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# Prevalence, Predictors, and Outcomes of Gestational Diabetes Mellitus in Sub-Saharan Africa: A Systematic Review and Meta-Analysis

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## Abstract

**Introduction:** Gestational diabetes mellitus remains a public health issue linked to various complications during pregnancy or at birth for both the mother and the child, with these complications potentially being short-term or long-term. This study aimed to estimate the current prevalence of gestational diabetes mellitus (GDM) in sub-Saharan Africa, along with its associated risk factors and outcomes. **Methods:** PubMed, Google Scholar, SpringerLink, and Cochrane Library were searched for full-text articles. A total of 29 articles that met the inclusion criteria were included in this systematic review and meta-analysis. Data were extracted into a pre-designed Excel sheet and exported to STATA 14.2 for statistical analysis. Pooled prevalence, risk ratios, and odds ratios are presented with corresponding 95% confidence intervals. **Results:** The pooled prevalence of GDM in SSA was 12.63% (95% CI: 9.66, 15.92). Maternal age ≥ 35 years, overweight/obesity, urban residence, a history of unexplained stillbirth, a history of a macrosomic baby, a previous history of GDM, a family history of diabetes mellitus, multigravida status, and a history of abortion were all significant predictors of GDM. Foetal macrosomia (RR: 5.16, 95% CI: 3.41, 7.81), CS delivery (RR: 1.98, 95% CI: 1.68, 2.32), pre-eclampsia (RR: 2.76, 95% CI: 2.08, 3.66), and postpartum haemorrhage (RR: 3.34, 95% CI: 2.13, 5.25) were significant outcomes of GDM. **Conclusion:** GDM poses a significant burden in SSA, and key risk factors for the disease have been identified. Individual countries must continue to monitor the prevalence of GDM and its associated complications.

## Keywords

Gestational Diabetes Mellitus, Pregnancy, Prevalence, Predictors,

Sub-Saharan Africa

## 1. Introduction

Diabetes refers to a group of metabolic disorders characterized by hyperglycaemia in the absence of treatment. The heterogeneous pathophysiology involves defects in insulin secretion, insulin action, or both, as well as disturbances in carbohydrate, fat, and protein metabolism [1]. In gestational diabetes mellitus (GDM), hyperglycaemia or glucose intolerance is first recognized or diagnosed during pregnancy [2]. Throughout pregnancy, a woman's body adapts to the nutritional demands of the growing foetus, including glucose requirements. Insulin secretion increases, elevating maternal fat and glycogen storage to ensure adequate maternal nutrition. Various placental hormones that act as insulin antagonists are produced at the beginning of the mid-trimester. These hormones enhance insulin resistance and raise maternal glucose and free fatty acids. If a woman has an underlying metabolic disorder or genetic predisposition affecting insulin secretion, her body may not produce enough insulin during this period, preventing it from counteracting these changes and leading to the development of GDM [3].

Around 14% of pregnancies globally are affected by gestational diabetes; its prevalence varies with differences in risk factors and approaches to screening and diagnosis, and it is increasing in parallel with obesity and type 2 diabetes [4]. However, this prevalence varies between 1% and 28% based on population characteristics such as race, ethnicity, region, and socioeconomic factors [5] [6]. Diagnostic criteria have varied, and comparing reports of GDM prevalence across studies can be challenging, but the prevalence seems to have increased over time. Several factors, such as pre-pregnancy body mass index (BMI), family history of diabetes, age, and glycosuria, are all associated with a higher risk of developing GDM. Still, anemia has also been proposed as playing a role in the GDM pathogenesis [7].

Gestational diabetes mellitus continues to be a public health problem associated with many complications during pregnancy or at birth, in both the mother and the child, and these complications may be short-term or long-term [8] [9]. Some of the complications include gestational hypertension, pre-eclampsia, increased rate of caesarean section, foetal macrosomia, sudden intra-uterine death, birth trauma, and increased perinatal mortality [6]. Development of obesity and diabetes in offspring during childhood and later development of diabetes mellitus in the mother are also related to GDM [10]. Despite being a public health problem, predicting the individual risk of developing GDM is difficult due to multiple risk factors, making it difficult to estimate the prevalence [8]. This is evident in the reported prevalence of GDM in sub-Saharan Africa from three systematic reviews published at different times. These reviews found the prevalence to be 14% [11], 9% [12], and 3.05% [13].

Therefore, this study aims to estimate the current prevalence of gestational di-

abetes mellitus (GDM) in sub-Saharan Africa, its associated risk factors, and outcomes. This information would help policymakers implement strategies and policies to increase awareness, diagnose, and manage GDM.

## 2. Methodology

### 2.1. Study Protocol and Search Strategy

This systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO) under registration ID: CRD42024590006. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines were adhered to in this review. Three databases were searched, focusing on studies published between 2014 and 2024, using the following MeSH terms for PubMed Central: ((“epidemiology” [Subheading] OR “epidemiology” [All Fields] OR “prevalence” [All Fields] OR “prevalence” [MeSH Terms]) AND (“diabetes, gestational” [MeSH Terms] OR (“diabetes” [All Fields] AND “gestational” [All Fields]) OR “gestational diabetes” [All Fields] OR (“gestational”[All Fields] AND “diabetes” [All Fields] AND “mellitus” [All Fields]) OR “gestational diabetes mellitus” [All Fields])) AND (“pregnancy” [MeSH Terms] OR “pregnancy” [All Fields]) AND (“africa” [MeSH Terms] OR “africa” [All Fields]). For Google Scholar, “Gestational diabetes mellitus OR Hyperglycaemia” AND “African countries” was used as search descriptions. For SpringerLink, the following terms were employed to search for articles: “Hyperglycaemia OR Gestational Diabetes mellitus AND prevalence AND Africa.” The databases utilised were freely accessible, and most of the articles were available at no cost.

### 2.2. Selection of Studies

This review included peer-reviewed observational studies (cross-sectional, cohort, and case-control) published in English between 2014 and 2024. The chosen period enables comparison of the pooled prevalence with other studies covering a similar time frame, though the prevalence rates may differ. The included studies met the following inclusion criteria: 1) conducted within sub-Saharan Africa, 2) reported on the prevalence, risk factors, predictors, and/or outcomes of GDM, and 3) had a sample size of 100 or more participants. Preprints and other non-peer-reviewed articles were excluded from the review. Interventional studies, case reports, case series, opinions, letters to the editor, qualitative studies, and systematic reviews were also excluded. Additionally, any study with a sample size of less than 100 and/or a modified Newcastle-Ottawa score of 6 or less was excluded.

The relevant articles were exported to EndNote version X8, after which duplicates were removed. Authors MC, FI, and ACZ independently screened the titles and abstracts of the articles using the outlined inclusion and exclusion criteria. Afterwards, the mentioned authors conducted the full-text screening. EK performed content validity of the articles. Ultimately, 29 studies met the inclusion criteria (**Figure 1**) [14].

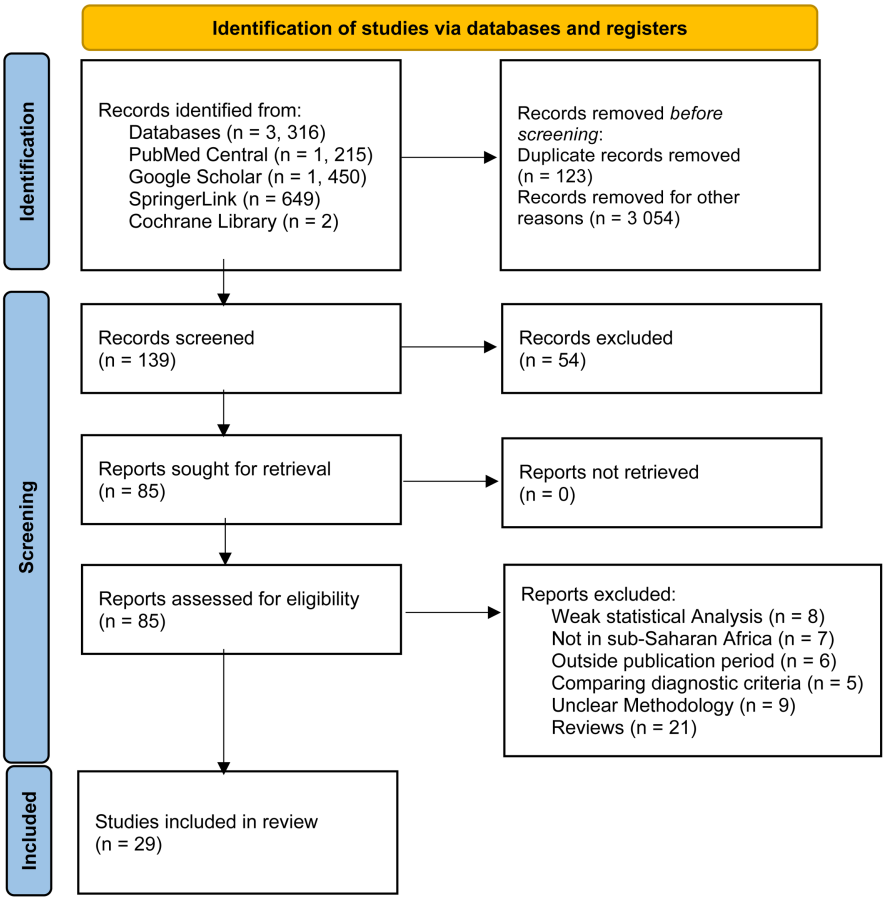


**Figure 1.** PRISMA flow diagram showing the search and selection process.

## 2.3. Quality Assessment

We employed the Newcastle-Ottawa assessment appraisal adapted for cross-sectional studies. Three domains were assessed: selection of study participants, comparability of groups or participants, and ascertainment of outcomes. The study could be classified as good, fair, or poor based on the number of stars assigned to each broad assessment area. Only studies classified as good or fair were included in the analysis. The individual scores for each of the included studies are displayed in the results.

## 2.4. Data Extraction and Analysis

Two independent reviewers extracted the following data into a pre-designed Excel sheet: first author, year of publication, country, study design, sample size, criteria for GDM diagnosis, region, GDM prevalence, predictors (age, BMI, gestational period, family history, caesarean delivery, and preterm birth), and outcomes (perineal tear, macrosomia, pre-eclampsia, stillbirth, PPH).

The Excel sheet was imported into STATA 14.2 (StataCorp LLC) for analysis. We conducted a random effects meta-analysis using the Freeman-Tukey double-arcsine transformation [15] to pool data on prevalence, risk factors (measured as

odds ratios), and outcomes (measured as relative risks). Forest plots were utilized to estimate the pooled effect sizes and assess the influence of individual studies, along with their 95% confidence intervals. The heterogeneity index ($I^2$) evaluated heterogeneity across studies, with a higher $I^2$ indicating more significant variability due to actual variation among studies [12]. The Metan, Metafunnel, and Metabias packages and commands were employed for the analysis.

## 3. Results

### 3.1. Study Characteristics

Our systematic review and meta-analysis included 29 studies conducted between 2014 and 2024 across sub-Saharan Africa. Of these, 16 studies came from East Africa, 10 from West Africa, two from Central Africa, and one from Southern Africa. Most studies (22 out of 29) were cross-sectional, while 6 were cohort studies and 1 was a case-control study. Sample sizes varied widely, ranging from 105 participants in a Nigerian cohort study to 9314 in a Nigerian cross-sectional study [16] [17], resulting in a total sample size of 29,477 across all 29 studies. Each of the 29 studies contributed to the estimate of GDM prevalence [2] [9] [10] [16]-[41]. Additionally, 14 studies informed the evaluation of GDM risk factors [2] [9] [10] [17] [19] [20] [23] [28] [30]-[32] [34] [35] [40], while four studies assessed GDM outcomes [16] [21] [22] [29] as shown in **Table 1.**

**Table 1.** General characteristics of the included studies and their outcomes (n = 29).

| Authors | Country | Design | Total | Prevalence | Criteria | Region | Study quality |
|---|---|---|---|---|---|---|---|
| Boda *et al.*, 2021 | Ethiopia | Cross-sectional | 380 | 7.1 | IADPSG | East | Good (6/7) |
| Ogu *et al.*, 2022 | Nigeria | Cross-sectional | 9314 | 5.2 | WHO | West | Good (7/7) |
| Basil *et al.*, 2023 | Nigeria | Cross-sectional | 281 | 16.7 | IADPSG | West | Fair (5/7) |
| Mghanga *et al.*, 2020 | Tanzania | Cross-sectional | 612 | 4.3 | WHO | East | Good (7/7) |
| Egbe *et al.*, 2018 | Cameroon | Cross-sectional | 200 | 20.5 | IADPSG | Central | Good (7/7) |
| Mdoe *et al.*, 2021 | Tanzania | Cross-sectional | 582 | 27.5 | WHO | East | Good (7/7) |
| Larebo *et al.*, 2021 | Ethiopia | Cross-sectional | 420 | 26.2 | WHO | East | Good (7/7) |
| Agbozo *et al.*, 2021 | Ghana | Cohort | 446 | 26.5 | IADPSG | West | Good (9/9) |
| Kerekou *et al.*, 2018 | Benin | Case-control | 967 | 7.5 | WHO | West | Fair (7/9) |
| Atlaw *et al.*, 2022 | Ethiopia | Cohort | 432 | 15.7 | WHO | East | Good (9/9) |
| Boadu *et al.*, 2022 | Ghana | Cross-sectional | 200 | 8.5 | IADPSG | West | Good (7/7) |
| Sobngwi *et al.*, 2024 | Cameroon | Cross-sectional | 984 | 17.1 | IADPSG | Central | Good (7/7) |
| Grunnet *et al.*, 2020 | Tanzania | Cohort | 392 | 39 | WHO | East | Fair (7/9) |
| Abindu *et al.*, 2024 | Uganda | Cross-sectional | 188 | 7.5 | WHO | East | Good (7/7) |
| Njete *et al.*, 2018 | Tanzania | Cross-sectional | 333 | 19.5 | WHO | East | Good (7/7) |

**Continued**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Muche *et al*., 2020 | Ethiopia | Cohort | 694 | 17.4 | WHO | East | Good (9/9) |
| Kahimakazi *et al*., 2023 | Uganda | Cross-sectional | 343 | 10.2 | WHO | East | Good (7/7) |
| John *et al*., 2019 | Nigeria | Cohort | 105 | 10.5 | WHO | West | Good (8/9) |
| Boko *et al*., 2024 | Ethiopia | Cross-sectional | 190 | 7.4 | WHO | East | Good (7/7) |
| Putoto *et al*., 2020 | Sierra leone | Cross-sectional | 5799 | 1.9 | WHO | West | Good (7/7) |
| Pastakia *et al*., 2017 | Kenya | Cross-sectional | 616 | 2.9 | IADPSG | East | Good (7/7) |
| Muche *et al*., 2019 | Ethiopia | Cross-sectional | 1027 | 12.8 | WHO | East | Good (7/7) |
| Nwali *et al*., 2021 | Nigeria | Cross-sectional | 391 | 11.5 | WHO | West | Good (7/7) |
| Basil *et al*., 2024 | Nigeria | Cohort | 253 | 20.6 | IADPSG | West | Good (8/9) |
| sewor *et al*., 2024 | Ghana | Cross-sectional | 799 | 7.5 | WHO | West | Good (7/7) |
| Nigatu *et al*., 2022 | Ethiopia | Cross-sectional | 390 | 16.9 | WHO | East | Good (7/7) |
| Macaulay *et al*., 2018 | South Africa | Cross-sectional | 1906 | 9.1 | WHO | South | Fair (5/7) |
| Woticha *et al*., 2019 | Ethiopia | Cross-sectional | 518 | 4.2 | WHO | East | Good (7/7) |
| Bune, 2024 | Ethiopia | Cross-sectional | 685 | 16.1 | WHO | East | Good (7/7) |

### 3.2. Prevalence of GDM in Sub-Saharan Africa

A total of 29 studies with a combined sample size of 29,477 were utilized to estimate the prevalence of GDM in SSA. The pooled prevalence of GDM in SSA was determined to be 12.63% (95% CI: 9.66, 15.92), which was statistically significant ($Z = 15.241$, $p < 0.001$), as illustrated in Figure 2. Sub-group analysis based on GDM diagnostic criteria revealed a GDM prevalence of 14.04% (95% CI: 8.20, 21.13) for studies that applied the IADPSG criterion and 12.11% (95% CI: 8.83, 15.82) for studies that used the WHO 2013 criterion (see Figure 3). Additionally, a further sub-group analysis of GDM prevalence by region indicated a higher prevalence in studies conducted in central Africa, followed by East Africa and then West Africa, with rates of 17.81% (95% CI: 14.55, 21.33), 13.43% (95% CI: 9.16, 18.36), and 10.67% (95% CI: 7.05, 14.92), respectively (see Figure 4).

### 3.3. Predictors (Risk Factors) of GDM in Sub-Saharan Africa

A total of 14 studies were used to evaluate the risk factors or predictors of GDM in SSA. The minimum number of studies that assessed each predictor was four, and ten critical predictors were identified. The history of having a macrosomic baby (OR: 6.99, 95% CI: 2.96,16.52), the history of unexplained stillbirth (OR: 5.80, 95% CI: 3.22,10.44), family history of diabetes (OR: 5.38, 95% CI: 3.13, 9.26), and the history of GDM (OR: 4.98, 95% CI: 1.38, 17.93) were the most significant predictors. Other important factors included maternal age ≥ 35 years, overweight/obesity, and a history of abortion (OR: 2.44, 95% CI: 1.60, 3.72; OR: 2.34, 95% CI: 1.75, 3.13; OR: 3.15, 95% CI: 1.75, 5.66, respectively), as shown in Table 2.

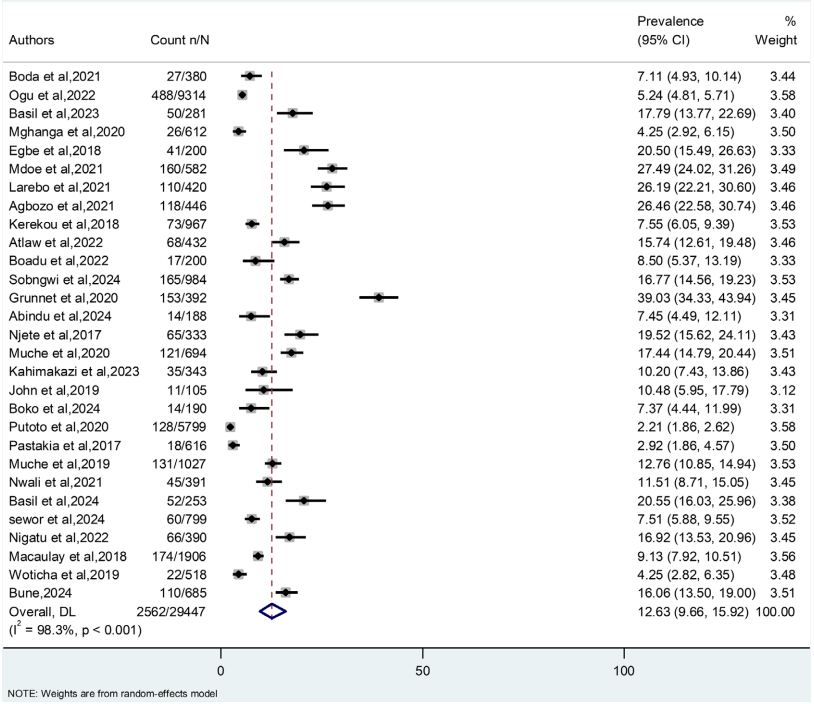


**Figure 2.** Meta-Analysis of GDM prevalence in sub-Saharan Africa.

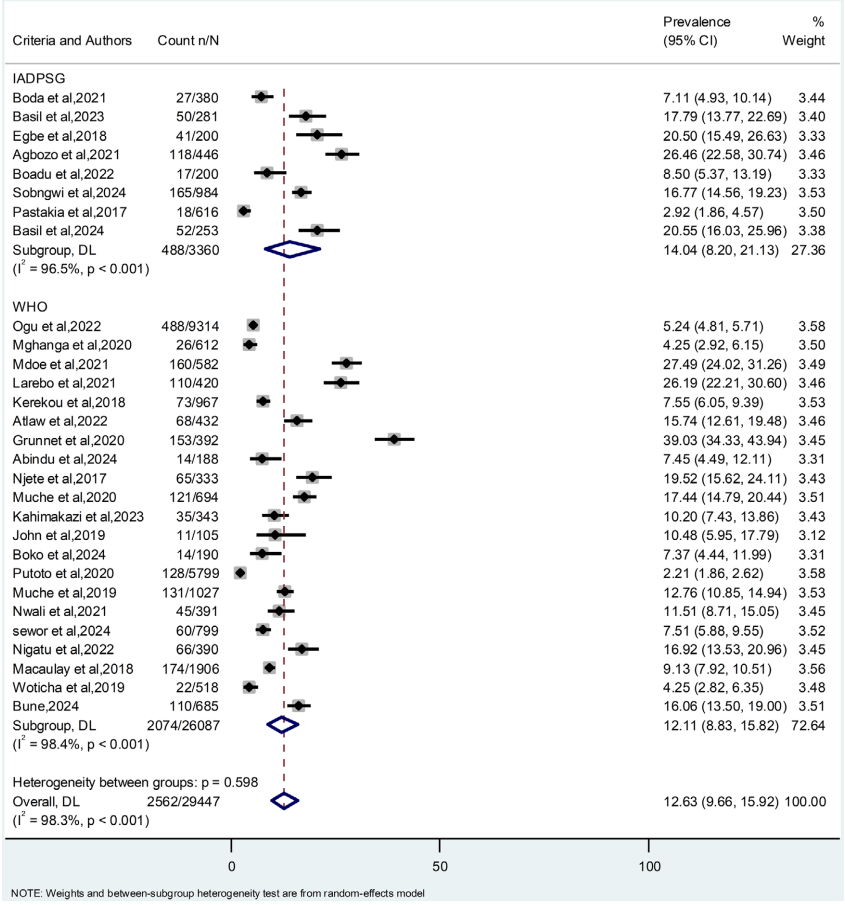


**Figure 3.** Subgroup Meta-Analysis of GDM prevalence by criteria.

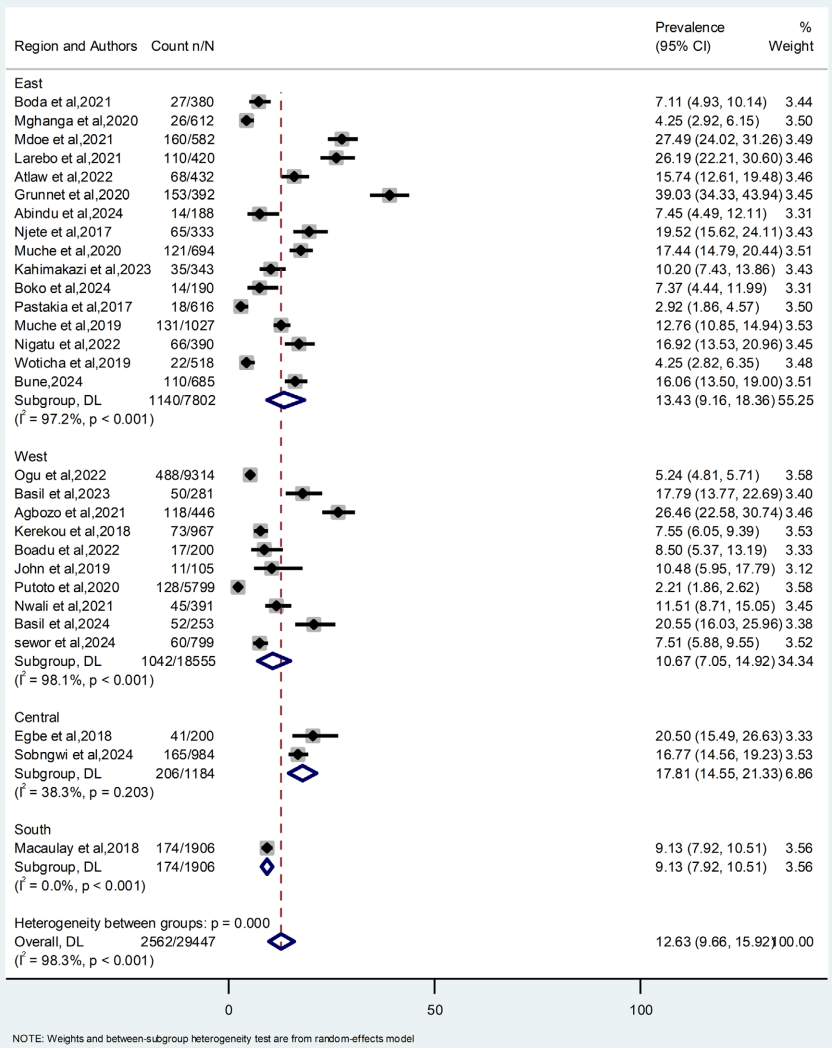


**Figure 4.** Sub-group analysis of GDM prevalence by region.

**Table 2.** Risk factors of GDM in SSA.

| No. | Risk factors (predictors) | No. studies included | OR (95% CI) | $I^2$ | p-value |
|---|---|---|---|---|---|
| 1 | Maternal age ≥35 years | 10 | 2.44 (1.60, 3.72) | 80.6% | <0.001 |
| 2 | Overweight/Obesity | 9 | 2.34 (1.75, 3.13) | 63.9% | 0.005 |
| 3 | Urban Residence | 4 | 1.78 (1.17, 2.72) | 52.4% | 0.098 |
| 4 | History of unexplained stillbirth | 11 | 5.80 (3.22, 10.44) | 80.6% | <0.001 |
| 5 | History of Macrosomic baby | 9 | 6.99 (2.96, 16.52) | 91.4% | <0.001 |
| 6 | Previous history of GDM | 5 | 4.98 (1.38, 17.93) | 67.3% | 0.016 |
| 7 | Family history of Diabetes Mellitus | 11 | 5.38 (3.13, 9.26) | 86.0% | <0.001 |
| 8 | History of caesarean section | 5 | 1.46 (0.48, 4.42) | 90.2% | <0.001 |
| 9 | Multigravida | 4 | 1.69 (1.29, 2.22) | 5.2% | 0.367 |
| 10 | History of abortion | 8 | 3.15 (1.76, 5.66) | 75.9% | <0.001 |

### 3.4. Outcomes of GDM in Sub-Saharan Africa

Four studies were evaluated to determine the maternal and foetal outcomes due to GDM. For each outcome, a minimum of three (3) studies were combined. Four (4) primary outcomes were identified, as shown in Table 3. Foetal macrosomia was pronounced (RR: 5.16, 95% CI: 3.41, 7.81), followed by postpartum haemorrhage (PPH) (RR: 3.34, 95% CI: 2.13, 5.25), Pre-eclampsia (RR: 2.76, 95% CI: 2.08, 3.66) and caesarean section (RR: 1.98, 95% CI: 1.68, 2.32).

Table 3. Pooled relative risks of GDM outcomes or complications in SSA.

| No. | Outcome | No. of studies included | RR | 95%CI | $I^2$ | p-value |
|---|---|---|---|---|---|---|
| 1 | Foetal macrosomia | 3 | 5.16 | 3.41, 7.81 | 83.1% | 0.003 |
| 2 | Caesarean section | 4 | 1.98 | 1.68, 2.32 | 60.5% | 0.055 |
| 3 | Pre-eclampsia | 3 | 2.76 | 2.08, 3.66 | 74.1% | 0.021 |
| 4 | Postpartum haemorrhage | 3 | 3.34 | 2.13, 5.25 | 0.0% | 0.607 |

### 3.5. Publication Bias

Potential small-study effects (publication bias) were assessed by visually inspecting the funnel plot (Figure 5), which revealed an imbalance with more studies (15) on the right side and only seven (7) studies within the triangular area, suggesting possible publication bias. Egger's regression test was performed, confirming publication bias with a positive slope of 0.33 (95% CI: 0.21, 0.46; $p < 0.001$) and a significant positive bias of 8.82 (95% CI: 4.87, 12.77; $p < 0.001$).

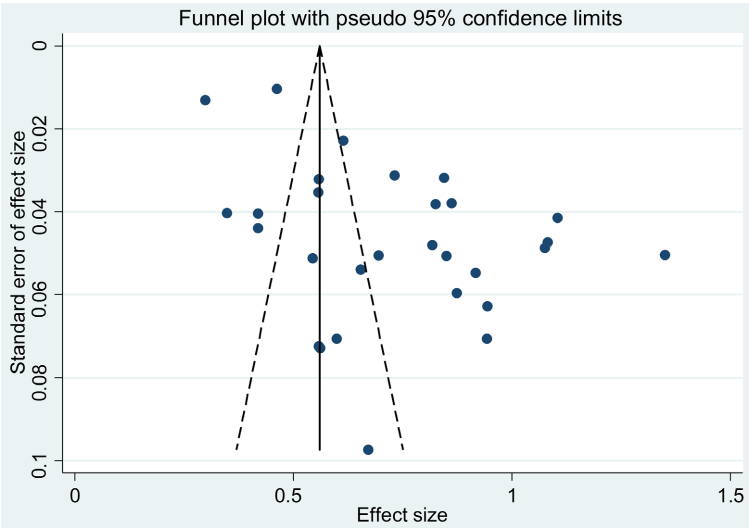


Figure 5. Funnel plot of GDM prevalence in SSA.

### 3.6. Sensitivity Analysis

Sensitivity analysis demonstrated the robustness of the pooled prevalence of GDM, indicating that no single study significantly influenced it (Figure 6).

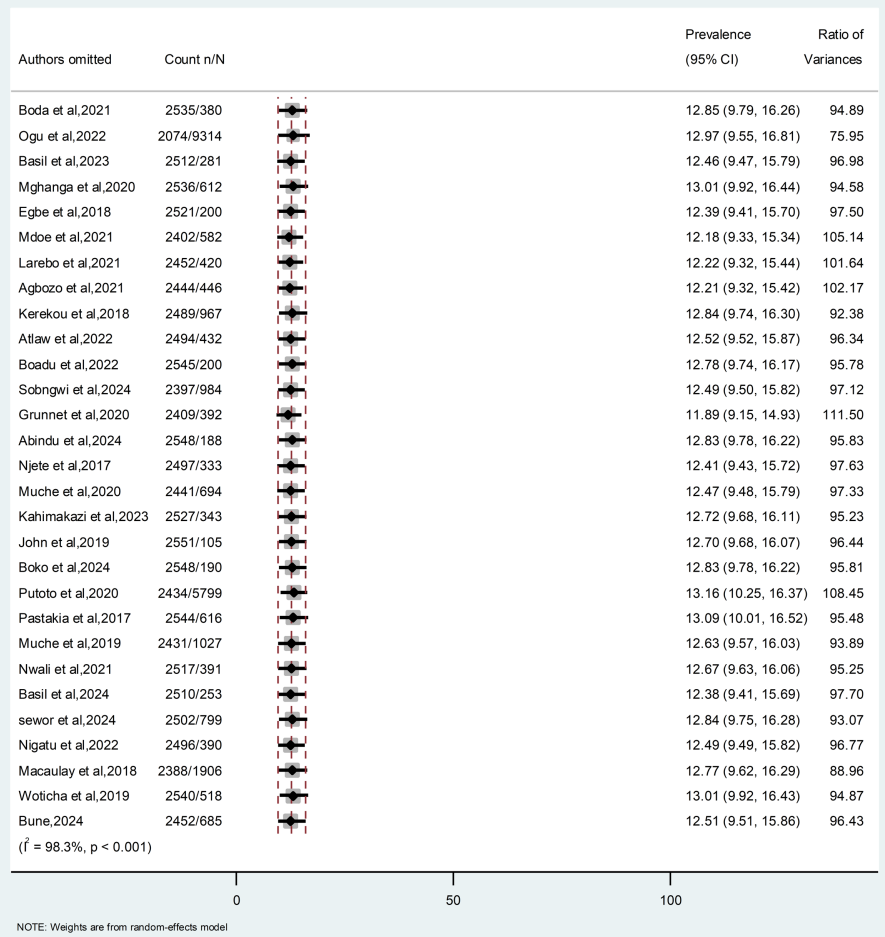


**Figure 6.** Leave-one-out sensitivity analysis.

## 4. Discussion

### 4.1. Prevalence of GDM in Sub-Saharan Africa

Gestational diabetes continues to present a significant public health threat, with adverse complications impacting both the mother and her child [42]. Despite its importance, prevalence varies globally and across sub-Saharan Africa [11]-[13] [42]. This meta-analysis aimed to estimate the prevalence and identify the risk factors and outcomes of gestational diabetes in SSA.

This study included a total of 29 studies with a combined sample size of 29,477 and found an estimated pooled prevalence of 12.63% (95% CI: 9.66, 15.92) with a high heterogeneity of 98.3%. This prevalence is similar to the pooled prevalence found in Ethiopia, 12.04% (95% CI: 8.17%, 15.90%) [43], in India, 13.0% (95% CI: 9.0, 16.0) [44], and in the Middle East and North Africa, 13.0% (95% CI: 11.5, 14.6) [45]. On the other hand, the prevalence found in this study is higher compared to those reported in other studies conducted in SSA [12] [13], in Nigeria [46], and in Asia [47] [48], but lower compared to the prevalence found in Brazil [49]. This variability in prevalence could be attributed to differences in geographical locations, race, social behaviors and customs, study duration, and diagnostic

criteria used. Interestingly, in the subgroup analysis based on the diagnostic criteria employed, we found a higher prevalence when the IADPSG criteria were used (14.04%; 95% CI: 8.20, 21.13) compared to the WHO 2013 criteria (12.11%; 95% CI: 8.83, 15.82). These findings align with those of other studies [12] [44]. A review carried out in Asia found a pooled prevalence of GDM to be 11.5% (95% CI 10.9–12.1); however, the prevalence of GDM varied based on the diagnostic criteria used, with the common and popular criteria of WHO 1980-2013 yielding 13.0% compared to the IADPSG, which showed a prevalence of 20.9% [47]. Despite the IADPSG criteria having similar cut-off values to the WHO 2013 criteria, this study showed that studies utilizing the IADPSG had a higher prevalence. This could be due to inconsistencies in applying these diagnostic criteria or possibly because WHO guidelines set a range of plasma glucose levels to distinguish diabetes in pregnancy and GDM, which might effectively reduce the prevalence of those diagnosed with GDM [50].

Sub-group analysis based on region showed varying prevalence of GDM across sub-Saharan Africa. Central African studies reported higher GDM prevalence, followed by Eastern and Western Africa. Currently, no review has reported regional sub-analysis in sub-Saharan Africa. However, this variation could be attributed to factors such as socioeconomic status, lifestyle, screening, and diagnostic practices.

### 4.2. Predictors (Risk Factors) of GDM in Sub-Saharan Africa

Maternal age of 35 years and older, overweight/obesity, a history of unexplained stillbirth, a history of macrosomic babies, previous gestational diabetes mellitus (GDM), a family history of diabetes mellitus, multigravida status, and a history of abortion were all identified as significant predictors of GDM. These findings align with those of Abera *et al.* [13], a systematic review in sub-Saharan Africa, which reported that being overweight or obese, having advanced maternal age, a family history of diabetes, and a previous history of gestational diabetes mellitus were significant predictors of gestational diabetes. Another systematic review by Natamba *et al.* [12] in sub-Saharan Africa found that a history of GDM, a history of stillbirth, a history of macrosomia, a family history of diabetes mellitus (DM), age greater than 25, BMI greater than 25, hypertension, and multiparity were significant predictors of GDM. Furthermore, these findings are consistent with results from other systematic reviews conducted in Ethiopia [43], Nigeria [46], Asia [47], and Iran [51] [52]. Factors such as overweight or obesity have been shown to predispose individuals to insulin resistance and other metabolic derangements, which are key in the development of gestational diabetes mellitus [52]. A family history of diabetes mellitus is a significant risk factor, highlighting the genetic susceptibility of certain women to GDM [52]. Therefore, it is vital that in countries where selective screening for GDM is practiced instead of universal screening, these factors should be considered to guide the decisions regarding screening pregnant women.

Interestingly, urban residence is identified as a significant risk factor for GDM.

The systematic review conducted in India revealed a higher prevalence of GDM in urban areas compared to rural areas [44]. Pregnant women in urban areas may have easier access to food items high in carbohydrate content, as diet is a critical risk factor for GDM [20]. Additionally, the level of physical activity among women in urban and rural areas may differ, with rural women often engaging in more physical activities. Participation in physical activities is a recommended lifestyle therapy for preventing and managing diabetes [13] [53]. This phenomenon may explain why pregnant women in urban areas are more likely to have GDM compared to their rural counterparts.

With the numerous risk factors and high prevalence of GDM in sub-Saharan Africa, universal screening is recommended to ensure that no pregnant woman with GDM is overlooked. This is essential for effective management.

### 4.3. Outcomes of GDM in Sub-Saharan Africa

In this study, we found that GDM is significantly associated with an increased risk of foetal macrosomia, caesarean section delivery (CS), pre-eclampsia, and postpartum haemorrhage. In the systematic review conducted by Natamba and others [12], only the risk of foetal macrosomia was found to be significantly increased by GDM. This difference could be due to a lack of studies examining the maternal and foetal outcomes of GDM at that time. However, the findings in our study are consistent with those of other studies [54]-[56]. In most African countries, healthcare facilities are overwhelmed, and complications such as pre-eclampsia, postpartum haemorrhage, and CS delivery exacerbate the situation. Furthermore, CS delivery increases the burden on the mother by extending her hospital stay and raising hospital bills. Therefore, understanding these outcomes of GDM necessitates continued sensitisation and screening to ensure early detection and management of GDM to prevent adverse outcomes.

Furthermore, although the complications or maternal and foetal outcomes of GDM in our study exceed those found in previous systematic studies conducted in sub-Saharan Africa, they are not as numerous as those reported in other studies in Asia and Europe [54]-[57]. This indicates that relatively few cohort and case-control studies have been undertaken in Africa to investigate the complications or outcomes of GDM. Therefore, it is crucial to focus on the outcomes and impacts of GDM on both the mother and the offspring, as such knowledge is invaluable for informing policy on the screening and management of GDM in the African context.

### 4.4. Limitations of the Study

The first limitation is the restricted search databases. The articles used in this review are from free, publicly accessible databases such as PubMed Central, Google Scholar, and SpringerLink. Consequently, other studies from different databases may have been overlooked in this review, resulting in missed important information about GDM. Additionally, a few cohort studies were evaluated to report on the complications of GDM.

## 5. Conclusion

This systematic review indicates that the prevalence of GDM in sub-Saharan Africa is 12.63% higher than in previous studies. In addition to demonstrating the classical risk factors, urban residence is a significant risk factor for GDM. Furthermore, this study has revealed significant complications of GDM in sub-Saharan Africa, including foetal macrosomia, caesarean section delivery, pre-eclampsia, and postpartum haemorrhage. Given the heterogeneity of the findings, it is essential to adopt locally tailored approaches to the screening of GDM using appropriate diagnostic criteria. Additionally, there is a need for proper management of GDM to mitigate the associated adverse outcomes.

## Authors' Contributions

Study conception: MC. Article screening and data extraction: MC, FI, and ACZ. Content validity: EK. Data analysis and interpretation: MC, EK. Drafting the manuscript: MC. All authors critically revised the manuscript for publication. All authors read and approved the final version of the manuscript. MC is the guarantor.

## Conflicts of Interest

All authors declare that they have no competing interests.

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## Abbreviations

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| BMI | Body Mass Index |
| CS | Caesarean Section |
| GDM | Gestational Diabetes Mellitus |
| IADPSG | International Association of Diabetes and Pregnancy Study Groups |
| SSA | Sub-Saharan Africa |
| WHO | World Health Organisation |