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Feasibility, acceptability and effectiveness of group antenatal care on maternal health continuum of care and perinatal outcomes in sub-Saharan Africa: a systematic review and meta-analysis

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ABSTRACT

Background Group antenatal care (G-ANC), integrating medical care with education, has demonstrated positive effects on maternal and newborn health. Individual studies have shown promising evidence in sub-Saharan Africa, but systematically synthesising the existing research would facilitate implementation and identify gaps for further research. This systematic review aimed, therefore, to review the existing evidence on feasibility, acceptability and effectiveness of G-ANC in resource-limited settings to guide policy and support implementing G-ANC to reduce maternal and perinatal mortality.

Methods A systematic and comprehensive literature search was conducted in the PubMed/MEDLINE, Web of Science, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Excerpta Medica Database (Embase) and Google Scholar electronic databases. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for systematic reviews and meta-analyses of healthcare interventions were followed. Data were extracted using a prespecified protocol and quality was assessed using the Joanna Briggs Institute appraisal tool. Random-effects meta-analyses were used to pool estimates. The review is registered on the International Prospective Register of Systematic Reviews (PROSPERO: CRD42024565501).

Results Of the 576 articles identified, 34 articles with 42 234 participants were included. G-ANC increased the likelihood of attending four or more ANC visits (pooled risk ratio (RR)=1.45; 95% CI 1.22 to 2.82), was associated with the likelihood of attending postnatal care visits (RR=1.23; 95% CI 1.03 to 1.47), increased uptake of postpartum family planning methods (RR=1.85; 95% CI 1.26 to 2.73) and was associated with improved birth weight (RR=1.53; 95% CI 1.09 to 2.14). It was also associated with improved quality of care, health literacy, psychosocial gains, empowerment and facilitating culturally sensitive discussions. There was, however, no significant difference

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Group antenatal care (G-ANC) is recognised for offering more than routine check-ups by integrating clinical assessments with group education and a highly participatory approach, which enhances maternal and newborn outcomes.

⇒ The WHO supports G-ANC as an innovative alternative that merges medical care and education, especially in low- and middle-income countries.

WHAT THIS STUDY ADDS

⇒ This is the first systematic review and meta-analysis of G-ANC, covering 42 234 participants and demonstrates that G-ANC significantly increases ANC attendance, postnatal care utilisation, postpartum family planning uptake and improves birth weight.

⇒ The review also highlighted non-clinical benefits such as empowerment, peer support and psychosocial gains that are rarely captured in traditional ANC models.

⇒ The included studies indicate that G-ANC is generally feasible and acceptable in resource-constrained areas.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The clinical, non-clinical benefits and feasibility of G-ANC support its integration into standard maternal care, providing robust evidence for policymakers to consider scaling G-ANC as a WHO-aligned strategy to reduce maternal and perinatal mortality.

⇒ This review also identified gaps in the existing literature concerning the cost-effectiveness, long-term outcomes and session intensity for high-risk populations, as well as the broader impacts on health systems, which are critical for informing policy decisions.

found between groups regarding likelihood of giving birth at health facilities compared with the traditional ANC. Also, no cost-effectiveness studies of G-ANC were identified in sub-Saharan Africa, highlighting a key evidence gap for guiding future implementation and scale-up.

Conclusions Exposure to G-ANC enhances utilisation of maternal healthcare such as ANC attendance, postnatal care, family planning uptake and improves birth weight. It also improves maternal engagement, health literacy and empowerment through a highly participatory learning approach and peer support. Nevertheless, no notable difference was observed between the groups in terms of likelihood of giving birth in health facilities.

PROSPERO registration number CRD42024565501.

INTRODUCTION

Maternal and perinatal mortality remains a significant global health issue, particularly in low- and middle-income countries (LMICs).[1] According to the WHO, approximately 287 000 women died from pregnancy-related causes in 2020, with sub-Saharan Africa (SSA) bearing over 70% of this burden.[1] The region's high mortality rate is largely linked to inadequate access to quality maternal healthcare, including antenatal care (ANC).[2] ANC is considered a crucial strategy for addressing these challenges, offering preventive services, detecting complications early and vital health education.[2] Studies indicate that women that receive adequate and comprehensive ANC services have a 79% lower risk of adverse maternal and perinatal outcomes compared with those with insufficient care.[3] However, ANC coverage remains low in SSA, with only about 58% of pregnant women receiving the recommended four or more visits.[4]

ANC uptake is a necessary indicator for evaluating progress toward improving maternal health outcomes.[5] The provision of high-quality, woman-centred ANC is particularly vital in LMICs, where pregnancy and perinatal outcomes are often disproportionately poor.[6–8] In LMICs, especially in SSA, the predominant model of individualised, one-on-one care has not significantly improved perinatal outcomes.[9] In contrast, group antenatal care (G-ANC) has emerged as a viable alternative service delivery model in high-income countries (HICs), linked to increased attendance, improved satisfaction and better health outcomes for pregnant women and newborns.[7 10 11] This model of care also benefits women from marginalised populations who experience maternal and perinatal outcomes comparable to those observed in certain LMIC.[12 13]

G-ANC is a transformative service delivery model that provides care to groups of 8 to 12 pregnant women at similar gestational ages through a series of scheduled meetings facilitated by a qualified healthcare provider.[14 15] This model incorporates physical assessments, individual clinical consultations, health education, skill development and peer support while adopting a more holistic and woman-centred approach compared with traditional ANC.[15] G-ANC is a collaborative and highly participatory learning approach to prenatal care that not only improves health outcomes but also empowers women through shared experiences and knowledge.[16] With an enhanced experience of care and increasing health literacy, the quality of care and engagement of women in the ANC process encourages them to return for their scheduled visits.[17]

The WHO recommends G-ANC as an alternative to individual ANC based on rigorous research and contextual guidance that promotes community mobilisation through facilitated participatory learning and action cycles.[18] However, several challenges hinder the implementation of G-ANC in various settings. Thus, the Global G-ANC Collaborative emphasises the importance of adapting G-ANC models to the unique local contexts and priorities of LMICs to ensure ownership, sustainability and expansion.[15] Previous studies indicate that difficulties in recruiting and retaining participants, inadequate training and resources, insufficient focus on individual needs, financial barriers and limited access to healthcare services are among the hindering factors.[19–21] While the evidence is still emerging, addressing these challenges requires developing cost-effective recruitment and retention strategies, using mixed methods to assess fidelity and exploring the potential of G-ANC-facilitated community groups.[22–24]

Various studies have demonstrated that G-ANC is associated with increased attendance at ANC visits, improved quality of care, higher rates of facility-based deliveries, enhanced health literacy and client satisfaction, increased uptake of family planning methods, better birth weights and higher rates of breastfeeding initiation and duration compared with the individualised care model.[25–27] This evidence is, however, mostly from HICs and research on the feasibility, acceptability and effectiveness of G-ANC in LMICs, particularly in SSA, is in its early stages. However, individual studies have reported encouraging results regarding the model's efficacy in these areas, indicating the potential of G-ANC to enhance maternal and neonatal health outcomes in low-income settings.[28 29]

There is a lack of comprehensive systematic reviews and meta-analyses evaluating G-ANC's effectiveness across various settings and current studies show considerable variability. Therefore, conducting a comprehensive review is essential to assess the quality of the emerging evidence, identify research gaps and synthesise the available knowledge both quantitatively and qualitatively to help guide implementation of G-ANC models in SSA and ultimately help in reducing maternal and perinatal mortality in the region. Specifically, the objective of this review is threefold: (1) to assess the effectiveness of G-ANC in increasing ANC retention and attendance, facility-based deliveries, attendance of postnatal care visits and uptake of postpartum family planning and determine the impact of G-ANC on perinatal outcomes and the utilisation of other maternal health services; (2) to synthesise the available evidence on the feasibility of G-ANC service delivery models in low-resource settings and (3) to evaluate its cultural sensitivity and acceptability among

pregnant women, healthcare providers and community health workers; quality of care outcomes and behavioural and social outcomes.

METHODS

Protocol registration and reporting

The protocol for this systematic review was registered on PROSPERO, the International Prospective Register of Systematic Reviews, with registration number (CRD42024565501), and subsequently published in PLOS One.[30] The review study was reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) of studies that evaluate healthcare interventions guidelines.[31]

Eligibility criteria

The population of interest included all adult and adolescent pregnant women, whether in their first or subsequent pregnancies, who are receiving ANC and who live in SSA. Additionally, we included healthcare providers, community health workers, and traditional birth attendants, all of whom play essential roles in facilitating G-ANC.

Intervention

The intervention was G-ANC, which is defined as the integration of conventional antenatal assessments with group discussions and support. Typically involves 8 to 12 women who are at similar gestational ages of pregnancy, guided by 1 to 2 trained healthcare providers.[14] These leaders adopt a highly participatory and facilitative approach during the G-ANC sessions. The number of sessions can be adjusted to align with both global and local guidelines regarding the required frequency of visits. The number of group sessions ranged from 5 to 16 with an average of 8–12 group sessions. Each session is structured to include clinical care, client education, and ongoing discussions. During these meetings, healthcare providers deliver clinical care, and participants engage in self-assessments, such as monitoring their blood pressure and weight or identifying any warning signs. The G-ANC sessions use interactive approaches such as small group work, games, songs, and illustration cards that highly engage women in discussions on pregnancy care. These group meetings count as ANC visits. The same group of women and facilitators attends all sessions together, fostering stability, trust and a sense of community among the participants.[19]

Comparator

The comparator was women whose ANC was provided by individualised, standard, conventional or traditional models of care.

Outcomes

The primary outcomes were the effect of G-ANC on attendance of four or more ANC visits, utilisation of institutional delivery, impacts on perinatal outcomes (such as birth weight, preterm birth, neonatal intensive care unit admission, and gestational age), attendance at postnatal care visits, uptake of any postpartum family planning methods. Secondary outcomes included the effect of group ANC on quality of care, maternal health outcomes (such as adoption of healthy behaviours, enhanced health literacy and self-efficacy, behavioural and social outcomes and access to additional maternal health services), and the acceptability, cultural sensitivity and feasibility of this model of care for pregnant women, healthcare providers and community health workers.

We included experimental studies (quasi-experimental study designs, cluster randomised controlled trial (RCT)), prospective cohort design, qualitative and mixed-method studies. We restricted settings to SSA, considering publications since 2016, coinciding with the emergence of research in LMIC in this area. In 2016, the Global G-ANC Collaborative was established as a platform for researchers focused on group ANC in LMICs.[15] Only studies published in English were included. We excluded commentaries, editorials, conference abstracts and non-English publications.

Information sources

Before initiating this review, we ensured that it had not been previously addressed in any existing systematic reviews by searching the Cochrane Library, the Health Services Research Projects in Progress (HSRProj) and the Prospero International Prospective Register of Systematic Reviews (PROSPERO) databases.

A systematic and comprehensive literature search was conducted in the PubMed/MEDLINE, Web of Science, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Excerpta Medica Database (Embase) and Google Scholar electronic databases on 28 June 2024 using a combination of key terms and MeSH terms. The search was updated on 17 April 2025 to accommodate new publications. To ensure the inclusion of all relevant studies, the systematic search was supplemented by a manual search of the reference lists from eligible studies. This process used both retrospective reference harvesting and prospective forward citation searching.

Search strategy

The search strategy for identifying relevant literature was constructed using a combination of Medical Subject Headings (MeSH) and keyword terms related to G-ANC, maternal health continuum, perinatal outcomes and sub-Saharan African settings. Those terms were combined according to the principles of Boolean logic. Specific criteria were applied to the literature search, including restrictions on the date, language and location of publication. The full search strategy adapted in each of the databases is presented in online supplemental appendix S1. Studies were retrieved from the databases and organised and managed using the Covidence web-based management systematic software (Covidence systematic review software, Veritas Health Innovation, Melbourne, Australia).

Study selection

Two reviewers (MG and ZHG) independently screened the title, abstract of all studies in duplicate and full-text reviews when necessary, according to the eligibility criteria. The full text of potentially eligible studies was screened independently in duplicate. Any discrepancies among the two reviewers were resolved with the assistance of a third reviewer (MBM). A separate section was set up in Excel specifically for relevant studies identified during full-text screening, which included the examination of reference lists from included studies. Reasons for exclusion were meticulously recorded throughout the full-text screening process.

Data collection process/data extraction

A standardised data collection tool was developed before the review was started. Subsequently, this form underwent a pilot test among various groups, with potential modifications made based on the feedback received. Two reviewers (HEA and ZHG) independently extracted data from the studies included in the analysis. To ensure consistency in assessment methods, the reviewers participated in a calibration exercise. Discrepancies in the process were resolved through discussion among the reviewers.

The following data items were extracted from the included studies: author, year of publication, country of study and region, sample size, study design and settings, follow-up period (for experimental and cohort studies), participant characteristics (number of women per group, how women were grouped, who led the group, total number of group ANC sessions, length of each group session); information was also collected on the contents of the model of care and outcome events, including effectiveness on perinatal outcomes and maternal health continuum of care and outcome measurements reported. Estimates of association measures such as RR, LogRR and SE of the composite outcomes were synthesised and if not reported, raw data were retrieved to calculate the RR and 95% CIs. Furthermore, the key themes for qualitative synthesis, challenges and limitations, and recommendations for the implementation of the model of care in resource-restraint areas were collected.

Risk of bias assessment

Three reviewers (TTC, AHA and EWT) independently performed the quality assessment of each research study using the Joanna Briggs Institute (JBI), which provides tools for use in JBI systematic reviews and meta-analyses, using checklists for RCTs,[32] quasi-experimental studies,[33] qualitative studies,[34] cohort studies and proportion studies.[35] The JBI star system evaluates the quality of various study designs using specific scoring criteria. For cohort studies, the maximum score is 11 stars, with scores of 0–4 indicating low quality, 5–8 moderate quality and 9–11 high quality. RCTs are assessed out of 13 stars, where scores of 0–5 reflect low quality, 6–9 moderate quality and 10–13 high quality. Quasi-experimental studies are rated out of 9 stars, with low quality indicated by scores of 0–3, moderate quality by scores of 4–6 and high quality by scores of 7–9. Qualitative studies are evaluated on a scale of 10 stars, with low quality for scores of 0–3, moderate quality for scores of 4–7 and high quality for scores of 8–10. Finally, proportion studies are rated out of 9 stars, where scores of 0–3 indicate low quality, 4–6 moderate quality and 7–9 high quality. Discrepancies in the process were resolved through discussion among the reviewers.

Patient and public involvement

Patients and/or the public were not involved in the design, conduct, report or dissemination plan of this research.

Statistical analysis

The analysis was conducted using the R statistical software.[36] Random effects meta-analyses were employed to calculate the pooled risk ratio (RR) of the impact of G-ANC on various maternal health continuums of care and perinatal outcomes, comparing effects between the two groups. The generic inverse-variance method was used to incorporate studies that did not report raw data but provided other relevant summary statistics. The results were reported sequentially, starting with primary outcomes followed by secondary outcomes. Forest plots were created to display overall estimates, either crude or adjusted with a preference for adjusted estimates when both types were available, along with their corresponding 95% CIs.

Statistical heterogeneity was assessed using I^2 values: 0%–40% indicated low heterogeneity, 40%–75% indicated moderate heterogeneity and values greater than 75% indicated high heterogeneity.[37] In cases where a meta-analysis was not feasible, we performed a summary and narrative synthesis, including statements and quotes regarding the acceptability and effectiveness of G-ANC from pregnant women, community health workers, and healthcare providers, following Popay's methodology.[38]

The following subgroup analyses were predetermined: country context/region (Eastern Africa, Western Africa and Southeastern Africa), setting (facility-based vs community-based intervention), and study design (RCT vs cohort). Additionally, a post-hoc leave-one-out sensitivity analysis was performed by systematically removing one study at a time from the meta-analysis to determine if any single study disproportionately influenced the results; no study was found to be removed.

RESULTS

The process of selecting studies is illustrated in the flow diagram provided by the PRISMA in figure 1. A total of 576 articles were identified through database searches. An additional nine articles were acquired via retrospective reference harvesting and prospective forward citation searching. After eliminating duplicates, the titles and abstracts of 585 articles were screened. This initial evaluation led to the exclusion

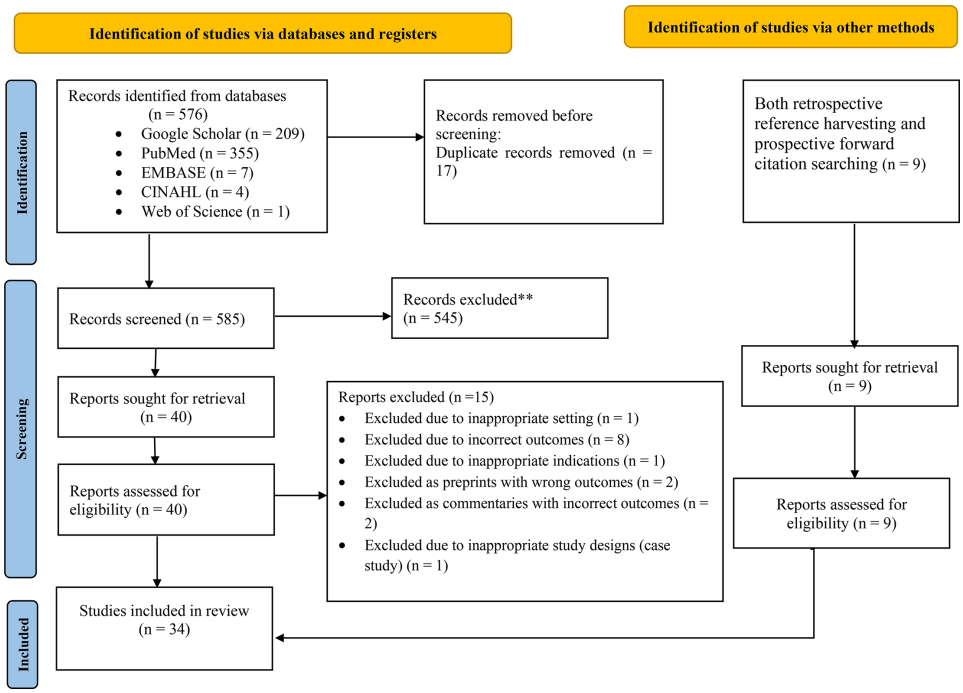

Figure 1 PRISMA 2020 flow diagram for new systematic reviews, which included searches of databases, registers and other sources. Reproduced from Page *et al.*[75] PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses. **Records excluded by a human and automation tools as irrelevant.

of 545 articles. Subsequently, 40 articles were selected for full-text review, of which 15 were excluded for specific reasons. Ultimately, 34 studies met the eligibility criteria and were included in this review.

Characteristics of included studies

The 34 articles included in this review were published between 2016 and 2025. In this review, 34 articles with a total of 42 234 participants were included. The studies were conducted across eight sub-Saharan African countries: 18 studies took place in East Africa,[14 39–54] 16 in West Africa[14 17 22 42 50 52 55–64] and 4 in Southeastern Africa.[39 46 47] Additionally, four studies were conducted simultaneously in both West and East Africa (specifically Kenya and Nigeria)[14 42 50 52] and three studies in East and Southeastern Africa (specifically Malawi and Tanzania).[39 46 47] Among these studies, 19 were RCTs,[14 39 40 42 46 47 50 53 55–59 61 64] eight were mixed-method studies,[22 41 45 48 52 54 60 62] three were cohort studies,[44 57 65] three were quasi-experimental studies[17 43 51] and one was a cross-sectional study.[49]

The settings for the studies varied: four studies were conducted in both community and facility settings, while 30 studies were conducted exclusively at the health facility level. Sample sizes ranged from 8910 participants in a population-based mixed-method study[45] to just 56 participants in a single-centred facility-based study.[41] Regarding the size of group sessions, 20 studies specified the number of group sessions,[17 40–45 47–49 51–55 58–61 64 65] with a maximum of 16 women per group[17] and a minimum of 5 women.[14 43] In 29 studies, women were grouped based on gestational age, while four studies randomly assigned participants based on attendance[41 43 46 47] and one study grouped them according to socioeconomic status.[45] The length of group sessions was reported in 14 studies[14 17 39 40 43 47 50 52 53 57–61]; the remaining studies did not specify this information. The maximum duration of a group session was between 3 and 4 hours,[17] while the minimum length was 1 hour.[43]

The studies reported various components of the maternal healthcare continuum in relation to G-ANC. Seven studies examined attendance of ANC visits[14 47 57 58]; four focused on the utilisation of institutional delivery[14 17 58]; seven investigated postnatal care visit attendance[14 17 40 47 58]; four reported on the use of family planning after delivery[50 56 63] and two reported on birth outcomes.[17 58] 20 studies (58.82%) showed moderate risk of bias and 14 studies (41.1%) had low risk of bias. Online supplemental tables S1 and S2, online supplemental appendix S2, online supplemental appendix S3 contain summaries of the main findings from these studies.

Results of the meta-analyses

The summary results of the continuum of maternal healthcare outcomes, perinatal outcomes, number of events in the intervention and comparator groups and estimates of association measures from the included studies for the meta-analysis are presented in online supplemental table S3. A total of 12 studies[14 17 40 47 50 56–58 63] provided 37 estimates of association measures and are included in the meta-analysis for the final result synthesis. Estimates from

the individual studies and pooled estimates for all the outcomes are provided in online supplemental figure S1.

Primary outcomes

Effect on attendance of four and above ANC visits

A total of seven studies reported estimates on the effect of G-ANC on attendance at four or more ANC visits among 4745 participants. The pooled effect estimates from these studies indicated that participants in G-ANC were 45% more likely to attend the recommended number of visits compared with those who received individualised focused ANC (pooled RR=1.45; 95% CI 1.22 to 1.73; (I^2=85%) (online supplemental figure S2).

Effect on utilisation of institutional delivery

A total of four studies reported estimates on the effect of G-ANC on the utilisation of facility-based delivery among 2761 participants. The pooled effect estimates from these studies indicated no significant difference between the two groups (G-ANC and individualised focused ANC) regarding the likelihood of giving birth at health facilities (RR=1.23; 95% CI 0.96 to 1.57; I^2=93%). Only one study demonstrated a statistically significant difference between the two groups (adjusted RR=1.42; 95% CI 1.29 to 1.56) (online supplemental figure S3).

Effect on attendance of postnatal care visits

A total of seven studies reported estimates on the effects of G-ANC on attendance of postnatal care visits at least once among 11 827 participants. The pooled effect estimates from these studies showed a statistically significant difference between the two groups on the ground of likelihood of attending postnatal care visits after delivery (RR=1.23; 95% CI 1.03 to 1.47; I^2=72%) (online supplemental figure S4). Accordingly, participants in G-ANC were 23% more likely to attend the postnatal care visits at least once compared with those who received individualised focused ANC.

Effect on uptake of any family planning methods

A total of four studies reported estimates on the effect of G-ANC on utilisation of any postpartum family planning methods among 3463 participants. The pooled effect estimates from these studies depicted a statistically significant difference between the two groups regarding the likelihood of uptake of any postpartum family planning methods (RR=1.85; 95% CI 1.26 to 2.73; I^2=89%) and this indicates participants in G-ANC were 85% more likely to uptake any postpartum family planning methods compared with those who received individualised focused ANC (online supplemental figure S5).

Effect on birth outcomes

Two studies reported estimates on the effect of G-ANC on birth outcomes among 847 participants (pooled RR=1.53; 95% CI 1.09 to 2.14) indicating that newborns of mothers receiving G-ANC had 53% higher birth weights compared with those receiving standard care (online supplemental figure S6).

Bias and heterogeneity

According to the JBI,[35] which was used for the systematic review and meta-analysis, the scores varied significantly across the included studies. The average mean scores for the included studies were as follows: the average score was 8 out of 11 for the three cohort studies, 8 out of 13 for the 15 RCTs, 7.6 out of 9 for the quasi-experimental studies, 7.6 out of 10 for the eight qualitative studies, and 9 out of 9 for the one proportion study (results are presented in online supplemental appendix S2).

Based on the estimates from the meta-analyses, heterogeneity among studies assessing birth outcomes was low (I^2=0%–40%), whereas it was high for studies evaluating other outcomes (I^2≥72%). To further explore this high level of heterogeneity, we conducted a leave-one-out sensitivity analysis, systematically removing one study at a time from the meta-analysis to identify whether any single study disproportionately influenced the results. However, for each outcome, there was no change in heterogeneity compared with the previous analysis. We were unable to conduct a publication bias analysis because none of the meta-analyses included ten or more estimates.[66] Neither meta-regression nor subgroup analysis based on the predetermined groups was feasible due to the small number of studies included in each meta-analysis.

Results of qualitative and narrative synthesis (secondary outcomes)

The findings from qualitative and mixed-method studies highlighted several common main themes related to healthcare delivery, community dynamics, cultural norms and effects on maternal health outcomes in relation to G-ANC. Specifically, 15 studies emphasised the importance of G-ANC in improving the quality of care and maternal health outcomes.[22 39 41–43 46 47 51–55 59 62 65] Additionally, seven studies reported on the role of social support and community networks[22 39 41 42 44 51 52 55 60 61]; while 10 studies addressed cultural sensitivity and acceptability of G-ANC.[39 41 43 44 48 49 60] Furthermore, challenges and recommendations for implementing the model of care in low-resource settings were identified across the included studies in the qualitative synthesis (online supplemental table S2).

Enhancing maternal and newborn health and improving quality of care

The G-ANC model has been reported to enhance health literacy and improve maternal health outcomes. Participants noted increased awareness of danger signs, improved experiences of care, heightened self-efficacy, and greater empowerment related to pregnancy.[39 41 43 51 52 59 60 67] Many women exhibited a better understanding of how to prepare for delivery and

recognise potential complications,[59 65 67] along with high levels of satisfaction and contentment with G-ANC.[55 60 62 65] However, a study from Ghana argued that while there was an increased awareness of danger signs and preparation for delivery among participants, this improvement did not translate into significant differences between the two groups in maternal health outcomes such as gestational duration, preterm birth rates and caesarean section rates.[59]

Many women and healthcare providers acknowledged that participants in group prenatal care were more likely to engage in key health behaviours and use services such as routine assessments and educational messages.[46 52 65] Women across studies reported improved breastfeeding initiation as a result of G-ANC participation.[65] Additionally, women involved in G-ANC had a higher intake of intermittent preventive treatment for malaria due to enhanced retention in ANC.[42] G-ANC optimises newborn health by increasing knowledge of newborn danger signs and understanding of the measures needed to keep a newborn healthy.[68]

Building resilient communities through peer support and social networks

Healthcare providers and community health workers noted that G-ANC enhances social support and fosters social connectedness while influencing social norms.[39 51 55 60] A study from Malawi and Tanzania emphasised the cultural and emotional benefits of group prenatal care that resulted in better pregnancy-related empowerment and reduced mental distress.[47] Participants reported increased emotional and material support from peers and providers within G-ANC settings. This fostered a sense of community and belonging[52] as well as improved relationships between providers and women.[41–43] Findings from Nigeria and Kenya[52] emphasised that participants experienced an increased ability to communicate effectively outside of group sessions, contributing to a more supportive network among women. Evidence also suggests that G-ANC significantly reduced unhealthy fears of childbirth (Tokophobia); antenatal group discussions were effective in alleviating these fears and potentially reducing elective caesarean delivery rates and women's mental health crisis.[61]

Fostering culturally sensitive care and community acceptability

Participating women and healthcare providers expressed that G-ANC effectively integrates HIV prevention into standard care practices[39 44]; a research done in Malawi and Tanzania supported this by noting that approximately 70% of pregnant women in G-ANC engaged in discussions about reproductive health and were more likely to report their partners being tested for HIV due to effective partner communication.[39] Furthermore, G-ANC was found to be particularly effective in promoting the use of prevention of mother-to-child transmission services among adolescent mothers.[49]

Moreover, studies indicated that G-ANC shows promise in enhancing retention and testing among pregnant adults and young women living with HIV (AYWLH), leading to increased uptake of early infant HIV testing as well as positive trends in knowledge regarding HIV-positive status and ART initiation among AYWLH.[39 44] The model was also recognised as culturally appropriate and responsive for adolescents.[60] A significant number of nurses and midwives expressed satisfaction with the group care model; they reported feeling a sense of freedom and fulfilment when engaging with mothers in group settings.[48] Moreover, many women and healthcare providers indicated that G-ANC has emerged as an effective approach for delivering antenatal services while facilitating discussions on sensitive issues such as intimate partner violence and safety.[64 67]

Feasibility and potential challenges to implementation in low-resource settings

The summary results of feasibility metrics and main challenges for the implementation of G-ANC in resource restraint areas are summarised in online supplemental appendix S3.

The primary challenges identified concerning G-ANC include privacy concerns, cultural barriers and resource constraints.[44 47 53] The limited availability of trained healthcare providers alongside staff workload issues is considered a potential barrier to the sustainability of the programme.[43 47 48 51 54]

The extra resources[40 41 56 58] required to organise group care as well as the need for copayments were also raised as a potential barrier to implementation in low resource settings. There was only one study[58] that has estimated the cost to introduce G-ANC, and no cost-effectiveness study was found. The cost which included materials (eg, facilitator guides, self-assessment cards, blood pressure cuffs) and the training of G-ANC facilitators, was estimated at about US$357 per health post.[58]

Overall recruitment and retention of participating pregnant women was generally high, ranging from around 70% to 95%, and retention rate was comparable across both groups. Inaccuracy in gestational age estimates, lack of complete registry, fear of privacy intrusion, partner cooperation and travel distance[41 55 58] affected recruitment and retention rates.[41] Healthcare providers identified further challenges such as time management issues due to participant lateness and transportation barriers during meetings partly due to the COVID-19 pandemic as well as a lack of redress mechanisms for those who discontinue the programme.[55] Additionally, potential cultural concerns regarding participation in group care may affect engagement levels and comfort—particularly among adolescents.[44 60] To address these challenges in implementing this model of care effectively, many studies consistently reported the necessity for strategies that ensure confidentiality while creating a safe space for participants. Recommendations include providing training for facilitators to address cultural concerns and

improve group dynamics; investing in training more healthcare providers; ensuring continuous training and mentorship of care providers; and securing adequate resources to support the sustainability and effectiveness of the programme.[41 44 46 51 53 55 60]

Furthermore, findings from Nigeria and Kenya[52] emphasised the need for substantial consideration regarding system supports necessary for success: 'G-ANC requires a significant shift in workflow along with new skill development for providers'. This was further supported by the pilot study conducted in Malawi and Tanzania that noted that funding along with a supportive environment is essential for successful programme implementation.[47] Additionally, studies consistently suggested fostering stronger partnerships with community health volunteers to enhance outreach efforts for pregnant women in resource-constrained areas.[43 51]

DISCUSSION

Main findings

The aim of this comprehensive systematic review and meta-analysis was to quantify the effect of G-ANC on various maternal health continuums of care and perinatal health outcomes in resource-limited areas. Primarily, it focused on synthesising evidence on the effect of G-ANC on ANC attendance and retention, institutional delivery, attendance of postnatal care visits, postpartum family planning uptake, and its effect on birth weights. Additionally, the review explored the acceptability and feasibility of G-ANC from the perspectives of mothers, healthcare providers, and community health workers. 34 studies from low-resource settings were reviewed and we found that G-ANC significantly increases the likelihood of attending four or more ANC visits, attending postnatal care visits and uptake of postpartum family planning compared with individualised ANC and is associated with improved birth weights. Additionally, the available studies demonstrated favourable results regarding the acceptability and feasibility of G-ANC in SSA.

Interpretation and comparison to previous studies

In this review, we found that G-ANC was consistently associated with increased retention and attendance of four or more ANC visits, enhanced uptake of postnatal care visits and family planning methods, and improved birth weights, aligning with other findings.[12 19 24 69] This phenomenon can be attributed to enhanced health literacy through participatory teaching and learning, continuity of care with integrated education, community engagement, and group settings for women to share experiences, address concerns and receive peer support. These approaches mitigate barriers to care, such as fear or misinformation, and encourage regular attendance. G-ANC, tailored to local customs and beliefs, makes the process more acceptable and accessible, improving retention and attendance rates. Although previous studies suggest that G-ANC enhances the use of maternal health services, including institutional delivery, our review found inconsistencies in its impact on facility-based delivery, showing no significant difference between the groups. This inconsistency might be due to factors such as the fidelity of implementation, cultural norms, geographic obstacles, and differences in healthcare infrastructure. Additionally, the review also highlighted that the lack of a statistically significant effect might be due to the limited number of studies, diverse populations and methodological variations among the studies included. The findings from the qualitative and narrative synthesis stressed the diverse benefits of Group G-ANC in enhancing maternal health outcomes and improving the quality of care. Although G-ANC enhances awareness of danger signs, self-efficacy, service utilisation and satisfaction, it demonstrated no significant impact on critical maternal outcomes and perinatal outcomes such as reducing preterm birth and improving gestational ages. This observation raises concerns regarding the disconnection between intermediate outcomes and long-term outcomes, indicating that health literacy and empowerment alone are insufficient to improve maternal and perinatal outcomes. It emphasises that there need to be context-specific policies to support increased ANC contacts and the integration of group care models to improve maternal and infant health outcomes in areas with limited resources.[70 71]

Furthermore, the review results depicted that G-ANC promotes social support, mitigates childbirth-related anxieties, and enhances provider–patient relationships, associating these psychosocial benefits with potential reductions in caesarean delivery rates. This contributes to the positive effects of G-ANC's role in addressing emotional and cultural barriers to care, which may indirectly influence health outcomes.[70] Additionally, it facilitates sensitive discussions in areas such as intimate partner violence and HIV care. This positions G-ANC as a culturally responsive model for addressing intricate public health priorities, particularly for vulnerable groups like adolescents and young women, particularly those living with HIV.

The included studies show that G-ANC is generally a feasible and acceptable model of care. However, challenges including staff shortages, cultural hesitancy, lack of training among providers and inadequate resource allocation were mentioned across the studies which highlight a critical disparity in its implementation in areas with limited resources. What facilitates implementation is highly dependent on the context, but structural reforms such as sustained funding, supportive environment and provider skill-building were raised as essential steps to address these implementation barriers. A previous systematic review of the mechanisms underlying group ANC emphasised the challenge of determining 'what works for whom, and under what circumstances', largely due to contextual differences, variations in how G-ANC was implemented or interpreted, and differences in the communities involved.[69] Other studies also highlighted

similar challenges.[72 73] Future initiatives must prioritise equitable access by integrating community partnerships and addressing cultural norms while rigorously evaluating how psychosocial gains and empowerment translate into measurable long-term health outcomes. These findings align with existing literature that emphasises G-ANC's ability to enhance patient satisfaction, health literacy, and uptake of healthy behaviours in low-resource settings.[16 52 74]

This review did not identify any study evaluating the cost-effectiveness of the GANC model in SSA, underscoring a critical research gap. Addressing this gap is essential to inform evidence-based decision-making and support the sustainable implementation and scale-up of the model across the region. Without such evidence, it remains challenging for policymakers and programme implementers to assess the affordability, efficiency and long-term viability of adopting G-ANC in resource-limited settings.

Strengths and limitations

The strengths of this comprehensive review include the following: One key strength is that we adhered to a protocol that was prespecified, prospectively registered, and subject to rigorous peer review and subsequently published. A systematic and comprehensive literature search was conducted in more than five electronic databases. To ensure the inclusion of all relevant studies, the systematic search was supplemented by a manual search using both retrospective reference harvesting and prospective forward citation searching. Another strength is that all processes were independently conducted by more than two reviewers, using a standardised data extraction form and a validated study appraisal tool. Furthermore, this review employed qualitative synthesis and meta-analysis, providing comprehensive evidence of the qualitative aspects of the model of care while offering a statistically robust overview of its effectiveness.

The inclusion of diverse outcomes, such as effectiveness in maternal healthcare and service utilisation, context-specific effects on maternal and perinatal health outcomes, acceptability and feasibility for women and providers, health empowerment, quality of care and care experiences, is also an additional strength. Furthermore, to our knowledge, this is the first systematic review and meta-analysis that has quantified the comparative effectiveness of G-ANC versus traditional one-on-one ANC, especially in low-resource settings and SSA.

This review also has some limitations: Consequently, the findings should be interpreted with caution, considering its limitations. First, most of the included studies in this review compare the effectiveness of G-ANC with traditional, individual-focused ANC. However, many studies focused on short-term outcomes with limited evidence on long-term maternal and neonatal health outcomes. Research on perinatal outcomes, such as birth weight, preterm birth, gestational age and admission to the intensive care unit, has been relatively limited.

Second, given the variability in context-specific programme design and measurement differences across studies such as varying settings, health systems, and outcome measurement methods this review has noted specific contributing factors, including content, the number of participants per group, the length and size of group sessions, and the total number of group sessions in each included study. These factors contributed to the observed variability. This variability was evident in the substantial heterogeneity in some of the outcomes in the meta-analysis. Despite efforts to identify sources of variability using additional analytical strategies, such as subgroup analysis, sensitivity analysis, or meta-regression, the small number of studies in each meta-analysis precluded the conduct of these analyses. Consequently, it was not possible to determine how the inclusion of these studies impacted the overall results or to identify additional sources of heterogeneity using these statistical strategies.

Third, the majority of the included studies focused on short-term outcomes and utilisation of maternal health services, thereby limiting the assessment of long-term maternal and perinatal outcomes, such as the paucity of data regarding its effect on preterm birth, neonatal intensive care unit admission, and gestational age. The inclusion of these studies could have possibly enhanced the statistical power of our meta-analysis. However, this review found that G-ANC is associated with improved birth weight, though this finding should be interpreted with caution due to potential confounding factors and the small number of studies, which may limit generalisability. In addition, although the initial search identified 34 potentially relevant studies, the largest comprehensive meta-analysis was limited to seven studies focusing on ANC attendance. To address this limitation and provide a more comprehensive overview, the findings of the excluded studies, specifically pertaining to feasibility, acceptability, and uptake of other maternal health services, were synthesised through a narrative summary.

Finally, formal evaluation and adjustment for publication bias were not feasible due to the limited number of eligible studies included in the final analysis. Alongside the implementation of a systematic and thorough search strategy spanning multiple databases, our review included the integration of articles sourced from registered clinical trials and a comprehensive review of institutional repositories via ProQuest. Nevertheless, potential publication and selection biases were not ruled out as commentaries, editorials and non-English sources were excluded. Furthermore, to address these limitations and strengthen the evidence base, future research should focus on comparative analyses of G-ANC and individual ANC models in high doses, with a focus on cost-effectiveness, clinical outcomes, long-term health impacts and effects of increased intensity of G-ANC sessions among high-risk populations, as well as broader health system implications and equity considerations, which are essential to inform policy decisions.

CONCLUSIONS

This review, which includes findings from 34 studies published after January 2016, strengthens the previously suggested positive impact of G-ANC on maternal and perinatal health outcomes in developed nations. It emphasises the importance of implementing G-ANC in resource-limited settings. The comprehensive review found that G-ANC enhances maternal engagement, health literacy and utilisation of the maternal health continuum of care like ANC attendance, postnatal care and family planning uptake and improves birth weights through participatory learning and peer support in low-resource settings. Nevertheless, there was no significant difference between the two groups in the utilisation of facility-based birth versus traditional ANC.

However, its limited impact on utilisation of institutional deliveries and other perinatal outcomes highlights persistent systemic barriers such as cultural norms, infrastructure gaps and fragmented implementation. It was also found that staff shortages, cultural hesitancy, lack of training among providers and inadequate resource allocation are among the main challenges to successful implementation of G-ANC. Thus, context-specific policies, structural reforms and investment in provider training are important for a successful and sustainable implementation. Future research must prioritise long-term maternal-perinatal outcomes, cost-effectiveness and scalable integration strategies to translate empowerment into measurable health gains, ensuring equitable and culturally responsive care for vulnerable populations. The absence of evidence on the cost-effectiveness of group ANC is particularly a key evidence gap for guiding future implementation and scale-up.

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