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Systematic Review

Adverse maternal and fetal outcomes associated with traditional herbal medicine use in Sub-Saharan Africa: a systematic review

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ABSTRACT

Traditional herbal medicine use is widespread during pregnancy in Sub-Saharan Africa (SSA), driven by cultural beliefs, limited access to healthcare, and affordability. Despite this, concerns persist about its safety, especially its impact on maternal and fetal outcomes. This systematic review synthesizes evidence on the adverse outcomes associated with herbal medicine use during pregnancy across SSA. A systematic literature search was conducted using PubMed, Google Scholar, African Journals Online (AJOL), and Scopus for studies published up to May 2025. Inclusion criteria comprised studies conducted in SSA involving pregnant women using herbal medicines with reported maternal and/or fetal outcomes. Observational studies, qualitative research, ethnobotanical surveys, and case reports were included. Study quality was assessed using the Joanna Briggs Institute (JBI) critical appraisal tools. A total of 23 studies met inclusion criteria and underwent narrative synthesis. Findings revealed a high prevalence of unsupervised herbal use across SSA. Reported adverse maternal outcomes included uterine rupture, preterm labor, postpartum hemorrhage, and increased cesarean delivery rates. Gastrointestinal and psychological side effects were also noted. Adverse fetal outcomes included stillbirth, early neonatal death, low birth weight, congenital anomalies, and low APGAR scores. Utero-tonic herbs such as *Mwanamphepo* and *Kaligu-tim* were commonly implicated. The majority of studies were of high methodological quality but often lacked precise herb identification and dosage standardization. This review highlights the significant health risks associated with traditional herbal medicine use during pregnancy in SSA. There is an urgent need for targeted public health education, clinician training, and stricter herbal medicine regulation to safeguard maternal and neonatal health.

Keywords: Traditional herbal medicine, Pregnancy, Adverse maternal outcomes, Adverse fetal outcomes, Sub-Saharan Africa

INTRODUCTION

Herbal medicinal products, derived from plant parts such as seeds, leaves, stems, bark, or roots, are prepared using water, alcohol, or other solvents and administered as teas, syrups, ointments, capsules, or dried extracts.[1-3] These remedies, used for preventive or curative purposes, are often combined with biomedical treatments and sourced from traditional herbalists, markets, shops, or even pharmacies.[1,4-6] Despite a perception of safety due to their natural origins and long history of use, herbal medicines often contain potent, pure plant extracts that can pose significant risks, especially during pregnancy.[7,12] In developing countries, poor regulation heightens the dangers of toxicity from overdose, adulteration, and contamination (e.g., lead, mercury), compounded by untested safety and efficacy profiles.[6]

Globally, herbal medicine use during pregnancy varies, with prevalence around 60% in Western countries.[8,9] In

Sub-Saharan Africa (SSA), however, up to 80% of pregnant women rely on these remedies, reflecting their critical role in healthcare delivery amid limited access to formal services.[3,5,9-11] Pregnancy involves profound physiological changes, requiring maternal adaptations to support fetal development.[13] Symptoms like nausea and vomiting in early pregnancy, and later issues such as breech presentations, post-term pregnancy, hypertensive disorders, infections, low back pain, and gastrointestinal discomfort, often drive women to seek relief.[14-17] Herbal ingestion during this period can affect both mother and fetus, with potential teratogenic effects, congenital malformations, and other adverse outcomes, particularly in the first trimester when organogenesis occurs.[7,17,18] Even post-organogenesis, fetal maturation may be disrupted.[19]

Socio-demographic factors age, marital status, education, occupation, income, ethnicity, rural residency, and spouse's education influence herbal use.[12] In Zambia, 69.4% of women used herbal medicines in the first trimester, believing they prevent miscarriage and promote fetal growth.[12] In Sierra Leone, 71.4% turned to herbs in the third trimester to facilitate labor and ensure safe delivery.[21] Popular remedies in SSA include ginger (*Zingiber officinale*), garlic (*Allium sativum*), damakasse (*Ocimum lamiifolium*), green tea (*Camellia sinensis*), peppermint (*Mentha piperita*), and neem (*Azadirachta indica*).[6,22,23] Cultural beliefs, limited healthcare access in rural areas, affordability, and the approachability of traditional healers compared to medical practitioners fuel this reliance.[16,24,25] However, many clinicians in SSA lack training to counsel on herbal safety, creating a knowledge gap.[24]

Despite widespread use, the safety and efficacy of most herbal medicines remain unverified.[26] Pharmacological mechanisms, toxicological profiles, and interactions with conventional drugs are poorly understood, with risks exacerbated by inadequate quality control, weak regulation, and poor labeling.[10,26,27] In Sierra Leone, over 95% of women did not disclose herbal use to healthcare providers, increasing the risk of adverse outcomes and herb-drug interactions.[21,28,29] Studies highlight high prevalence: 70% of women in Osun State, Nigeria, used herbal concoctions like *"agbo"* and *"agbo jedi"* for protection, baby strengthening, and relief from constipation and back pain.[17] In Enugu State, Nigeria, 82.1% used herbal mixtures.[30] In Northern KwaZulu-Natal, South Africa, 79% relied on traditional medicines despite free healthcare access.[31]

Adverse outcomes are concerning, with maternal effects like uterine rupture, miscarriage, preterm labor, and increased cesarean rates, and fetal outcomes including stillbirth, low birth weight, and congenital anomalies.[9,18,25,32-34] Yet, most studies focus on prevalence rather than clinical outcomes, limiting efforts to promote safe motherhood and reduce maternal and infant mortality.[17] Ethical constraints limit human studies, but epidemiological data suggests that herbal use grossly impacts pregnancy outcomes.[22] This systematic review addresses this gap, evaluating the adverse maternal and fetal outcomes of traditional herbal medicine use during pregnancy in SSA. The following two main specific objectives have guided this enquiry: to determine the reported adverse maternal outcomes associated with the use of traditional herbal medicines during pregnancy in SSA, and to determine the reported adverse fetal/neonatal outcomes associated with traditional herbal medicine use in pregnancy within SSA.

METHODS

Inclusion criteria

Studies were included if they were conducted in SSA and involved pregnant women who had used traditional herbal medicine during pregnancy. Eligible studies reported specific maternal outcomes (such as postpartum hemorrhage, uterine rupture, or preterm labour) and/or fetal outcomes (including low birth weight, congenital anomalies, stillbirth, or neonatal death). Observational study designs (cross-sectional, cohort, case-control), ethnobotanical surveys, qualitative studies, and case reports were considered due to the ethical limitations in conducting randomized trials among pregnant populations. Only full-text articles published in English (up to May 2025) in reputable peer-reviewed journals, and available open access were included in the review.

Exclusion criteria

Studies conducted outside SSA, those that examined herbal use unrelated to pregnancy, and those that lacked documented maternal or fetal outcomes were excluded. Reviews, expert commentaries, editorials, animal studies, in vitro studies, and articles not published in English were also excluded.

Keywords for literature search

The keywords for the literature search engines included: "herbal medicine," "traditional medicine," "medicinal plants," "pregnancy," "maternal health," "fetal outcomes," "perinatal outcomes," "birth complications," "concoction," "Sub-Saharan Africa," and "Africa." Boolean operators (AND, OR) were used to refine the search.

For example: ("herbal medicine" OR "traditional medicine") AND ("pregnancy" OR "pregnant women") AND ("maternal outcome" OR "fetal outcome") AND ("Sub-Saharan Africa" OR "Africa").

Search strategy

The keywords were used to search for literature in PubMed, Google Scholar, African Journals Online (AJOL), and Scopus, and included all studies published up to May 2025.

Additional articles were identified by reviewing the reference lists of eligible studies to capture relevant papers not indexed in the initial database search.

Methods of review

Two independent reviewers conducted the initial screening of titles and abstracts to identify studies that met the predefined inclusion criteria. The outcomes of this screening were cross-verified among the reviewers to ensure consistency. Full-text articles were subsequently retrieved for all studies considered potentially relevant. Discrepancies in study selection were resolved through group discussion and consensus. Where consensus could not be reached, the decision was made in consultation with a senior reviewer.

This systematic and collaborative approach was employed to minimize selection bias and enhance the reliability of the study inclusion process.

Data extraction and synthesis

A structured data collection form was developed in alignment with the study objectives to ensure consistency in data extraction across all included studies. Key variables extracted included: author(s), year of publication, country of study, study design, sample size, type of herbal concoction used, source of herbal recommendation, timing and frequency of use, and reported adverse maternal and/or fetal outcomes.

Given the diversity in study designs and outcome measures, a meta-analysis was not performed, but instead a narrative synthesis was conducted. The results were organized thematically based on the maternal and fetal outcomes reported and patterns observed. The systematic review protocol was registered by PROSPERO.[57] The PRISMA checklist was used to guide the reporting of the systematic review.

Quality assessment

The methodological quality of the included studies was evaluated using the Joanna Briggs Institute (JBI) critical appraisal tools.[35] These tools were tailored to study designs (e.g., cross-sectional, cohort, qualitative, case report). They assessed criteria such as clarity of objectives, bias control, and reliability of outcome measurement. Two reviewers independently appraised each study, coding responses as 'yes,' 'no,' 'unclear,' or 'not applicable.' Total scores were converted to percentages, with quality rated as high (≥70%), moderate (50–69%), or low (<50%). Disagreements were resolved through consensus. The findings of the quality assessment were used to inform the interpretation of results but were not grounds for exclusion due to data scarcity.

RESULTS

A total of 503 records were identified through database searches, including PubMed, Google Scholar, African Journals Online (AJOL), and Medline. After the removal of 359 duplicates and irrelevant sources, 141 records remained and were screened by title and abstract. These 141 articles were then subjected to full-text review for eligibility. Following this assessment, 118 articles were excluded for various reasons: 40 were not conducted in Sub-Saharan Africa, 25 did not focus on herbal medicine use during pregnancy, 30 failed to report any adverse maternal or fetal outcomes, and 23 were excluded due to being ineligible publication types such as reviews, editorials, expert commentaries, or animal and in vitro studies. Ultimately, 23 studies met the inclusion criteria and were included in the final synthesis of this systematic review. The summary of this inclusion and exclusion process is illustrated in Figure 1.

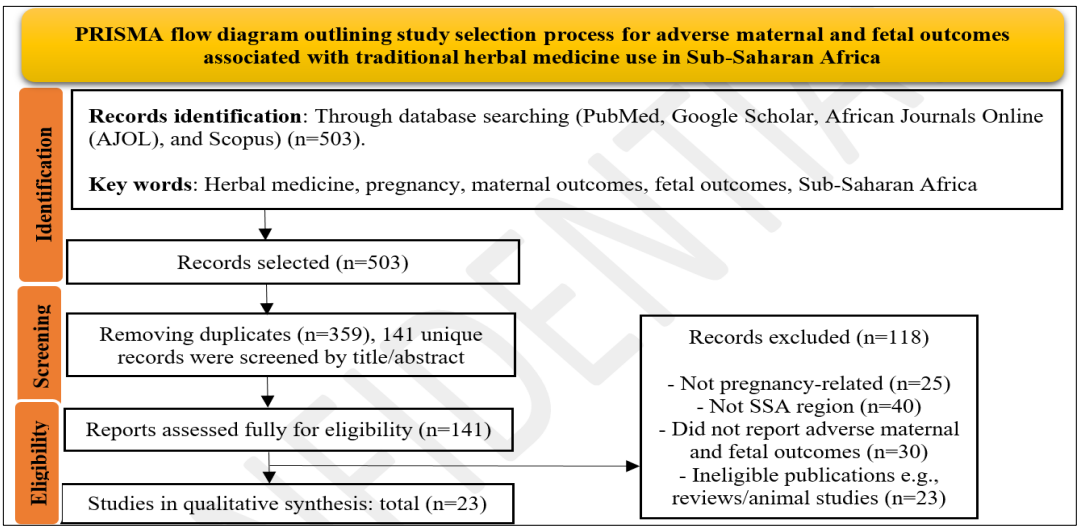

Figure 1: PRISMA flow diagram of study selection.

Overview of included studies

The 23 studies included in this review were conducted across ten countries in Sub-Saharan Africa. Nigeria contributed the highest number of studies, accounting for six (26.2%) of the total, followed by Ghana with four studies (17.4%). Tanzania, South Africa, Cameroon, Zimbabwe, and Malawi were each represented by two studies, making up 8.7% each. Ethiopia, Uganda, and Zambia each had one study included (4.3% each). West Africa accounted for 43.6% of studies, reflecting a regional concentration, while Central and East Africa were less represented. The diversity in geographical origin reflects the widespread use of traditional herbal medicines during pregnancy across various cultural and healthcare settings in Sub-Saharan Africa.

Regarding study design, the majority of the included studies were observational, with cross-sectional designs being the most common, accounting for 18 out of the 23 studies. The remaining studies consisted of one prospective cohort study, two qualitative studies, one ethnobotanical survey, and one case report. The predominance of observational designs is likely due to ethical challenges associated with conducting randomized controlled trials in pregnant populations, particularly when assessing the effects of potentially harmful exposures such as unregulated herbal products. Most of the studies involved pregnant or postpartum women and recruited participants from antenatal clinics, maternity units, or through community-based outreach. Sample sizes varied significantly, ranging from 93 participants to over 8,000 in the largest study. In nearly all cases, the studies relied on self-reported data regarding the use of herbal medicines during pregnancy, labor, or the postpartum period.

Quality assessment of the included studies was conducted using the JBI critical appraisal tools appropriate to each study design. Of the 23 studies, 16 (69.6%) were rated as high quality, having met 70% or more of the JBI criteria. Five studies (21.7%) were rated as moderate quality, meeting between 50% and 69% of criteria, while one study (4.3%) was considered low quality, scoring below 50%. JBI scores ranged from a low of 3 out of 8 (37.5%) to a high of 9.5 out of 10 (95%). High-quality studies, which included most of the cross-sectional designs and the only cohort study, demonstrated thorough reporting on prevalence and maternal or fetal outcomes. For instance, studies by Getachew et al and Dohbit et al scored 100% and 95%, respectively.[39,47] In contrast, moderate- and low-quality studies often exhibited weaknesses such as inadequate control for confounders, lack of clinical outcome data, or insufficient methodological details. Countries like Nigeria and Ghana contributed both high- and moderate-quality studies, indicating variability in research rigor within the same national context.

Although the primary focus of this review was on outcomes, the types of herbs reported across the studies are noteworthy. A wide variety of herbal preparations were identified, including commonly used species such as *Zingiber officinale* (ginger), *Allium sativum* (garlic), *Vernonia amygdalina* (bitter leaf), *Azadiracta indica* (Neem), *Garcinia kola* (bitter kola), *Ocimum gratissimum* (scent leaf), *Ricinus communis* (castor oil), *Carica papaya* (paw paw), *Moringa oleifera* (moringa), and *Aloe barbadensis miller* (aloe vera).[7-9,13,36,45,46] Most of these herbs were primarily administered orally.[38,40] A few studies noted topical, vaginal, or rectal routes of administration.[20,23,54] The use of herbal concoctions was often unregulated and based on cultural norms or information from traditional practitioners, relatives, media, and even conventional practitioners.[36,52] The primary reasons for herbal medicine use were to induce or shorten labor, treat malaria, relieve nausea or morning sickness, improve general wellbeing during pregnancy, or support postpartum recovery.[17,23,36,46,49,53] In several studies, the exact reason for use was not specified.[39]

The most frequently reported maternal adverse outcomes associated with traditional herbal medicine use in SSA included uterine rupture (seven studies).[9,38,41-45] Nausea and vomiting were also common (six studies).[20,32,36,37,46,47] Diarrhea was reported in five studies.[32,36,36,46,47] Other commonly reported outcomes were brilliant dilatation/tachysystole (four studies).[20,38-40] Postpartum hemorrhage was reported in four studies.[17,43,44,51] An increased risk of cesarean section was noted in four studies.[9,38,40,43] Additional adverse effects included miscarriage, skin rashes, and psychological disturbances, each reported in three studies.[7,17,20,36,37,46,48] Other less frequently reported outcomes comprised general malaise, dystocic labor, preterm labor, abdominal pain, headache, drug–herb interactions, dynamic dystocia, perineal tears, prolonged labor, intrapartum vaginal bleeding, uterine atony, heartburn, and insomnia.[5,7,9,32,36-40,43,46,47,51] These adverse effects, reported across countries in Sub-Saharan Africa, were often associated with uterotonic herbs such as *Mwanamphepo* (used in Malawi), *Ocimum gratissimum* (used in Ethiopia), and *Cleome gyrandra* (used in Uganda) used for labour induction. The use of *Cannabis sativa* (marijuana) for labour pains is also highly discouraged. Their use has been linked to serious complications including uterine hyperstimulation, soft tissue trauma, and, in severe cases, maternal mortality.[32,45]

Similarly, adverse fetal and neonatal outcomes were widely reported across studies. The most frequently reported adverse fetal outcomes associated with traditional herbal medicine use in Sub-Saharan Africa included early neonatal death (six studies).[40,43,45,46,49,50] Stillbirth was also reported in six studies.[9,20,40,47,49,51] Fetal distress, meconium-stained liquor, or birth asphyxia were noted in five studies.[9,38,40,49,51] Low APGAR scores were documented in five studies.[38,40,49-51] Other commonly observed complications included low birth weight, increased risk of neonatal hospital admission, and developmental abnormalities.[9,20,40,44,47,49-51] Less frequently reported outcomes included preterm birth, intrauterine growth restriction (IUGR), fetal mutations,

congenital anomalies, suboptimal fetal well-being, neonatal jaundice, neonatal convulsions, neurodevelopmental issues, and even fetal myocardial infarction.[7,9,17,20,40,47] These adverse outcomes, reported in countries such as Ghana, South Africa, Malawi, Tanzania, and other parts of SSA, were strongly linked to the use of utero-tonic herbs (e.g., *Mwanamphepo*, *Ricinus communis*, *Kaligu-tim*), particularly when used for labor induction. Such herbs were associated with serious complications, including poor neonatal adaptation, perinatal mortality, and long-term growth and developmental impairments in newborns.

Table 1: Geographic spread of studies in Sub-Saharan Africa.

Country	Number of studies	Percentage of total	Studies (author, year)
Nigeria	6	26.2	Fakeye et al, 2009; Attah et al, 2012; Achema et al, 2012; Chidinma et al, 2019; Olowokere and Olajide, 2013; Kanma-Okafor et al, 2023
Ghana	4	17.4	Ayelyini et al, 2019; Penorkie, 2019; Busse et al, 2022; Salifu et al, 2024
Tanzania	2	8.7	Masoud et al, 2018; Tengia-Kessy and Msalale, 2021
South Africa	2	8.7	Mkize, 2014; Kekana and Sebitloane, 2020
Cameroon	2	8.7	Essome et al, 2019; Dohbit et al, 2019
Zimbabwe	2	8.7	Mureyi et al, 2012; Dimene et al, 2020
Malawi	2	8.7	Zamawe et al, 2018; Makombe et al, 2023
Ethiopia	1	4.3	Getachew et al, 2024
Uganda	1	4.3	Nelson, 2016
Zambia	1	4.3	El Hajj et al, 2020

Table 2: JBI quality assessment of studies on adverse maternal and fetal outcomes linked to traditional herbal medicine use in Sub-Saharan Africa.

Study (author, year)	Study type	Country	JBI score	Percentage	Quality rating	Key notes
Attah et al, 2012	Ethnobotanical survey	Nigeria	6.5/9	72.2	High	Strong on maternal outcomes; fetal outcomes implied, not measured
Getachew et al, 2024	Cross-sectional	Ethiopia	8/8	100	High	Robust reporting of fetal and maternal outcomes; no weaknesses noted
Mkize, 2014	Cross-sectional	South Africa	6.5/8	81.25	High	Good prevalence data; unclear bias control for some factors
Nelson, 2016	Case report	Uganda	7.5/8	93.75	High	Clear adverse maternal outcomes; single case limits generalizability
Mureyi et al, 2012	Cross-sectional	Zimbabwe	6.5/8	81.25	High	Reports prevalence, types, and adverse events; unclear on some biases
Tengia-Kessy and Msalale, 2021	Cross-sectional	Tanzania	6.5/8	81.25	High	Strong prevalence and risk data; unclear on confounding control
Achema et al, 2012	Cross-sectional	Nigeria	3/8	37.5	Low	Weak on bias control, outcome measurement; high 'no' responses
Dimene et al, 2020	Cross-sectional	Zimbabwe	7/8	87.5	High	Good on prevalence and risks; unclear on some methodological details
Kanma-Okafor et al, 2023	Cross-sectional	Nigeria	7.5/8	93.75	High	Strong on prevalence, patterns, and risks; minor unclarity in reporting
Ayelyini et al, 2019	Cross-sectional	Ghana	7.5/8	93.75	High	Robust prevalence and outcome data; minor unclarity in bias control
El Hajj et al, 2020	Qualitative	Zambia	9.5/10	95	High	Strong qualitative data; outcomes partially met, not clinically measured
Fakeye et al, 2009	Cross-sectional	Nigeria	7.5/8	93.75	High	Clear prevalence and side effects; minor unclarity in methodology
Busse et al, 2022	Cross-sectional	Ghana	7.5/8	93.75	High	Strong on neonatal outcomes; maternal outcomes less detailed

Continued.

Study (author, year)	Study type	Country	JBI score	Percentage	Quality rating	Key notes
Penorkie, 2019	Cross-sectional	Ghana	5.5/8	68.75	Moderate	Good prevalence; weak on bias control and adverse outcome reporting
Salifu et al, 2024	Cross-sectional	Ghana	5.5/8	68.75	Moderate	Reports prevalence and outcomes; weak on bias and outcome rigor
Kekana and Sebitloane, 2020	Cross-sectional	South Africa	6.5/8	81.25	High	Strong on prevalence and outcomes; minor weakness in bias control
Essome et al, 2019	Cross-sectional	Cameroon	7/8	87.5	High	Robust maternal and fetal outcomes; one criterion not met
Olowokere and Olajide, 2013	Cross-sectional	Nigeria	5/8	62.5	Moderate	Good prevalence; lacks specific clinical outcomes, weak on bias
Makombe et al, 2023	Qualitative descriptive	Malawi	8.5/10	85	High	Strong on perceptions; outcomes partial, no clinical measurement
Zamawe et al, 2018	Cross-sectional	Malawi	5.5/8	68.75	Moderate	Reports maternal and neonatal outcomes; weak on bias and rigor
Dohbit et al, 2019	Prospective cohort	Cameroon	9.5/10	95	High	Robust maternal and fetal outcomes; minor unclarity in one criterion
Masoud et al, 2018	Cross-sectional	Tanzania	7/8	87.5	High	Strong on maternal and neonatal outcomes; one criterion not met
Chidinma et al, 2019	Cross-sectional	Nigeria	5/8	62.5	Moderate	Good prevalence and perceptions; weak on clinical outcomes and bias

Table 3: Reported adverse fetal outcomes associated with traditional herbal medicine use during pregnancy in Sub-Saharan Africa.

Outcome category	Specific outcomes reported	Herb (if specified)	Notes	Reported in (regions/citations)
General	General malaise	Malaria herbal remedies		Nigeria[36,37]
Obstetric complications	Brilliant dilatation (rapid labor progression) and tachysytole	Plants with utero-tonic properties, e.g., *Hibiscus rosa-sinensis* (Chinese hibiscus) – often used for its utero-tonic properties. Isihlambezo – (traditional polyherbal remedy used by Zulu women)	Rapid cervical dilatation, while facilitating quick delivery, disrupts the physiological labor process, leading to tissue trauma and fetal hypoxia	Ghana, Cameroon, South Africa[20,38-40]
	Dynamic dystocia	Plants with utero-tonic properties	Abnormal labor progression due to uncoordinated or excessive contractions	Cameroon[38]
	Dystocic labour	Traditional medicine ingestion significantly associated with increased risk	Slow or difficult labor due to inefficient uterine contractions, prolonged labor (>12 hours), arrested descent, or cephalopelvic disproportion	Cameroon, Ghana[39,51]
	Uterine rupture	Plants with utero-tonic properties: Mwanamphepo (a polyherbal uterotonic used in Malawi), *Ocimum gratissimum*, *Cleome gyrandra*, *Cannabis sativa* (Marijuana), and other non-specified herbs	Attributed to uterine hyperstimulation (hyperkinesia), often linked to potent utero-tonic herbs causing excessive contraction frequency and intensity	Malawi, Cameroon, Uganda, Nigeria, Zimbabwe, Tanzania[9,38,41-45]

Continued.

Outcome category	Specific outcomes reported	Herb (if specified)	Notes	Reported in (regions/citations)
	Perineal tears	Plants with utero-tonic properties	May result from intense and accelerated uterine contractions, increasing the likelihood of soft tissue trauma	Cameroon[38]
	Caesarean section (increased risk)	Katate leaves/roots, Mwanamphepo	The elevated cesarean section rate is likely due to labor abnormalities, such as fetal distress and dystocia, which increase the need for surgical delivery and associated maternal complications	Malawi, Cameroon, South Africa[9,38,40,43]
	Preterm labor	Not specified, increased uterine activity, and bleeding risks noted in *Zingiber officinale* (ginger) usage	Several women reported precipitate labor following herbal use, resulting in unplanned out-of-hospital deliveries	Malawi, South Africa[5,9]
	Prolonged labor	Mwanamphepo		Malawi[43]
	Intra-partum vaginal bleeding	Not specified	Use of traditional medicines was significantly associated with increased incidence of the condition	Cameroon[39]
	Post-partum hemorrhage	Mwanamphepo, *Cannabis sativa*, *Zingiber officinale* (ginger), Kaligu-tim, also known as "local oxytocin"		Nigeria, Malawi, Zimbabwe, Ghana[17,43,44,51]
	Uterine atony	Traditional medicine ingestion strongly associated with increased risk, honey implicated	All cases of uterine atony were associated with excessive blood loss, potentially due to uterine fatigue from hyperkinetic contractions or toxic effects (e.g., alkaloids in honey)	Cameroon[39]
	Miscarriage (in early pregnancy), implantation failure/ abortion	*Ruta Chalepensis* (RC), *Vernonia amygdalina* (bitter leaf), *Zingiber officinale* (ginger)	Ruta chalepensis contains furanocoumarins known for embryotoxicity. Bitter leaf may stimulate uterine contractions and is best avoided during the first trimester due to miscarriage risk	Nigeria[7,17,46]
	Maternal death (rare, reported)	Not specified	Though rare, maternal death has been reported as a severe adverse outcome potentially linked to traditional medicine use during pregnancy	Ghana, Tanzania[32,45]
Gastrointestinal effects	Nausea and vomiting	Not specified, malaria herbal remedies	In a study conducted in Ethiopia, 21.1% reported	Ghana, Ethiopia,

Continued.

Outcome category	Specific outcomes reported	Herb (if specified)	Notes	Reported in (regions/citations)
			gastrointestinal side effects	Nigeria [20,32,36,37,46,47]
	Diarrhea (watery stool)	Not specified, malaria herbal remedies		Ghana, Ethiopia, Nigeria [32,36,37,46,47]
	Abdominal pains	Not specified		Nigeria, Ethiopia[46,47]
	Heart burn	Not specified		Nigeria[36]
Dermatologic effects	Skin rashes	Malaria herbal remedies		Nigeria[36,37,46]
Neurological symptoms	Dizziness	Malaria herbal remedies		Ethiopia, Nigeria[36,37,46,47]
	Headache	Not specified		Ghana, Nigeria[32,37]
	Insomnia	Malaria herbal remedies		Nigeria[36]
Psychological effects	Psychological disturbances e.g., anxiety, restlessness, agitation, altered mood, sleep disturbances	Not specified, malaria herbal remedies	Although underreported, psychological effects may arise due to hormonal disruption, neuroactive compounds in herbs, or stress from physical complications	Ghana, Nigeria, Zambia[20,36,48]
Maternal drug-herb interaction and toxicities	Reduced antiretroviral efficacy	*Zingiber officinale* (ginger)	Reduced saquinavir levels in HIV-positive mothers. Compromise HIV treatment and PMTCT efforts, raising maternal and fetal transmission risk. Herbal use alongside antiretrovirals could exacerbate hepatotoxicity or nephrotoxicity.	Nigeria, South Africa[7,40]

Many studies did not name specific herbs used by participants. This limits the ability to associate outcomes with particular plant constituents, highlighting a gap in herbal pharmacovigilance in Sub-Saharan Africa

Table 4: Reported adverse fetal outcomes associated with traditional herbal medicine use during pregnancy in Sub-Saharan Africa.

Outcome category	Specific outcomes reported	Herb (if specified)	Notes	Reported in (regions/ citations)
Perinatal morbidity	Suboptimal fetal well-being	Not specified	Indicating potential abnormalities in fetal heart rate, possibly due to uterine hyperstimulation or placental insufficiency.	South Africa[40]
	Preterm birth	Not specified	Herbal users delivered earlier before term increasing risk of prematurity complications.	Ghana, South Africa[20,40]

Continued.

Outcome category	Specific outcomes reported	Herb (if specified)	Notes	Reported in (regions/ citations)
	Fetal distress, meconium-stained liquor, birth asphyxia	Not specified herbs, *Ricinus communis* (castor oil), Kaligu-tim, also known as "local oxytocin," plants with utero-tonic properties	Fetal distress, often accompanied by meconium-stained liquor and birth asphyxia, may result from excessive uterine activity induced by oxytocic herbs.	Malawi, Cameroon, South Africa, Tanzania, Ghana[9,38,40,49,51]
	Low birth weight	*Ocimum lamiifolium*, *Zingiber officinale* (ginger), non-specified herbs		Ghana, Ethiopia[20,47,51]
	Low APGAR scores	Not specified herbs, *Ricinus communis* (castor oil), plants with utero-tonic properties	Neonates of herbal medicine users showed significantly higher odds of low APGAR scores, indicating poor immediate postnatal adaptation	Cameroon, South Africa, Tanzania, Ghana[38,40,49,50,51]
	Jaundice	Not specified herbs		Ghana[20]
	Increased risk of hospital admission	Not specified herbs	Infants of mothers who consumed herbs had increased likelihood of postnatal complications requiring neonatal intensive care or special unit admission	South Africa, Tanzania, Ghana[40,49,50]
Perinatal mortality	Stillbirth	*Ruta chalepensis*, *Ocimum lamiifolium*, *Zingiber officinale* (ginger), Kaligu-tim		Malawi, Ghana, South Africa, Ethiopia, Tanzania[9,20,40,47,49,51]
	Early neonatal death	Mwanamphepo	Use of *Mwanamphepo* was strongly associated with an elevated risk of early neonatal complications and mortality	South Africa, Malawi, Tanzania, Ghana, Tanzania, Nigeria[40,43,45,46,49,50]
Growth abnormalities	Intrauterine growth restriction (IUGR)	*Cannabis sativa* (marijuana)	Cannabis sativa poses fetal risks due to delta-9-tetrahydrocannabinol (THC), a psychoactive compound capable of crossing the placenta and impairing fetal growth	Nigeria, Ghana[17,20]
	Developmental abnormalities e.g., inability to walk, poor mental growth	Not specified herbs		Malawi, Ghana, Zimbabwe[9,20,44]
Congenital issues	Fetal mutation	*Zingiber officinale* (ginger)		Nigeria, Ethiopia[17,47]
	Congenital anomalies	*Lepidium sativum* (feto), *Cucurbita pepo* (pumpkin) fruit, *Ocimum lamiifolium*		Malawi, Ethiopia[9,47]

Continued.

Outcome category	Specific outcomes reported	Herb (if specified)	Notes	Reported in (regions/ citations)
Neurological complications	Convulsions (neonatal seizures)	Not specified		Malawi[9]
	Neurodevelopmental issues	*Cannabis sativa* (marijuana)		Nigeria[17]
Cardiovascular complications	Fetal myocardial infarction	Certain herbal teas (unspecified)	Some teas used to induce labor may cause intense contractions, reducing placental perfusion	Nigeria[7]

Many studies did not name specific herbs used by participants. This limits the ability to associate outcomes with particular plant constituents, highlighting a gap in herbal pharmacovigilance in Sub-Saharan Africa

Table 5: Summary of reported maternal adverse outcomes.

Specific outcome reported	Number of studies	Citations
Uterine rupture	6	9,38,41,42,44,45
Nausea and vomiting	5	20,32,36,46,47
Diarrhea (watery stool)	4	32,36,37,46
Brilliant dilatation/tachysystole	4	20,38-40
Post-partum hemorrhage	4	17,43,44,51
Dizziness	4	36,37,46,47
Caesarean section (increased risk)	3	9,38,40
Miscarriage/implantation failure	3	7,17,46
Skin rashes	3	36,37,46
Psychological disturbances	3	20,36,48
Feeling unwell/malaise	2	36,37
Dystocic labour	2	39,51
Preterm labor	2	5,9
Abdominal pains	2	46,47
Headache	2	32,37
Maternal death (rare)	2	32,45
Reduced antiretroviral efficacy	2	7,40
Dynamic dystocia	1	38
Perineal tears	1	38
Prolonged labor	1	43
Intra-partum vaginal bleeding	1	39
Uterine atony	1	39
Heart burn	1	36
Insomnia	1	36

While a few studies, such as the prospective cohort study by Dohbit et al included comparison groups or longitudinal designs, the majority were cross-sectional (n=16) or descriptive in nature, with one ethnobotanical survey, one case report, and two qualitative studies.[39] This limited the ability to draw causal inferences but provided valuable insights into prevalence, patterns, and perceptions surrounding herbal use during pregnancy. In terms of methodological quality, most studies were rated as high quality (n=16, 69.6%) based on JBI criteria, with scores ranging from 37.5% to 95%. Common limitations included unclear control of confounding factors, recall bias, lack of clinical outcome measurement in some studies, and incomplete reporting of herbal preparation composition or dosage.[9,17,44,45] Nevertheless, the studies provided important evidence on the potential risks associated with traditional herbal medicine use during pregnancy in SSA.

Table 6: Summary of reported fetal and neonatal adverse outcomes.

Specific outcome reported	Number of studies	Citations
Early neonatal death	6	40,43,45,46,49,50
Fetal distress/meconium/birth asphyxia	5	9,38,40,49,51
Low APGAR scores	5	38,40,49-51
Stillbirth	5	9,20,40,47,49
Low birth weight	3	20,47,51
Increased risk of hospital admission	3	40,49,50
Developmental abnormalities	3	9,20,44
Preterm birth	2	20,40
Intrauterine growth restriction (IUGR)	2	17,20
Fetal mutation	2	17,47
Congenital anomalies	2	9,47
Suboptimal fetal well-being	1	40
Jaundice	1	20
Convulsions (neonatal seizures)	1	9
Neurodevelopmental issues	1	17
Fetal myocardial infarction	1	7

DISCUSSION

A systematic review of herbal medicine used during pregnancy in SSA was long overdue, and this

comprehensive review seeks to increases our understanding of the potential health risks by focusing on adverse maternal and fetal outcomes associated with the usage of herbal medications during pregnancy as seen among African women. Despite the widespread use of herbal medicinal products (HMPs) during pregnancy, high-quality evidence regarding their safety and efficacy remains insufficient.[54] This review covered 10 SSA countries and includes 23 papers published in the past twenty-five years, which could suggest an intensification of research focusing on herbal medication use and the outcomes. The geographic spread of studies was uneven, with Nigeria and Ghana dominating (43.5% combined), potentially reflecting research infrastructure and population size. The paucity of studies from Central and parts of East Africa limits insights into regional variations in herbal medicine use and outcomes, warranting further research.

The findings underscore the potential risks of traditional herbal medicine use during pregnancy in SSA, particularly with uterotonic herbs that induce excessive uterine contractions, leading to complications such as uterine rupture, fetal distress, and stillbirth.[9,20,38,40-45,47,49,51] The high prevalence of gastrointestinal effects (e.g., nausea, vomiting, diarrhea) and less frequent but severe outcomes like maternal death and fetal myocardial infarction suggest a broad spectrum of risks, likely due to unstandardized dosages, unidentified plant constituents, and poor regulatory oversight.[7,20,32,36,37,45,47] The association of herbs like *Ruta chalepensis* and *Cannabis sativa* with miscarriage and intrauterine growth restriction respectively, highlights the teratogenic and growth-impairing potential of certain compounds crossing the placenta, especially during the critical first trimester of organogenesis.[7,17,20,46] These results align with prior reviews, carried out by El Hajj and Holst, which noted the widespread use of herbal medicines in Sub-Saharan Africa and the lack of safety data.[15]

The link between uterotonic herbs and adverse outcomes like uterine rupture and fetal distress conforms to the findings from Attah et al (Nigeria) and Nelson et al (Uganda), who documented uterine hyperstimulation as the mechanism of these utero-tonic herbs.[41,42] However, the scarcity of studies directly measuring fetal mutations and neurodevelopmental issues contrasts with the numerous animal studies suggesting embryotoxicity from herbs like *Ruta chalepensis*.[55,56] The high non-disclosure rate of herbal use to healthcare providers, as seen in Sierra Leone, mirrors global trends and exacerbates risks of herb-drug interactions, such as reduced antiretroviral efficacy noted in Nigeria and South Africa.[7,21,40]

The consistent association of herbal medicine use with adverse outcomes has critical implications for maternal and child health in SSA. The reliance on traditional remedies, often driven by cultural beliefs, limited healthcare access, and affordability, underscores the need for improved education and awareness campaigns about the possible adverse effects of herbal medicine intake during pregnancy.

Clinicians in the region often lack training to address herbal medicine safety, and this hampers effective counseling. These findings call for stronger regulatory frameworks to ensure quality control, proper labeling, and safety testing of herbal concoctions. Public health initiatives should focus on raising awareness about risks, especially during early pregnancy, and encourage disclosure to healthcare providers to prevent dreaded complications like maternal and early neonatal death, which undermine efforts to reduce maternal and infant mortality in Africa.

Limitations and future research directions

Several limitations must be considered when interpreting these results. The predominance of cross-sectional studies (18 of 23) and reliance on self-reported data introduce recall bias and limit causal inferences. The lack of specific herb identification in many studies hampers the ability to link outcomes to particular plant constituents, reflecting a gap in herbal pharmacovigilance. Geographic imbalance, with 43.5% of studies from West Africa (Nigeria and Ghana), may not fully represent regional variations in herbal practices. Variability in study quality, with scores ranging from 37.5% to 95% on JBI criteria, and inconsistent control of confounders further complicate interpretation.

Future research should prioritize longitudinal cohort studies to establish causality, standardize reporting of herbal composition and dosage, and explore understudied regions like Central and East Africa. Investigations into specific herb-drug interactions, particularly with antiretrovirals, and the long-term neurodevelopmental impact on infants exposed to herbs in utero are also needed. Botanical identification and toxicological profiling of commonly used herbs, such as *Mwanamphepo* and *Kaligu-tim*, could inform safer practices.

CONCLUSION

This systematic review reveals a concerning pattern of adverse maternal and fetal outcomes associated with traditional herbal medicine use during pregnancy in SSA, including uterine rupture, stillbirth, and early neonatal death. While cultural and practical factors drive their use, the lack of safety evidence and regulatory oversight poses significant risks. These findings highlight the urgent need for enhanced education, clinician training, and regulatory measures to promote safe motherhood and reduce maternal and infant mortality. By addressing these gaps, the safety outcomes of pregnant women and babies in SSA would be accelerated.

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