead to an underestimation of personal vulnerability. Similarly, *perceived severity* reflects beliefs about the seriousness of PDA and its consequences. If symptoms (e.g., persistent sadness, fatigue, excessive worry and irritability) do not visibly interfere with daily functioning, physical health or childcare responsibilities, they may be downplayed, limiting the motivation to seek support or treatment [49, 53, 59].

Moreover, gendered expectations regarding motherhood, family honor, and emotional resilience may discourage women from acknowledging their distress or drive them to seek multiple sources of care, sometimes nonorthodox healthcare providers [60] or approaches such as prayers [61].

The availability of AI technologies to address PDA may be perceived as beneficial to the early detection of symptoms, convenience, anonymity, and improved access to care, particularly in rural and underserved, low-resource communities. Even in urban and peri-urban settings

where mental health services may exist, perinatal women may also appreciate the ability to access support discreetly to mitigate potential stigma [21]. Despite the perceived benefits of AI tools, barriers remain substantial. These include a lack of access to smartphones or stable internet, unfamiliarity with digital tools, fear of confidentiality breaches, and scepticism about machine-based assessments [21, 62]. Cultural and religious interpretations of mental illness may also discourage the use of biomedical or AI-supported solutions [63]. To mitigate these challenges, cues to action, such as advice from nurses and midwives, media campaigns, or shared experiences from other mothers, can prompt engagement with AI tools. Finally, self-efficacy, or the belief in one's ability to use technology effectively, influences whether women are willing to try or sustain the use of smart devices [64]. Low digital literacy, especially among women in rural or low-resource areas or with limited education, undermines confidence and usability [65].

The application of AI in maternal healthcare, including for mental health screening and early intervention, holds potential in resource-constrained settings. However, the successful implementation of such tools depends heavily on end-user attitudes and sociocultural fit. The TAM provides a useful framework for analyzing these attitudes, especially through the constructs of perceived usefulness and perceived ease of use [33, 66]. For example, the model can help explain how women perceive the usefulness and ease of use of digital mental health technologies, including AI-based screening tools, and how it impacts their choice to adopt them [67]. AI-driven tools such as mHealth applications and predictive algorithms hold promise in addressing gaps in surveillance, personalized care, and early detection of complications such as preeclampsia and PDA. In the context of PDA, perceived usefulness is related to whether women believe that AI tools can improve their emotional well-being or assist in recognizing early symptoms of PDA. In Ghana, where mobile telephony is abundant [68] and digital health tools are increasingly introduced [69], it can create enthusiasm among pregnant women, particularly when such tools are recommended by healthcare workers [70]. However, gaps in digital literacy among rural or low-educated women and mistrust in unfamiliar systems, such as concerns over privacy and algorithmic bias, often limit the uptake of AI-based interventions [65].

By integrating the HBM and TAM, this study acknowledges that the decision to adopt AI-supported maternal mental health technologies is shaped not only by perceived health threats and personal beliefs but also by practical considerations such as usability and trust in technology. The dual-theoretical lens is particularly well suited to guide this study in an LMIC context [71], where structural challenges, limited mental health infrastructure, and strong sociocultural norms shape health behaviours [13, 38–40]. It offers a robust framework for understanding both the psychological and contextual factors that influence women's engagement with digital interventions for PDA in Ghana and served as the analytical lens through which participants' perceptions and experiences were interpreted.

Application of health belief model and technology acceptance model in this study

In this study, the HBM and TAM were employed as organising and interpretive frameworks to guide both data collection and analysis. The HBM informed exploration of women's beliefs about their susceptibility to and perceived severity of PDA, perceived benefits and barriers to seeking help, cues to action, and self-efficacy regarding mental health care. These constructs align with Objective 1 (exploring women's experiences with PDA) by illuminating how individual perceptions and sociocultural norms shape recognition and help-seeking behaviours. The TAM complemented this perspective by examining how perceived usefulness and ease of use influence attitudes toward AI-based mental health interventions, directly addressing Objective 2 (assessing attitudes toward using AI for PDA management) and Objective 3 (identifying perceived benefits of AI in predicting, diagnosing, and treating PDA). Together, these models provided an integrated framework for understanding both psychological and technological determinants of engagement with AI-enabled maternal mental health solutions in Ghana.

Study context

This qualitative study was conducted in Accra, the capital city of Ghana (Fig. 1), between July and August 2024. Accra was purposively selected because it is densely populated and ethnically diverse, comprising individuals from various regions of Ghana and neighboring countries [72, 73]. The 2021 Population and Housing census identifiesAccra as the most populated area in Ghana and among the four regions that account for more than half of the national population [74]. Geographically, Accra is situated on the southern coast along the Gulf of Guinea, which is part of the Atlantic Ocean [75]. The Greater Accra Region (GAR) covers approximately 3,245 km^2, representing approximately 1.4% of Ghana's total land area (Fig. 2) [73]. The region is also recognized as one of the most urbanized and economically advanced regions in the country [76]. The research team also considered logistical feasibility and the location of our community partner, APEC Ghana, whose office is based in the city.

The socioeconomic profile and cultural composition of Accra broadly reflect the lower to middle classes targeted in this study [79, 80]. Compared with rural areas, access

Fig. 1 A map of Ghana [77]

to healthcare in Accra is relatively better [81]; however, significant disparities persist, particularly among marginalized communities [82]. Accra is ethnically diverse because of high internal migration and shares demographic similarities with other major urban centers, such as Kumasi and Sekondi-Takoradi [79, 83].

The dominant ethnic groups in the city, predominantly Akan, Ga-Dangme and Ewe, each have distinct cultural beliefs and practices surrounding pregnancy, childbirth, and the postpartum period [84–88]. Christianity is the predominant religion in the region, accounting for approximately 83.0% of the population. Both ethnicity and religion have significant implications for maternal health behaviours, as many pregnant women and new mothers integrate religious practices and traditional healing methods with biomedical care [89]. Moreover, extended family networks play a vital role in maternal care, with older female relatives, including mothers, grandmothers, and aunts, often providing critical guidance and support throughout pregnancy and the postpartum period.

Pregnancy

During pregnancy, many women in Accra navigate a hybrid care system that blends biomedical antenatal care (ANC) with traditional beliefs and practices [60, 84, 90, 91]. It is common for women to simultaneously utilize formal ANC services alongside alternative care providers, including traditional birth attendants, herbalists, and spiritualists [92]. In recent years, national health campaigns and increased health literacy have contributed to improved ANC attendance, with most women in Accra meeting the minimum recommended number of four ANC visits and initiating care in the first trimester [93–95].

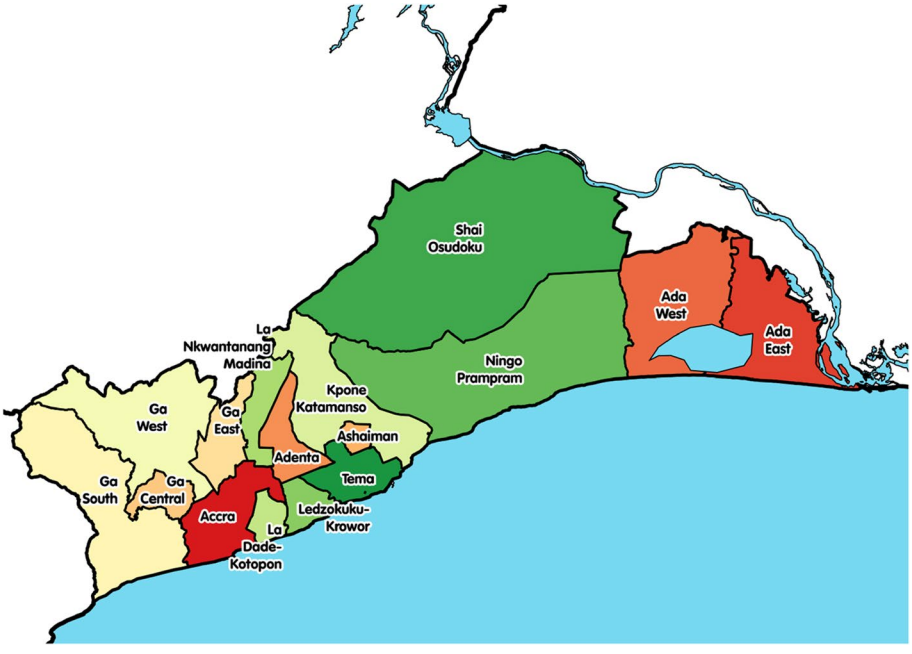

Fig. 2 A map of the Greater Accra Region [78]

Nevertheless, delays in initiating ANC remain prevalent and are often linked to fears of spiritual harm or cultural taboos against early pregnancy disclosure [84, 96]. Common traditional practices during pregnancy include dietary restrictions, prayer rituals, and consultations with spiritual leaders or traditional birth attendants [84, 96]. Elderly individuals, especially mothers and grandmothers, play an influential role in guiding pregnant women in appropriate dietary choices, dress codes, and behavioural expectations to ensure safe delivery [61, 88]. Additionally, the influence of Christianity, particularly Pentecostal and charismatic movements, reinforces faith-based interpretations of pregnancy as a spiritual battle, often necessitating the use of prayer, fasting, and anointing oils [85].

Childbirth

Institutional deliveries in Accra have increased in recent years, driven by government intervention, improved access to healthcare services, and the implementation of the National Health Insurance Scheme (NHIS) [97–99]. These developments have contributed to greater utilization of skilled birth attendants and facility-based deliveries. However, significant challenges persist [100], especially in low-income neighborhoods, where some women continue to seek care from traditional birth attendants (TBAs) or faith-based prayer camps [60, 90]. Barriers to institutional delivery include fears of mistreatment by healthcare providers, high out-of-pocket costs, especially for cesarean sections, and the absence of emotional and psychosocial support during labour [84, 85, 101]. Many women report feeling isolated during hospital births because of restrictions on birth companions and limited interpersonal engagement from health workers [101]. In contrast, traditional and home births are often communal events [86], where women are surrounded by experienced female relatives who provide emotional, physical, and spiritual support [102]. Cultural interpretations of labour pain also influence childbirth experiences. In some ethnic groups, particularly among Ga-Dangme and Akan, labour pain is perceived as a test of strength, and silence during childbirth is valued as a marker of bravery and endurance [103].

Postpartum

The postpartum period is deeply shaped by family and community influences [84]. In many cultural settings, women are expected to observe a rest period, typically lasting at least six weeks, during which they are cared for by mothers or mothers-in-law. This period is often marked by traditional postpartum practices such as hot water baths, herbal treatments, and abdominal binding, all aimed at restoring the woman's strength and facilitating recovery [84]. Breastfeeding is strongly encouraged and widely practiced, with new mothers receiving both practical and spiritual support from family and religious networks [104]. However, prevailing cultural expectations of strength, resilience, and silence can mask symptoms of perinatal depression and anxiety. Emotional distress is often misinterpreted as spiritual weakness or moral failure, leading women to seek help from pastors, spiritual leaders, or traditional healers rather than mental health professionals [60, 61]. This dynamic contributes to the under-recognition and undertreatment of perinatal mental health conditions, particularly in communities where biomedical mental health services remain limited or stigmatized.

Methods

Study design and rationale

The present study adopted an exploratory descriptive qualitative (EDQ) design to generate a low-inference, practice-oriented account of stakeholders' awareness, perceptions, and experiences regarding PDA and AI-enabled approaches to prediction, diagnosis, and treatment of PDA. EDQ is well suited to under-researched and applied questions where the goal is to produce actionable descriptions in participants' own words rather than to build formal theory or interpret the essence of lived experience [105, 106]. Data were collected through homogeneous focus group discussions (FGDs) to encourage interaction within stakeholder groups and to elicit shared and divergent viewpoints efficiently [107]. The study formed the qualitative component of a broader research project that involved a systematic review and was conducted through collaboration between social science researchers and maternal health professionals.

Setting and context

The study took place in Accra, Ghana. Participants were recruited by Action for Preeclampsia (APEC) Ghana (our community partner) at two types of sites within the Greater Accra area: the Ridge (Greater Accra Regional) hospital's Obstetrics & Gynaecology (O&G) outpatient clinic, in collaboration with hospital management; and APEC-partnered community centres, in collaboration with community leaders. Screening and written consent were conducted in private rooms at the recruitment sites to protect confidentiality. Study information was provided in English, and trained field staff were available to translate materials and questions into Ga or Twi. Individuals who met the inclusion criteria were scheduled for FGDs. Primary data collection was led by APEC Ghana, an organisation with a comprehensive understanding of the study setting and context. They explored their existing collaborations and partnerships and managed community entry, stakeholder engagement, and field logistics.

Participants and eligibility (incl. cognitive—impairment assessment)

We used purposive sampling to recruit pregnant women and new mothers meeting the inclusion criteria. Eligible participants were: 1) perinatal or postpartum women, 2) at least 18 years old, 3) residing in Accra at the time of the study, and 4) able and willing to provide written informed consent. To support a range of perspectives, we sought variation in socioeconomic background and ethnicity within Accra. The research was designed to be culturally sensitive, with careful consideration of local norms, values, and language. To that effect, participants had to be able to speak English or the commonly understood local languages (Ga and Twi). Exclusion criteria were limited to circumstances likely to prevent comfortable or effective participation in a group discussion (e.g., diagnosed anxiety or depression, impaired hearing or reduced functional ability). Perinatal women who were cognitively impaired were deemed ineligible. Capacity to consent was established during the consent conversation using a brief teach-back approach. Participants were asked to explain the study purpose, what participation involved, and their rights, and to ask any questions. We did not administer a standardized cognitive screener. Potential participants who self-reported difficulty understanding the study after clarification, or who were identified by the field staff as unlikely to follow discussion despite explanation, were not enrolled. Finally, if they were unwilling or unable to provide written consent either through appending their signature or thumbprinting, they were excluded from participating in the study.

Sampling strategy and sample size

We used purposive sampling to recruit pregnant women and new mothers who met the eligibility criteria and could contribute to the study aims. Homogeneous FGDs were organised by reproductive stage, with perinatal women (currently pregnant women and women in their first year post-partum) grouped together and new mothers (nonpregnant women who are not in the perinatal period with a live birth in the past five years) group together. This within-group similarity was intended to foster comfort when discussing sensitive topics, reduce status-related inhibition and promote interactional depth consistent with guidance on focus group composition [108, 109]. We judged sample adequacy using the principle of information power rather than a strict notion of saturation. Given a focused aim, a specific and relevant participant group, and high-quality, moderated discussions, a total sample of 15 women was judged sufficient to address the research questions. In focus group research, 'saturation' is not a sole or always appropriate benchmark because new comments from participants is partly a function of group dynamics and composition [110]. We therefore emphasized clarity of aim, appropriateness of sampling, within-group homogeneity, and the richness of interaction as the main adequacy criteria, completed by iterative checking during analysis for redundancy in themes. In terms of group size and planned numbers, we targeted approximately seven participants per group, which sits within the recommended range of 6–10 participants per group for FGDs and balances conversational flow with diversity of perspectives [111]. At the project level, the broader multi-stakeholder design budgeted up to 10 FGDs distributed across stakeholder categories to ensure coverage and triangulation across perspectives. The study opted for the lower end of this range because of financial and human resource constraints. Additionally, it allowed the research team to take advantage of the small group size in terms of ease of management, participants' comfort, and increased opportunity for sharing insights. This paper reports on the women's groups only. Within this component, the total sample of 15 women met the information power criteria for our focused objectives.

Recruitment procedures

Recruitment was conducted by trained staff from APEC Ghana between July and August 2024. Staff approached potential participants in two locations within Accra: the Greater Accra Regional (Ridge) Hospital O & G outpatient clinic, in collaboration with clinic management, and APEC-partnered community centres, in collaboration with community leaders. At both locations, staff introduced the study in English and, when preferred, explained materials in Ga or Twi. They answered questions, assessed basic eligibility, and scheduled women who met the criteria into perinatal or new mothers focus group discussions. Recruitment emphasized privacy and voluntariness at all times. Screening and consent conversations took place in private rooms at the clinic and quiet areas in community venues, and women were told that participation was optional and could be discontinued at any point without consequence. Written consent was completed later in the meeting room prior to the session. A combined purposive, convenience, and snowball approach was used. First, APEC Ghana applied a stakeholder mapping exercise and community entry protocol to identify women who matched the study's eligibility criteria. Second, staff invited eligible clinic attendees and community members who were available and interested at the point of contact. Third, enrolled participants could refer peers who met the criteria but were not present at the sites, after which staff verified eligibility before scheduling. Names and contact details were recorded in a secure recruitment log maintained by APEC Ghana, and session reminders were issued by phone or text one to two days before the group.

Data collection procedures

We conducted two in-person FGDs with 15 women in total: eight pregnant women and seven new mothers, all aged 18 years or older and residing in Accra. These two groups formed the women's component of a broader multi-stakeholder project that included eight other purposively sampled stakeholder groups (health professionals who work with pregnant women and/or mothers; policymakers representing women-focused government agencies and parastatals; representatives of women-focused nongovernmental organisations; maternal health and AI researchers from postsecondary institutions and research institutes; health-focused AI-related software developers; traditional/community leaders; religious leaders; and male household heads. In total, we engaged 59 participants from the 10 stakeholder groups, with a mean of 6 participants per group. The present article reports only the women's focus groups. The primary aim of this study is to explore perceptions of and experiences with PDA and perceptions of the role of AI in PDA among perinatal women.

Both groups were held on 8 August 2024 in a meeting room at the Ridge Hospital to support comfort and ease of access. Sessions took place in private rooms to protect confidentiality and minimise interruptions. A semi-structured discussion guide, developed on the basis of evidence from the literature and refined with input from the research team and APEC Ghana, covered: the experiences and perceptions of PDA, existing support systems and resources, and views on the role of AI in the prediction, diagnosis, and treatment of PDA. Prompts were open-ended and included follow-up probes to elicit depth and clarify meaning. Each group was led by a female moderator with qualitative experience in maternal health and lived experience of PDA, supported by a female note-taker and a female observer. The moderator, note-taker and observer were all women to ensure that the participants were comfortable expressing themselves about sensitive issues regarding pregnancy, childbirth and the postpartum period. The moderator guided the discussion and ensured balanced participation. The note-taker documented non-verbal cues, seating, and emergent topics. The observer monitored group dynamics, timekeeper, and logistics, and flagged points for clarification during natural pauses. Study information was available in English, with real-time explanation in Ga or Twi when preferred. Participants could respond in any of these languages. The moderator summarized key points in plain language to confirm mutual understanding before moving to the next topic. Each session lasted approximately 60 to 90 min. The moderator moved toward closure when the discussion ceased to introduce substantively new points and after all guide sections had been covered, with time reserved for final reflections and participant debrief. Sessions were audio recorded, and handwritten field notes were produced during and immediately after each group. Field notes captured contextual details, salient quotes, and the team's immediate analytic impressions. Immediately after each focus group, the field team held a brief debrief to summarize preliminary insights, document any procedural issues, and note implications for subsequent analysis.

Data management and analysis

Audio from the two focus groups was transcribed verbatim. Segments spoken in Ga or Twi were translated into English and checked by two team members (CSF and SAA) for accuracy. Identifiers were removed during transcription. Transcripts, audio files, and analytic memos were stored in MAXQDA version 2020 qualitative data analysis software, which supports systematic organisation, coding, data retrieval, and audit trail. We used inductive thematic analysis following a six-phase approach: familiarization, initial coding, generating candidate themes, reviewing themes, defining and naming themes, and reporting [112, 113]. CSF and SAA independently coded an initial subset of transcript pages, met to compare interpretations, and collaboratively developed a shared codebook. The remaining transcripts were coded with regular meetings to resolve differences by discussion and to refine code definitions. Memos were used to document coding decisions and reflections, and constant comparison was applied within and across groups to preserve nuance and divergence.

Discrepancies were resolved by consensus after joint review of transcript excerpts and audio. We did not calculate intercoder reliability statistics, consistent with qualitative best practice that privileges negotiated agreement and transparency of decision making. Credibility was strengthened through analyst triangulation, and an audit trail in MAXQDA, and systematic use of memos. Coding was inductive. In later stages, interpretation was organised using constructs from the HBM and TAM. Specifically, the HBM constructs—perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy—were used to interpret participants' beliefs, motivations, and help-seeking behaviours related to perinatal depression and anxiety. The TAM constructs—perceived usefulness and perceived ease of use—were applied to explore participants' perceptions and attitudes toward AI-based interventions. This hybrid approach allowed the theories to serve as an organising framework for analysis; it helped link participants' accounts to psychological and technology-related factors without forcing data into predefined categories.

The analysis addressed three questions: 1) awareness and experiences with PDA, 2) attitudes towards using

AI in maternal mental healthcare, and 3) perceived benefits and barriers to AI tools for maternal mental healthcare. The final analysis yielded four (4) key themes and ten (10) sub-themes, illustrated with anonymized quotations selected for clarity and range, to provide deeper insight into the lived experiences and perceptions of the participants.

Reflexivity, trustworthiness, and COREQ alignment

Focus groups were facilitated by health professionals who volunteer with APEC Ghana on its research and community engagement teams. The author team is transdisciplinary with experience in social sciences, public health, and digital innovation. At the time of the study, authors were engaged in research or program roles: two postdoctoral researchers (USA and AOO), one programme officer (SK), and two postgraduate students (CSF and SAA). The author team did not conduct direct recruitment and had no prior relationships with participants. During sessions, information was provided in English, with clarification in Ga or Twi by the moderator, who is fluent in the local languages. The moderator emphasized that there were no correct answers, encouraged balanced participation, and used plain language checks for shared understanding. Before data collection, the team documented assumptions about PDA and about AI in maternal health care in brief reflexive memos. After each discussion, the moderator, note taker, and observer completed a structured debrief on influences on discussion, procedural issues, and any moments of discomfort. These materials informed analysis.

Credibility was supported through analyst triangulation, audio recordings accompanied by contemporaneous field notes, and iterative team discussions. Two analysts independently coded an initial subset of transcripts, reached negotiated consensus on a shared codebook, then coded remaining transcripts with scheduled adjudication meetings. Peer debriefing across roles was used to probe interpretations, and disconfirming examples were examined to refine theme boundaries. We did not return transcripts to participants. Dependentability was addressed through an audit trail in MAXQDA that included dated codebook versions, coding guidelines, meeting minutes that documented decisions, and reflexive memos linked to specific transcripts. These records allow readers to trace how themes were developed from raw data.

Confirmability was supported by preserving links from themes to multiple supporting excerpts within MAXQDA, recording assumptions and decision points in reflexive memos, and separating recruitment and facilitation from analysis to minimise expectancy effects. We provide a description of the urban Accra setting, recruitment sites, language context, group composition, and session length in the Setting, Participants, and Data collection sections. Verbatim quotations are presented with anonymized identifiers so readers can judge relevance to similar urban Ghanaian and West African contexts. As previously discussed, adequacy was judged using information power given the focused aim, the specific participant group, and the quality of moderated discussions. Reporting follows COREQ: Domain 1 items are addressed here and in Data collection, Domain 2 in Study design, Setting, Participants and sampling, and Recruitment; and Domain 3 in Data management and analysis and the Results, where we present quotations, clarify theme development, and indicate treatment of minor themes.

Patient and public involvement

The multistakeholder qualitative study was carried out through interdisciplinary collaboration between social science researchers and maternal health professionals. APEC Ghana served as the community partner. Their role included stakeholder mapping, community entry, identification of suitable venues, recruitment logistics, and refinement of the semi-structured guide for clarity and local relevance. APEC staff approached potential participants at the study sites, provided study information in English with explanations in Ga or Twi when preferred, answered questions, and coordinated scheduling. Volunteer health professionals affiliated with APEC facilitated the focus groups. As noted previously, the research team did not participate in recruitment and APEC did not participate in coding or interpretation. We shared preliminary findings during an in-person workshop held in August 2024 coordinated by APEC Ghana to generate feedback on findings.

Ethical considerations

This study received ethics approval from the University of Ghana Ethics Committee for the Humanities (ECH 297/23–24) and the University of Alberta Research Ethics Office (Pro00143771). Site permissions were obtained from hospital management and relevant community leaders for recruitment and use of private rooms for FGDs. All participants were adults and provided written informed consent after a detailed explanation of study aims, procedures, potential risks and benefits, and the right to withdraw without penalty. For participants with low literacy, trained staff read the consent form aloud and consent was documented by thumbprint with an impartial witness signature. The Research Ethics Committees did not approve verbal-only consent.

To protect confidentiality, identifying information was collected directly by APEC Ghana and stored in shared folders accessible only to the research team on a need-to-know basis. Research datasets were de-identified prior to

analysis, and findings are reported with anonymized participant identifiers only. The study adhered to the ethical principles of respect for human dignity, beneficence and nonmaleficence, in line with institutional policies and the Declaration of Helsinki and its amendments. Focus groups were facilitated by health professionals who volunteer with APEC Ghana and their volunteer status and non-clinical roles were disclosed during consent. The research team had no prior relationships with participants, which reduced the potential for role-based influence on participants' responses.

Table 1 Demographic characteristics of the participants

Demographic	Characteristics	Frequency (N)	%
Maternal Status	Perinatal Woman	8/15	53.33
	New Mother	7/15	46.67
Age (years)	18–24	2/15	13.33
	25–29	1/15	13.33
	30–34	3/15	20.00
	35–49	7/15	53.34
	50 and above	-	-
Educational Level	Tertiary (University degree and above)	7/15	53.33
	Secondary	6/15	40.00
	Primary	-	-
	No basic education	1/15	6.67
Marital Status	Married	7/15	53.33
	Single	6/15	40.00
	Divorced/Separated	-	-
	Widowed	1/15	6.67
	Other	-	-
Religious Affiliations	Muslim	-	-
	Christian	13/15	86.67
	Other	1/15	6.67
	Not religious	1/15	6.67
Ethnic Group	Ga	1/15	6.67
	Ga-Adangbe	0/15	0.00
	Akan	3/15	20.00
	Ewe	6/15	40.00
	Hausa	-	-
	Fante	2/15	13.33
	Other	3/15	20.00
Employment status	Employed	5/15	33.3
	Self employed	7/15	46.7
	Unemployed	3/15	20.0
	Retired	-	-
Household income (monthly)	GHC ≤500.00	5/15	33.33
	GHC 501.00–1000.00.00.00	1/15	6.67
	GHC 1001–2000.00.00	4/15	26.67
	GHC 2001–5000.00.00	3/15	20.00
	GHC Above 5000.00	2/15	13.34
Number of people living in same household	1	2/15	13.33
	2	2/15	13.33
	3	1/15	6.67
	4	4/15	26.67
	5	3/15	20.00
	6 or more	3/15	20.00
Years lived in the Community	Less than a year	1/15	13.3
	1–3 years	8/15	60.0
	4–6 years	4/15	20.0
	7–9 years	-	-
	>=10 years	2/15	6.7

Results

The background characteristics of the 15 women are summarized in Table 1. Eight participants were perinatal women (53.33%), and 7 were new mothers (46.67%). The age group of the women varied between 18–24 years and 35–49 years, with over half of them within the 35–49 years age group at the time of data collection. The majority of the women had at least secondary education, with over half (53.33%) having a university degree or above. Furthermore, approximately 53% are married, 87% are Christian, and approximately 4 in every 10 are self-employed. Approximately one-third of the sampled women lived in a household with a total income of 500 GHS or less (≈ US$41.67), and one-third earned between 501 and 2000 GHS (≈ US$41.75–US$166.67). Approximately two-thirds live in a household with 4 or more people, and 60% of the women have lived in their community for 1–3 years.

Thematic results

The findings provide insights into the emotional and psychosocial challenges faced by perinatal women, their attitudes and perceptions of AI as a supportive resource, and the barriers and benefits they perceive in adopting these AI tools in their mental health management (Table 2).

Theme 1: Women's experiences with perinatal depression and anxiety in Ghana

General awareness and recognition of PDA

The participants shared a range of experiences related to PDA, highlighting the importance of awareness and recognition. Many expressed an understanding of the biological and emotional changes during pregnancy that allow them to identify symptoms of PDA. For instance, one participant noted:

> *'For me, I think it's because maybe the body's going through some changes which you must adapt to, and it takes a lot of time for it to adapt to that. Therefore, I think it's understandable.' [P3 pregnant woman].*

Demonstrating awareness of PDA, one of the participants described the number of individuals who experience PDA in the population. Talking about this, she commented.

Table 2 Thematic findings

Main Themes	• Sub-themes	• Codes
Experiences with Perinatal Depression and Anxiety	• General awareness and recognition of PDA	• Recognition of Symptoms • Personal Experience • Labelling of Experiences
	• Emotional distress and anticipatory anxiety	• Pregnancy-related Fear • Physical Discomforts • Medical Uncertainty • Fear of Outcomes
	• Role of support systems.	• Emotional & Physical Support • Family and Community Support • Health Support • Coping Mechanisms • Traditional Beliefs
Emotional and Cultural Responses of Perinatal Women to AI in Addressing PDA	• Fear and mistrust of AI	• Privacy & Surveillance Concerns • Limited Trust & Conditional Acceptance • Mistrust
	• Preference for Human Touch	• Emotional support from midwives • Human touch valued • Expressive listening is therapeutic • Trust in partners/family • AI can't show empathy. Machines are "cold" • Midwives give reassurance • Emotional needs best met by humans • App conversation feels artificial • AI lacks cultural understanding
	• Concerns about AI's impact on Healthcare Jobs	• Fear of job losses • Anxiety about AI taking over health systems • Doubts about AI accuracy • Concern AI can't detect human emotion • AI seen as "soulless" • Disbelief in AI for mental care • Belief AI can't handle complications • AI might misinterpret symptoms
Perceived Benefits of AI Tools in Predicting, Diagnosing and Treating PDA	• Self-awareness and education	• Encouraging journaling • Teaching self-care tips • Educating about baby blues • Detecting early signs of distress • Helping women understand emotions
	• Reminders and behavioural prompts	• Daily mood prompts • Reminder for child vaccination and ANC appointments
	• Early Diagnosis and monitoring	• Mood self-check feature • Daily mood prompts • Support for anxiety recognition
Perceived Barriers of AI Tools in Predicting, Diagnosing and Treating PDA	• Privacy and Data Protection Concerns	• Data leaks • Unauthorised access • Third-party misuse • Lack of transparency
	• Lack of Trust in Technology for Mental Health.	• No control over data. • Unknown data storage • Suspicion of surveillance • Concern about digital identity • Limited trust in system developers

'Oh, I mean the research that I did; it happens to 10–20% of women. In addition, it's good to know about it so if you or your friends are going through it, you don't feel isolated. You know it happens.' [P4, pregnant woman].

This awareness aligns with the HBM, which highlights that recognizing the signs of PDA can empower women to seek help [32].

Emotional distress and anticipatory anxiety

However, alongside this awareness, fear and anticipatory anxiety were prevalent themes. The participants recounted past experiences of loss, with one woman reflecting on her aunt's miscarriage:

'When my auntie was pregnant, she lost the baby, so sometimes I ask myself if I will experience the same and I start crying.' [P6 pregnant woman].

These memories intensified anxiety, particularly during challenging moments in their current pregnancies:

'I remember the pains I experienced during my last pregnancy, and I start thinking if I am going to experience the same thing I experienced before.' [P5 pregnant woman]

Role of support systems/Coping with PDA

Despite emotional turmoil, many participants emphasized the importance of strong support systems, especially from family members. They shared how their husbands provided essential help during difficult times, with one participant stating:

'My husband is my strongest support system; he's always there for me. He's been like that all the time, even with the house chores, he is the one doing the things I cannot do.' [N3 New Mother].
'I have a very wonderful husband, he's the one that gives me all the support, both emotionally, otherwise, everything that I need to pass through that first trimester.' [N2 New Mother].

These types of support underscore the importance of social connections in mitigating the effects of PDA.

Theme 2: Attitudes and perceptions toward the use of AI in addressing PDA

Fear and mistrust of AI

As the participants discussed their attitudes toward AI, scepticism and fear emerged as major themes. Many expressed concerns that AI could replace human

healthcare providers, thereby diminishing the emotional support that personal interactions offer:

> *'Machines can't understand emotions like humans do. How can it know when I am struggling?' (P2, pregnant woman).*

Preference for Empathetic, Culturally Integrated Human Care

This highlights a fundamental apprehension regarding the limitations of AI in recognizing and responding to emotional needs. Reflecting the strong cultural value placed on familial and community support, the preference for human interaction was further emphasized by another participant, who stated,

> *'A midwife will listen to you and encourage you. AI is just a machine' (N1, New Mother).*

This underscores the belief that human caregivers provide an essential emotional connection that technology cannot replicate.

Concerns about AI's impact on Healthcare Jobs

Additionally, concerns about job security surfaced, with one participant noting,

> *'AI can be good for searching things, but it can also replace people's jobs' (N5, New Mother).*

This fear reflects broader anxieties about the implications of AI in healthcare settings.

Another participant expressed a heightened fear of AI's potential dominance:

> *'I am scared of AI. It will take over everything, even hospitals!' [N6, New Mother].*

These apprehensions illustrate the challenges faced in accepting AI as a supportive resource in maternal health, aligning with the TAM, which suggests that emotional connection is crucial for technology acceptance. The findings reveal a complex landscape where despite recognizing the potential benefits of AI, participants remain deeply concerned about its limitations and implications for human interactions in healthcare.

Theme 3: Perceived benefits of AI tools in predicting, diagnosing and treating PDA

Self-awareness and Education

Participants recognized AI's potential as a valuable source of information for understanding their mental health status. Many expressed interest in using AI for self-assessment and gaining mental health awareness. The desire for accessible information that could help them identify and understand their emotional states was evident. One participant articulated this need, stating:

> *'If AI can tell me whether I am depressed, that would be good' (N2, New Mother)*

Another participant emphasized the practical utility of receiving guidance, noting:

> *'If AI can tell me what I need to do when I feel anxious, I would try it.' (N4, New Mother)*

These responses highlight a desire for tools that could facilitate better understanding and self-knowledge about their mental health conditions.

Reminders and Behavioural Prompts

Beyond education, participants saw value in AI serving as a behavioural support tool through timely reminders for self-care activities. The demanding nature of perinatal life often made it difficult for women to prioritize their own well-being, and they recognized that simple prompts could help maintain healthy habits. One participant suggested:

> *'Maybe an AI app can remind me to rest or drink water when I am stressed.' (P5, Pregnant Woman)*

This finding illustrates the practical applications that AI could have in supporting perinatal women's daily well-being through gentle nudges toward self-care behaviours.

Theme 4: Perceived barriers to using AI tools in predicting, diagnosing and treating PDA

Privacy and Data Protection Concerns

Participants expressed significant apprehension about the security of their personal information when using AI technologies. Concerns centred on the potential for data breaches and unauthorized access to sensitive health information. The vulnerability of storing personal mental health data digitally was a primary worry for many participants. One participant voiced this concern explicitly, questioning:

> *'What if my information is leaked? Who will see it?' (N4, New Mother)*

Another participant expressed confusion and anxiety about internet connectivity and data exposure, asking:

> *'If AI is connected to the internet, does that mean strangers can see my health records?' (N1, New Mother)*

These concerns highlight the need for clear communication about data security protocols and robust protection measures to reassure potential users about the confidentiality of their information.

Lack of trust in technology for mental health

Beyond specific privacy concerns, participants demonstrated a general hesitancy to rely on technology for managing sensitive personal matters, particularly during the vulnerable perinatal period. There was scepticism about entrusting technology with intimate health issues that are deeply personal and culturally significant. This fundamental distrust represented a substantial barrier to AI adoption. As one participant stated:

> *'I don't trust technology with personal matters such as pregnancy and mental health.' (P3, Pregnant Woman)*

This sentiment reflects a broader reluctance to replace or supplement human interaction and traditional support systems with technological solutions, especially for issues perceived as requiring empathy and cultural understanding.

In conclusion, the findings reveal a complex interplay of awareness, emotional experiences, and attitudes toward AI among pregnant women and new mothers in Ghana. These insights highlight the types of perceived benefits and barriers of AI maternal healthcare that may require addressing in future design efforts while also highlighting the need for supportive frameworks that enhance women's mental health during this vulnerable period.

Discussion

This study examined the experiences and attitudes of perinatal women in Ghana regarding the use of AI to address PDA. By analyzing the findings through the lenses of the HBM and TAM, this research makes several key contributions to the field of women's health, specifically perinatal mental health. The two models served as an organising framework for analysis: constructs of the HBM (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy) guided interpretation of women's beliefs and help-seeking behaviours, while constructs from the TAM (perceived usefulness and perceived ease of use) informed understanding of participants' attitudes toward AI-enabled interventions. This dual-theoretical approach provided a structured lens through which participants' experiences were coded and interpreted, ensuring that both psychological and technological factors were systematically captured in the analysis.

First, this study expands the application of the HBM and TAM within a Ghanaian maternal-health context, demonstrating their usefulness in explaining both help-seeking and technology-adoption behaviours. Similar to findings from the United Kingdom [114], Europe [115], and East and Southeast Asia [116], women's perceptions of risk and cultural beliefs shaped engagement with mental-health support, while attitudes toward technology were influenced by perceived ease of use and trust. Collecting qualitative data through FGDs provides nuanced insights that fill a gap at the intersection of perinatal mental health and AI-driven healthcare.

Most participants demonstrated awareness of PDA, suggesting that mental health educational initiatives can empower women to recognize early symptoms of PDA early and seek timely help. This finding aligns with the core tenet of the HBM, which posits that perceived susceptibility and awareness are critical motivators of health-seeking behaviour and underscores the need for culturally relevant educational programmes that resonate with women's lived experiences [32, 117, 118].

Furthermore, fear, grief, and anxiety, stemming from past pregnancy losses emerged as dominant experiences faced by perinatal women. This aligns with the HBM construct of perceived severity [117, 119] and with research from other regions [120–122] reporting that anticipatory anxiety heightens vulnerability to postpartum depression. Addressing these emotional needs through targeted, empathetic mental-health interventions could enhance self-efficacy and resilience, as emphasised in WHO and Ghana Ministry of Health recommendations [19].

Cultural norms around motherhood and interpersonal care shaped women's scepticism toward AI in mental-health support. Many participants questioned AI's capacity for empathy and emotional support that human caregivers offered. This echoes the TAM's emphasis on perceived usefulness and ease of use as crucial factors that drive technology acceptance and adoption [33, 34, 43]. Participants' fears about AI's inability to understand emotions highlight significant barriers to adoption, suggesting that any implementation of AI must prioritize these emotional needs. AI-based technologies cannot substitute for the emotional connection that healthcare professionals (e.g., midwives and nurses) or family members can offer.

In a context such as Ghana, where community and familial support play crucial roles in maternal healthcare [18, 60], the fear of losing human touch in healthcare interactions is particularly pronounced. This serves as a significant barrier to the acceptance of AI in healthcare, suggesting that any implementation must prioritize these emotional needs and cultural contexts. Additionally, it reflects a broader cultural understanding of healthcare not only as a clinical service but also as a deeply personal experience. Therefore, for successful integration of AI in Ghana's healthcare system, it is essential to develop

solutions that complement, rather than replace, human interactions.

Despite their concerns, participants also identified potential benefits of AI, including its potential for self-diagnosis and monitoring. Additionally, the women expressed enthusiasm for AI tools that could help manage their mental health, such as tracking mood changes and providing reminders for self-care. These findings support the TAM's concept of perceived usefulness, suggesting that if AI-driven interventions are well designed to be user friendly and culturally sensitive, they could significantly enhance awareness and management of PDA.

However, significant barriers to adoption remain. Concerns about privacy, data security, and lack of trust were noted by the participants. The participants raised fears about data security and confidentiality (unauthorized access to their health information), reflecting broader scepticism about the safety of digital technologies in handling sensitive technologies and highlighting the need for trust in technology. These concerns align with existing studies that underscore privacy concerns associated with using AI for diagnosing, predicting, or treating PDA [21], emphasizing the importance of ethical considerations in technology adoption [29]. Addressing these measures is essential for fostering user confidence in AI technologies.

Given Ghana's increasing embrace of digital health technological innovation [19, 123] there is growing potential for integrating AI into maternal health services. For example, recent studies in Ghana have shown that there has been a major focus and use of mobile health, including mobile applications for maternal healthcare delivery and health education [124]. Additionally, evidence shows the significant use and reliance on electronic health systems such as the District Health Information Management System (DHIMS-2) and the Lightwave Health Information Management System (LHIMS) to improve Ghana's data management and coordination [14]. Furthermore, the recent use of drone technology to deliver medications in Ghana has been perceived to be beneficial and offers substantial enhancements to healthcare services in rural and hard-to-reach areas [125]. Therefore, policymakers should prioritize the development of robust guidelines and safeguards that support the ethical use of AI, ensuring data privacy and security. Public health campaigns should focus on demystifying AI technologies by educating women about PDA and the potential benefits of AI tools, enhancing their comfort and trust in using these technologies. By fostering collaboration among healthcare providers, technology developers, and community stakeholders, Ghana and other LMICs may facilitate the development of a supportive ecosystem that promotes maternal mental health through ethical, culturally appropriate and innovative technological solutions.

In light of these findings, this study highlights the importance of women's perceptions of their vulnerability to PDA and the severity of its impacts as motivators for seeking help. While the study provides valuable insights into maternal mental health in Ghana, the EDQ design and reliance on a small, urban, purposively sampled group restricts the transferability of the findings to the broader Ghanaian population. Overall, the findings suggest the need for culturally sensitive educational initiatives and ethical guidelines for AI integration in maternal health, ultimately aiming to inform interventions that may improve health outcomes for women and their families in LMICs. Future research should focus on bridging the gap between women's emotional needs and the capabilities of AI technologies. Additionally, integrating education on both PDA and AI tools into maternal health programmes could empower women to utilize these resources effectively. Mixed-method studies, pilot implementations, and codesign approaches with pregnant women and new mothers would be particularly useful in advancing the field of perinatal mental health.

Strengths & limitations

This study has several strengths and limitations that shape its findings and implications. One of the key strengths of this study is its focus on the cultural context of Ghana, providing valuable insights into the unique beliefs and practices surrounding perinatal mental health and AI adoption. By employing a qualitative approach through FGDs, this study captures a diverse range of perspectives and experiences, allowing for in-depth explorations of participants' thoughts and feelings. Additionally, interdisciplinary collaboration between researchers and maternal health practitioners enhances the credibility and relevance of the study. Clinicians and public health experts provided contextual and experiential insights that informed data interpretation, ensuring that the findings accurately reflected the lived realities of Ghanaian women. Their involvement also strengthened analytic triangulation and confirmability, as interpretations were reviewed across disciplinary perspectives, thereby increasing the trustworthiness of the results. The study also benefits from its theoretical framework, which combines the HBM and TAM, offering a robust lens to examine participants' perceptions and attitudes toward PDA and the role of AI in addressing these challenges.

However, the study is not without limitations. The EDQ design and reliance on a small, urban, purposively sampled group ($N = 15$) restricts the transferability of the findings to the broader Ghanaian population of perinatal women. Findings are specific to Accra and may not reflect the infrastructural barriers or different cultural norms concerning mental health help-seeking and technology adoption found in deep rural settings. However,

they offer valuable insights that may be relevant to similar LMIC contexts where women face comparable maternal mental health and technological challenges. Overall, while this study offers significant contributions to the understanding of perinatal mental health in LMICs, its limitations should be considered when interpreting the findings and their implications for future research and practice.

Conclusion

In conclusion, this exploratory qualitative study sheds light on the experiences and attitudes of 15 pregnant women and new mothers in Accra, Ghana, regarding the potential utilization of AI in addressing PDA. Drawing on the HBM and the TAM, the findings highlight the significance of women's perceptions of susceptibility and severity for informing health-seeking behaviour. Additionally, the cultural context strongly shapes attitudes toward both PDA and AI, revealing a complex interplay of scepticism and potential acceptance of digital interventions. Participants emphasised the need for human interaction, suggesting that AI may need to complement human interaction rather than replace the emotional connections offered by healthcare providers and family members. While participants recognized the potential of AI to assist with self-monitoring and health education, they raised pressing concerns around privacy and trust that must be addressed to foster confidence in AI technologies. Overall, the insights gained from this research call for the development of culturally sensitive educational programmes, ethical guidelines, and community-based awareness efforts to support equitable AI implementation in maternal health in Ghana and similar LMIC settings. Addressing these concerns is essential for enhancing the mental health and well-being of perinatal women and their families.

Abbreviations

AI	Artificial Intelligence
ANC	Antenatal Care
APEC	Action for Preeclampsia
BMZ	German Federal Ministry for Economic Cooperation and Development
DHIMS-2	District Health Information Management System
ECH	Ethics Committee for the Humanities
FGD	Focus Group Discussion
FGDs	Focus Group Discussions
HBM	Health Belief Model
LHIMS	Lightwave Health Information Management System
LMICs	Low- and Middle-Income Countries
mHealth	Mobile Health
NHS	National Health Service
NHIS	National Health Insurance Scheme
PDA	Perinatal Depression and Anxiety
PMI	Perinatal Mental Illnesses
PMIs	Perinatal Mental Illnesses
TAM	Technology Acceptance Model
TBA	Traditional Birth Attendant
TBAs	Traditional Birth Attendants
WHO	World Health Organisation

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Generative AI statement

The authors declare that Gen AI was used in the creation of this manuscript to organise and refine the content, ensuring clarity and coherence in the presentation of the findings. The authors reviewed and edited the AI-generated content to ensure its accuracy and relevance to the study. Nevertheless, the original idea and draft are completely the authors.

Authors' contributions

AOO: Conceptualization, Funding acquisition, Methodology, Project administration, Supervision, Writing—original draft, Writing – review & editing CSF: Data curation, Formal analysis, Investigation, Validation, Writing—original draft, Writing – review & editing USA: Conceptualization, Funding acquisition, Methodology, Project administration, Writing—original draft, Writing – review & editing SK: Conceptualization, Methodology; Writing—original draft SAA: Data curation, Formal analysis, Investigation.

Authors' information

Authors are founders and team members of Kuzaa, now Thrive Maternal and Child Care Initiative, a non-governmental organisation dedicated to creating awareness and revolutionizing maternal healthcare by leveraging cutting-edge non-pharmaceutical solutions to address perinatal health challenges. The organisation aims to promote awareness of maternal health through interdisciplinary collaboration, evidence-based research, and community outreach.

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Data availability

The datasets generated and analyzed for this study are not publicly available due to confidentiality and privacy concerns but are available and can be requested from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee for the Humanities (ECH) at the University of Ghana (ID: ECH 297/23–24) and the Research Ethics Office at the University of Alberta (ID: Pro00143771). Additional permission was sought from appropriate authorities, e.g., community leaders and heads of

institutions, who assisted in recruiting participants or providing appropriate venues for the FGDs. The research conducted between July and August 2024 was guided by strict adherence to the ethical principles of research involving human subjects, which is centred on respect for human dignity, beneficence and nonmaleficence, according to the ethical standards of the responsible committee and with the Helsinki Declaration of 1975 and its later amendments. Prior to any data collection, the participants were informed in detail about the objectives of the study, the potential risks and benefits of their participation, and their right to withdraw at any time without penalty. To that end, we obtained written informed consent from all consenting participants.To ensure confidentiality, APEC Ghana worked directly with the participants to collect biodata, and the collected information was uploaded to an encrypted cloud server and not shared with anyone except the APEC staff assigned to the project. The identities of the participants were anonymized when the findings were reported.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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