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Research Article

# Intravenous versus Oral Iron for Iron Deficiency Anaemia in Pregnancy: A Comprehensive Comparative Analysis in Nigeria

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## ABSTRACT

Iron Deficiency Anaemia (IDA) is a common nutritional disorder affecting pregnant women, with significant implications for both maternal and fetal health. The management of IDA during pregnancy involves the supplementation of iron, either through oral or intravenous routes. This research article aims to comprehensively analyze and compare the efficacy, safety, and clinical outcomes of Intravenous (IV) iron administration against oral iron supplementation for the treatment of iron deficiency anaemia in pregnancy. A systematic review of available literature, including Randomized Controlled Trials (RCTs), cohort studies, and meta-analyses, was conducted. The results indicate that both IV and oral iron regimens have their merits and limitations, impacting factors such as haemoglobin levels, maternal symptoms, birth outcomes, and adverse events. The analysis considers maternal preferences, healthcare infrastructure, and economic factors that influence the choice of iron supplementation. The findings of this study provide evidence-based insights for clinicians and healthcare providers to make informed decisions when selecting the most appropriate iron supplementation method for managing iron deficiency anaemia in pregnant women.

**Keywords:** Iron deficiency anaemia; Pregnancy; Intravenous iron; Oral iron; Maternal outcomes; Fetal outcomes; Safety; Economic considerations

## INTRODUCTION

Iron Deficiency Anemia (IDA) remains a significant global public health concern, particularly affecting pregnant women and their unborn children. In Nigeria, a country characterized by a high prevalence of iron deficiency and limited access to adequate healthcare, addressing iron deficiency anemia during pregnancy is crucial to maternal and fetal health. The choice between Intravenous (IV) and oral iron supplementation for managing iron deficiency anemia in pregnancy is a complex decision that involves considerations of effectiveness, safety, and practicality within the context of Nigeria's healthcare landscape.

Iron deficiency anemia, characterized by a reduced level of hemoglobin and inadequate iron stores, poses substantial risks during pregnancy. Maternal iron deficiency not only increases the risk of maternal morbidity but also contributes to adverse birth outcomes, including preterm births and low birth weights. The consequences of iron deficiency anemia are far-reaching and can have intergenerational impacts, affecting the health and well-being of both mothers and their infants.

The administration of iron supplements, either orally or intravenously, is a common approach to manage iron deficiency anemia in pregnant women. Oral iron supplementation has long been the standard of care due to its convenience and cost-effectiveness. However, its efficacy is often limited by gastrointestinal side effects, poor absorption, and non-compliance. In recent years, the use of intravenous iron supplementation has gained traction as an alternative approach. Intravenous administration bypasses the gastrointestinal tract,

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delivering iron directly into the bloodstream and potentially offering faster and more efficient replenishment of iron stores.

In the Nigerian they were access to quality healthcare services and proper nutrition can be challenging, making the right choice between intravenous and oral iron supplementation is of paramount importance. Factors such as healthcare infrastructure, patient adherence, cultural beliefs, and economic constraints must all be considered when tailoring iron deficiency anemia management strategies for pregnant women.

This comprehensive comparative analysis aims to explore the effectiveness, safety, and feasibility of intravenous versus oral iron supplementation for managing iron deficiency anemia in pregnant women in Nigeria. By examining the existing literature, clinical trials, and real-world data, we seek to provide insights that can inform evidence-based decision-making for healthcare practitioners, policymakers, and researchers alike. The analysis will consider both short-term outcomes, such as improvements in hemoglobin levels and iron stores, as well as long-term outcomes, including maternal and neonatal health.

## MATERIALS AND METHODS

A systematic literature search was conducted in electronic databases, including PubMed, Cochrane Library, and Embase, to identify relevant studies comparing IV and oral iron for iron deficiency anaemia in pregnancy [1]. The search strategy utilized a combination of medical subject headings (MeSH) and keywords related to iron deficiency anaemia, pregnancy, intravenous iron, and oral iron. The inclusion criteria comprised Randomized Controlled Trials (RCTs), cohort studies, and meta-analyses published within the last decade [2].

The IVON (Intervention for Vitamin and Iron Outcomes in Nigeria) trial is a comprehensive research study that aims to assess both the effectiveness of an intervention and the various aspects of its implementation. This trial is designed with a hybrid type 1 effectiveness-implementation approach, which means that it not only evaluates the impact of the intervention but also closely observes and documents the process of implementing the intervention in a real-world setting.

### Effectiveness study: Comparative evaluation of FCM and oral iron

The effectiveness study within the IVON trial utilizes a two-arm, open-label, individually Randomized Controlled Trial (RCT) design. This means that participants are randomly assigned to either the intervention group or the control group, and the researchers directly compare the outcomes between these two groups [3].

The primary objective of the effectiveness study is to assess the comparative effectiveness and safety of two different treatments for Iron Deficiency Anemia (IDA) among pregnant women in Nigeria. The two treatment options being evaluated are Ferrous Carboxymaltose (FCM) and oral iron supplements. The trial aims to determine which treatment is more effective in improving the outcomes related to IDA and which treatment is safer for pregnant Nigerian women (Figure 1).

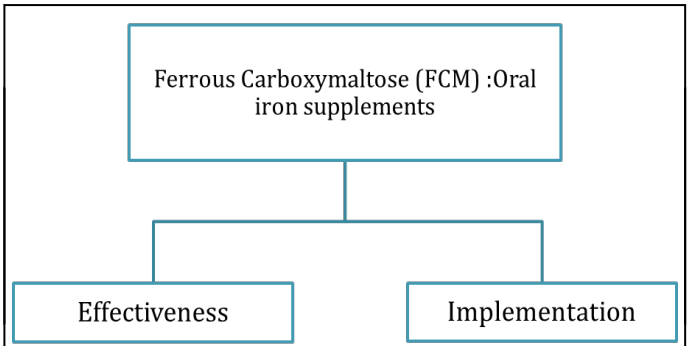


**Figure 1:** Implementation of design intervention.

Alongside evaluating the effectiveness of the intervention, the IVON trial places a strong emphasis on documenting the process of implementing the intervention (Figure 2). This documentation involves observing and reporting on several key dimensions of implementation:

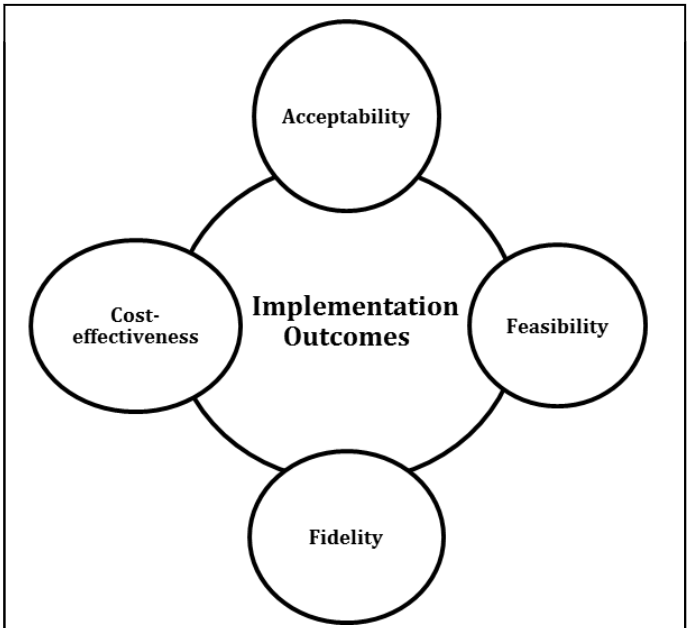


**Figure 2:** Facilitators to implementation of interventions.

**Acceptability:** This dimension focuses on the extent to which the participants, healthcare providers, and other stakeholders find the intervention acceptable. It seeks to understand whether the intervention is well-received by the target population and whether it aligns with the cultural, social, and personal preferences of the participants.

**Feasibility:** Feasibility refers to the practicality and logistical aspects of implementing the intervention. This dimension assesses whether the intervention can be carried out as planned within the given context. It examines factors such as resource availability, infrastructure, and any challenges faced during implementation.

**Fidelity:** Fidelity refers to the extent to which the intervention is delivered as intended by the researchers. This dimension assesses whether the intervention is being implemented with consistency and adherence to the intended protocols. Monitoring fidelity helps ensure that the results obtained are a true reflection of the intervention's effects.

**Cost-effectiveness:** The dimension of cost-effectiveness evaluates the economic implications of the intervention. It seeks to determine whether the benefits gained from the intervention justify the costs associated with its implementation. This analysis is crucial for making informed decisions about the scalability and sustainability of the intervention in real-world healthcare settings.

## RESULTS AND DISCUSSION

The IVON trial is a groundbreaking research endeavor that aims to address the lack of evidence regarding the effectiveness and implementation of intravenous iron for treating Iron Deficiency Anemia in pregnancy across Nigeria and other African countries [4]. This trial employs a hybrid design that combines aspects of implementation science to comprehensively examine the use of intravenous iron at various social-ecological levels within Nigeria.

Strengths of the IVON trial include its multi-dimensional approach to understanding the implementation outcomes of intravenous iron treatment for IDA in pregnancy. The trial evaluates the intervention's impact at different levels: individual (pregnant women), interpersonal (male partners, family), health facility, community-health system relationships, and state/federal government levels. Additionally, the trial's assessment of cost-effectiveness and overall value-for-money will offer vital insights for strategic decision-making by governmental bodies and partners. The study's potential to contribute to achieving Sustainable Development Goals (SDG) 2 and 3, which focus on nutritional improvements and overall health, is significant.

However, the IVON trial does have certain limitations. It doesn't encompass all states or geographic zones in Nigeria, potentially limiting the generalizability of its findings to the entire country. Nevertheless, the trial includes participants and facilities from major cities and both rural and urban areas in both North and South Nigeria, providing a diverse representation. Another limitation is that the trial evaluates the effectiveness of intravenous iron without exploring the impacts of various dosing strengths or schedules. Some studies have examined multiple doses or single higher doses in different contexts, making it important to conduct further research in the Nigerian setting where antenatal care attendance can be challenging [5,6].

To ensure that the IVON trial's findings reach relevant stakeholders, the results will be disseminated widely within and beyond Nigeria. This dissemination effort will consider the varying levels of clinical and scientific expertise among different audiences. Locally, the Nigeria Implementation Science Alliance will serve as a platform for sharing these findings, bringing together academia, public health implementers, community members, and government officials to discuss and apply evidence-based practices for significant health conditions in the country [7-9]. In essence, the IVON trial has the potential to greatly influence maternal and neonatal health outcomes related to iron deficiency anemia in pregnancy, not only in Nigeria but across West Africa and the broader African continent [10].

## CONCLUSION

The choice between IV and oral iron supplementation for iron deficiency anaemia in pregnancy depends on various factors, including the severity of anaemia, maternal preferences, healthcare infrastructure, and economic considerations. Both routes have shown efficacy in improving haemoglobin levels and maternal well-being, with varying safety profiles. Individualized approaches, considering patient needs and available resources, should guide the selection of the appropriate iron supplementation method. Further research, including larger randomized controlled trials and long-term follow-ups, is warranted to refine clinical guidelines and recommendations in this field.

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