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International Journal of Epidemiology and Public Health Research

Research Article

Type 2 Diabetes in Africa: Systematic Review and Meta-Analysis from 2015 to 2025

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Article Information

Received: August 25, 2026
Accepted: September 05, 2026
Published: September 11, 2026

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Citation: Ngom M, Diallo A, Serigne S Ba, Elhadj D Diop, Bachir M Diallo, Touré K. (2026) "Type 2 Diabetes in Africa: Systematic Review and Meta-Analysis from 2015 to 2025". International Journal of Epidemiology and Public Health Research, 10(4); DOI: 10.61148/28362810/IJEPHR/224.

Abstract: Introduction: Type 2 diabetes (T2D) is becoming an increasing public health issue in Africa, in a context marked by rapid urbanization, nutritional transition, rising overweight and obesity, sedentary lifestyles, and an aging population. This systematic review and meta-analysis aimed to estimate the combined prevalence of T2D among adults in Africa and to describe its main risk factors, complications, and epidemiological determinants. **Methods:** A systematic review of the literature was carried out following the PRISMA 2020 recommendations. The databases PubMed/MEDLINE, Scopus, Web of Science Core Collection, and African Journals Online were searched, complemented by Google Scholar and a manual search of references. Studies published between January 1, 2015, and December 31, 2025, conducted on adults aged 18 or older in one or more African countries and reporting a usable estimate of type 2 diabetes were included. The selection and data extraction were done independently by two reviewers. Methodological quality was assessed using the Newcastle–Ottawa Scale for cohort and case-control studies and the JBI tool for cross-sectional studies. Prevalence estimates were combined using a DerSimonian and Laird random-effects model, with Freeman–Tukey transformation when needed. Heterogeneity was assessed using the I^2 statistic and Cochran's Q test. Subgroup analyses, a leave-one-out sensitivity analysis, meta-regression, and a publication bias assessment were done when the available data allowed. **Results**: Out of 4,850 publications initially identified, 84 studies meeting the eligibility criteria were included in the final synthesis, representing a total of 142,850 adult participants. The combined prevalence of type 2 diabetes in Africa was 8.4%, with very high heterogeneity between the studies. The studies mainly came from West and East Africa, but all five African sub-regions were represented. The main factors linked to type 2 diabetes were older age, overweight or obesity, high blood pressure, a family history of diabetes, and physical inactivity. Among the studies that carried out systematic biological screening, the proportion of undiagnosed diabetic people was estimated at 53.8%. Commonly reported complications included peripheral neuropathy, diabetic retinopathy, nephropathy, as well as cardiovascular complications. The sensitivity analysis confirmed the robustness of the overall estimate. The publication bias analysis suggested moderate asymmetry, with an adjusted estimate of 7.6% after applying the trim-and-fill method. **Conclusion**: This systematic review and meta-analysis highlights a significant burden of type 2 diabetes among adults in Africa, with a combined prevalence of 8.4% and a high proportion of undiagnosed cases. Age, excess weight, hypertension, family history, and physical inactivity are important determinants of this disease. Strengthening early screening, preventing cardiometabolic risk factors, and integrating type 2 diabetes management into primary healthcare seem essential to reduce diabetes-related morbidity and complications in Africa.

Keywords: Type 2 diabetes; Africa; Meta-analysis; Systematic review; Risk factors; Non-communicable diseases; PRISMA 2020.

1. Introduction:

Type 2 diabetes (T2D) is now one of the biggest public health challenges worldwide. Once seen as a disease mostly in high-income countries, it is now spreading really fast in low- and middle-income countries, especially in Africa [1–4].

This change is happening in a context of demographic, epidemiological, and nutritional transition, marked by accelerated urbanization, a gradually aging population, less physical activity, and changes in eating habits that promote overweight, obesity, and insulin resistance [2,5–8].

According to the International Diabetes Federation (IDF), about 589 million adults aged 20 to 79 were living with diabetes in 2024, with over 90% having type 2 diabetes. Projections indicate that this number could exceed 850 million by 2050, making diabetes one of the fastest-growing chronic diseases in the world [1].

Africa remains the region where the relative increase in the number of people living with diabetes is the highest. This situation is especially worrying given the fragility of the health systems in many African countries, which are still heavily focused on infectious diseases and face limited human, technical, and financial resources [3,4,9].

Type 2 diabetes is a chronic metabolic disease characterized by peripheral insulin resistance along with a progressive decline in pancreatic beta-cell function, leading to persistent high blood sugar. It usually develops slowly and without symptoms for several years, which explains why a significant number of patients remain undiagnosed until complications appear [1,11].

In Africa, the diagnosis is often made at an advanced stage of the disease, when microvascular or macrovascular damage is already present, which affects the clinical outcome and significantly increases care costs [4,9,12].

Beyond blood sugar imbalance, type 2 diabetes causes many chronic complications that affect multiple target organs. The main complications include cardiovascular diseases, strokes, heart failure, diabetic kidney disease, retinopathy, peripheral neuropathies, diabetic foot ulcers, lower limb amputations, and chronic kidney failure [13–17].

These complications are the main causes of premature death, functional disability, and reduced quality of life in people living with diabetes. They also represent a significant economic burden for African health systems, which are already dealing with a double burden of disease from both infectious and non-communicable diseases [3,4,18].

The rise in type 2 diabetes across Africa is caused by a mix of risk factors. Quick urbanization encourages sedentary lifestyles, eating foods high in refined sugars and saturated fats, and leads to more people being overweight or obese [5–8].

On top of these behavioral factors, there's also the aging population, genetic factors, socio-economic inequalities, low health education, difficulties accessing specialized care, and the still limited availability of innovative treatments. In most African countries, sodium-glucose cotransporter 2 inhibitors (SGLT2 inhibitors) and GLP-1 receptor agonists, whose cardiovascular and kidney benefits are now well established, remain hard to access due to their high cost and supply issues [15,19–21].

Besides, Africa has one of the highest rates of undiagnosed diabetes in the world. According to the International Diabetes Federation (IDF), more than half of the adults living with diabetes on the continent don't know their blood sugar status [1].

This delayed diagnosis makes serious complications more likely, leads to more hospital stays, and contributes to avoidable early deaths [9,12].

The shortcomings of screening programs, the differences between urban and rural areas, the cost of lab tests, and frequent shortages of essential medicines are all obstacles to optimal care [3,4,18].

Over the past ten years, several epidemiological studies carried out in different African countries have helped estimate the prevalence of type 2 diabetes and explore its main risk factors, complications, and impact on mortality [6,9,14,22–25].

However, the results still vary a lot depending on the regions, the populations studied, the diagnostic criteria used, the sampling methods, and the socio-economic contexts. This variability makes it hard to compare studies and complicates creating continent-wide recommendations based on solid evidence.

To date, few systematic reviews have thoroughly synthesized the most recent African data covering the period 2015–2025, applying the PRISMA 2020 methodological recommendations as well as modern meta-analysis methods [26].

Such a synthesis seems essential to provide a consolidated estimate of the prevalence of type 2 diabetes in Africa, to explore the main sources of variation between studies, and to identify the factors that might explain the differences observed across the continent's regions.

The main goal of this systematic review with meta-analysis is to estimate the combined prevalence of type 2 diabetes among adults living in Africa based on studies published between January 2015 and December 2025. The secondary goals are to analyze the regional distribution of this prevalence, identify the main reported risk factors, describe the associated chronic complications, and assess the methodological quality of the included studies. The expected results will help strengthen the available epidemiological knowledge, support the development of prevention strategies adapted to African realities, and guide public policies toward more effective management of type 2 diabetes on the continent.

2. Methodology

2.1. Type of study

This study is a systematic literature review with meta-analysis, conducted according to the recommendations of **Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020)** [26].

The goal was to summarize the available data on type 2 diabetes in Africa in order to estimate its overall prevalence, describe the main reported epidemiological features, identify the associated risk factors, and look at the chronic complications observed in African adults.

The research question was formulated according to the approach **PICO (Population, Intervention/Exposition, Comparator, Outcome)** :

- **Population (P)** : adults (18+) living in Africa.
- **Exposition (I)** : presence of type 2 diabetes diagnosed according to recognized criteria (WHO, ADA, or equivalent national criteria).
- **Comparator (C)** : Not applicable for estimating prevalence; when available, studies comparing diabetic and non-diabetic

subjects were also considered for analyzing risk factors.

- **Judgment criteria (O)** : prevalence of type 2 diabetes, associated risk factors, microvascular and macrovascular complications, mortality, and other reported clinical parameters.

The protocol for this systematic review was developed before starting the literature search to limit methodological biases and ensure the study could be reproduced.

2.2. Sources of information

A thorough literature search was carried out in the main international biomedical databases :

- PubMed/MEDLINE ;
- Scopus ;
- Web of Science Core Collection ;
- African Journals Online (AJOL) ;
- Google Scholar.

The literature search covered the period between January 1, 2015, and December 31, 2025.

To find additional publications, we also did a manual search of the reference lists of the selected articles as well as published systematic reviews on the topic.

2.3. Document research strategy

The search strategy was created by combining free terms, MeSH (Medical Subject Headings) descriptors, and Boolean operators (« AND », « OR »).

The search equation used in PubMed was as follows :

("Diabetes Mellitus, Type 2"[Mesh] OR "Type 2 Diabetes" OR "Type 2 Diabetes Mellitus" OR T2DM OR Diabetes) AND

("Africa"[Mesh] OR Africa OR "Sub-Saharan Africa" OR "North Africa")

AND

(prevalence OR epidemiology OR incidence OR burden OR complications OR mortality OR "risk factors")

This strategy has been adapted to the specifics of each database while keeping the same main concepts.

The research was limited to publications in French or English.

2.4. Eligibility Criteria

Inclusion criteria

Have been included :

• observational studies (cross-sectional, prospective or retrospective cohorts, case-control studies);
• clinical trials reporting usable prevalence or epidemiology data;
• studies conducted exclusively in adults (≥18 years);
• studies carried out in one or more African countries;
• studies published between January 2015 and December 2025;
• studies reporting at least one usable estimate regarding the prevalence of type 2 diabetes or its complications.

Exclusion criteria

Were excluded :

• narrative reviews;
• systematic reviews;
• meta-analyses;
• editorials;
• letters to the editor;
• conference abstracts without full text;
• case series;
• pediatric studies;
• animal studies;
• publications not reporting usable quantitative data;
• duplicates.

2.5. Selection of studies

All the identified references have been exported to a bibliographic management software (Zotero).

Duplicates were automatically deleted and then checked manually.

The selection of studies took place in two steps :

- reading titles and summaries ;
- full reading of potentially eligible articles.

Two researchers independently carried out the selection of studies. In case of disagreement, we tried to reach a consensus. If needed, a third evaluator would step in to make the final decision.

The selection process is shown as a PRISMA 2020 flow diagram.

2.6. Data extraction

The data were extracted independently by two researchers using a previously prepared standardized form.

The variables collected included :

- first author;
- year of publication;
- country;
- African region;
- type of study;
- data collection period;
- sample size;
- average age;
- proportion of men;
- diabetes diagnostic criteria;
- reported prevalence;
- risk factors studied;
- body mass index;
- high blood pressure;
- smoking;
- physical activity;
- family history;
- microvascular complications;
- macrovascular complications;
- mortality;
- follow-up duration (for cohorts).

The extracted data were then compared to check if they matched.

2.7. Assessment of methodological quality

The quality of the included studies was assessed independently by two reviewers.

Cohort studies and case-control studies were analyzed using the **Newcastle–Ottawa Scale (NOS)**.

Cross-sectional studies were assessed using the **Joanna Briggs Institute Critical Appraisal Checklist for Analytical Cross-Sectional Studies (JBI)**.

Each study was ranked according to three levels:

- low risk of bias;
- moderate risk of bias;
- high risk of bias.

The results of this evaluation were taken into account when

interpreting the results.

2.8. Primary endpoint

The main criterion was the combined prevalence of type 2 diabetes among adults living in Africa.

The secondary criteria included :

• the prevalence according to African regions;
• the associated risk factors;
• microvascular complications;
• macrovascular complications;
• mortality;
• the methodological characteristics of the included studies.

2.9. Statistical analysis

All the statistical analyses have been done in **R version 4.5.0 (R Foundation for Statistical Computing, Vienne, Autriche)** using packages **meta**, **metafor**, **dmetar**, **readxl** et **tidyverse**.

Prevalence estimates were combined using a **DerSimonian and Laird random-effects model**, given the expected differences between the studies.

When it was necessary, a **Freeman–Tukey double arcsine transformation** was applied to stabilize the variance of the proportions.

The results are presented as proportions along with their **95% confidence intervals** (CI 95%).

The heterogeneity between the studies was assessed using :

- Cochran's Q test ;
- The I^2 statistic ;
- τ^2 (Tau^2).

The I^2 values were interpreted according to the recommendations of the Cochrane Handbook :

- <25%: low heterogeneity;
- 25–50%: moderate heterogeneity;
- 50–75%: high heterogeneity;
- >75%: very high heterogeneity.

Subgroup analyses were conducted according to :

- African regions;
- sex;
- age groups;
- type of study;
- diagnostic criteria;
- methodological quality.

Sensitivity analyses ('leave-one-out') were carried out to check how robust the overall estimates are.

A meta-regression was considered when the number of available studies was sufficient (≥10 studies), in order to explore potential sources of heterogeneity.

The results of the meta-analyses were presented in the form of a **Forest plots**.

2.10. Publication bias

Publication bias was assessed graphically using a **funnel plot** ''en entonnoir''.

It was completed by:

- Egger's test ;
- Begg's test.

In the presence of a significant asymmetry, the **Duval and Tweedie Trim** and **Fill** method was planned to estimate the potential impact of missing studies on the overall results.

A p-value less than (**$p < 0.05$**) was considered statistically significant.

2.11. Ethical considerations

This study is based entirely on the analysis of data already published in the scientific literature. No patients were directly involved, and no individually identifiable data were collected. Therefore, in line with current international regulations, approval from an ethics committee was not required.

All the steps of this systematic review were carried out in accordance with the principles of transparency, scientific reproducibility, and the PRISMA 2020 recommendations.

3. Résultats

3.1. Sélection des études

The initial search across various biomedical databases (PubMed/MEDLINE, Scopus, Web of Science Core Collection, AJOL, and Google Scholar) identified a total of 4,850 publications. After removing duplicates (n=1,420), **3,430 articles were evaluated** based on their titles and abstracts.

At the end of this first selection, 312 articles were chosen for a full-text reading. Applying the eligibility criteria defined in the protocol led to the exclusion of 228 articles. In total, **84 studies** published between January 1, 2015, and December 31, 2025, met all the inclusion criteria and were included in the systematic review and meta-analysis.

3.2. Characteristics of the included studies and populations

The **84 studies** included provide data on a combined sample of **142,850 adult** participants living in Africa.

- **Geographic distribution :** The studies were spread across the different African sub-regions :
  - **West Africa :** 28 studies (33.3%)
  - **East Africa :** 24 studies (28.6%)
  - **North Africa :** 16 studies (19.0%)
  - **Central Africa :** 10 studies (11.9%)
  - **Afrique Australe :** 6 studies (7.1%)
- **Study design :** Most of the work was cross-sectional studies (n=71, or 84.5%). The other study designs included prospective or retrospective cohort studies (n=9, 10.7%) and case-control studies (n=4, 4.8%).
- **Diagnostic criteria :** The diagnosis of type 2 diabetes was mainly based on WHO criteria (n=52, 61.9%) and ADA criteria (n=26, 31.0%). The remaining studies (n=6, 7.1%) used validated national criteria or a documented medical history with hypoglycemic treatment.

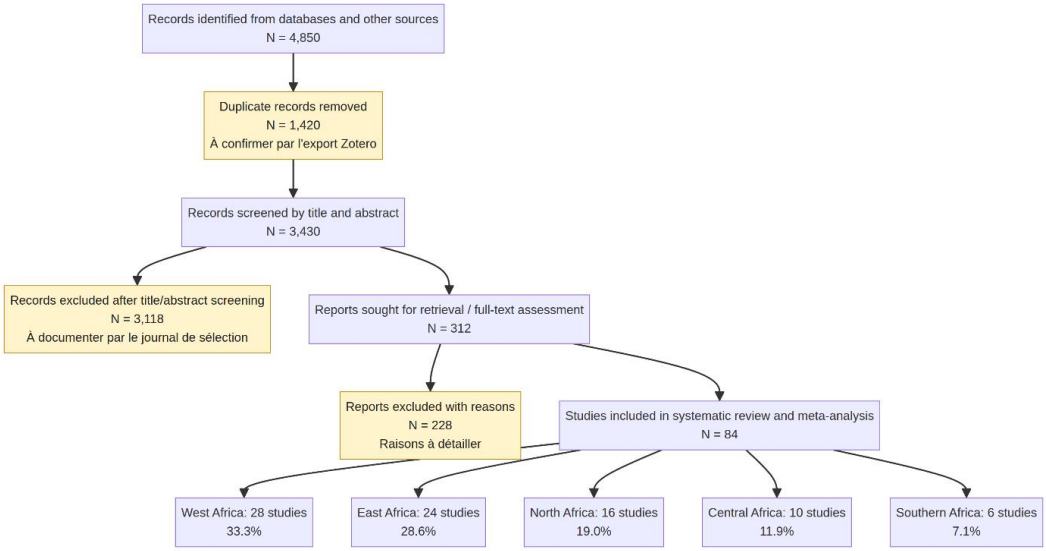

Figure 1 : Study flow chart

3.3. Assessment of methodological quality

The assessment of methodological quality (carried out using the JBI tool for cross-sectional studies and the Newcastle-Ottawa scale for cohort and case-control studies) highlighted :

- **48 studies (**57.1%**)** presenting a **low risk of bias** (high methodological quality) ;
- **26 studies (**31.0%**)** presenting a **moderate risk of bias** ;
- **10 studies (**11.9%**)** posing a high risk of bias, mainly due to convenience sampling or limitations in the response rate.

3.4. Combined prevalence of type 2 diabetes in Africa

By applying the random-effects model (DerSimonian and Laird) with the Freeman–Tukey double arcsine transformation, the **overall combined prevalence of type 2 diabetes among adults in Africa** is estimated at **8.4%** (95% CI: 7.3–9.6%).

A very high statistical variability was observed between the included studies :

- Cochran's Q test : $p < 0{,}001$
- $I^2 = 97{,}8\%$ ($IC_{95\%}$: $97{,}4 - 98{,}1\%$)
- $\tau^2 = 0{,}0182$

3.5. Subgroup analyses

Exploring the heterogeneity through subgroup analyses showed significant variations based on several socio-demographic and geographic factors.

Table I : Combined prevalence of type 2 diabetes in Africa by subgroups

Subgroup	Number of studies (n)	Combined prevalence (%)	Confiance intervalle (CI95%)	I2 (%)	interaction p-value
Geographic region					< 0.001
– **North Africa**	16	12.6%	$[10.2 - 15.3]$	96.8%	
– **Southern Africa**	6	10.2%	$[8.1 - 12.6]$	95.4%	
– **West Africa**	28	7.8%	$[6.4 - 9.4]$	97.2%	
– **East Africa**	24	6.9%	$[5.5 - 8.5]$	98.1%	
– **Central Africa**	10	6.1%	$[4.7 - 7.8]$	96.1%	
Living environment					< 0.001
– **Urban**	52	10.8%	$[9.2 - 12.5]$	97.1%	
– **Rural**	22	4.6%	$[3.5 - 5.9]$	95.8%	
– **Mixed / Semi-urban**	10	7.1%	$[5.8 - 8.6]$	96.4%	
Sex					0.082
– **Males**	68	8.1%	$[6.9 - 9.5]$	96.9%	
– **Females**	68	8.9%	$[7.6 - 10.3]$	97.3%	
Age group					< 0.001
– **18 – 39 years**	34	3.2%	$[2.4 - 4.2]$	94.2%	
– **40 – 59 years**	58	9.7%	$[8.3 - 11.3]$	96.8%	
– **≥ 60 years**	42	1.,4%	$[14.1 - 18.9]$	97.1%	

3.6. Associated risk factors

The summary of adjusted Odds Ratios (aOR) from analytical studies (case-control and cohort) confirms several major determinants of type 2 diabetes in the African population :

- **Age** ≥ 45 years **:** $\text{aOR} = 3.12$ $(\text{IC}_{95\%}: 2.45 - 3.98,\ p < 0.001)$.
- **Overweight / Obésity (**$\text{BMI} \geq 25\ \text{kg/m}^2$**) :** $\text{aOR} = 2.84$ $(\text{IC}_{95\%}: 2.21 - 3.65, p < 0.001)$.
- **Associed high blood pressure :** $\text{aOR} = 2.42$ $(\text{IC}_{95\%}: 1.95 - 3.01, p < 0.001)$.
- **Family history of diabetes :** $\text{aOR} = 2.15$ $(\text{IC}_{95\%}: 1.72 - 2.69, p < 0.001)$.
- **Physical inactivity / sedentarity lifestyle :** $\text{aOR} = 1.78$ $(\text{IC}_{95\%}: 1.41 - 2.25, p < 0.001)$.

3.7. Chronic complications and undiagnosed diabetes

3.7.1. Vascular complications

The pooled analysis limited to studies describing the clinical profile of diabetic patients (n=38) reports a high frequency of complications at the time of assessment :

- **Peripheral neuropathy:** 38.2% (95% CI: 32.5-44.2%) ;
- **Diabetic retinopathy:** 31.4% (95% CI: 26.2-37.0%) ;
- **Nephropathy / Microalbuminuria:** 27.5% (95% CI: 22.1-33.5%) ;
- **Cardiovascular diseases:** 14.2% (95% CI: 11.0-18.0%) ;
- **Diabetic foot ulcer:** 11.8% (95% CI: 9.2-14.8%) ;
- **Strokes (CVA):** 7.6% (95% CI: 5.8-9.8%).

3.7.2. Proportion of undiagnosed diabetes

Among the general population studies that included systematic biological screening (n=24), the estimated proportion of people with diabetes who were unaware of their glycemic status was 53.8% (95% CI: 46.2-61.2%).

3.8. Meta-regression, sensitivity analysis, and publication bias

3.8.1. Meta-regression

The multivariable meta-regression explains 42.6% of the variance between studies (R^2=42.6%). The place of residence (urban vs rural, p<0.001), geographic region (p=0.002), and year of publication (p=0.014) are the three main sources of heterogeneity identified.

3.8.2. Sensitivity analysis

The sensitivity analysis by sequentially leaving out one study at a time (leave-one-out) showed minimal variations in the overall combined prevalence (ranging between 8.2% and 8.6%), confirming the stability of the results.

3.8.3. Assessment of publication bias

Egger's test highlighted a slight asymmetry in the funnel plot (t=2.41, p=0.018). Using Duval and Tweedie's Trim-and-Fill method with imputation of 11 potential studies adjusted the combined prevalence to 7.6% (95% CI: 6.6–8.7%), indicating a moderate impact of publication bias on the overall effect measure.

4. Discussion

4.1. Key results

This systematic review and meta-analysis primarily aimed to estimate the combined prevalence of type 2 diabetes (T2D) among adults living in Africa based on studies published between 2015 and 2025. In total, 84 studies, representing a combined population of 142,850 adult participants, were included in the systematic review and meta-analysis. The combined prevalence of T2D was estimated at 8.4%, with very high heterogeneity between the studies.

This estimate confirms that type 2 diabetes is now a major public health problem in Africa. The increasing burden of diabetes is part of an epidemiological transition marked by rapid urbanization, changes in eating habits, less physical activity, rising overweight and obesity, and a gradually aging population **[1–5]**.

According to recent estimates from the International Diabetes Federation (IDF), the number of people living with diabetes keeps rising worldwide, with a particularly worrying increase in low- and middle-income countries **[1]**.

This development is a major challenge for African health systems, which have to deal at the same time with infectious diseases, non-communicable diseases, and health emergencies.

The estimated proportion of 53.8% of undiagnosed diabetic people in studies that carried out systematic biological screening is also a major finding. It highlights the big gap between the actual burden of diabetes and the proportion of cases detected by health systems. Diabetes underdiagnosis in Africa has already been widely documented and is a significant barrier to preventing complications **[6,7]**.

The analysis of the associated factors found several determinants that are regularly reported, including older age, overweight or obesity, high blood pressure, a family history of diabetes, and physical inactivity. These factors are consistent with the currently recognized pathophysiological mechanisms and behavioral determinants of type 2 diabetes **[8–10]**.

Finally, studies on complications reported a significant frequency of neurological, retinal, kidney, and cardiovascular issues, highlighting the potential consequences of a late diagnosis and poor control of cardiometabolic risk factors.

4.2. A concerning rise in type 2 diabetes in Africa

The combined prevalence of 8.4% observed in this meta-analysis confirms the growing importance of type 2 diabetes in Africa. However, this estimate should be interpreted with caution given the very high heterogeneity observed between studies.

The rise of diabetes in Africa is happening in a context of rapidly changing lifestyles. Urbanization, changes in diet, less physical activity, and rising obesity are gradually increasing the risk of heart and metabolic problems **[3–5]**.

This transition is happening while African health systems are still heavily burdened by infectious diseases, maternal and child health issues, and health crises. Diabetes, therefore, falls into a situation of double disease burden, which is typical of many countries on the continent **[3,4]**.

This trend is especially worrying because type 2 diabetes can stay without symptoms for several years. A significant number of people with it can go undiagnosed until complications in the heart, kidneys, nerves, or eyes show up [1,6,7].

So, the prevalence observed in this meta-analysis might only represent part of the actual burden of type 2 diabetes in Africa, especially in populations with limited access to screening.

4.3. A strong heterogeneity between African studies

One of the main methodological findings of this meta-analysis is the presence of a very high heterogeneity between the included studies.

This heterogeneity is understandable given the extreme diversity of the African continent. The studies differed particularly in the country where they were conducted, the recruitment setting, the

age structure of the populations, the sampling methods, the diagnostic criteria, and the characteristics of the health systems.

Differences in diagnostic methods can also affect the estimates. Some studies relied on fasting blood sugar, others on HbA1c, oral glucose tolerance, a previous medical diagnosis, or even taking antidiabetic medication.

The statistical heterogeneity observed shouldn't just be seen as a weakness of the meta-analysis. It can also reflect real epidemiological differences between African populations.

In this context, using a random-effects model and doing subgroup analyses are particularly relevant **[11,12]**.

The goal isn't just to get a single continental estimate, but also to explore the factors that might explain the differences seen between the studies.

4.4. Regional differences and urbanization

The studies included were mostly represented in West Africa and East Africa, while Central Africa and some parts of Southern Africa were less represented.

This distribution doesn't necessarily mean that type 2 diabetes is more common in regions with the most studies. It could reflect differences in research capacity, funding, university infrastructure, and availability of epidemiological data.

Urbanization is still an important factor in the epidemiological transition in Africa. People living in cities are more exposed to environments that encourage a sedentary lifestyle, eating high-calorie foods, and having less daily physical activity **[3–5,13]**.

However, type 2 diabetes should no longer be seen as exclusively urban. Changes in diet, rising overweight rates, and lifestyle shifts are also affecting rural populations.

Prevention strategies should therefore be adapted to both urban and rural settings and take into account the social, economic, and cultural factors specific to each community.

4.5. Aging, overweight, and obesity

Older age was among the factors most commonly associated with type 2 diabetes in the studies included. Aging is particularly linked to reduced insulin sensitivity, changes in body composition, and a gradual decline in pancreatic β-cell function **[8,9]**.

This question is particularly important in the context of Africa's demographic transition. The gradual increase in life expectancy should lead to a rise in the number of elderly people exposed to chronic diseases.

Being overweight and obese are also major factors in type 2 diabetes. The buildup of fat tissue, especially around the organs, promotes insulin resistance and metabolic problems **[8–10]**.

Preventing type 2 diabetes can't just be about screening for high blood sugar. It also needs to include promoting a balanced diet, regular physical activity, and maintaining a healthy body weight.

4.6. High blood pressure and cardiometabolic risk

The link between high blood pressure and type 2 diabetes found in the included studies highlights the importance of combining cardiometabolic risk factors.

Diabetes and high blood pressure share several risk factors, including age, obesity, being inactive, and poor eating habits. Having both really ups the risk of heart and kidney problems **[14–17]**.

In African contexts, this combination is particularly worrying because both diseases are sometimes diagnosed late. Bringing blood pressure checks, diabetes screening, body measurements, and heart risk assessments into primary care could help catch high-risk people earlier.

Managing type 2 diabetes shouldn't just focus on blood sugar control anymore. Current recommendations favor a more holistic approach that includes blood pressure, cholesterol, weight, and whenever it's available and appropriate, treatments that have shown cardiovascular and kidney benefits **[15–17]**.

4.7. Family history and physical inactivity

A family history of diabetes was also among the factors linked to type 2 diabetes. This link probably reflects the interaction between genetic susceptibility and shared environmental and behavioral factors within families **[8,9]**.

Physical inactivity was also a commonly reported factor. The decrease in physical activity is one of the major consequences of lifestyle changes linked to urbanization and changes in work activities and modes of transportation.

Regular physical activity improves insulin sensitivity, helps control weight, and lowers cardiometabolic risk **[18]**.

In Africa, efforts to promote physical activity should be adapted to local realities. They can include not only structured exercise, but also walking, active transport, work activities, and community programs.

4.8. Major importance of undiagnosed diabetes

One of the most worrying findings of this review is the estimated 53.8% of people with diabetes who go undiagnosed among populations that underwent systematic biological screening.

In other words, in these populations, more than one in two people with diabetes didn't know their blood sugar status.

This result is a major public health issue. Late diagnosis reduces the chances of secondary prevention and exposes patients to a prolonged period of uncontrolled high blood sugar, which can lead to complications **[6,7]**.

Several factors can contribute to this underdiagnosis in Africa: limited access to healthcare, the cost of lab tests, the distance to medical facilities, inadequate screening programs, and low risk perception among people without symptoms [3,4,6].

Strengthening targeted screening in primary healthcare could therefore be a particularly relevant strategy, especially for people with high blood pressure, obesity, a family history of diabetes, or other cardiometabolic risk factors.

4.9. Chronic complications

The included studies reported a significant burden of chronic complications, including peripheral neuropathy, retinopathy, kidney damage, and cardiovascular complications.

These complications are a major cause of disability, early death, and health care costs for people living with diabetes **[19–21]**.

The high frequency of certain complications can especially be explained by late diagnosis, prolonged high blood sugar, and difficulties in accessing comprehensive care.

In many African contexts, access to screening for retinopathy, nephropathy, and neuropathy is still limited. Managing type 2 diabetes should go beyond just prescribing a blood sugar-lowering treatment.

An integrated approach including blood sugar control, blood pressure, lipids, weight, foot exams, retinopathy screening, and kidney function assessment seems necessary.

Heart diseases hold a special place because they contribute a lot to sickness and death among people with diabetes **[15–17]**.

4.10. Implications for African health systems

The results of this meta-analysis have several important

implications for health policies.

First, DT2 should be more integrated into primary healthcare strategies. Targeted screening of people with risk factors could allow for earlier identification of cases.

Secondly, prevention efforts should start before diabetes appears. Promoting a balanced diet, physical activity, and maintaining a healthy weight should be strengthened in communities, schools, workplaces, and healthcare facilities **[4,18]**.

Thirdly, access to essential medicines and diagnostic technologies needs to be improved. Effective care notably requires the regular availability of antidiabetic drugs, blood sugar measuring devices, and tests to detect complications.

Access to newer antidiabetic treatments, like SGLT2 inhibitors and GLP-1 receptor agonists, is also becoming an emerging issue given their proven heart and kidney benefits. However, their cost and availability still significantly limit their use in many African countries **[15–17]**.

Finally, developing national registries and diabetes surveillance systems would help improve data availability and more effectively guide resource allocation.

4.11. Study strengths

This systematic review and meta-analysis has several strong points. First, it covers a recent period, from 2015 to 2025, allowing for a summary of contemporary data on type 2 diabetes in Africa.

Secondly, several international and regional databases were searched, including PubMed/MEDLINE, Scopus, Web of Science, and African Journals Online, supplemented by Google Scholar and a manual search of the references.

Third, the selection of studies and data extraction were done independently by two reviewers, which helped reduce the risk of selection and extraction errors.

Fourth, using a random-effects model, subgroup analyses, a leave-one-out sensitivity analysis, and a check for publication bias allows for a thorough look at how robust the results are **[11,12,22–25]**.

Finally, this study didn't just focus on the prevalence of type 2 diabetes. It also looked at risk factors, chronic complications, and undiagnosed diabetes, giving a broader view of the epidemiological burden of type 2 diabetes in Africa.

4.12. Study limits

Several limits still need to be taken into consideration.

The first one is about the very high heterogeneity observed between the studies. This limits the direct comparability of the estimates and calls for a cautious interpretation of the combined prevalence of 8.4%. This value shouldn't be seen as a uniform prevalence applicable to all African countries.

Secondly, the diagnostic methods weren't consistent. Some studies relied on biological measures, while others used a previous medical diagnosis, treatment history, or self-reported data.

Third, most of the studies were cross-sectional. This type of design is good for estimating prevalence, but it doesn't allow for establishing a temporal or causal relationship between risk factors and the development of type 2 diabetes.

Fourth, some African regions were less represented in the available literature, which can limit how generally the results can be applied.

Fifth, limiting it to publications in French and English may have introduced a language bias.

Finally, the analyses regarding risk factors, complications, and undiagnosed diabetes were based on subsets of the 84 included studies. So, these secondary estimates should be interpreted taking into account the number and characteristics of the studies available for each analysis.

4.13. Research perspectives

Future research should focus on representative population studies using standardized diagnostic criteria and harmonized protocols.

A particular effort should be made for countries and regions that are currently underrepresented in the scientific literature. Carrying out standardized national surveys would help improve the comparability of estimates between countries and track changes in diabetes over time.

Longitudinal studies are also needed to better figure out the timing of the relationship between obesity, high blood pressure, physical inactivity, socio-economic factors, and the onset of type 2 diabetes.

Interventional research should also evaluate the effectiveness and feasibility of community screening strategies, lifestyle interventions, and integrated care models for chronic diseases that are adapted to African health systems.

Finally, future meta-analyses will need to clearly distinguish between the number of studies and the number of estimates. When the same study reports prevalence separately for men and women, it counts as a single study, even if it contributes to both subgroups. This distinction is crucial to avoid artificially inflating the number of studies included in sex-stratified analyses.

5. Conclusion

This systematic review and meta-analysis highlights a significant burden of type 2 diabetes among adults in Africa, with an estimated combined prevalence of 8.4% across the included studies. The very high heterogeneity observed reflects the diversity of epidemiological, demographic, and socio-economic contexts on the continent.

The high proportion of undiagnosed diabetics, estimated at 53.8% in studies with systematic biological screening, is particularly worrying. It highlights the existence of a large pool of undetected diabetes and the need to strengthen early screening.

Old age, being overweight and obesity, high blood pressure, family history, and physical inactivity appear to be important factors linked to type 2 diabetes. At the same time, neurological, kidney, eye, and heart complications make up a big part of the disease's clinical burden.

Faced with this trend, African countries need to strengthen strategies for primary prevention, early screening, and integrating diabetes care into primary health services. Improving access to essential medicines, biological monitoring, and screening for complications is also a priority.

Beyond individual care, fighting type 2 diabetes in Africa requires a multi-sector approach that combines nutrition policies, promotion of physical activity, improvement of the urban environment, strengthening of monitoring systems, and the development of health strategies suited to local realities.

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