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Magnitude and histopathological patterns of gestational trophoblastic disease in Africa: a systematic review and meta-analysis

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ABSTRACT

Objectives Gestational trophoblastic disease, characterised by abnormal proliferation of trophoblastic tissue in the placenta during pregnancy, contributes to maternal morbidity and mortality. This study aimed to estimate the pooled prevalence and histopathological patterns of gestational trophoblastic disease in Africa, where previous studies have reported inconsistent findings.

Design Systematic review and meta-analysis adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 guidelines.

Data sources We searched PubMed, ScienceDirect, Hinari and Google Scholar for studies published between January 2000 and January 2024.

Eligibility criteria Institution-based observational studies from African countries reporting the prevalence and/or histopathological patterns of gestational trophoblastic disease, using total deliveries as the denominator.

Data extraction and synthesis Data were extracted into Excel and analysed using Stata V.17. Pooled estimates were calculated using a random-effects model with Knapp-Hartung adjustment. Heterogeneity was assessed with Cochran's Q test and the I² statistic, and study quality was evaluated using the Joanna Briggs Institute tool.

Results Of the 2252 studies identified, 33 were included, comprising 2885 gestational trophoblastic disease cases from eight countries. The pooled prevalence of gestational trophoblastic disease in Africa was 4.35 per 1000 deliveries (95% CI 3.26 to 5.45, I^2=99.8%). The pooled prevalence of hydatidiform mole, invasive mole and choriocarcinoma in Africa was 3.49 per 1000 deliveries (95% CI 2.45 to 4.52, I^2=99.7%), 0.47 per 1000 deliveries (95% CI 0.14 to 0.79, I^2=72.2%) and 0.97 per 1000 deliveries (95% CI 0.54 to 1.40, I^2=99.1%), respectively.

Conclusion This review indicated the prevalence of gestational trophoblastic disease was high. Hydatidiform mole was the predominant histopathological pattern observed. Routine antenatal screening is needed for early detection. Further research should be conducted to identify risk factors and evaluate strategies for the prevention and management of the disease.

PROSPERO registration number CRD42024504268.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Comprehensive search across multiple databases to capture a wide range of relevant studies.
⇒ Rigorous methods, including subgroup and sensitivity analyses, heterogeneity assessment and publication bias evaluation.
⇒ Quality of included studies was critically appraised using the Joanna Briggs Institute tool.
⇒ Pooled estimates were calculated using deliveries as the denominator, possibly excluding studies with different reporting methods.
⇒ Inclusion was limited to English-language articles, potentially missing relevant non-English studies.

INTRODUCTION

Fetal trophoblast cells, specialised cells in the placenta, play a critical role in successful implantation of the embryo into the uterus.[1] Gestational trophoblastic disease (GTD) comprises disorders characterised by the abnormal proliferation of trophoblastic tissue in the developing placenta during pregnancy.[2] The WHO categorises GTD into benign forms, such as hydatidiform moles (partial and complete), and malignant forms, including invasive moles, gestational choriocarcinoma, placental site trophoblastic tumours (PSTT) and epithelioid trophoblastic tumours.[3] Patients with GTD typically present with vaginal bleeding, excessive nausea and vomiting and uterine enlargement greater than expected for their gestational age. Diagnosis is confirmed using ultrasound, human chorionic gonadotropin (hCG) levels and histopathological examination.[4]

Accurate estimates of GTD are challenging due to the lack of centralised databases, variations between hospital-based and population-based data and inconsistent denominators

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such as live births, pregnancies and deliveries.[2 5] GTD remains a significant global reproductive health problem, with higher frequencies reported in parts of Asia, the Middle East and Africa.[6 7] The magnitude of GTD also varies in different countries, with incidences ranging from 0.4 to 0.8 per 1000 pregnancies in the USA,[8] 3.87 per 1000 pregnancies in China,[9] 2.3 per 1000 deliveries in Morocco,[10] 2.8–7.2 per 1000 deliveries in Nigeria,[11 12] 3.42 per 1000 deliveries in Uganda[13] and 2.8–13.04 per 1000 deliveries in Ethiopia.[14 15]

Notably, GTD remains one of the causes of maternal morbidity and mortality. Complications include severe bleeding, anaemia, shock, pre-eclampsia, hyperthyroidism, hyperemesis and respiratory distress.[12 16 17] Malignant forms of GTD carry a high mortality risk due to haemorrhage, sepsis, embolism and metastasis, particularly to the lungs, gastrointestinal tract and brain, leading to severe symptoms such as dyspnoea, cough, chest pain, haemoptysis, abdominal pain and neurological deficits.[4 18]

Moreover, GTD is highly curable, with cure rates exceeding 90% even in metastatic cases, and early diagnosis allows the preservation of fertility.[4] Although its incidence appears to be decreasing in developed countries, GTD remains a significant problem in the developing world, including many African countries, where reported magnitudes are inconsistent.[5 14 15 19–21]

Although a recent review reported GTD magnitude exclusively in East African countries,[22] to our knowledge, no systematic review and meta-analysis have evaluated GTD prevalence across the entire African continent. Therefore, this study aimed to determine the pooled prevalence and histopathological patterns of GTD in Africa. In the African context, concise evidence on the burden of GTD is important for healthcare planning, resource allocation and targeted interventions. The findings may also inform clinical management, prognosis and treatment outcomes and serve as a reference for researchers and policymakers.

METHODS

Protocol registration

The protocol for this study was registered with the International Prospective Register of Systematic Reviews (PROSPERO) under the registration number (CRD42024504268). The methodology and reporting of this review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 guidelines (online supplemental checklist S1).[23]

Search strategy

This review identified published and unpublished studies reporting data on the prevalence and histopathological patterns of GTD in Africa. Relevant studies were identified through a literature search of PubMed, ScienceDirect, Hinari, Google Scholar and other sources. The following key Medical Subject Headings and free-text terms were used to identify relevant articles: "gestational trophoblastic disease", "gestational trophoblastic neoplasia", "gestational trophoblastic neoplasm", "molar pregnancy", "hydatidiform mole", "invasive mole" and "choriocarcinoma", together with terms related to histopathology ("histopathologic", "histopathological", "pattern") and epidemiological measures ("magnitude", "prevalence", "incidence", "epidemiology"), as well as the names of individual African countries. Boolean operators (AND, OR) were used to combine key terms. A snowball search of the reference lists of selected studies was undertaken to retrieve other relevant studies. In addition, a manual search of institutional repositories and a Google search were conducted to identify relevant unpublished studies, including theses and dissertations that were not indexed in standard databases. The database search terms were applied flexibly to enhance retrieval from grey literature sources. The literature search was initially conducted up to 2 February 2024, including studies published in English from 1 January 2000 to 1 January 2024. The search was repeated in 2025, and no additional eligible studies were identified.

The search strategy was first developed for PubMed and presented as follows; ((((((((((((((("names of African countries"[Title/Abstract] AND ("Magnitude*"[Title/Abstract])) OR ("prevalence*"[Title/Abstract])) OR ("incidence*"[Title/Abstract])) OR ("epidemiology"[Title/Abstract])) AND ("histopathologic"[Title/Abstract])) AND ("pattern*"[Title/Abstract])) AND ("gestational trophoblastic disease*"[Title/Abstract])) OR ("gestational trophoblastic neoplasia"[Title/Abstract])) OR ("gestational trophoblastic neoplasm*"[Title/Abstract])) OR ("molar pregnancy*"[Title/Abstract])) OR ("hydatiform mole"[Title/Abstract])) OR ("invasive mole"[Title/Abstract])) OR ("choriocarcinoma"[Title/Abstract]) Filters: abstract, free full text, full text, English, from 1 January 2000 to 1 January 2024. The complete search strings for each database are provided in online supplemental appendix S1.

Inclusion and exclusion criteria

In this systematic review and meta-analysis, we included all institution-based observational studies reporting the prevalence of GTD and/or its histopathological patterns, regardless of the diagnostic method. Only studies that used the total number of deliveries as the denominator for prevalence estimation, were conducted in African countries, and were published between January 2000 and January 2024 were included. All published articles and grey literature (theses and dissertations) written in English were considered. Grey literature was eligible if it was accessible through institutional repositories or online databases and met the same inclusion criteria as published studies. For studies from the same institution with overlapping data collection periods, we carefully assessed for duplication; in such cases, the most up-to-date report was included. We excluded citations without an abstract or full text, conference abstracts, case reports

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or series, reviews and studies that did not report the total number of deliveries during the study period.

Study selection and screening

Initially, articles extracted from various sources were exported to EndNote X8 reference manager. Duplicate studies were then eliminated by using the EndNote. Two authors (EMA and ABK) independently screened the study titles and abstracts before retrieving full-text papers. Two authors (MB and AAT) independently reviewed and screened the full-text articles using predefined inclusion criteria. Disagreements were resolved through discussion with a third author (MDB) regarding the final selection of studies to be included in the systematic review and meta-analysis.

Data extraction

Data extraction was carried out using a standardised format in a Microsoft Excel spreadsheet. The extraction sheet included information on the author's name, year of publication, country, study design, total number of deliveries, total number of GTD cases, prevalence of GTD per 1000 deliveries and the number of cases for each histopathological pattern. The sheet was piloted on three studies to ensure clarity and completeness and was refined before use. Two authors (AJT and GA) independently extracted the data, and a third author (AA) independently verified its accuracy.

No missing or incomplete data were encountered during data extraction. However, if such cases had arisen, we planned to contact the corresponding authors of the original studies for clarification or additional information.

Measurement of outcome variables

This systematic review has two outcomes. The first was the pooled prevalence of GTD among total deliveries, calculated as the total number of GTD cases divided by the total number of deliveries, multiplied by 1000. The second outcome was the pooled prevalence of each histopathological pattern of GTD. Each histopathological pattern of GTD was analysed individually if it was reported in at least two studies. This was also calculated by dividing the number of cases for each histopathological pattern of GTD by the total number of deliveries and multiplying by 1000.

Quality assessment

The Joanna Briggs Institute (JBI) critical appraisal tool for observational studies was used to assess the methodological quality of the included studies.[24] The checklist considers key domains including sampling strategy, adequacy of sample size, description of study subjects and setting, adequacy of data analysis, validity and reliability of outcome measurement and appropriateness of statistical analysis. Studies that fulfilled 7–8 out of 8 criteria were classified as low risk of bias, those fulfilling 5–6 criteria as medium risk and those fulfilling fewer than 5 criteria as high risk. For this review, studies assessed as low or medium risk of bias (meeting at least 50% of the checklist criteria) were included in the statistical analysis. Two authors (EMA and GM) independently performed the assessments, and disagreements were resolved through discussion. Domain-level assessment results for each study are provided in online supplemental appendix S2.

Data analysis

Data were exported to Stata V.17.0. Effect sizes and their SEs were calculated using Stata commands, and the meta-analysis was conducted using Stata's built-in meta-analysis graphical user interface (GUI). The pooled prevalence of GTD and its histopathological patterns, with 95% CIs, was determined using a random-effects model with Knapp-Hartung adjustment. This model was chosen to account for both within-study and between-study variability, and the Knapp-Hartung adjustment provides more accurate CIs under high heterogeneity.

Heterogeneity across studies was evaluated using Cochran's Q test ($p<0.05$ indicating significant heterogeneity) and the I^2 statistic. Conventional thresholds of 25%, 50% and 75% are often cited to indicate low, moderate and high heterogeneity, respectively, and were used here only as approximate guides.[25] Interpretation was made in the context of both the magnitude and direction of effects, as well as the strength of evidence from Cochran's Q test. Subgroup analyses were conducted to explore potential source of heterogeneity, particularly when substantial or high heterogeneity was observed. Analyses based on study region and year of publication were prespecified in the protocol. Additionally, exploratory subgroup analyses were performed according to the mean number of participants to further assess variability across studies. A leave-one-out sensitivity analysis was also conducted to assess the robustness of the findings by evaluating whether any individual study disproportionately influenced the overall pooled estimate. Potential publication bias was assessed using funnel plots and Egger's regression test, with $p<0.05$ considered statistically significant. Additionally, a non-parametric trim-and-fill method was applied to estimate and adjust for the potential effect of missing studies. Results were presented as text, tables and figures.

Patient and public involvement

Patients and the public were not involved in the design, conduct, reporting or dissemination plans of this research as this study is a systematic review and meta-analysis of previously published and grey literature. Direct involvement was therefore not feasible or appropriate.

RESULTS

Search results

A comprehensive internet-based search identified a total of 2252 studies, including 1705 from PubMed, 26 from Hinari, 13 from ScienceDirect, 505 from Google Scholar and 3 from other sources. After removing duplicates, 2158 studies remained. Screening of titles and abstracts led to

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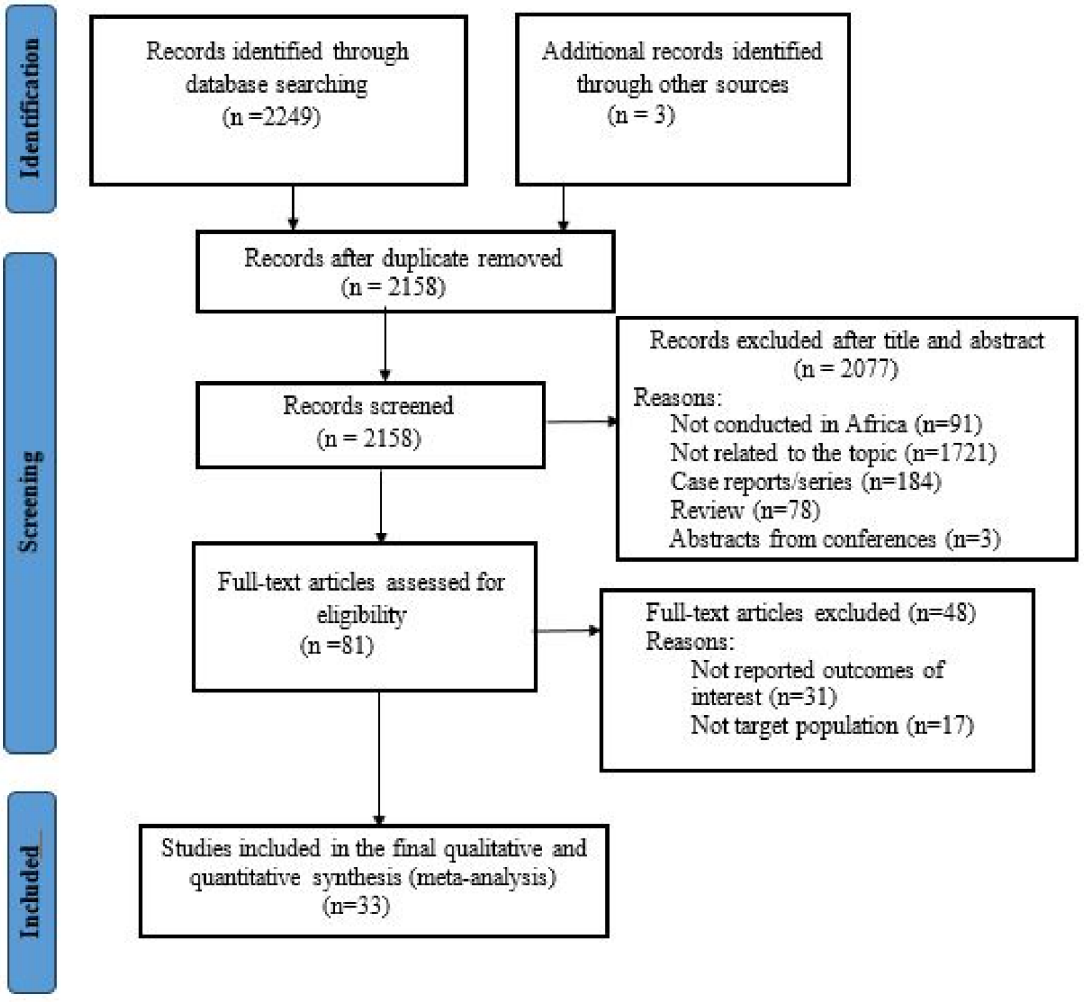


Figure 1 Flow chart showing the selection of studies for the systematic review and meta-analysis of gestational trophoblastic disease in Africa.

the exclusion of 2077 studies. Subsequently, 81 studies underwent full-text assessment for eligibility. Finally, 33 studies met the inclusion criteria and were included in the systematic review and meta-analysis (figure 1).

Characteristics of included studies

A total of 33 institution-based studies were included in the current systematic review and meta-analysis. The studies were conducted in 8 countries of Africa: 17 from Nigeria,[11 12 20 26–39] 1 from Ghana,[21] 5 from South Africa,[5 19 40–42] 1 from Morocco,[10] 1 from Tanzania,[43] 1 from Uganda,[13] 1 from Eritrea[44] and 6 from Ethiopia.[14 15 17 45–47] All the studies were cross-sectional in design. A total of 1 779 161 participants (deliveries) were involved in calculating the pooled prevalence of GTD in Africa. The total number of participants (deliveries) in the included studies ranged from 3172[35] to 554 057[40] (online supplemental table S1).

Quality assessment

The methodological quality of the 33 included observational studies was assessed using the JBI checklist. Study quality scores ranged from 5 to 8, indicating an overall moderate methodological rigour. 12 studies were classified as having a low risk of bias, while the remaining 21 were considered to have a moderate risk of bias. No study was deemed to have a high risk of bias. Detailed results of the risk of bias assessment, including individual study scores, are presented in online supplemental appendix S2.

Meta-analysis

Pooled prevalence of GTD in Africa

In this meta-analysis, 2885 GTD cases among 1 779 161 participants were identified from 33 studies. Using a random-effects model, the pooled prevalence of GTD in Africa was 4.35 per 1000 deliveries (95% CI 3.26 to 5.45). Very high heterogeneity was observed across the studies (I^2=99.8%, p<0.001), indicating that most of the variability in reported prevalence was due to differences between studies rather than chance. Prevalence estimates varied widely, ranging from 0.34 per 1000 deliveries[21] to 13.04 per 1000 deliveries,[15] reflecting substantial variation in both the magnitude and direction of effects (figure 2).

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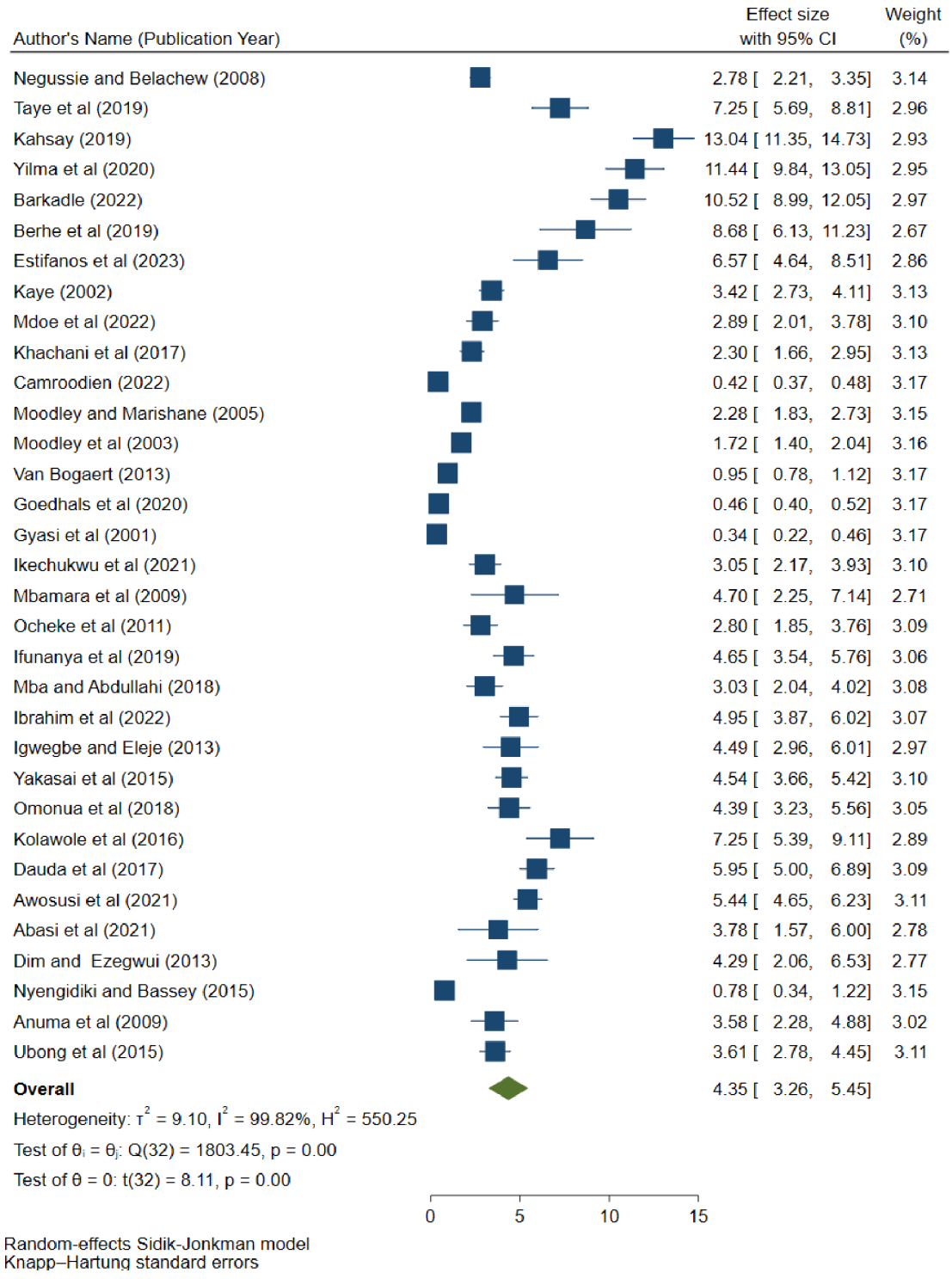


Figure 2 Forest plot of the pooled prevalence of gestational trophoblastic disease per 1000 deliveries in Africa.

Subgroup analysis for the prevalence of GTD in Africa

Subgroup analyses were conducted by study region, year of publication and mean number of participants. Random-effects models were applied for all subgroup analyses.

By study region

The included studies were conducted in 4 regions of Africa: 18 from West Africa (Nigeria and Ghana), 5 from Southern Africa (South Africa), 1 from North Africa (Morocco) and 9 from East Africa (Tanzania, Uganda, Eritrea and Ethiopia). The highest pooled prevalence of GTD was observed in East Africa at 7.34 per 1000 deliveries (95% CI 4.37 to 10.30), while the lowest was in Southern Africa at 1.15 per 1000 deliveries (95% CI 0.14 to 2.15). High heterogeneity persisted within studies conducted in the same region (table 1).

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Table 1 Subgroup analysis of the pooled prevalence of GTD by study region, year of publication and mean number of participants in Africa

Variables	Characteristic	Number of studies	Pooled* (95% CI)	(I^2, p value)†
Study region	West Africa	18	3.89 per 1000 (3.04 to 4.73)	94.7%, 0.001
	Southern Africa	5	1.15 per 1000 (0.14 to 2.15)	99.5%, <0.001
	North Africa	1	2.30 per 1000 (1.66 to 2.95)	//
	East Africa	9	7.34 per 1000 (4.37 to 10.30)	97.8%, <0.001
Year of publication	Before SDGs	14	2.71 per 1000 (1.86 to 3.55)	97.9%, <0.001
	After SDGs	19	5.51 per 1000 (3.83 to 7.20)	99.8%, <0.001
Mean number of participants	Below	28	5.02 per 1000 (3.90 to 6.14)	97.2%, <0.001
	Above	5	0.77 per 1000 (0.06 to 1.47)	99.3%, <0.001

*Prevalence per 1000 deliveries.
†Heterogeneity.
GTD, gestational trophoblastic disease; SDGs, Sustainable Development Goals.

By year of publication

The studies were classified into two groups: published before and after the introduction of the Sustainable Development Goals (SDGs), effective from 2016 to 2030. Studies published before the SDGs had a pooled prevalence of 2.71 per 1000 deliveries (95% CI 1.86 to 3.55), whereas studies published after SDGs were implemented had a higher pooled prevalence of 5.51 per 1000 deliveries (95% CI 3.83 to 7.20). Heterogeneity remained high in both groups (table 1).

By mean number of participants

The mean sample size of the included studies was 53 914 participants. Studies with fewer participants than the mean had a higher pooled prevalence of GTD (5.02 per 1000 deliveries, 95% CI 3.90 to 6.14), while studies with more participants than the mean had a lower pooled prevalence (0.77 per 1000 deliveries, 95% CI 0.06 to 1.47). High heterogeneity persisted across both groups (table 1).

Sensitivity analysis for prevalence of GTD

A leave-one-out sensitivity analysis showed that no single study substantially affected the overall pooled estimate. The pooled prevalence of GTD ranged from 4.07 per 1000 deliveries (95% CI 3.09 to 5.05)[15] to 4.48 per 1000 deliveries (95% CI 3.39 to 5.58)[21] after sequentially excluding each study (online supplemental figure S1).

Publication bias for prevalence of GTD

Publication bias was assessed using a funnel plot and Egger's regression test at a 5% significance level. Visual inspection of the funnel plot suggested asymmetry (figure 3), and Egger's test confirmed a significant presence of publication bias (p<0.05). To adjust for this, a non-parametric trim-and-fill analysis was conducted, which imputed 13 potentially missing studies. After adjustment, the pooled prevalence of GTD was 2.24 per 1000 deliveries (95% CI 1.89 to 2.59).

Histopathological patterns of GTD in Africa

The prevalence of hydatidiform mole was computed from 29 studies,[5 10–15 17 19 20 26–33 35 38–47] which reported a total of 2127 cases among 1 632 240 deliveries. The reported prevalence ranged from 0.41 per 1000 deliveries[5] to 10.91 per 1000 deliveries.[15] Using a random-effects model, the pooled prevalence of hydatidiform mole in Africa was 3.49 per 1000 deliveries (95% CI 2.45 to 4.52). Substantial heterogeneity was observed (I^2=99.7%, p<0.001), indicating that most variability was due to differences between studies (table 2).

The prevalence of invasive mole was estimated from six studies,[14 15 17 33 45 47] which reported 52 cases among 109 759 deliveries. The highest reported prevalence was 1.10 per 1000 deliveries,[15] whereas the lowest was 0.16 per 1000 deliveries.[33] Using a random-effects model, the pooled prevalence of invasive mole in Africa was 0.47 per 1000 deliveries (95% CI 0.14 to 0.79). Moderate heterogeneity was observed (I^2=72.2%, p=0.01), suggesting some variability between studies beyond chance (table 2).

The prevalence of choriocarcinoma was assessed from 25 studies,[5 12 14 15 17 19 21 26–28 30–38 41–43 45–47] which reported 483 cases among 1 117 243 deliveries. Reported prevalence ranged from 0.05 per 1000 deliveries[5] to 5.04 per 1000 deliveries.[12] The pooled prevalence of choriocarcinoma in Africa was 0.97 per 1000 deliveries (95% CI 0.54 to 1.40) using a random-effects model. High heterogeneity was observed (I^2=99.1%, p<0.001), indicating that most variability was attributable to differences between studies (table 2).

The prevalence of PSTT was calculated from four studies reporting a total of eight cases among 209 929 deliveries. Reported prevalence ranged from 0.8 to 12.07 per 100 000 deliveries.[30 42] The pooled prevalence of PSTT in Africa was 3.72 per 100 000 deliveries (95% CI 0.00 to 9.18). A low-to-moderate level of heterogeneity was observed (I^2=40.5%, p=0.29), suggesting that variability between studies was limited (table 2).

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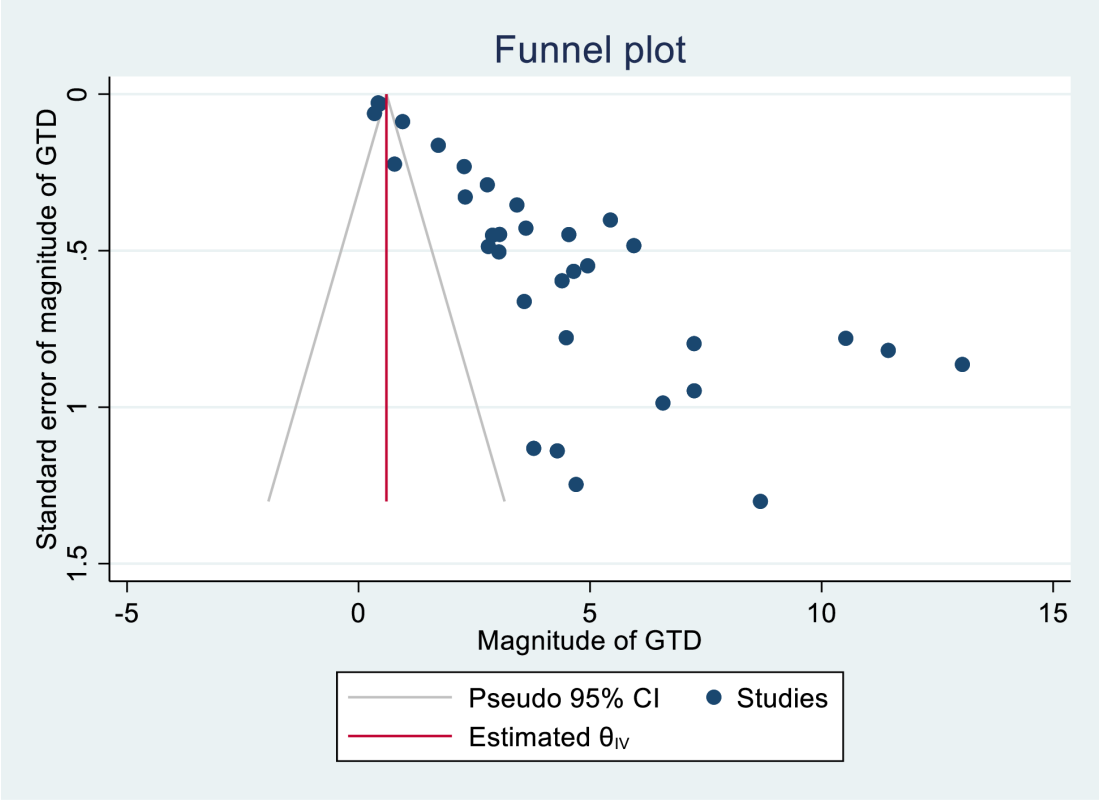


Figure 3 A funnel plot assessing publication bias for the pooled prevalence of GTD in Africa. GTD, gestational trophoblastic disease.

DISCUSSION

Worldwide, GTD is an important obstetrical problem that demands special consideration in medicine as it leads to significant maternal morbidity and mortality, necessitating prompt and appropriate medical intervention.[4] GTD also significantly affects women's well-being and psychosocial functioning, with a considerable impact on overall quality of life and emotional health. A systematic review examining health-related quality of life outcomes in women with GTD found that these patients experience substantial levels of anxiety, depression, sexual dysfunction and fertility-related distress.[48]

The magnitude of GTD can vary across age and ethnic groups. Reproductive health factors may contribute to differing GTD rates among women of reproductive age and older women. Additionally, disparities in healthcare access, utilisation and awareness among different ethnic groups may lead to variations in reported GTD prevalence.[4 6] Geographical differences also influence GTD prevalence, which may be attributed to inconsistent definitions and diagnoses of GTD, inadequate histological examinations and variations in the denominators used in reporting.[5 49]

Estimating the burden of GTD in Africa can serve as a valuable benchmark for healthcare professionals, policymakers and researchers. It highlights the need for increased awareness, early detection and proper management of GTD within the African context. In addition,

Table 2 Pooled prevalence of different histopathological patterns of GTD in Africa

Histopathological patterns of GTD	Number of studies	Number of cases	Number of participants	Pooled*/pooled† (95% CI)	(I^2, p value)‡
HM	29	2127	1 632 240	3.49 per 1000 (2.45 to 4.52)	99.7%, <0.001
IM	6	52	109 759	0.47 per 1000 (0.14 to 0.79)	72.2%, 0.01
CC	25	483	1 117 243	0.97 per 1000 (0.54 to 1.40)	99.1%, <0.001
PSTT	4	8	209 929	3.72 per 100 000 (0.00 to 9.18)	40.5%, 0.29

*Prevalence per 1000 deliveries (HM, IM, CC).
†Prevalence per 100 000 deliveries (PSTT).
‡Heterogeneity.
CC, choriocarcinoma; GTD, gestational trophoblastic disease; HM, hydatidiform mole; IM, invasive mole; PSTT, placental site trophoblastic tumours.

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recent knowledge of the magnitude of GTD and its histopathological pattern can guide healthcare planning, resource allocation and the development of targeted interventions to reduce maternal morbidity and mortality associated with GTD. Therefore, this systematic review and meta-analysis is designed to estimate the prevalence of GTD and its histopathological patterns in Africa.

Our meta-analysis provides a comprehensive evaluation of GTD prevalence in Africa, synthesising evidence from 33 studies conducted across eight countries. Reported GTD rates varied widely, ranging from 0.34 per 1000 deliveries in Ghana[21] to 13.04 per 1000 deliveries in Ethiopia.[15] Additionally, some studies included relatively larger sample sizes[5 40] than others, potentially influencing the reported prevalence.

The current meta-analysis revealed that the pooled prevalence of GTD in Africa was 4.35 per 1000 deliveries (95% CI 3.26 to 5.45). This estimate is comparable to findings from India (4 per 1000 deliveries),[50] but notably higher than figures from the Netherlands (1.67 per 1000 deliveries),[49] Italy (1.8 per 1000 deliveries)[51] and Turkey (1.2 per 1000 deliveries).[52]

The variations in reported prevalence across countries may reflect differences in healthcare systems strength, antenatal care coverage, socioeconomic conditions and diagnostic capacity. Countries with well-established healthcare systems and routine antenatal screening tend to report lower GTD rates, likely due to early detection and timely management of cases. A study from Korea found that GTD rates decreased with increasing gross domestic product,[53] supporting the role of socioeconomic development in reducing disease burden. In contrast, limited healthcare access, inadequate antenatal care services and nutritional deficiencies prevalent in many African countries may contribute to the higher rates observed. Malnutrition, which is common in Africa, has also been associated with increased GTD frequency.[6] Conversely, our pooled estimate was lower than results from Brazil (8.5 per 1000 deliveries)[54] and Turkey (12.13 per 1000 deliveries).[55]

To explore potential sources of heterogeneity, subgroup analysis was conducted based on study regions. The findings revealed that the highest pooled prevalence of GTD was 7.34 per 1000 deliveries (95% CI 4.37 to 10.30) in East Africa. In contrast, a recent meta-analysis by Abebaw *et al*[22] reported a substantially higher pooled prevalence of 22%. This discrepancy is likely due to methodological differences. Our review calculated prevalence using total deliveries as the denominator, whereas the previous study included high-risk groups such as biopsies performed, GTD cases, incomplete abortions and first-trimester pregnancy losses. These denominators can artificially inflate prevalence estimates, suggesting that the higher prevalence reported may not reflect the general population of pregnant women in East Africa.

Regarding the year of publication, the pooled prevalence of GTD was lower (2.71 per 1000 deliveries) in the studies conducted before the implementation of the SDGs. In contrast, studies conducted after the SDGs were introduced revealed a higher pooled prevalence (5.51 per 1000 deliveries). This increase may reflect the SDGs' emphasis on improving healthcare infrastructure, data collection and awareness of reproductive health issues, which could have enhanced detection, diagnosis and reporting of GTD in recent studies.

Subgroup analysis based on study sample size (participants) revealed that studies with fewer participants than the mean reported a higher pooled prevalence of GTD (5.02 per 1000 deliveries), whereas studies with a higher number of participants reported a lower pooled prevalence (0.77 per 1000 deliveries). This discrepancy may be due to the heterogeneity of study populations among studies with different participant numbers. Smaller studies might have included populations or settings with a higher GTD prevalence due to factors such as geographical location, healthcare access or genetic predispositions. Conversely, larger studies likely included more diverse populations, better representing the general population, which could explain the lower pooled prevalence. These findings indicate that variation in sample size can substantially affect GTD estimates.

Our review revealed that hydatidiform mole was the most common histopathological pattern of GTD, followed by choriocarcinoma and invasive mole. These patterns were reported in 29, 25 and 6 studies, respectively. Across all histologically confirmed cases, there were 2127 cases of hydatidiform mole, 483 cases of choriocarcinoma, 52 cases of invasive mole and 8 cases of PSTT. These results are consistent with previous reports, which also identified hydatidiform mole as the predominant subtype, accounting for about 80% of all GTD cases.[56 57]

In this review, the pooled prevalence of hydatidiform mole in Africa was 3.49 per 1000 deliveries (95% CI 2.45 to 4.52). This estimate is higher than the reported rates in Sweden (1.2 per 1000 deliveries),[58] the Netherlands (1.34 per 1000 deliveries),[59] Denmark (1.98 per 1000 deliveries)[60] and Finland (0.98 per 1000 deliveries).[61] This higher prevalence may reflect differences in study settings, genetics, nutritional status and limited access to antenatal care and diagnostic facilities. Several genetic variations, including NLRP7 and KHDC3L variants, have been identified in African populations,[62–67] and mutations in these genes disrupt genomic imprinting, leading to abnormal trophoblast cell growth.[68]

In this systematic review and meta-analysis, reporting of invasive moles was limited, with only 52 cases identified across six studies. The pooled prevalence of invasive moles in Africa was 0.47 per 1000 deliveries (95% CI 0.14 to 0.79), comparable to reports from South Korea (0.2 per 1000 pregnancies).[57]

The present meta-analysis also indicated that the pooled prevalence of choriocarcinoma in Africa was 0.97 per 1000 deliveries (95% CI 0.54 to 1.40), consistent with findings from Turkey (0.83 per 1000 deliveries),[55] but higher than from the Netherlands (0.03 per 1000 deliveries)[59] and Brazil (0.06 per 1000 deliveries).[54] These

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differences may be due to genetic, environmental and healthcare system variations. Certain genetic mutations, such as those in the NPRL7 gene, may be more prevalent in African populations, increasing susceptibility to choriocarcinoma.[69 70]

In our review, PSTT had a pooled prevalence of 3.72 per 100 000 deliveries (95% CI 0.00 to 9.18), representing 0.3% of all GTD cases in Africa. This aligns with global estimates of approximately 1 per 100 000 deliveries, accounting for 0.2% of GTD cases.[71] Despite the wide CI due to the small number of cases, reporting these findings emphasises the rarity of PSTT in Africa.

Significant heterogeneity was identified among the included studies. Subgroup analyses based on study region, year of publication and mean number of participants did not fully explain the observed variability. A sensitivity analysis confirmed the robustness of the overall findings. Publication bias was detected and addressed using a non-parametric trim-and-fill analysis, which imputed 13 potentially missing studies. After adjustment, the estimated pooled prevalence of GTD was 2.24 per 1000 deliveries (95% CI 1.89 to 2.59), indicating that the unadjusted estimate may slightly overestimate the true prevalence of GTD in Africa.

Strengths

This study has several strengths. It used a comprehensive search strategy across multiple databases to capture a wide range of relevant studies. To our knowledge, this is the first study to provide pooled estimates of GTD prevalence and histopathological patterns across Africa. Rigorous methodological approaches, including subgroup and sensitivity analyses, heterogeneity assessment and evaluation of publication bias, were applied to ensure the robustness of the findings. In addition, the quality of included studies was critically appraised using the JBI tool, enhancing the credibility of the conclusions drawn.

Limitations

This review calculated pooled estimates using the number of deliveries as the denominator, which may have excluded studies that reported GTD using alternative denominators and may have under-represented data from cancer registries and pathology audits, potentially limiting comparability with some global literature. Publication bias and heterogeneity may also have influenced the pooled estimates. The included studies were conducted in a limited number of countries, which restricted generalisability across Africa. Furthermore, only English-language studies were included, which may have overlooked relevant evidence published in other languages. Collectively, these limitations warrant cautious interpretation of the findings.

CONCLUSION

Based on this review, the overall pooled prevalence of GTD in Africa remains high and raises concerns. Hydatidiform mole was the predominant histopathological pattern observed. These results indicate that limited emphasis has been placed on addressing GTD in African countries. Therefore, it is imperative to implement targeted interventions at the grassroots level across the continent to effectively reduce the burden of GTD.

Recommendations and future implications

Comprehensive health education programmes should be implemented to increase awareness of GTD among healthcare providers and communities. Special attention should be given to strengthening antenatal care services, ensuring regular screenings and assessments for GTD risk factors. A screening programme for GTD, including ultrasound examinations and hCG measurements, should be instituted during the antenatal period to aid in early detection and diagnosis. Further research should be conducted to identify factors contributing to GTD and to evaluate strategies for prevention and management of the disease.

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