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Understanding Anemia among Women of Reproductive Age and Children in Namibia: A Comprehensive Review

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ABSTRACT

Anemia is one of the leading causes of death globally, not only among children and women; however, there have been records of deaths among men too. Anemia disproportionately affects young children and expecting mothers with increased morbidity and mortality. Who estimates that anemia affects 30% of women aged 15 to 49, 37% of pregnant women, and 40% of children aged 6 to 59 months globally. The goal of lowering anemia among women of reproductive age has not been met, and 25.2% of women between the ages of 15 and 49 are now affected in Namibia. Namibia with a current prevalence rate of 46.1% of children under 5 years, is a severe global public health issue. According to the morphological classification of anemia, normocytic normochromic anemia (86.3%) was the most common kind in Namibia, with a moderate frequency of iron deficiency anemia whereas the highest prevalence of vitamin b12 deficient anemia was found in some regions. Anemia indicates both poor nutrition and poor health and is often categorized based on its cause. Iron deficiency, pregnancy, antiretroviral therapy side effects, and hereditary blood abnormalities increase the risk of anemia. Depending on the hemoglobin levels in the blood, anemia can be either short-term or long-term. For pregnant women and children under the age of 5, mild anemia is defined as a level of hemoglobin concentration between 10.0 and 10.9g/dl, moderate anemia is defined as a level between 7.0 and 9.9g/dl, and severe anemia is defined as a level below 7.0g/dl. Medical professionals follow different standards such as typical treatment recommendations, World Health Organization recommendations, and reference materials while dealing with individuals who have suspected anemia.

INTRODUCTION

The World Health Organization defines anemia as a deficiency where there are either too few red blood cells or too little hemoglobin within them (Hashim, 2014). Three major subtypes of anemia pathology are a decrease in red cell production, an increase in red cell oxidation, or a loss of red cells through bleeding. However, anemia pathophysiology is often complicated and can present as the symptom of an underlying disorder (Williams *et al.*, 2023).

The capacity of blood to transfer oxygen to the body's tissues will be reduced when a person has too few or malformed red blood cells, not enough hemoglobin, or both as hemoglobin is required to carry oxygen (Owais *et al.*, 2021). This may result to symptoms like fatigue, exhaustion, dizziness, and shortness of breath, among others. Factors such as age, sex, elevation of habitation, smoking habits, and pregnancy status can all affect the ideal hemoglobin concentration needed to meet physiologic needs (Newhall *et al.*, 2020).

Anemia can have an effect on other global nutritional issues like stunting and wasting, low birth weight, childhood overweight and obesity due to lack of energy to exercise, cognitive and physical development reduced school performance in children, and reduced productivity in adults, which could have additional social and economic repercussions for the individual and their families (Namibia - Demographic and Health Survey 2006-2007, 2017). Anemia during pregnancy carries the risk of premature birth, low birth weight, and fetal

abnormalities which can increase expenditures for both society and families (Marshall & Connors, 2018).

Problem Statement

Based on a progress report that emphasized anemia in Namibia (MoHSS, 2014), through growth monitoring and promotion, 106,823 children under five for underweight, 94,753 for wasting, and 99,556 were stunting, out of the 334,696 children under five years of age. Anemia in pregnant women was monitored, and 6.8% (994 out of 11,338) of women had hemoglobin levels below 10g/dl. Merely 77.8% of 14,573 of pregnant women were checked for iron insufficiency during their initial ANC visit, according to data from monitored pregnant women screened for the condition and DHIS2.

By using the DHIS2 database system to track birth weight at medical facilities, it was discovered that 10.2% of live births, or 1405 babies had low birth weights. A study that tracked the mortality rate from malnutrition cases at medical facilities discovered that (Nutrition, 2010), of the 355 instances that were reported, 40 fatalities (11.3%) occurred. Anemia can be caused by several factors; however, the most major in Namibia is iron deficiency.

Therefore; the Objectives of a Review are:

To provide the estimated prevalence data of anemia among women and children in Namibia

To explore the health repercussions and implications of anemia among women and children in Namibia.

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LITERATURE REVIEW

Anemia is one of the leading causes of death globally, not only among children and women however there have been records of deaths among men too (Campbell, 2003). According to World Health Organization estimates, anemia affects 30% of women aged 15 to 49, 37% of pregnant women, and 40% of children aged 6 to 59 months globally (Hashim, 2014). Anemia disproportionately affects young children and expecting mothers with increased morbidity and mortality (Thomson, 1997). Young children, adolescent girls, and women who are menstruating, pregnant, and postpartum women, are particularly at risk for anemia, which is a significant global public health issue (El Banco Mundial, 2015). An estimated 1.74 billion individuals worldwide suffered from anemia in 2019, with the risk of anemia being higher in children, women, and those with chronic conditions like cancer. By 2021, it was estimated to have had a global impact on more than two billion people (El Banco Mundial, 2015). The incidence of childhood anemia varies greatly between geographical areas. In 2011, low-income families in the United States had the highest frequency of anemia among children aged 12 to 17 months (18.2%); however, in India's north-eastern states, the number of anemic children was projected to be over 53% (Hashim, 2014). A high prevalence of anemia was reported among children under 5 years old in Central and South Asia, as well as in the Sub-Saharan Africa regions, where some nations like Ghana and Burkina Faso reported an anemia prevalence of over 70% in the general population. Of World Health Organization regions, approximately 60% of African children under the age of five had anemia, followed by 48% in Southeast Asia (Oyedele, 2022).

Anemia is Classified as Iron Deficiency Anemia

Iron deficiency anemia is a prevalent type of anemia, a disorder in which the blood does not contain enough healthy red blood cells. Iron deficiency anemia, as the name implies, occurs due to the lack of iron. Iodine shortage is linked to a multitude of unfavorable pregnancy outcomes, including abortion, congenital malformations, stillbirths, and premature deaths as well as fetal brain impairment (Iron and the Anaemia of Chronic Disease_ a Review and Strategic Recommendations_ Current Medical Research and Opinion_ Vol 22, No 4, n.d.). A review article about iron deficiency Anemia, as a burden for world health (Kumar & Sagar, 2014), concluded that iron deficiency anemia in adolescent girls and pregnant women can adversely affect the cognitive performance, behavior, performance of adolescents and physical growth of infants, preschool and school-age children. Anemia affects immune status and morbidity from infections of all age groups. In addition, it leads to a decrease in the work performance of adolescents and adults of all age groups (Sahar *et al.*, 2023).

Vitamin B12 Deficiency Anemia

Vitamin B12 deficiency Anemia is a disorder that develops

when the body can't make enough vitamin B12 to produce enough healthy red blood cells. To produce healthy red blood cells, white blood cells, and platelets, your body needs vitamin B12 (Zhang *et al.*, 2016). An article about therapeutics for common serious condition (Wolffenbuttel *et al.*, 2023), explained that B12 increases the risk of adverse pregnancy outcomes, including early pregnancy loss, neural tube defects, preterm birth, and low birth weight, including insulin resistance and adiposity. Further, it also may lead to neurological complications in newborns, such as hypotonia, failure to thrive, central apneas, and seizures (Gottwald-Hostalek & Kahaly, 2023).

Hemolytic Anemia

Hemolytic Anemia is a blood disorder when the red blood cells break down or die more quickly than the body can produce new blood cells to replace them. This causes the situation that one may develop hemolytic anemia. Hemolytic anemia can be passed down through genetic disorders that cause anemia, as well as from certain infections and drugs (Marina, n.d.).

Causes of Anemia

According to the World Health Organization, the highest incidence rates of anemia found in Africa can be attributed to the continent's extreme poverty, insufficient household food security, high rates of HIV infection, lack of nutrition education, and improper feeding practices (Hashim, 2014).

Numerous studies have also been conducted to assess and pinpoint the causes of anemia in Namibia as a whole. It is a significant health issue that typically arises from malnutrition, an infection, or a persistent illness (Namibia - Prevalence Of Anemia Among Pregnant Women - 2023 Data 2024 Forecast 1990-2019 Historical, n.d.). Anemia is an indication of both poor nutrition and poor health. Iron deficiency, pregnancy, antiretroviral therapy side effects, and hereditary blood abnormalities increase the risk of anemia in HIV-infected women of reproductive age (Namibia - Demographic and Health Survey 2013, 2013).

Anemia is often categorized based on its cause. Nutritional anemia frequently develops from a deficiency in the micronutrients needed for blood production, such as iron, folate, riboflavin, vitamins A, B12, and C (Huang *et al.*, 2019). Heavy menstruation, higher iron needs during pregnancy and in growing children, chronic infections (including tuberculosis, HIV, hookworm, and malaria), and ineffective iron absorption, transport, and storage, including hemoglobinopathies, are other causes of anemia. Decreased dietary iron intake, increased iron demand or iron loss, as well as decreased iron bioavailability from staple foods, are all contributing factors to nutritional iron insufficiency (Ma *et al.*, 2008).

A systematic review and meta-analysis were carried out in Ethiopia among children aged 6 – 23 months on the prevalence and associated factors of anemia (Azmeraw *et al.*, 2023). It revealed that diarrhea, stunting, household food insecurity, dietary diversity, and age were identified

as predictors of anemia in children aged 6 -23 months. A cross-sectional survey carried out in low and middle-income countries(Kumar & Sagar, 2014) found that educational status, wealth status, family size, media exposure, and residence were common factors significantly associated with anemia in pregnant and non-pregnant women. According to the study, mode III was selected and all the factors with p-values <0.001 were considered predictors of anemia.

Factors contributing to childhood anemia such as nutritional deficiencies, acute and chronic inflammation, hereditary or acquired diseases that impact the generation or survival of red blood cells, as well as dietary and pathogenic variables, are some of the causes of childhood anemia(Ni *et al.*, 2022). Childhood anemia has also been influenced by other variables, such as mothers, home, and community characteristics. In addition, the child's age, sex, and domicile, as well as maternal education and household wealth position have been identified too. (Gallagher, 2022).

Interventions

A study conducted to review the intervention of products for use in the prevention and control of anemia in young children, adolescent girls and women, and pregnant and postpartum women(Lopez de Romaña *et al.*, 2023), its results showed that daily iron supplementation reduces the risk of anemia in children aged 6 – 23 months, children aged 5 – 12 years of age, women of reproductive age, and pregnant women however there is insufficient evidence available regarding the effect on anemia among children 2 – 5 years of age. In addition, promising interventions to prevent anemia include vitamin A supplementation Antenatal Multiple Micronutrient supplementation, lipid-based nutrients supplements, daily food supplements, and bio fortification.

Depending on the levels of hemoglobin in the blood, anemia can be either short-term (transient) or long-term (chronic), and its severity can range from mild to severe. For pregnant women and children under the age of five, mild anemia is defined by a level of hemoglobin concentration between 10.0 and 10.9 g/dl, moderate anemia is defined by a level between 7.0 and 9.9 g/dl, and severe anemia is defined by a level below 7.0 g/dl(Miller *et al.*, 2012). The moderate to severe classifications can result in potentially serious health complications and even fatality; however, the mild classification can be easily treated(Iron and the Anaemia of Chronic Disease_ a Review and Strategic Recommendations_ Current Medical Research and Opinion_ Vol 22, No 4, n.d.).

The relationship between socioeconomic, and demographic variables and the prevalence of childhood anemia exists in Namibia, however, is not well understood. Even though mild cases of anemia can be treated and avoided, it can also be serious, life-threatening, and even fatal(MoHSS, 2014).

The Sustainable Development Goals and the Global Nutrition Targets for 2025 both place a high premium on

reducing anemia(Global Nutrition Report, 2022). Medical professionals follow different standards such as typical treatment recommendations, World Health Organization recommendations, and reference materials while dealing with individuals who have suspected anemia. Clinical practice could be standardized by adhering to a single reference document(Turawa *et al.*, 2021).

The most economical method to prevent and reduce anemia is food fortification with micronutrients, dietary supplementation, oral iron supplementation, blood transfusion in severe cases, and encouraging the use of mosquito bed nets coated with pesticides in malaria-prone areas(Xia *et al.*, 2012). It is recognized that appropriate dietary iron consumption can considerably prevent and treat iron deficiency(Therapeutic Effects of NaFeEDTA-fortified Soy Sauce in Anaemic Children in China - Huo - 2002 - Asia Pacific Journal of Clinical Nutrition - Wiley Online Library, n.d.). Because of this, the World Health Organization (WHO) advised using these supplements as part of routine prenatal care and a preventative intervention to lessen anemia in children and pregnant women in high-burden areas(Camilleri, 1960). The law requires that all cornmeal (also known as maize meal) and wheat flour be fortified with vitamin A, thiamin, riboflavin, niacin, folic acid, iron mineral, and zinc oxide to add more micronutrients and reduce the burden of anemia and iron deficiency in the population(Ma *et al.*, 2008).

The study conducted in China indicated that there is evidence that adding various micronutrient powders to food at home is an effective intervention to rapidly reduce anemia, iron deficiency, and vitamin A deficiency in young children. A specific additional food supplement called “Ying Yang Bao” (YYB) has been developed in China to prevent and treat malnutrition in children in rural areas(Zhang *et al.*, 2016).

Implementing these preventive strategies is simple and inexpensive when people have a regular balanced, healthy diet. To maintain appropriate hemoglobin levels, it is necessary to consume adequate meals rich in iron and these vitamins, as well as food high in vitamin C to aid in absorption(Gonzo *et al.*, 2021). This is not unique to Namibia; many of these simple, low-cost initiatives are out of the price range of many households in developing countries. In Namibia as a whole, numerous investigations have been carried out to evaluate and identify the root causes of anemia(WHO/UNICEF, 2010).

METHODOLOGY

The method that was used in reviewing sources and searching in which the research located and retrieved relevant literature. The materials sourced have provided information from which evidence, conclusions, and recommendations were drawn. However, the reviewer has entailed the systematic search strategy before the literature search, which is fundamental to a relevant, and successful information search. This was aimed at ensuring that the systematic review of the review is

comprehensive, thorough, and objective. Eventually, the search was as wide as possible to maximize the likelihood of capturing all relevant data and reducing the adverse effects of reporting biases.

RESULTS AND DISCUSSION

As of 2019, Namibia had a 25.20 percent prevalence of anemia among women of reproductive age (women ages 15 to 49). In the previous 19 years, its maximum value was 30.40 in 2000, and its lowest value was 24.40 in 2014(Namibia Demographic and Health Survey 2000 Ministry of Health and Social Services, 2003).

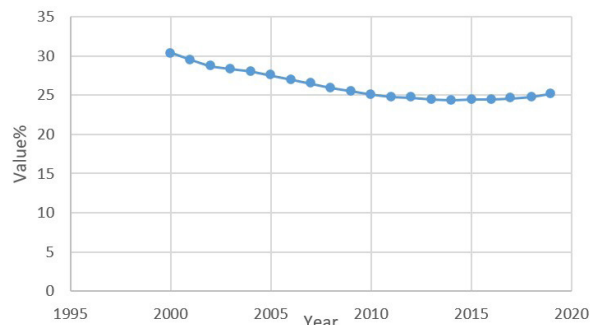


Figure 1: The Prevalence of anemia among women of reproductive age (%15 - 49 Years) in Namibia

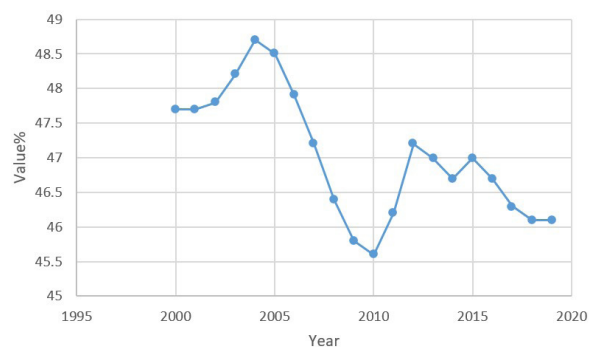


Figure 2: The Prevalence of anemia among children (% children under 5 years) in Namibia

As of 2019, the percentage of children under five in Namibia who had anemia was 46.10. In the previous 19 years, its best value was 48.70 in 2004, and its lowest value was 45.60 in 2010.

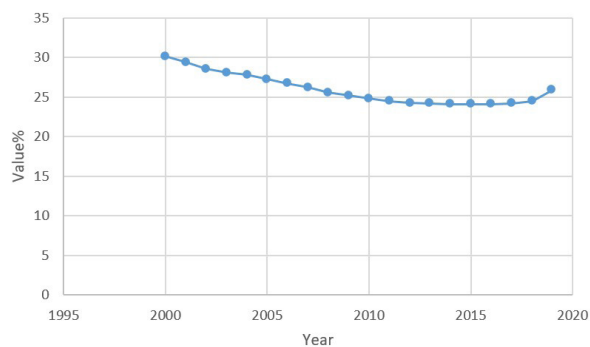


Figure 3: The Prevalence of anemia among non-pregnant women (% of women ages 15 – 49 years) in Namibia

As of 2019, Namibia had a 24.90 percent prevalence of anemia among non-pregnant women (% of women ages 15-49). In the previous 19 years, its maximum value was 30.20 in 2000, and its lowest value was 24.10 in 2014(Namibia - Demographic and Health Survey 2006-2007, 2017).

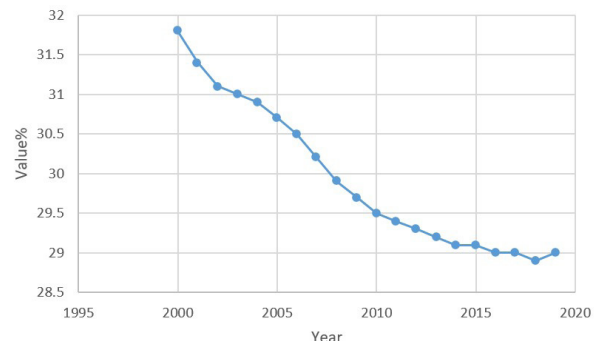


Figure 4: The Prevalence of anemia among pregnant women (% of women ages 15 – 19 years) in Namibia

As of 2019, Namibia had a prevalence of anemia among pregnant women (%) of 29.00. The graph below illustrates how this indicator has changed over the last 19 years, peaking at 31.80 in 2000 and falling to 28.90 in 2018(Namibia - Demographic and Health Survey 2013, 2013).

The 2022 Global Nutrition Report indicated that Namibia is yet to reach all of the maternity, infant, and young child nutrition goals(Global Nutrition Report, 2022). As a fundamental component of human capital and as such, good nutrition supports economic growth. Adequate nutrition is essential to a child's development. The period from birth to age two is referred to as the critical window of opportunity and is crucial for the best growth, health, and development. The goal of lowering anemia among women of reproductive age has not been met, and 25.2% of women between the ages of 15 and 49 are now affected in Namibia (Global Nutrition Report, 2022).

There is a high prevalence (>40%) of anemia in children, particularly in low- and middle-income countries, including Namibia with a current prevalence rate of 46.1%, which is a severe global public health issue(Oyedele, 2022). The WHO defines anemia prevalence above 40% in a population, as it is in Namibia, as a major public health issue that results in a 2.5% decrease in adult income and higher medical costs for the nation(Nutrition, 2010).

According to The World Bank Collection of 2020, Namibia has an estimated prevalence of 29% of anemia among pregnant women, and anemia rates in women are somewhat greater in rural than in urban settings(Shaduka, 2022). Data on the prevalence of anemia among children was reported at 42.6% and 47.1% in 2016 and 2019 respectively(Oyedele, 2022). The study conducted at the University of Science and Technology in Namibia indicated that according to morphological classification of anemia, normocytic normochromic anemia (86.3%)

was the most common kind in Namibia, With the moderate frequency of Iron Deficiency Anemia, whereas the highest prevalence of vitamin B12 deficient anemia was found in some regions(Shaduka, 2022).

Iron deficiency, which affects 2-3% of toddlers and 3% of adolescent girls, is the most frequent nutritional disruption in children and the leading cause of anemia in this age group in Namibia. The prevalence of iron deficiency anemia among women is 25%(Shaduka, 2022). Based on the study conducted in 2022 in Namibia indicated that the prevalence of Vitamin B12 deficiency anemia among women stands at 17.5%(Namibia - Prevalence Of Anemia Among Pregnant Women - 2023 Data 2024 Forecast 1990-2019 Historical, n.d.). The pediatric population has a record of moderate prevalence of Vitamin B12 deficiency in Namibia(Shaduka, 2022). Hemolytic anemia is the most prevalent in Namibia. The fundamental problem is addressed by healthcare professionals while treating this illness(Shaduka, 2022). The 2013 Namibia Demographic Health Survey gathered information on deworming medicine use during the most recent pregnancy, and the use of iron-folic acid supplements among women aged 15 to 49 with a child born within the previous five years(MoHSS, 2014).

Interventions

Six Food and Nutrition Security Technical Working Groups have been established to implement the Food and Nutrition Security Policy Implementation Action Plan. These groups will concentrate on food security, advocacy, research, nutrition, coordination, and food systems. These working groups gather every quarter to oversee the execution of the actions related to nutrition and those that are particular to it(Namibia - Demographic and Health Survey 2006-2007, 2017).

A total of 193 community health workers received training on the Nutrition Task Shifting on ORS/Zinc Co-packaging method, which enables them to diagnose severe acute malnutrition, manage diarrhea, and give vitamin A supplements.

A modified version of the WHO/UNICEF Baby Friendly Hospital Initiative 20-hour training program was completed by 29 medical staff members from maternity units around the nation. A total of 190 community health workers from the regions of Ohangwena, Omusati, Oshikoto, and Khomas received training in feeding infants and young children(WHO/UNICEF, 2010).

To improve nutrition counseling, important nutrition messages for mothers, newborns, and early children were printed on brochures and flip charts, which were then distributed to community and health professionals(MoHSS, 2014).

Innovations Points

There is no review of research on anemia among women and children conducted in Namibia. This review research has focused on the broad search of prevalence figures, classification, causes, and intervention of anemia

among the women and children population. It seeks to encourage cross-disciplinary collaboration by suggesting that researchers from the medical field work together to bring diverse perspectives and expertise to the study of Anemia. Additionally, the findings of this review seek to promote the advocacy of existing policies and programs aimed at reducing anemia. Furthermore, this review would make it possible to evaluate the impact of nutritional supplementation, healthcare access improvements, or educational programs on reducing anemia rates. The content of this review would contribute to the literature on the causation or underlying mechanisms of anemia in women and children.

Challenges

Maintenance of vital feeding and health services impacted by the COVID-19 epidemic. Insufficient funds and personnel were all devoted to handling COVID-19.

RECOMMENDATIONS

According to the experience from existing literature sources, there is a need for long-term data that can provide insights into the persistence of anemia, its impact on health outcomes, and the effectiveness of interventions in Namibia. The researcher would recommend a diverse range of study designs such as epidemiological studies, clinical trials, qualitative research, and observational studies, as this can provide a more robust estimation of the overall prevalence and impact of anemia in Namibia. Anemia is a complex issue with multifaceted determinants, this will provide a comprehensive understanding of anemia from various perspectives. Future research directions would be recommended to highlight specific gaps in knowledge and propose research questions that could advance the anemia research context.

CONCLUSION

A precise description of anemia is essential for planning public health measures, understanding the burden and epidemiology of anemia, and providing clinical care to patients throughout their lives. While dietary adjustments can frequently treat iron deficiency anemia, which is the most prevalent kind and the easiest to treat, other forms of anemia must be treated by addressing underlying infections and chronic illnesses, which necessitate extensive medical treatments.

World Health Organization has guidelines that apply to all WHO regions. To lower the prevalence of anemia through prevention and treatment, with the use of fortification or supplementation with iron, folic acid, and other vitamins and minerals, these recommendations seek to boost dietary.

Diversity enhances baby feeding procedures and raises the bioavailability and consumption of micronutrients. To alter eating habits, social and behavior change communication techniques are employed. The main causes of anemia, such as poverty, illiteracy, and gender norms, are addressed by interventions that focus on

issues like disease control, water, and sanitation, hygiene, and reproductive health.

Nutrition profiles, risk factor trends, demographic shifts, experience in developing and implementing nutrition policies, and the evolution of health systems must all be taken into account when translating global targets into national ones. To treat anemia as a public health concern, many government departments, nongovernmental organizations, and United Nations entities must work together in concert.

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