

**Vitamin A Deficiency and Child Mortality in Cameroon:
The Challenge Ahead**

Victor M. Aguayo, Daniel Sibetchou, Martin Nankap, and Nancy J. Haselow^a

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^a D. Sibetchou and M. Nankap are affiliated with the Nutrition Division at the Ministry of Public Health in Cameroon. VM Aguayo and NJ Haselow are affiliated with Helen Keller International (HKI).

Correspondence to: Dr. Victor M. Aguayo. Rue 555/27, Quinzambougou. BP. E-1557, Bamako. Mali.
e.mail: vaguayo@hkimali.org

Summary

It has been demonstrated that in regions where vitamin A deficiency (VAD) is prevalent, VAD control can significantly reduce child mortality. In Cameroon, VAD and mortality rates in children are both very high; for every 1,000 live births, 150 children die before their fifth anniversary and 40% of underfives are vitamin A deficient. Our objective was to estimate the potential child survival benefits of effective policy and program action for the control of VAD in Cameroon. Our analysis shows that in Cameroon, an estimated 937,600 children under five years of age are vitamin A deficient. In the absence of appropriate policy and program action, VAD would be the attributable cause of about 12,000 deaths of children 6-59 months old annually; this represents 23.1% of all cause mortality in this age group. Therefore, VAD control has the promise to be among the most cost-effective and high-impact child survival interventions in Cameroon. Among the challenges that Cameroon will need to face in the coming years, VAD in children is one that can be overcome. The solutions are effective and affordable and the need urgent.

Introduction and Objective

Four independent meta-analyses of eight population-based intervention trials conducted between 1986 and 1993 worldwide, showed that in areas where VAD is prevalent, vitamin A repletion reduces child mortality by an average 23-34% (1-4). In Cameroon, both vitamin A deficiency (VAD) and mortality rates in children are high. The objective of our analysis was to estimate the potential child survival benefits of effective policy and program action for the control of VAD in Cameroon.

Methods and Findings

The most recent data on the extent of VAD in Cameroon come from the national VAD survey conducted by the Ministry of Public Health between September and November 2000. Blood samples were collected in a nationally representative sample of children 12-71 months old (n=2375) using a two-stage cluster sampling methodology. Serum retinol concentration was analyzed using high performance liquid chromatography (HPLC). VAD was defined as a serum retinol (SR) concentration below 0.70 $\mu\text{mol/L}$. According to the results of the National VAD survey, 40% of Cameroonian underfives presented SR levels below the 0.70 $\mu\text{mol/L}$ threshold and were therefore considered as vitamin A deficient (5). This prevalence is 2.7 times higher than that of 15% used for the definition of VAD as a problem of public health concern in children (6).

According to the most recent Demographic and Health Survey, the child mortality rate in Cameroon is estimated at 150; this means that for every 1,000 live births, 150 children die before they are five years old (7). Children with VAD are at an increased risk of death. It is estimated that the risk of death in children 6-59 months old suffering from VAD is 1.75 times higher than that in children without VAD (8).

The potential contribution of VAD to child mortality in Cameroon was estimated combining the observed VAD prevalence in children under five years of age, the measured child mortality effects of VAD, and the observed child mortality levels in the country. The following equation was used: $PAR = \frac{PREV (RR-1)}{1 + (PREV (RR-1))}$; where PAR (population attributable risk) is the proportion of all-cause child mortality in Cameroon attributable to VAD; PREV is the observed prevalence of VAD in children under five years of age (40.0%); and RR the increased risk of death in children with VAD relative to children without VAD (1.75).

Our analysis shows that in Cameroon, an estimated 937,600 children under five years of age are vitamin A deficient. In the absence of appropriate policy and program action, VAD would be the attributable cause of about 12,000 deaths of children 6-59 months old every year (23.1% of all cause mortality in this age group). Effective VAD control can therefore reduce child mortality in Cameroon by an estimated 23% (table 1); this needs to be considered a conservative estimate of the potential contribution of VAD-control to child survival in Cameroon because our analysis did not account for the contribution of VAD to the mortality of infants 0-5 months as the available data from which to derive estimates is inconclusive.

Results and Discussion

In view of the almost one million underfives suffering from VAD and of the significant contribution of VAD to child mortality in the country, the Ministry of Public Health in Cameroon has adopted high-potency vitamin A supplementation as a short-to-medium term strategy for the control of VAD in children. In 2000, vitamin A supplementation was integrated for the first time into National Immunization Days (NIDs) for polio eradication. Since then, the integration of vitamin A supplementation into NIDs has ensured one annual high-potency vitamin A dose to over 90% of children 6-59 months old.

However, to ensure maximum impact in the reduction of VAD-attributable mortality, children 6-59 months old need to receive two high-potency vitamin A supplements annually (4-6 months apart). Beginning in March 2002, the Ministry of Public Health in Cameroon decided to integrate vitamin A supplementation into routine child health services, with emphasis on its integration into the Expanded Program of Immunization (EPI), to ensure that all children 6-59 months reached by the health system receive two high-potency vitamin A doses annually. Unfortunately, the national VAD survey in 2000 shows that less than 2% of children had received a non-NIDs vitamin A supplement in the six months preceding the survey.

It is therefore imperative that additional program strategies be implemented to deliver vitamin A supplements to children bi-annually to maximize the child survival benefits of vitamin A supplementation. Moreover, with the upcoming phasing out of NIDs in 2004, all potential opportunities for vitamin A coverage acceleration will need to be used. The Community Directed Treatment with Ivermectin (CDTI) for onchocerciasis control offers one such opportunity for the acceleration of vitamin A supplementation coverage in Cameroon, as 80% of the country is covered by CDTI programs (scheduled for the next 15-20 years), which involve over 15,000 community distributors.

Whatever the mechanism used, it is important that bi-annual vitamin A supplementation of children 6-59 months old be seen as a component of an integrated strategy for VAD control in Cameroon. Such strategy needs to include as well: a) the supplementation of all women in the early postpartum period (as soon as possible after delivery but not later than 6 weeks postpartum) with a high-potency vitamin A supplement; b) the promotion of exclusive breastfeeding for six months; c) the promotion of adequate complementary feeding practices beginning at six months with continued breastfeeding until 24 months and beyond; d) the promotion of production and consumption of vitamin A-rich foods including vitamin A fortified foods; and e) the effective control of infection diseases in childhood.

The control of VAD has the promise to be among the most cost-effective child survival interventions in Cameroon as it could reduce child mortality by an estimated 23% from 1998 child mortality levels (before the onset of large-scale vitamin A supplementation). Among the challenges that Cameroon will need to face in the coming years, VAD control in children is one that can be overcome. The solutions are known, effective, and affordable and the need is urgent.

References

1. Beaton GH, Martorell R, Aronson KJ, Edmonston B, McCabe G, Ross AC, et al. Effectiveness of vitamin A supplementation in the control of young child morbidity and mortality in developing countries. ACC/SCN State-of-the-Art Series: Nutrition Policy Discussion Paper No. 13. Geneva: The United Nations, 1993
2. Fawzi WW, Chalmers TC, Herrera MG, Mosteller F. Vitamin A supplementation and child mortality: a meta-analysis. *Journal of the American Medical Association* 1993; 269: 898-903.
3. Glaziou PP, Mackerras DEM. Vitamin A supplementation and infectious disease: a meta-analysis. *British Medical Journal* 1993; 306: 366-70.
4. Tonascia JA. Meta-analysis of published community trials: impact of vitamin A on mortality. *Proceedings of the Bellagio Meeting on vitamin A deficiency and childhood mortality*. New York: Helen Keller International, 1993.
5. Ministere de la Sante Publique. Enquete Nationale sur la carence en vitmaine A et l'anemie au Cameroon. Washington, DC. USA 2000.
6. Sommer A and Davidson FR. Assessment and control of vitamin A deficiency: The Annecy Accords. *Journal of Nutrition*, 2002; 132: 2845S-2850S.
7. Enquete Demographique et de Sante du Cameroun de 1998 (EDSC-II). Ministere de la Sante Publique de Yaounde, (Cameroon) and Macro International Inc, Calverton, Maryland (United States of America), 1999.
8. Ross JS. Derivation of the relative risk of child mortality due to vitamin A deficiency. *PROFILES Working Notes Series No. 2*. Academy for Educational Development (AED). Washington, DC. USA. 1996.

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