Effectiveness of a Large-Scale Multiple-Sector Program to Reduce Anemia in Ghanaian and Malawian Women

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ABSTRACT

Background: Although it is well known that anemia is a result of multiple causes and is exacerbated by drought and HIV/AIDS, there are few reported examples of integrated programs effectively addressing the various causes of anemia, especially in difficult contexts. **Aims:** This paper compares the effectiveness of an integrated multi-sectoral program to decrease anemia among Ghanaian and Malawian women, the latter facing the additional burden of recurrent droughts and high HIV prevalence. **Framework**: The anemia program was implemented as part of a comprehensive MICronutrient And Health (MICAH) program implemented from 1996 to 2005 to improve nutrition status of women and children through sustainable, community based interventions, in collaboration with national government ministries, managed by World Vision (WV) and funded by CIDA/WV. The MICAH program, targeting 1.8 million people in Malawi and 150,000 in Ghana, included interventions to increase dietary iron intake and availability, decrease contributing diseases (e.g., malaria, hookworm), build capacity and increase advocacy for improved iron programs. Program effectiveness was evaluated by comparing cross-sectional surveys in 1996/7, 2000 and 2004. **Outcomes:** Anemia prevalence among Ghanaian women decreased from 48% (1997) to 16% (2004) in MICAH areas, remaining at 32% (2004) in comparison areas. Weekly iron/folic acid (IFA) supplementation increased in MICAH (76%) but not in comparison (2%) areas, as did improved malaria prevention. A similar decrease in anemia from 60% (1997) to 18% (2004) was achieved among pregnant women (PW) in MICAH areas, but not in comparison areas (36%), despite similar IFA coverage to PW in both MICAH (69%) and comparison areas (65%). In Malawian women, hemoglobin levels increased significantly in the MICAH communities from 2000 (11.8 ±1.7 g/dL) to 2004 (12.3 ±1.3 g/dL), while no change was observed in the comparison areas. Coverage of weekly iron-folic acid supplements, insecticide treated bednets, raising small animals and fortified flour was significantly higher in MICAH than comparison communities in 2004. **Implications:** Weekly IFA supplementation to non-pregnant women in combination with multiple integrated interventions, contributed to dramatic decreases in anemia in women in Ghana, and although to a lesser degree in Malawi, demonstrating that anemia can be impacted even in difficult contexts. Further work is required to understand the relative contributions of interventions and to improve outcomes in drought-prone and high HIV prevalence contexts.

Small Animal Revolving Loan Recipient with Rabbits in Malawi

INTRODUCTION

Anemia is a pervasive global health problem, affecting 2 billion people.[1] Worldwide, more than 50% of pregnant women and over 30% of all women suffer from anemia.[2] Iron deficiency is the major cause of anemia, as well as the most prevalent nutritional deficiency.

In 2002, the international community resolved to reduce the global prevalence of anemia by one third by 2010[3], however to date there is little evidence of achieving this goal. Programming challenges include the multiple causes of anemia, requiring multi-sectoral efforts; logistical and access to health services constraints for supplementation programs; and the contribution of HIV infections to anemia.

The review of the effectiveness of a recent multiple-intervention program in Ghana and Malawi provides evidence that constraints to anemia control can be overcome.

OBJECTIVES

1. To review the effectiveness of an integrated multi-sectoral program to reduce anemia by one third.
2. To identify potential contributing factors to changes in anemia for programs in a variety of contexts.

Acknowledgements: The MICAH Project is is funded by the Canadian International Development Agency (CIDA) and World Vision Canada (WVC), managed by WVC and implemented by World Vision Malawi and World Vision Ghana in collaboration with a number of government institutions, partner NGOs and MICAH communities.

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FRAMEWORK

Anemia control interventions were implemented in Ghana and Malawi, covering target populations of 150,000 and 1.8 million, respectively, as part of the comprehensive MICronutrient And Health (MICAH) program. Interventions were chosen based on causes of anemia identified in the MICAH baseline survey in each country and were implemented **in partnership with relevant government ministries and communities.**

Non-pregnant women received **weekly iron and folic acid (IFA) supplements**, in addition to supplementing pregnant women daily. **Small animals (guinea fowl, chickens, rabbits)** for household rearing and consumption were distributed to women through a revolving loan scheme, in addition to promoting household and community **gardens** and increasing consumption of iron-rich foods. In Malawi, **small scale fortification** was piloted and adopted with local millers and consumers, whereby micronutrients were added to maize during the milling. **Social marketing** to consumers was a key component. **Environmental measures** to reduce mosquito breeding grounds, malaria prophylaxis for pregnant women (Malawi) and **insecticide-treated nets** were all used to control malaria. Prevention and treatment of **hookworm and schistosomiasis**, including construction of 12,000 pit **latrines** and provision of protected water sources, were implemented to address other contributing factors to anemia. Significant effort was targeted to **influencing policy at national level**, contributing to the development of policies and strategies for anemia prevention and control.

Program effectiveness was evaluated by comparing prevalence of anemia (Chi-square) and difference of mean hemoglobins (Hb) (t-test) among women, from cross-sectional household surveys at baseline (1997), midterm (2000) and final (2004). Significance was defined as $p<0.05$. Anemia was defined as Hb<12.0g/dL in non-pregnant women, and Hb<11.0g/dL among pregnant women.

Malawian Women Fortifying Maize at Local Hammermill

Ghanaian Women Receiving Iron Supplements

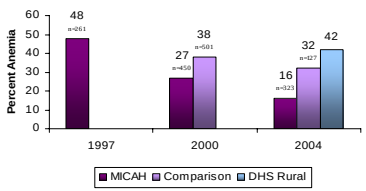
OUTCOMES

Anemia Prevalence Decreased in MICAH Areas:

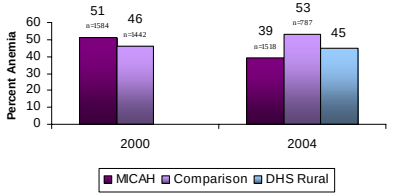
Prevalence of anemia in Ghanaian women decreased by 67% over 7 years; doubling the goal of decrease of 1/3 by 2010 and increasing mean Hb (±SD) from 11.7±1.8 to 12.9 ±1.2 g/dL ($p<0.05$). Anemia prevalence decreased in comparison communities, but to a lesser degree (33%) (Graph 1).

In Malawi, anemia decreased by 23% over 4 years, with a significant increase in mean Hb (±SD) in MICAH areas from 2000 to 2004 (11.8±1.7 g/dL to 12.3±1.3 g/dL), while an increase in anemia prevalence was observed in the comparison areas (Graph 2).

Graph 1: Anemia in Non-Pregnant Ghanaian Women from 1997 to 2004



Graph 2: Anemia in Non-Pregnant Malawian Women from 2000 to 2004

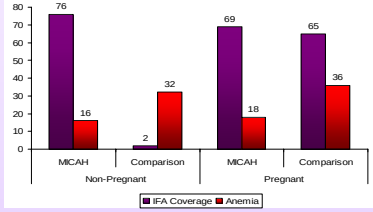


[1]WHO/UNICEF/UNU. Iron deficiency anaemia: assessment, prevention, and control. Geneva, World Health Organization, 2001. (WHO/NHD/01.3)
[2] WHO. The prevalence of anaemia in women. Geneva, World Health Organization, 1992. (WHO/MCH/MSM/92.2)
[3] Resolution adopted by the General Assembly: S-27/2: A world fit for children. United Nations General Assembly, 11 October 2002.
[4] UNAIDS data: www.unaids.org/en/Regions_Countries/Countries/malawi.asp.

Potential Contributors to Decreases in Anemia:

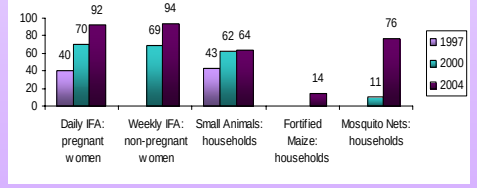
The large anemia reduction achieved by **MICAH Ghana** in non-pregnant women was mainly due to the high coverage of **weekly IFA supplementation to all women of childbearing age** in MICAH areas. It is likely that the weekly IFA supplementation also contributed to the decrease in anemia among pregnant women since IFA coverage for pregnant women was similar in both MICAH and comparison groups, but only the MICAH group showed decreased anemia levels (Graph 3).

Graph 3: Anemia & IFA Coverage in Non-Pregnant & Pregnant Ghanaian Women (2004)



MICAH Malawi achieved a smaller reduction in anemia prevalence, likely due to additional major constraints than Ghana, including higher levels of non-dietary contributing factors (malaria, hookworm, schistosomiasis); drought during 2001/2002; higher rates of HIV infection[4], and a larger target population. The success of the Malawi program is likely due to **multiple interventions**, focusing on increasing dietary iron (**weekly IFA, fortification of maize, small animal revolving funds**), as well as **prevention & treatment of parasites** (Graph 4).

Graph 4: Coverage of Anemia Control Interventions, MICAH Malawi



IMPLICATIONS

Anemia prevention and control in women in developing countries is an achievable goal. The approach and expected results must take into account local context.

Key lessons from the MICAH experience can be applied in anemia control programs:

1. **Anemia prevention and control programs must be context-specific**. Multiple interventions may be required to address all the major contributors to anemia in a population.
2. **In settings where iron deficiency anemia prevalence is in the severe public health range, iron supplementation to all women of childbearing age** is necessary to improve hemoglobin levels. Iron supplementation in pregnancy is insufficient to meet the needs of women who enter pregnancy with low hemoglobin.
3. **Supplementation is a key strategy for rapid improvement of iron status but cannot be relied upon for long-term anemia prevention**.
4. **Iron supplementation and dietary diversification activities can be effectively implemented on a large-scale.**
5. **Community-based administration of anemia control interventions, with strong support and monitoring by government ministries and NGOs, is critical to their success.**