

Low-dose aspirin and anaemia risk in pregnancy: A scoping review with emphasis on low- and middle-income contexts



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Background: Anaemia remains a major public health concern in pregnancy and is associated with adverse maternal and perinatal outcomes. Low-dose aspirin (LDA) is widely prescribed to reduce the risk of preeclampsia (PE), yet its effects on haemoglobin (Hb) levels and anaemia risk are poorly characterised.

Methods: This scoping review mapped available evidence on the association between LDA use and Hb concentration or anaemia outcomes in pregnant women. The review followed Joanna Briggs Institute methodology and was reported in accordance with PRISMA-ScR. PubMed, Google Scholar, Scopus, Web of Science and the Cochrane Library were searched from inception to December 2025. Eligible studies included pregnant women prescribed LDA, a comparator group and reported Hb- or anaemia-related outcomes, with particular focus on low- and middle-income country (LMIC) settings. Studies were screened, and data were extracted using a standardised charting tool by one reviewer and independently checked by a second reviewer. Evidence was analysed descriptively using a two-stage approach.

Results: Thirteen studies met the inclusion criteria, comprising one case report with a narrative review, four observational cohort studies, four systematic reviews, two randomised controlled trials (RCTs) and two secondary analyses of RCTs. Most studies evaluated LDA for PE prevention, while only two pregnancy-specific studies directly assessed Hb outcomes. Bleeding-related haematologic endpoints were variably reported, but no study evaluated anaemia incidence.

Conclusion: Evidence on the relationship between LDA use and anaemia in pregnancy remains limited and inconclusive. Available studies lack standardised haematologic endpoints, and LMIC-specific data are sparse.

Contribution: This review highlights critical evidence gaps and underscores the need for well-designed prospective studies incorporating standardised anaemia-related outcomes in pregnant populations, particularly in LMIC contexts.

Keywords: low-dose aspirin; haemoglobin; anaemia; preeclampsia; hypertensive disorders of pregnancy; gastrointestinal bleeding; obstetric haemorrhage.

Introduction

Low-dose aspirin (LDA) is increasingly being recognised for its role in the prevention of preeclampsia (PE), a hypertensive disorder of pregnancy (HDP). Globally, HDPs continue to cast a long and persistent shadow over maternal and perinatal health, accounting for a significant proportion of obstetric morbidity and mortality.^{1,2} Low- and middle-income countries (LMICs) bear the heaviest brunt of this burden, since health systems often lack capacity, and late antenatal booking remains common.^{3,4} South Africa (SA) is no exception, for nearly one in five maternal deaths is attributed to HDP.⁵ In recent years, the use of LDA has become a more widely adopted strategy to interrupt this trajectory, offering a simple yet powerful intervention to prevent PE if prescribed at the appropriate gestational age.^{6,7} South African guidelines recommend LDA for women at high risk of PE, with doses ranging from 75 mg to 150 mg daily, advising initiation around 12 weeks of gestation and continuation until approximately 36 weeks.⁸

Preeclampsia is a multifaceted syndrome characterised by new-onset hypertension with organ dysfunction after 20 weeks of gestation. Its origins lie in defective placentation, poor spiral artery remodelling and systemic endothelial dysfunction – pathways that collectively compromise

maternal and foetal well-being.^{9,10} Low-dose aspirin works primarily by irreversibly inhibiting platelet cyclooxygenase-1 (COX-1), suppressing thromboxane A₂ (TXA₂) – a potent vasoconstrictor and pro-thrombotic agent – thereby restoring the delicate vascular balance needed to ensure healthy placental perfusion.^{11,12}

Alongside the burden of HDP is the global crisis of anaemia in pregnancy, which further erodes quality maternal health in LMICs. Defined by the World Health Organization (WHO) as haemoglobin (Hb) below 11 g/dL, anaemia affects over 35% of pregnant women globally.¹³ In many low-resource settings, it is driven by a complex web of causation, consisting of nutritional deficiencies, chronic inflammation and structural barriers to care.^{14,15} Anaemia increases the risk of preterm birth, low birth weight and perinatal mortality, and its consequences – though often less visible than those of PE – are no less profound.^{16,17}

Haemoglobin concentrations in pregnancy follow a non-linear pattern of risk.¹⁸ Both low and high levels are associated with adverse outcomes: anaemia reduces oxygen delivery to the foetus, while elevated Hb may signal inadequate plasma volume expansion or iron overload, increasing the risk of placental dysfunction and hypertension.^{19,20}

These conditions – PE and anaemia – do not operate in isolation. Instead, they often coexist in a physiological tug-of-war. Preeclampsia can suppress red cell production through systemic inflammation and oxidative stress, while anaemia exacerbates placental hypoxia and maternal cardiovascular strain.^{21,22,23} This is particularly relevant in LMICs, where coexisting burdens such as human immunodeficiency virus (HIV), tuberculosis, malaria and obesity intersect with sub-optimal maternal nutrition, further complicating management.

As LDA becomes embedded into global antenatal guidelines, the yet-to-be-resolved question is whether it might influence Hb levels, especially in anaemia-prone populations. While LDA's vascular benefits are well established, emerging concerns include its potential to cause subclinical gastrointestinal bleeding, interfere with iron absorption or modulate inflammatory pathways that affect erythropoiesis.

Objectives

The specific objectives of this review were to:

- Examine existing evidence on the association between LDA use and Hb or anaemia outcomes in pregnant women.
- Describe underlying biological mechanisms through which LDA may influence iron metabolism, erythropoiesis and red-cell indices.
- Identify contextual factors and evidence gaps relevant to LMIC settings, where the dual burden of hypertensive disorders and anaemia remains high.

The review question was conceptualised using the Population–Intervention–Comparator and Outcome (PICO) framework:

- Population: Pregnant women, particularly in LMICs
- Intervention: Women prescribed LDA.
- Comparator: Placebo or no treatment.
- Outcome: Changes in Hb, incidence of anaemia, bleeding or blood loss and haemorrhage.

Research methods and design

This scoping review followed the Joanna Briggs Institute (JBI) methodological framework, which guided the development of the review objectives, eligibility criteria, search strategy, evidence selection, data charting and synthesis.²⁴ Reporting was aligned with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guideline to ensure transparency and completeness.²⁵ Scoping reviews, as outlined in the JBI Manual for Evidence Synthesis, aim to map the breadth and nature of available evidence rather than evaluate intervention effects or generate pooled estimates. This approach was appropriate for the present review, given the heterogeneity of study designs, outcomes and mechanistic evidence on LDA and anaemia-related endpoints during pregnancy.

Eligibility criteria

Studies were eligible for inclusion if they:

- Included pregnant women at any gestational age.
- Reported exposure to LDA prescribed during pregnancy (typically ≤ 165 mg/day).
- Included a comparator group, defined as placebo, standard antenatal care or no aspirin use.
- Reported at least one of the following outcomes; namely changes in Hb levels; maternal bleeding, blood loss or haemorrhage; and/or incidence or prevalence of anaemia.
- Included populations from LMICs, with some studies from high-income countries (HICs) where relevant to contextualise the evidence.
- Employed any study design, including randomised controlled trials (RCTs), cohort studies, case–control studies, observational studies, systematic reviews, case reports, narrative or literature reviews, dissertations, theses and international guidelines.

Studies were excluded if they were editorials, commentaries, opinion pieces or animal studies.

There were no language restrictions. Where necessary, non-English articles were translated using Google Translate or professional translation services to maximise evidence capture, consistent with scoping review methodology.

Information sources

A comprehensive literature search was conducted across five databases in PubMed, Google Scholar, Scopus, Web of Science and the Cochrane Library covering all records from inception to December 2025. In addition to electronic databases, we also search the reference lists of included articles (backward citation chaining) and use forward citation tracking via Google Scholar to identify additional relevant studies.

Search strategy

The search terms and synonyms were developed using Medical Subject Headings (MeSH) and piloted in PubMed. The final PubMed search string was:

((“Aspirin” [MeSH Terms] OR “low-dose aspirin” OR “acetylsalicylic acid”) AND (“Anemia” [MeSH Terms] OR “haemoglobin” OR “hemoglobin” OR “blood iron levels” OR “iron deficiency” [MeSH Terms]) AND (“Pregnancy” [MeSH Terms] OR “pregnant women” OR “maternal” OR “pregnancy complications” [MeSH Terms] OR “hypertensive disorder of pregnancy” [MeSH Terms] OR “preeclampsia” [MeSH Terms] OR “pregnancy outcomes” [MeSH Terms] OR “obstetric hemorrhage” [MeSH Terms] OR “postpartum hemorrhage” [MeSH Terms])). This search strategy was adapted for all other databases. The search was peer-reviewed by an information specialist according to the Peer Review of Electronic Search Strategies (PRESS) checklist to optimise sensitivity and precision.²⁶ To ensure comprehensive coverage, grey literature sources were included, such as ProQuest dissertations, theses and international guidelines or policies where published studies were limited.

Evidence screening and selection

All retrieved citations were imported into Zotero (v5.0.81) for reference management and duplicate removal using its built-in detection tool and manual verification. Title and abstract screening were performed using Rayyan software by two independent reviewers (Nokwethemba M. Ngcobo and Vinogrin Dorsamy) according to predefined inclusion and exclusion criteria.²⁷ Any disagreements arising during the screening process were addressed through mutual discussion or, if necessary, by seeking input from a third reviewer (Chauntelle Bagwandeen) to reach consensus. A calibration exercise was conducted prior to screening to ensure consistency and shared understanding of the eligibility criteria. Full-text articles deemed potentially relevant were retrieved and assessed for eligibility by two independent reviewers, and reasons for exclusion at this stage were recorded to maintain transparency.

Charting the data

Data were charted using a standardised extraction table developed in Microsoft Excel, guided by the JBI and PRISMA-ScR principles. Extracted information included citation details (author and year of publication), study

design, country and population characteristics. Details of the intervention or exposure (LDA dose, timing and indication), comparator (if applicable) and outcomes measured – such as Hb levels, anaemia prevalence, ferritin concentration and related haematological indices – were recorded. Information on the indication for LDA use (e.g. PE or HDP) was extracted where reported. Contextual variables, including healthcare setting, comorbidities, nutritional status and other relevant sociodemographic factors, were also documented. Data extraction was conducted by one reviewer and independently checked by a second reviewer for accuracy and completeness. Prior to full charting, the data extraction tool was piloted on a subset of studies by two independent reviewers to ensure clarity and consistency.

Analysis of evidence

Evidence was analysed using the two stages of the Arksey and O'Malley framework.²⁸ Firstly, the study selection process was mapped using a PRISMA-ScR flow diagram to provide an overview of the identification, screening and inclusion of sources of evidence. Secondly, a descriptive summary of the included studies was generated and presented in tabular form, detailing key study characteristics such as study design, setting, sample size, LDA dose and timing and reported outcome measures.

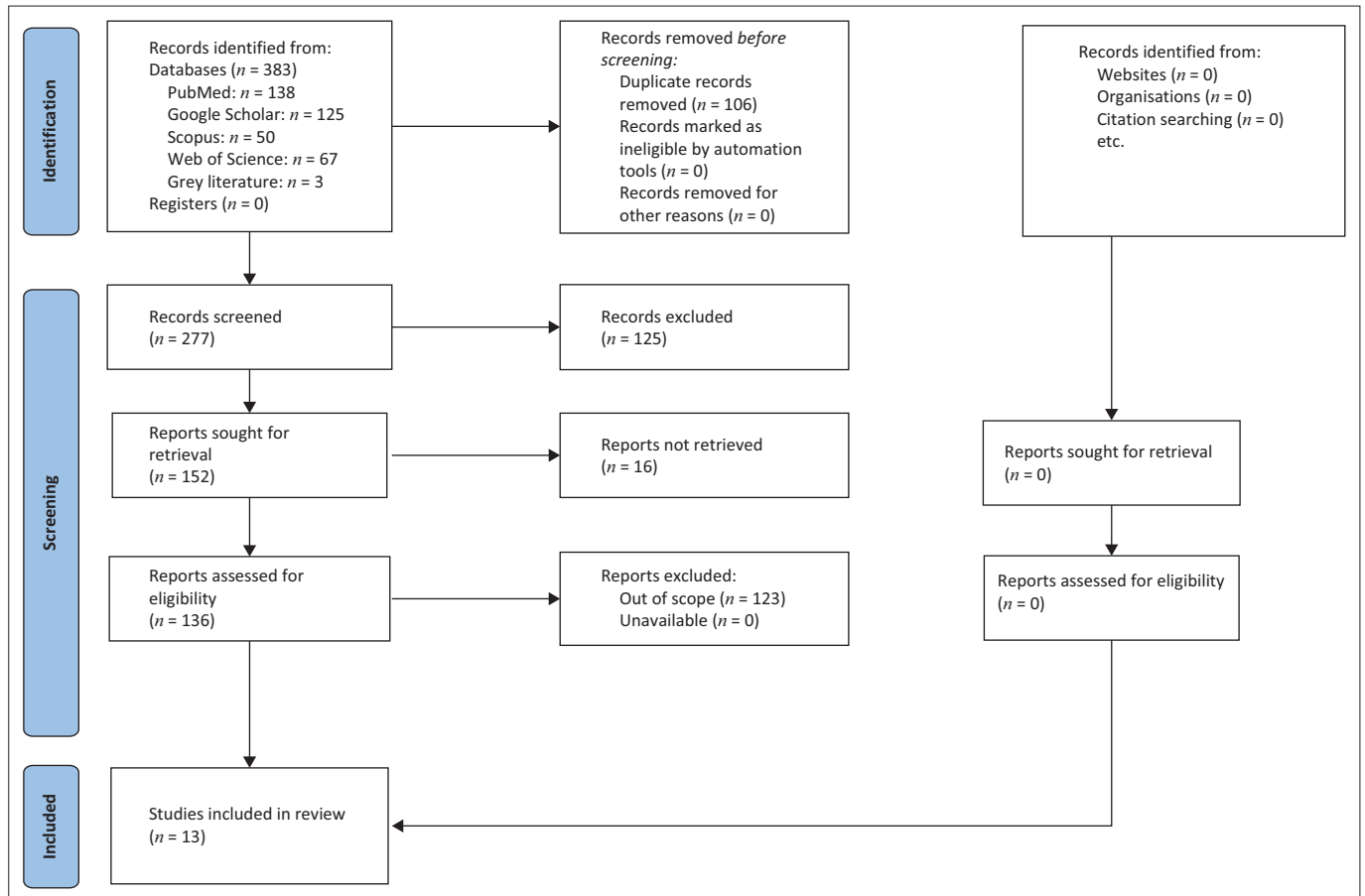
Ethical consideration

This review is part of a larger study investigating the impact of LDA on Hb levels during pregnancy, which obtained ethical approval from the University of KwaZulu-Natal (UKZN) Biomedical Research Ethics Committee (BREC reference BREC/00007156/2024).

Results

The search identified a heterogeneous body of literature, including RCTs, observational studies and systematic reviews relevant to LDA and haematologic outcomes. After screening 383 records and reviewing full texts, 13 studies met the eligibility criteria and were included in the final analysis. A PRISMA-ScR flow diagram summarises the selection process (Figure 1).²⁹

The included studies varied in design, population, indication for LDA use, dosage (typically 60 mg/day – 165 mg/day), outcomes reported and contextual relevance to LMICs. As several individual studies addressed more than one review objective, results are presented descriptively by mapping the available evidence across key outcome domains – namely Hb changes, bleeding-related outcomes and anaemia incidence or prevalence. Within each outcome domain, the number and type of studies, reported findings and identified evidence gaps are summarised in relation to the review objectives.



Note: Please see the full reference list of the article Ngcobo NM, Dorsamy V, Bagwandeen C. Low-dose aspirin and anaemia risk in pregnancy: A scoping review with emphasis on low- and middle-income contexts. *S Afr Fam Pract.* 2026;68(1), a6195. <https://doi.org/10.4102/safp.v68i1.6195>

FIGURE 1: Preferred Reporting Items for Systematic Reviews and Meta-Analysis for Scoping Review (PRISMA-ScR) flow chart for selection of studies.²⁹

Outcome 1: Changes in haemoglobin levels

Two studies reported on changes in maternal Hb levels. Both were secondary analyses of RCTs. Jessani et al., a secondary analysis of the ASPIRIN trial, enrolled nulliparous pregnant women from multiple LMICs between 6 and 13 weeks of gestation.³⁰ Ngcobo et al. included pregnant women of African ancestry ($n = 249$) with singleton, normotensive pregnancies attending a regional hospital in Durban, South Africa, enrolled between 12 and 20 weeks of gestation.³¹

Low-dose aspirin dosage and timing

In the ASPIRIN trial secondary analysis, participants received 81 mg of LDA daily, initiated in the first trimester (6–13 weeks) and continued throughout pregnancy. Haemoglobin concentration was measured in the first trimester and again at 26–30 weeks of gestation. In contrast, Ngcobo et al.³¹ evaluated 162 mg of LDA daily, initiated between 12 and 20 weeks of gestation and continued until delivery. Haemoglobin change was assessed from enrolment to delivery.

Outcomes reported

Jessani et al.³⁰ reported:

- Maternal Hb concentration at two time points (first trimester and 26–30 weeks of gestation).
- Comparisons of mean Hb levels between aspirin and placebo groups at each time point.

Ngcobo et al.³¹ reported:

- Change in maternal Hb concentration from enrolment to delivery.
- Associations between the magnitude of Hb decline and the risk of hypertensive disorders of pregnancy (HDP).

Key findings

Jessani et al.³⁰ found no significant differences in mean Hb concentrations between the aspirin and placebo groups at either the first-trimester measurement or at 26–30 weeks of gestation. Ngcobo et al.³¹ reported smaller declines in Hb from enrolment to delivery amongst women receiving 162 mg of LDA compared with controls. Additionally, larger declines in Hb were associated with an increased risk of HDP.

Gaps identified

The following gaps were evident:

- Only two pregnancy-specific studies directly evaluated LDA in relation to Hb or anaemia-related outcomes. Haemoglobin changes were a primary outcome in Ngcobo et al.,³¹ and Jessani et al.³⁰ reported Hb concentration as a secondary outcome.

- Both studies were secondary analyses of RCTs; no primary trials were specifically designed with Hb or anaemia as primary endpoints in pregnancy.
- Differences in aspirin dose (81 mg vs 162 mg) and timing of Hb assessment limit comparability across studies.
- No included study systematically assessed iron status (e.g. ferritin, transferrin saturation), dietary iron intake or biological pathways related to iron metabolism, erythropoiesis or red-cell indices in relation to LDA exposure during pregnancy.
- Although Ngcobo et al.³¹ adjusted for potential confounders such as HIV status, no association between HIV and changes in Hb was observed.
- Evidence is limited to specific populations (nulliparous women in a multi-country LMIC trial and women of African ancestry from a single South African centre), restricting generalisability to broader LMIC settings.

Outcome 2: Maternal bleeding, blood loss or haemorrhage

Obstetric bleeding represents a potential pathway through which LDA may influence maternal Hb and anaemia risk; therefore, studies reporting maternal bleeding outcomes in relation to LDA use during pregnancy were examined. Eleven heterogeneous sources of evidence were identified, including case reports, observational cohort studies, two multicentre RCTs and systematic reviews. A single case report with a narrative literature review by Plancha et al. described a pregnant woman using LDA (75 mg/day – 150 mg/day) for PE prevention who developed life-threatening upper gastrointestinal bleeding, illustrating that serious haemorrhagic events can occur, although rarely, during LDA exposure.³² At the population level, Hastie et al. conducted a large registry-based cohort study in Sweden (approximately 315000 pregnancies; 1.3% exposed to aspirin 75 mg/day – 160 mg/day) and reported an increased risk of bleeding during labour among aspirin-exposed pregnancies; anaemia outcomes were not assessed.³³ Similarly, White et al., in an observational cohort of women prescribed 81 mg LDA for early PE prophylaxis, reported a higher risk of postpartum bleeding compared with non-use.³⁴ In a multicentre propensity score-based cohort study, Souter et al. reported increased odds of placental abruption (OR 1.44) and postpartum haemorrhage (OR 1.21) among pregnancies exposed to LDA.³⁵

In contrast, high-quality RCT evidence demonstrates neutral bleeding safety profiles. Rolnik et al. conducted a multicentre double-blind RCT of 1776 high-risk pregnancies across 13 countries, randomising women at 11–14 weeks to 150 mg nightly aspirin until 36 weeks versus placebo and found postpartum haemorrhage rates of 4.4% (35/798) in the aspirin group versus 4.0% (32/798) in placebo (RR 1.09, 95% CI 0.69–1.73) with no significant increase in placental abruption (0.3% vs 0.1%).⁷ Similarly, Lin et al. reported findings from the largest Chinese multicentre RCT ($n = 3236$ high-risk women enrolled 12–20 weeks across 13 tertiary hospitals), comparing 100 mg daily aspirin until 34 weeks versus standard care, which showed no significant differences in postpartum

haemorrhage or other bleeding complications between groups as safety endpoints.³⁶

Other observational studies and systematic reviews provide mixed findings. Zhang and Wang, in a retrospective cohort of high-risk pregnant women, found no significant difference in postpartum haemorrhage rates between aspirin-exposed and non-exposed groups.³⁷ Jiang et al. conducted a systematic review of 21 studies reporting postpartum haemorrhage ($n = 373926$) and seven reporting blood loss ($n = 10163$) among women receiving 60 mg/day – 150 mg/day aspirin and found a modestly increased risk of postpartum haemorrhage (OR 1.20, 95% CI 1.07–1.34) and greater blood loss in LDA users.³⁸ However, Roberge et al., in a systematic review of 45 RCTs ($n = 20909$) in which LDA (≥ 100 mg/day) was initiated at or before 16 weeks of gestation, found no significant increase in placental abruption or antepartum haemorrhage.³⁹ Similarly, Henderson et al. reported no significant increase in haemorrhagic complications in high-risk pregnancies treated with 60 mg/day – 150 mg/day aspirin initiated at ≤ 16 weeks of gestation, while Duley et al., in a systematic review of 60 RCTs, reported a small increase in minor bleeding events but no clinically important excess in major haemorrhage or blood loss.^{40,41}

Overall, the available evidence primarily addresses obstetric bleeding outcomes – such as intrapartum bleeding, postpartum haemorrhage, placental abruption and rare gastrointestinal haemorrhage – without directly examining Hb or anaemia outcomes in relation to bleeding among pregnant women using LDA. The evidence base is methodologically diverse and occasionally discordant, with several observational studies and one systematic review suggesting modest increases in postpartum haemorrhage or blood loss, whereas two RCTs generally do not demonstrate a clinically meaningful increase in haemorrhagic events.^{7,33,34,35,36,37,38} Notably, few studies originate from LMIC settings with a high background prevalence of anaemia, and none explicitly link LDA-related bleeding to subsequent maternal Hb or anaemia outcomes during pregnancy or the postpartum period.^{30,31,36,37}

Outcome 3: Incidence or prevalence of anaemia

None of the included studies directly reported the incidence or prevalence of anaemia following LDA use during pregnancy. Although several studies evaluated related outcomes, such as Hb concentration or obstetric bleeding, anaemia was not measured or analysed as a primary or secondary endpoint in any study. Consequently, no quantitative or qualitative synthesis could be performed for this outcome.

As shown in Table 1, LDA is well established as an effective intervention for preventing PE, yet few studies have directly examined its impact on Hb levels or anaemia risk in pregnancy. One study reported no meaningful difference in Hb trajectories between aspirin and placebo groups, whereas another observed smaller declines in Hb among women receiving LDA, with larger Hb reductions associated with increased HDP risk.^{30,31} Several large RCTs

TABLE 1: Characteristics of 15 studies investigating low-dose aspirin and anaemia-related or haematological outcomes.

Author	Study design and population	LDA dosage and timing	Key findings or outcomes
Jessani et al. ³⁰	Secondary analysis of ASPIRIN Trial (RCT); nulliparous women at 6–13 weeks of gestation from LMICs.	81 mg daily; Hb measured at first trimester and 26–30 weeks	No significant difference in Hb levels between the aspirin and placebo groups at both time points.
Ngcobo et al. ³¹	Secondary analysis of RCT; pregnant women of African ancestry (<i>n</i> = 249) at a regional hospital in Durban, South Africa, normotensive with singleton pregnancies at 12–20 weeks of gestation.	162 mg daily; initiated between 12–20 weeks until birth, with Hb measured from enrolment to delivery	LDA was associated with smaller Hb declines vs controls; greater Hb drops correlated with higher HDP risk, suggesting haematological benefit that could mitigate anaemia progression and Hb change as a potential early HDP indicator.
Plancha et al. ³²	Case report and literature review; pregnant woman using LDA for PE prevention.	75 mg/day – 150 mg/day	Reported life-threatening upper gastrointestinal bleeding; serious bleeding is rare but possible during LDA use.
Hastie et al. ³³	Population-based cohort (Sweden, 2013–2017); 4088/315 000 pregnancies (1.3%) with aspirin exposure	75 mg/day – 160 mg/day	LDA associated with an increased risk of bleeding during labour. Anaemia-related outcomes were not reported.
Jiang et al. ³⁸	Systematic review and meta-analysis; including 21 studies (including RCTs and cohort studies, total <i>n</i> = 373 926 women) on postpartum haemorrhage and 7 studies (<i>n</i> = 10 163) on blood loss, involving pregnant women using LDA for various indications	60 mg/day – 150 mg/day during pregnancy	LDA increased the risk of postpartum haemorrhage (OR 1.20, 95% CI 1.07–1.34) and blood loss.
White et al. ³⁴	Observational cohort of pregnant women	81 mg daily; early initiation for PE prevention	LDA use may be associated with increased postpartum bleeding risk.
Zhang and Wang ³⁷	Retrospective cohort study of high-risk pregnant women for PE.	Not specified	No significant difference in postpartum haemorrhage between aspirin and non-aspirin groups (<i>p</i> > 0.05).
Roberge et al. ³⁹	Systematic review of 45 (<i>n</i> = 20 909) RCTs on LDA for PE prevention.	Initiated ≤ 16 weeks; ≥ 100 mg/day	No significant increase in placental abruption or antepartum haemorrhage with LDA.
Souter et al. ³⁵	Multicentre observational cohort using propensity score analysis; pregnant women recommended LDA	Not specified	Increased risk of placental abruption (OR 1.44) and postpartum haemorrhage (OR 1.21).
Duley et al. ⁴¹	Systematic review and meta-analysis of 60 RCT; pregnant women at increased risk for PE.	Not specified	Reported mild bleeding risk with no clinically significant blood loss; anaemia-related outcomes were not reported.
Henderson et al. ⁴⁰	Systematic review and meta-analysis; high-risk pregnancies for PE.	60 mg/day – 150 mg/day, ≤ 16 weeks of gestation	LDA reduced perinatal mortality and foetal growth restriction; no significant increase in haemorrhage.
Rolnik et al. ⁷	Multicentre double-blind RCT; 1776 pregnancies at high risk for preterm PE (< 37 weeks), recruited at 11–14 weeks of gestation across 13 countries.	150 mg nightly aspirin from 1 to –14 weeks of gestation until 36 weeks or delivery vs placebo	Postpartum haemorrhage 35/798 (4.4%) aspirin vs 32/798 (4.0%) placebo (RR 1.09, 95% CI 0.69–1.73, <i>p</i> = 0.71); placental abruption 2/798 (0.3%) vs 1/798 (0.1%) (no significant difference). No Hb concentrations or anaemia incidence reported.
Lin et al. ³⁶	Multicentre RCT; 3236 high-risk pregnant women for PE across 13 tertiary hospitals in China, enrolled 12–20 weeks of gestation.	100 mg daily aspirin from 12 to 20 weeks until 34 weeks of gestation vs standard care.	No PE reduction; postpartum haemorrhage and bleeding complications showed no significant group differences. No Hb or anaemia data reported.

Note: Please see the full reference list of the article Ngcobo NM, Dorsamy V, Bagwandeen C. Low-dose aspirin and anaemia risk in pregnancy: A scoping review with emphasis on low- and middle-income contexts. *S Afr Fam Pract.* 2026;68(1), a6195. <https://doi.org/10.4102/safp.v68i1.6195>.

RCT, randomised controlled trials; LMIC, low- and middle-income country; LDA, low-dose aspirin; HDP, hypertensive disorder of pregnancy; PE, preeclampsia; Hb, haemoglobin.

and systematic reviews have evaluated LDA for PE prevention in high-risk pregnancies; however, anaemia-related outcomes were infrequently reported.^{7,36,41}

Observational studies and one systematic review indicated a possible association between LDA and increased risks of postpartum bleeding or haemorrhage.^{33,34,38} However, some large trials and other systematic reviews reported no clinically significant increase in obstetric haemorrhage.^{7,39}

Discussion

This scoping review mapped current evidence on the relationship between LDA and anaemia-related outcomes in pregnancy, with a particular attention to LMIC contexts. The overarching finding is that, despite widespread guideline recommendations for LDA to prevent PE and other HDP, its effects on Hb, iron status and anaemia classification remain poorly characterised.^{6,42} Most trials and observational studies were designed to evaluate LDA for PE prevention, with haematologic outcomes reported primarily as bleeding or haemorrhage endpoints rather than anaemia.^{7,38,40} While the direct relevance of bleeding in these studies to anaemia development remains uncertain, even mild or subclinical bleeding may increase anaemia risk among pregnant women in LMICs, where baseline anaemia prevalence is already high.⁴³

Only two pregnancy-specific studies directly evaluated Hb outcomes in relation to LDA use, both as secondary analyses of RCTs.^{30,31} Notably, systematic reviews assessing LDA for PE or HDP prevention did not predefine Hb or anaemia as outcomes, underscoring the limited attention given to anaemia.^{39,40,41}

Mechanistic evidence, derived from narrative reviews and in vitro pregnancy studies, suggests both potentially harmful and potentially protective pathways.^{44,45,46} Aspirin and its metabolites may bind iron and reduce its bioavailability, potentially impairing absorption and contributing to iron deficiency anaemia (IDA) in susceptible individuals.^{44,45} Conversely, LDA can attenuate systemic inflammation, including reductions in interleukin 6 (IL-6), a key regulator of hepcidin synthesis.⁴⁶ Lower hepcidin levels could improve iron absorption and mobilisation from stores, thereby ameliorating anaemia of inflammation. At present, no included studies directly assessed LDA's impact on hepcidin, iron indices and erythropoiesis in pregnant women, particularly in those with PE or coexisting infections. Consequently, the net haematologic effect of LDA in pregnancy remains uncertain. In LMICs, the interplay between LDA, anaemia and HDP is further shaped by contextual factors. Chronic infections such as HIV, tuberculosis and malaria cause persistent inflammatory states, elevate hepcidin and impair iron utilisation, predisposing women to anaemia of chronic disease.^{47,48,49}

While Ngcobo et al.³¹ adjusted for potential confounders such as HIV status, no association between HIV and changes in Hb was observed. However, in malaria-endemic regions, infection modified LDA's impact on pregnancy outcomes, including perinatal mortality.⁵⁰ Nutritional deficiencies – particularly iron, folate and vitamin B12 – remain prevalent while rising obesity introduces a parallel burden of chronic low-grade inflammation and altered iron metabolism.^{51,52} Genetic conditions such as sickle cell trait, thalassaemia and glucose-6-phosphate dehydrogenase (G6PD) deficiency may further alter haematologic responses to iron supplementation.^{53,54} Structural and health system barriers, including late antenatal booking, limited diagnostic capacity, inconsistent availability of iron supplements or aspirin and fragmented continuity of care, may delay LDA initiation, hinder Hb monitoring and amplify anaemia risk.^{55,56}

Taken together, these findings indicate that the safety profile of LDA with respect to anaemia cannot be assumed to be uniform across all populations. The balance between its vascular benefits and potential haematologic consequences is likely to be context dependent, influenced by baseline anaemia prevalence, infection burden, nutritional status and health-system factors. Addressing these gaps will require study designs that mirror real-world antenatal care in LMICs, incorporate anaemia-related endpoints and allow stratified analyses by nutritional status, infection and comorbidity profiles, genetic background and gestational age at LDA initiation. In parallel, include mechanistic assessments of iron metabolism, hepcidin regulation and erythropoiesis. Such evidence is essential to ensure that the benefits of LDA in preventing PE are not offset by unrecognised haematologic harms.

Implications

For clinicians: Current evidence does not clearly establish whether LDA influences Hb or anaemia outcomes during pregnancy. For clinicians, this underscores the importance of interpreting LDA-related haematologic findings within the broader context of local anaemia prevalence, comorbidities and antenatal care practices.

For researchers: The review highlights substantial research gaps, particularly the absence of studies that systematically evaluate Hb or iron-related endpoints in pregnant women receiving LDA. Future work may benefit from incorporating standardised haematologic measures and exploring mechanistic pathways in diverse populations, including LMIC settings.

For policymakers: Policy frameworks may consider the need for more locally relevant evidence on anaemia and LDA use, especially in contexts where anaemia and infectious comorbidities are highly prevalent. Strengthening routine data systems and surveillance for both HDP and anaemia may help inform future guideline refinement.

Limitations

As a scoping review, this work was designed to map the extent, nature and characteristics of the available evidence on LDA and anaemia-related outcomes in pregnancy, rather than to synthesise findings across studies, assess the risk of bias of individual studies or evaluate the certainty of evidence. Consequently, no formal quality appraisal, quantitative synthesis or assessment of causal effects was undertaken. In addition, the review may be subject to publication bias, selective outcome reporting and language bias, particularly given that anaemia-related outcomes were often not predefined endpoints in the included studies. The heterogeneity in study designs, populations, aspirin dosing, outcome definitions and reporting further limits direct comparison across studies.

Despite these limitations, this scoping review provides a descriptive overview of the existing evidence base and highlights critical gaps in the literature – particularly the paucity of pregnancy-specific data on Hb, iron status and anaemia outcomes in LMIC settings. These findings can inform the design of future primary studies and targeted systematic reviews aimed at evaluating the haematologic effects of LDA in pregnancy.

Conclusion

Low-dose aspirin has transformed the landscape of PE prevention and is increasingly embedded in antenatal guidelines worldwide. Robust evidence from RCTs and systematic reviews demonstrates that its efficacy in reducing early-onset PE, without a consistent signal of major bleeding in predominantly well-nourished populations. However, its potential impact on Hb and anaemia risk during pregnancy remains underexplored.

The limited available data – comprising two pregnancy studies with Hb endpoints and several trials reporting bleeding outcomes – do not demonstrate a clear detrimental effect of LDA on maternal Hb concentration. At the same time, mechanistic studies suggest biologically plausible pathways through which LDA could influence iron balance, either adversely (through gastrointestinal blood loss or altered iron bioavailability) or beneficially (via anti-inflammatory and hepcidin-modulating effects). In LMICs, where anaemia, infection and nutritional deficiencies are common, these uncertainties acquire particular relevance. Low-dose aspirin use should be accompanied by careful attention to baseline and interval anaemia assessment, especially in women with comorbid disease or high inflammatory burden. Targeted research in LMIC populations – combining clinical, mechanistic and implementation perspectives – is required to ensure that the benefits of LDA are fully realised while monitoring for potential haematologic consequences in vulnerable groups.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

CRedit authorship contribution

Nokwethemba M. Ngcobo: Conceptualisation, Methodology, Formal analysis, Investigation, Writing – original draft, Visualisation, Project administration, Data curation, Resources, Writing – review and editing. Vinogrin Dorsamy: Conceptualisation, Methodology, Formal analysis, Investigation, Writing – original draft, Visualisation, Data curation, Writing – review and editing, Supervision. Chauntelle Bagwandeen: Conceptualisation, Methodology, Formal analysis, Investigation, Writing – original draft, Visualisation, Data curation, Writing – review and editing, Supervision. All authors reviewed the article, contributed to the discussion of results, approved the final version for submission and publication and take responsibility for the integrity of its findings.

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Data availability

The authors confirm that the data supporting this study and its findings are available within the article and its listed references.

Disclaimer

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