

<https://doi.org/10.59298/NIJPP/2026/728186>

# The Role of Anemia in Maternal Mortality in African Countries: A Comparative Review

Nyiramana Mukamurera P.

Faculty of Medicine Kampala International University Uganda

## ABSTRACT

Maternal mortality remains a pressing public health challenge in sub-Saharan Africa, where anemia is a prevalent yet often underrecognized contributor. This comparative review synthesizes evidence on the role of anemia in maternal mortality across African countries, examining its prevalence, pathophysiology, quantitative impact, and the effectiveness of interventions. Severe anemia significantly increases the risk of maternal death by exacerbating obstetric complications such as hemorrhage, infections, and hypertensive disorders. The review highlights substantial regional variations in anemia prevalence, influenced by malaria endemicity, nutritional deficiencies, health system capacity, and socioeconomic determinants. Despite the availability of interventions—including iron and folic acid supplementation, malaria prophylaxis, deworming, and nutrition support—implementation gaps, poor adherence, limited antenatal care coverage, and weak health infrastructure impede progress. Addressing anemia-related maternal mortality requires integrated, context-specific strategies combining clinical care, public health measures, and nutrition-sensitive interventions, supported by implementation research and policy prioritization. Strengthening these efforts is critical for reducing preventable maternal deaths and achieving Sustainable Development Goal 3 targets.

**Keywords:** Anemia, Maternal Mortality, Pregnancy, Sub-Saharan Africa, Iron Supplementation, Malaria Prevention.

## INTRODUCTION

Maternal mortality continues to be one of the most critical indicators of health system performance and overall development in any country. Despite significant progress made globally toward reducing maternal deaths under the Millennium Development Goals (MDGs) and now the Sustainable Development Goals (SDGs), maternal mortality remains unacceptably high in sub-Saharan Africa [1]. According to the World Health Organization (WHO) [2], approximately 287,000 women died in 2020 from complications related to pregnancy and childbirth, and nearly 70% of these deaths occurred in sub-Saharan Africa. The region carries a disproportionately high maternal mortality ratio (MMR), with countries such as Nigeria, Sierra Leone, Chad, and South Sudan recording some of the highest figures worldwide.

The major direct causes of maternal mortality in Africa are hemorrhage, hypertensive disorders of pregnancy, obstructed labor, and sepsis. However, less attention has often been paid to indirect causes, particularly underlying medical conditions that exacerbate these direct complications. Anemia, defined as a hemoglobin concentration below 11 g/dl during pregnancy, stands out as one of the most prevalent and deadly contributors [3]. Globally, anemia affects nearly 40% of pregnant women, but in sub-Saharan Africa, prevalence rates are significantly higher, ranging from 50% to over 60% in some countries. This high prevalence intersects with other health burdens in the region,

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited

including malaria, HIV/AIDS, poor nutrition, and parasitic infections, making anemia a central concern in maternal health [4].

Anemia in pregnancy is multifactorial. Iron deficiency remains the most common cause, but other contributors include folate and vitamin B12 deficiencies, chronic infections, helminth infestations, malaria, and genetic conditions such as sickle cell disease and thalassemia. The synergistic effect of these factors often leads to severe anemia in women of reproductive age, especially those living in poverty [5]. Anemia weakens a woman's ability to cope with blood loss during childbirth, increases her susceptibility to infections, and exacerbates the severity of hypertensive disorders, thereby significantly raising the risk of maternal death.

Given the multifactorial causes and high prevalence of anemia, understanding its role in maternal mortality is critical for designing effective interventions. While iron and folic acid supplementation, malaria prevention strategies, deworming programs, and nutritional interventions have been widely promoted, the implementation and effectiveness of these measures vary considerably across African countries [6]. A comparative review that explores how anemia contributes to maternal mortality across different African settings, and which interventions have shown measurable impact, is essential to guide policy, strengthen health systems, and accelerate progress toward reducing maternal deaths.

Despite decades of global health efforts, maternal mortality in Africa remains a pressing challenge. While direct causes such as hemorrhage and sepsis are well-documented, the contribution of underlying anemia has not been adequately emphasized in health policy and programming. In many African countries, anemia is not merely a background condition but a central risk factor that exacerbates pregnancy-related complications [7].

For example, a woman who is already severely anemic due to iron deficiency or malaria infection is far less likely to survive obstetric hemorrhage than a woman with normal hemoglobin levels. Similarly, anemia worsens the effects of hypertensive disorders, contributes to poor wound healing, and increases vulnerability to sepsis. Despite this well-established biological link, maternal health programs often treat anemia as a secondary issue rather than a primary target for intervention [8].

The problem is further compounded by weak health systems across the region. Many women enter pregnancy already malnourished and with untreated infections, yet access to preventive measures such as antenatal screening, iron supplementation, and malaria prophylaxis is inconsistent. Cultural practices, limited health education, gender inequality, and poverty also reduce women's ability to access and adhere to preventive and therapeutic interventions [9]. Moreover, national health statistics in many African countries often underreport anemia-related maternal deaths because the condition is seen as an indirect contributor rather than a direct cause. This underestimation leads to inadequate prioritization of anemia in maternal health policies.

Therefore, the role of anemia in maternal mortality requires urgent re-examination. Without tackling this silent but deadly condition, Africa may struggle to achieve the SDG target of reducing the global maternal mortality ratio to less than 70 per 100,000 live births by 2030. This review is guided by specific objectives and research questions that aim to address the prevalence, impact, and interventions surrounding anemia in pregnancy across Africa, while also highlighting its significance for maternal health and broader socio-economic development. The objectives include examining the prevalence and burden of anemia across African countries, analyzing its relationship with maternal mortality, comparing policies and interventions such as iron supplementation, malaria prevention, nutritional interventions, and genetic counseling, identifying barriers such as health system weaknesses, cultural practices, and socioeconomic challenges, and finally, providing evidence-based recommendations for stronger maternal health policies. The study also seeks to answer critical questions on the correlation between anemia and maternal mortality, the role of anemia in worsening obstetric complications such as hemorrhage, hypertensive disorders, and sepsis, the effectiveness of country-specific interventions, the barriers to prevention and treatment, and strategies for strengthening health systems and community-based responses. The significance of this review lies in its contribution to understanding anemia as a central determinant of maternal mortality, providing comparative insights, informing policy design, supporting international goals like SDG 3 and Agenda 2063, and emphasizing the far-reaching social, economic, and developmental implications of addressing maternal anemia in methods. For this narrative review, I systematically synthesized evidence from both international and regional sources with a focus on maternal health, anemia, and pregnancy-related outcomes in Africa. Key references included World Health Organization (WHO) fact sheets, policy briefs, and technical guidance documents, which provided standardized global perspectives on maternal anemia and related mortality. In addition, I consulted large observational studies, meta-analyses, and systematic reviews published in peer-reviewed journals as well as open-access repositories, ensuring that the evidence base was comprehensive and representative. Search terms were carefully constructed using combinations

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited

of core concepts such as “anemia,” “maternal mortality,” “pregnancy,” and “Africa,” together with intervention-related keywords including “iron supplementation,” “intermittent preventive treatment in pregnancy (IPTp),” and “deworming.” This allowed for the identification of both burden-focused studies and intervention-oriented evaluations. Particular priority was assigned to high-quality, recent syntheses and multi-country analyses, as these offered robust comparative insights across diverse African settings and minimized contextual bias. Representative sources were cited throughout to reflect the range of evidence reviewed and to highlight converging findings. This methodological approach ensured that the review provided a balanced, well-contextualized analysis of anemia’s role in maternal health outcomes.

### **Burden: prevalence and regional variation**

Anaemia in pregnancy remains a major global health burden with striking regional variations, disproportionately affecting women in low- and middle-income countries. According to the World Health Organization (WHO), an estimated 35.5% of pregnant women aged 15–49 years were anaemic in 2023, with Africa carrying a significant share of this burden [10]. In sub-Saharan Africa, the prevalence is especially alarming, with multiple regional studies and meta-analyses consistently reporting rates between 30% and 50%. Some systematic reviews indicate even higher pooled prevalences, ranging from 40% to 49% in certain populations. The burden is not uniform across countries or regions, as factors such as malaria endemicity, nutritional deficiencies, health service coverage—including antenatal care access and iron-folic acid supplementation—and broader socioeconomic determinants play key roles in shaping prevalence patterns. Within individual countries, disparities further emerge, with urban-rural differences, household wealth inequalities, maternal education levels, and adolescent pregnancies contributing to variations in anaemia rates. Additionally, recent challenges such as disruptions to healthcare services during the COVID-19 pandemic, as well as food-price inflation and worsening food insecurity, have exacerbated maternal undernutrition and likely increased anaemia prevalence in vulnerable populations. These complex interrelated factors underscore the urgent need for context-specific interventions to address anaemia in pregnancy across sub-Saharan Africa [11].

### **Pathophysiology: how anaemia increases maternal mortality risk**

Anaemia significantly contributes to maternal mortality by undermining a pregnant woman’s physiological resilience and oxygen-carrying capacity, which are vital for sustaining both maternal and fetal health. During pregnancy, the body undergoes major hemodynamic changes, including increased blood volume and cardiac output, to support the developing fetus. When anaemia is present, especially in its severe form, the mother’s ability to meet these heightened metabolic demands is compromised [12]. This leaves her more vulnerable to life-threatening complications such as obstetric haemorrhage, which can rapidly deplete already reduced oxygen reserves, and sepsis, where the immune response is weakened. Furthermore, anaemia places additional strain on the heart, heightening the risk of cardiac failure during pregnancy or delivery. Beyond maternal health, anaemia is strongly linked to adverse perinatal outcomes, including preterm birth, low birthweight, and greater susceptibility to neonatal infections, which together escalate the risk of maternal and infant mortality. The severity of anaemia directly correlates with mortality risk, with haemoglobin levels below 7.0–8.0 g/dL being most dangerous. Thus, anaemia not only reduces a woman’s capacity to cope with pregnancy-related stressors but also amplifies the fatal consequences of common obstetric emergencies, making it a critical and preventable determinant of maternal survival [13].

### **Quantitative evidence linking anaemia and maternal mortality**

Quantitative evidence strongly supports the association between anaemia and maternal mortality, highlighting it as a critical public health concern in low-resource settings. A landmark pooled analysis reported that severe anaemia during pregnancy significantly increases the likelihood of maternal death, with an adjusted odds ratio of approximately 2.3 (95% CI 1.6–3.5), meaning that women with severe anaemia face nearly double the risk of mortality compared to their non-anaemic counterparts [14]. Importantly, this association persisted even after controlling for potential confounders, underscoring its robustness and clinical relevance. The findings are particularly concerning in sub-Saharan Africa, where anaemia prevalence remains high due to nutritional deficiencies, infections such as malaria and HIV, and limited access to quality antenatal care. Observational and case-control studies conducted across several African countries consistently confirm that low hemoglobin levels contribute to increased maternal case fatality rates, especially in contexts where obstetric complications such as postpartum haemorrhage arise and blood transfusion services are scarce. Furthermore, systematic reviews of maternal morbidity and mortality repeatedly identify anaemia as an independent and preventable predictor of adverse maternal outcomes. These findings underscore the urgent need to strengthen anaemia prevention and

**Country and comparative perspectives**

Malaria and anaemia in pregnancy present varied challenges across different countries and regional contexts, shaped largely by endemicity, nutrition, and healthcare system strength. In highly malaria-endemic regions such as parts of West, Central, and East Africa, malaria during pregnancy significantly contributes to maternal anaemia and associated risks. Here, integrated strategies including intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine, insecticide-treated bed nets, and timely malaria treatment are essential complements to iron and folic acid (IFA) supplementation. In Sahelian and food-insecure settings, maternal health risks are further compounded by chronic food shortages and widespread micronutrient deficiencies, which exacerbate iron-deficiency anaemia [16]. These challenges are worsened by political instability and disruptions to antenatal care services, limiting the reach of preventive interventions. By contrast, countries with stronger antenatal care (ANC) systems, such as those in parts of North Africa and southern Africa, demonstrate lower anaemia prevalence and improved maternal outcomes through higher coverage of IFA programs and better integration of malaria prevention where relevant. Nonetheless, disparities persist among marginalized populations, underscoring gaps in equity and access. Comparative analyses reveal that program coverage, including IFA distribution and adherence, IPTp uptake, and access to blood transfusion services, explains inter-country differences more than biological or genetic factors alone.

**Implementation barriers and gaps in evidences**

Implementation of interventions to prevent and manage anaemia in sub-Saharan Africa (SSA) faces several barriers and evidence gaps that hinder progress. Poor adherence and coverage remain critical challenges, with many women failing to meet the recommended 90 or more days of iron supplementation during pregnancy. Multi-country analyses have reported alarmingly low adherence rates, averaging around 28.7% across 22 SSA countries, largely due to drug stockouts, delayed initiation of antenatal care (ANC), side-effects, and insufficient counselling [17]. Health-system constraints further compound the problem, including limited ANC access, weak supply chains, and inadequate blood transfusion services, which are crucial in managing severe anaemia complicated by haemorrhage. Contextual factors such as high malaria transmission, widespread food insecurity, adolescent pregnancies, and socio-cultural barriers to ANC uptake also contribute to persistently high anaemia prevalence. Despite strong evidence linking severe anaemia to maternal mortality, attributing maternal deaths directly to anaemia remains difficult, as it often coexists with haemorrhage, infections, and hypertensive disorders. Additionally, there is a lack of robust implementation science research to identify which intervention models, such as community distribution, adolescent-focused programs, conditional cash transfers, or enhanced counselling, are most effective in African contexts. Moreover, significant data gaps persist on the availability and safety of blood transfusion services across regions, limiting understanding of their role in reducing mortality among severely anaemic pregnant women [18].

**Policy and programmatic recommendations**

Policy and programmatic recommendations to reduce maternal anaemia must adopt a multi-faceted and evidence-based approach. First, preventing severe anaemia should be prioritized through universal antenatal care (ANC) coverage, ensuring high-coverage distribution of iron and folic acid (IFA) supplements, and providing effective counselling on their use. Strengthening supply chains and creating incentives for early ANC booking are essential strategies to maximize reach and adherence, as emphasized by the World Health Organization. [19] Second, integrating malaria prevention interventions, including intermittent preventive treatment in pregnancy (IPTp) and the provision of insecticide-treated nets, within ANC services in endemic areas is critical, given that malaria remains a significant proximate cause of anaemia. Third, addressing underlying food-system drivers is necessary; this includes scaling up micronutrient-fortified staples and delivering targeted nutritional support for vulnerable populations, particularly pregnant adolescents and food-insecure households, as highlighted by AP News. Fourth, strengthening emergency obstetric care and blood transfusion services ensures that women experiencing severe anaemia or obstetric haemorrhage receive timely and effective treatment, reducing maternal morbidity and mortality. Finally, behavior-change strategies and delivery innovations, such as community-based distribution of IFA, mobile reminders, and engaging male partners, should be implemented and rigorously evaluated. Funding for implementation research must be embedded within programs to optimize IFA adherence and overall program effectiveness, as recommended in PMC studies.

**CONCLUSION**

In conclusion, anemia represents a critical yet often underappreciated determinant of maternal mortality across African countries. Severe anemia markedly increases the risk of death during pregnancy and childbirth by

exacerbating complications such as hemorrhage, infections, and hypertensive disorders. Despite the availability of effective biomedical interventions, including iron and folic acid supplementation, malaria prevention through IPTp and insecticide-treated nets, deworming programs, and targeted nutritional support, maternal anemia remains highly prevalent due to persistent implementation gaps. Key challenges include limited antenatal care coverage, poor adherence to supplementation protocols, weak health system capacity, inadequate blood transfusion services, and broader socioeconomic and food-system constraints. Addressing these challenges requires a comprehensive, context-specific approach that integrates clinical care, public health strategies, and nutrition-sensitive interventions. Strengthening monitoring, promoting behavior-change innovations, and investing in implementation research are essential to optimize program effectiveness. Only through coordinated and evidence-based efforts can African countries substantially reduce anemia-related maternal deaths and move closer to achieving global maternal health targets.

## REFERENCES

1. Sajedinejad, S., Majdzadeh, R., Vedadhir, A., Tabatabaei, M.G., Mohammad, K.: Maternal mortality: a cross-sectional study in global health. *Global Health*. 11, 4 (2015). <https://doi.org/10.1186/s12992-015-0087-y>
2. Maternal health, [https://www.who.int/health-topics/maternal-health#tab=tab\\_1](https://www.who.int/health-topics/maternal-health#tab=tab_1)
3. Egba S. I, Obeagu E I, Obeagu G U, (2023) Coexisting Conditions: Addressing Diabetes in Sickle Cell Anemia Care Int. J. Curr. Res. Med. Sci. (2023). 9(11): 23-28
4. Stephen, G., Mgongo, M., Hussein Hashim, T., Katanga, J., Stray-Pedersen, B., Msuya, S.E.: Anaemia in Pregnancy: Prevalence, Risk Factors, and Adverse Perinatal Outcomes in Northern Tanzania. *Anemia*. 2018, 1846280 (2018). <https://doi.org/10.1155/2018/1846280>
5. Obeagu, E. I., Obeagu, G. U., Ugwu, O. P. C., Alum, E. U. Navigating Hemolysis in Expectant Mothers with Sickle Cell Anemia: Best Practices and Challenges. *IAA Journal of Applied Sciences*. 2024; 11(1):30-39. <https://doi.org/10.59298/IAAJAS/2024/4.78.99.11>
6. Bhutta, Z.A., Keats, E.C., Owais, A., González-Fernández, D., Udomkesmalee, E., Neufeld, L.M., et al: What works for anemia reduction among women of reproductive age? Synthesized findings from the exemplars in anemia project. *The American Journal of Clinical Nutrition*. 121, S68–S77 (2025). <https://doi.org/10.1016/j.ajcnut.2024.11.031>
7. Lancaster, L., Barnes, R.F.W., Correia, M., Luis, E., Boaventura, I., Silva, P., et al: Maternal death and postpartum hemorrhage in sub-Saharan Africa – A pilot study in metropolitan Mozambique. *Research and Practice in Thrombosis and Haemostasis*. 4, 402–412 (2020). <https://doi.org/10.1002/rth2.12311>
8. Ugwu, O. P. C. Obeagu, E. I., Obeagu, G. U., Alum, E. U. Persistent Immune Activation and Chronic Inflammation: Unraveling Their Impact on Anemia in HIV Infection. *INOSR Experimental Sciences*. 2023; 12(3):73-84. <https://doi.org/10.59298/INOSRES/2023/7.3.21322>
9. Burayu, E.T., Degefa, B.D.: Exploration of iron deficiency anemia and its associated factors among pregnant women seeking antenatal care in public health facilities of southwestern Ethiopia. A mixed study. *AJOG Glob Rep*. 4, 100417 (2024). <https://doi.org/10.1016/j.xagr.2024.100417>
10. Anaemia, <https://www.who.int/news-room/fact-sheets/detail/anaemia>
11. Rutayisire, E., Habtu, M., Ngomi, N., Mochama, M., Mbayire, V., Ntihabose, C., Muhire, P.: Magnitude and determinants of food insecurity among pregnant women in Rwanda during the COVID-19 pandemic. *Journal of Agriculture and Food Research*. 11, 100468 (2023). <https://doi.org/10.1016/j.jafr.2022.100468>
12. Alum, E. U., Ugwu, O. P. C., Obeagu, E. I., Obeagu, G. U., Anemia as a Prognostic Marker for Disease Progression in HIV Infection. *IAA Journal of Biological Sciences*. 2023; 11(1):33-44. <https://doi.org/10.59298/IAAJB/2023/3.2.23310>
13. Obeagu, G.U., Obeagu, E.I.: Complications of anemia in pregnancy: An updated overview for healthcare professionals. *Medicine (Baltimore)*. 104, e44246 (2025). <https://doi.org/10.1097/MD.00000000000044246>
14. J, D., J, Z., Bm, F.-F., J, V., Ot, O., N, M., Ö, T., Mr, T., S, M., K, J., P, L., G, T., S, T., Ks, K.: Risk of maternal mortality in women with severe anaemia during pregnancy and post partum: a multilevel analysis. PubMed.
15. Udeozor P A, Precious A U, Ibiham U A, Uti D E, Umoru G U, Onwe E N, et al (2022).. Antioxidant and anti-anemic effects of ethanol leaf extracts of *Mucuna poggei* and *Telfairia occidentalis* in phenyl-hydrazine-induced anemia in Wistar albino rats. *Ibnosina Journal of Medicine and Biomedical Sciences*, 2022. 14(03): p. 116-126

16. Ampofo, G.D., Osarfo, J., Okyere, D.D., Kouevijin, E., Aberese-Ako, M., Tagbor, H.: Malaria and anaemia prevalence and associated factors among pregnant women initiating antenatal care in two regions in Ghana: an analytical cross-sectional study. *BMC Pregnancy Childbirth*. 25, 617 (2025). <https://doi.org/10.1186/s12884-025-07735-5>
17. Ba, D.M., Ssentongo, P., Kjerulff, K.H., Na, M., Liu, G., Gao, X., Du, P.: Adherence to Iron Supplementation in 22 Sub-Saharan African Countries and Associated Factors among Pregnant Women: A Large Population-Based Study. *Curr Dev Nutr*. 3, nzz120 (2019). <https://doi.org/10.1093/cdn/nzz120>
18. Igwe M C, Alum E U, Obeagu I E, Obeagu G. U, Ugwu O. P C (2023). Men's Essential roles in the Management of Sickle Cell Anemia. *Newport International Journal of Scientific and Experimental Sciences*, 4, (2), 20-29.
19. Ramachandran, P.: Prevention & management of anaemia in pregnancy: Multi-pronged integrated interventions may pay rich dividends. *Indian J Med Res*. 154, 12–15 (2021). [https://doi.org/10.4103/ijmr.IJMR\\_994\\_20](https://doi.org/10.4103/ijmr.IJMR_994_20)

**CITE AS: Nyiramana Mukamurera P. (2026). The Role of Anemia in Maternal Mortality in African Countries: A Comparative Review. NEWPORT INTERNATIONAL JOURNAL OF PUBLIC HEALTH AND PHARMACY, 7(2):81-86. <https://doi.org/10.59298/NIJPP/2026/728186>**