Review Paper

Maintaining high vitamin A supplementation coverage in children: Lessons from Niger

Victor M. Aguayo, Shawn K. Baker, Xavier Crespin, Harouna Hamani, and Aissa MamadoulTaïou

Abstract

In 1997, the reduction of child mortality became a policy priority for the Government of Niger because Niger's child mortality rate was the highest in the world. The Ministry of Public Health, Helen Keller International (HKI), and UNICEF spearheaded a coalition-building process linking vitamin A deficiency (VAD) control to national child survival goals. An evidence-based advocacy strategy was developed around the child survival benefits of adequate and sustained VAD control with one unambiguous message: "VAD control can avert over 25,000 child deaths per year." As a result, in 1997 Niger became one of the first countries in Africa to effectively integrate vitamin A supplementation into National Immunization Days (NIDs) for polio eradication. The challenge was then to provide children with a second annual dose of vitamin A. This led in 1999 to the first ever National Micronutrient Days (NMDs) in Africa. NMDs are mobilization campaigns in which caregivers are actively encouraged to take their children for the delivery of vitamin A supplements. Since 1999, the combination of NIDs and NMDs has ensured that over 80% of children 6 to 59 months of age receive two vitamin A doses annually. The success of NIDs/NMDs has relied on five pillars: leadership and ownership by the Ministry of Public Health; district-level planning and implementation; effective training and flexible delivery mechanisms; effective social information, communication, and mobilization; and responsiveness and flexibility of Ministry of Public Health and development partners. This successful approach has been widely disseminated, notably through the West African Nutrition Focal Points Network.

Key words: Child survival, Niger, supplementation, vitamin A

Introduction

For several decades, vitamin A deficiency (VAD) has been recognized as the leading cause of preventable pediatric blindness in developing countries [1]. A better understanding of the public health importance of VAD began when four independent meta-analyses revealed that in areas where VAD is prevalent, mortality rates in children 6 to 59 months of age can be reduced by 23% to 34% following vitamin A repletion [2–5].

Current global estimates suggest that 127 million preschool-age children have VAD and therefore are at an increased risk of death, mainly from diarrhea, measles, and malaria; an estimated 26% to 33% of vitamin A deficient children worldwide live in sub-Saharan Africa [6, 7]. The recognition of VAD control as a low-cost/high-impact child survival intervention in countries where VAD is endemic led numerous countries in sub-Saharan Africa to launch broad-based, high-potency vitamin A supplementation programs to cover 4–6 months of children's vitamin A needs twice yearly. This paper reviews the chronology, principles, and perspectives of the implementation of twice-yearly broad-based vitamin A supplementation programs in Niger.

Chronology of program development

Niger is one of the poorest countries in the world. The Demographic and Health Survey (DHS-I) conducted

Victor M. Aguayo is affiliated with UNICEF Regional Office for West and Central Africa. Shawn K. Baker is affiliated with Helen Keller International (HKI) Regional Office for Africa. Xavier Crespin, Harouna Hamani, and Aissa MamadoulTaïou are affiliated with HKI-Niger.

A preliminary version of this paper was presented at the XXI International Vitamin A Consultative Group Meeting at Marrakech, Morocco. February 3–5, 2003.

Please direct queries to the corresponding author: Dr. Victor M. Aguayo, Regional Nutrition Advisor; UNICEF Regional Office for West and Central Africa; BP. 29720, Dakar, Senegal; e-mail: vaguayo@unicef.org.

in Niger in 1992 revealed a national mortality rate of 320 deaths per 1,000 live births among children under five years of age; 80% of these deaths occurred in children 6 to 59 months of age [8]. This under-five mortality rate was at that time the highest in the world. Moreover, child mortality rates had showed no positive trend in the previous 25 years. Following the release of the DHS-I report, the reduction of child mortality became a policy priority for the Government of Niger and its development partners.

In 1993, an independent meta-analysis of eight population-based trials enrolling more than 165,000 children worldwide showed that in areas where VAD is prevalent, child mortality is reduced by an average of 23% following vitamin A repletion [2]. This significant reduction in childhood mortality, which is attributable largely to the reduction in mortality from measles [9, 10], severe diarrhea and dysentery [11], and possibly falciparum malaria [12], made VAD control one of the most cost-effective and high-impact child survival interventions in regions where VAD was prevalent.

In the light of these findings, in 1995 the control of VAD became an integral part of the Ministry of Public Health's national sectoral policy. In 1996, routine vitamin A supplementation was integrated into the *Journées d'Accéleration du PEV*—a catch-up campaign added to the Expanded Program of Immunization (EPI); this approach ensured the coverage of 71% of infants 6 to 11 months of age (the EPI target group). However, only 19% of children 12 to 59 months of age benefited from high-potency vitamin A supplementation [13].

The Ministry of Public Health of Niger, Helen Keller International, and UNICEF decided to join forces to demonstrate that the Government of Niger with its development partners could deliver vitamin A supplements to children 6 to 59 months of age through National Immunization Days (NIDs) for polio eradication. In 1997, Niger became one of the first countries in sub-Saharan Africa to ensure the effective integration of vitamin A supplementation into NIDs, allowing for the annual provision of a high-potency vitamin A supplement to over 80% of children 6 to 59 months of age in 1997 and 1998 (**fig. 1**).

In 1998, the Micronutrient Initiative (MI) and UNICEF generated worldwide country-level VAD prevalence estimates to increase policy attention to the control of VAD in countries where country-level VAD survey data were not available [14]. These estimates were developed using interpolation models built upon a data set that included 42 VAD surveys (39 of them subnational) in 36 countries worldwide (1987–95). The models that maximized the concordance between the observed and predicted values for countries with VAD survey data were used to generate VAD country-level estimates for countries where, as in Niger, national-level VAD survey data were not available. According to these and later calculations, an estimated 25–50% of children in Niger were vitamin A deficient.

These VAD estimates and the momentum created by the successful integration of vitamin A supplementation into NIDs in 1997 and 1998 (advocacy is effective only if one can demonstrate that what *needs* to be done *can* be done) were the foundation for an advocacy coalition-building process linking effective VAD control to national child survival goals. A targeted, evidence-based policy advocacy strategy was built around the child survival benefits of effective and sustained policy and program action for VAD control. Two unambiguous policy advocacy messages were developed: "In Niger, effective and sustained VAD control can avert over 25,000 child deaths per year" and "In Niger, effective and sustained VAD control can reduce child mortality by an estimated 29% from 1992 mortality levels."

From a programmatic perspective, the challenge was to ensure that children 6 to 59 months of age be provided with two high-potency vitamin A doses per year: one annual dose delivered in conjunction with NIDs, and a second annual dose provided through a new delivery mechanism in the form of a national mobilization campaign around micronutrients. This led in 1999 to the first National Micronutrient Days in Africa (and the first nationwide mass vitamin A supplementation campaign independent of a national immunization campaign). National Micronutrient Days (NMDs) are mobilization campaigns in which caregivers are actively encouraged to take their children to designated centers or outreach posts for the delivery of vitamin A supplements. Since June 1999, NMDs have been organized every six months, either in conjunction with NIDs or as stand-alone institutionalized campaigns managed by the district-level health system. Since June 1999, NMDs have ensured that more than 80% of children receive a second dose of vitamin A annually. Moreover, since

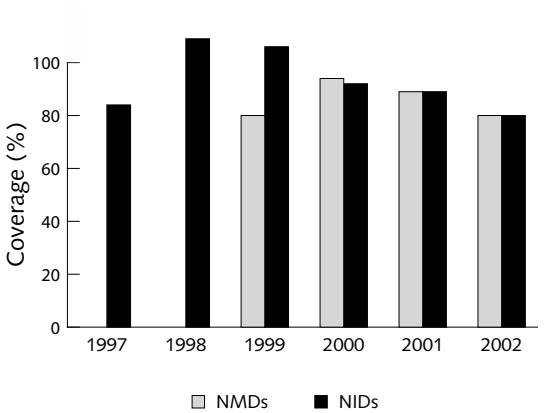

FIG 1: Vitamin A supplementation coverage (%) in children 6–59 months old through National Immunization Days (NIDs) and National Micronutrient Days (NMDs). Niger, 1997–2002

December 1998 the combination of NIDs and NMDs has ensured that over 80% of children 6 to 59 months of age receive two high-potency vitamin A doses annually (**fig. 1**) and has allowed for the provision of vitamin A and iron-folate supplements to more than 50% of eligible postpartum (vitamin A) and pregnant (iron-folate) women. (**fig. 2**).

Key features of the program

In Niger, a sustained coalition for child survival between the government and its development partners has ensured the effective and sustained integration of vitamin A supplementation into NIDs and NMDs on the basis of five features.

Leadership and ownership by the Ministry of Public Health

The Ministry of Public Health has led the planning, implementation, monitoring, and evaluation of NIDs/NMDs since their inception through the Ministry of Public Health-based National Coordination Committee for NIDs/NMDs, under the presidency of the Deputy Secretary General of the Ministry of Public Health. The National Coordination Committee has three subcommittees: the Technical Committee, the Social Mobilization Committee, and the Logistics Committee. The same organizational chart (i.e., a coordination committee consisting of three subcommittees for technical, social mobilization, and logistic issues) exists in each of the country regions ($n = 8$) and districts ($n = 42$).

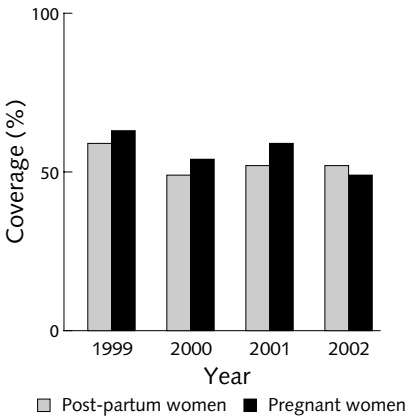

FIG 2: Supplementation coverage (%) of post-partum (vitamin A) and pregnant (iron + folate) women through National Micronutrient Days (NMDs). Niger, 1997–2002

Women in the early post-partum period (< 40 days after delivery) received a high-potency vitamin A supplement (200,000 IU). Pregnant women received a 90-day supply of iron + folate supplementation (60 mg elemental iron and 400 μg folic acid per supplement).

District-level planning and implementation with oversight and coordination at the central level

Each district takes the lead in the planning and implementation of the district plan of action for NIDs/NMDs. District-level planning is led by the district with technical assistance from the central level when assistance is needed. The planning phase involves all district-level administrative and traditional authorities, the heads of all health centers in the district, the leaders of the district health committees, and the leaders of women, youth, and religious groups. Once finalized, district plans of action are submitted to the regional coordination committee. The regional committee reviews all district plans in the region and consolidates them into a regional plan of action for NIDs/NMDs. The eight regional plans are then reviewed by the National Coordination Committee and consolidated into a national plan for NIDs/NMDs. Once the national plan is finalized and the necessary governmental and nongovernmental resources have been mobilized and allocated by the Ministry of Public Health (including the vitamin A supplements), resources are passed on from the Ministry of Public Health (central level) to the eight Regional Health Directorates (intermediary level), who in turn allocate them to the Health Districts (peripheral level) for the implementation of the district plans of action for NIDs/NMDs. Vitamin A supplements are donated by the Canadian Agency for International Development (CIDA) to UNICEF through the Micronutrient Initiative.

Effective training and flexible delivery mechanisms

A cascade approach ensures the effective training of supplementation and supervision agents at all levels. A training of trainers takes place at the central level, where two master trainers per region are trained; region-level master trainers train two trainers per health district; district-level trainers train the district supplementation and supervision agents, a body consisting of over 5,000 district-level health workers and volunteers (with no medical training). Training and supervision tools are developed at the central level and adapted at the district level to the specific needs and realities of the districts. To respond to the uneven geographical distribution of the population and coverage of the national health system (only 48% of the population lives within 5 km of a health facility), flexible delivery mechanisms have been conceived for the distribution of vitamin A supplements at NIDs/NMDs. Districts have adopted a combination of three approaches: the fixed strategy, in which supplement distribution takes place in the existing health facilities (fixed posts); the advanced strategy, in which supplement distribution takes place in health posts created for the occasion (advanced posts) in rural areas located within 5 to 10 km from a fixed

post; and the mobile strategy, in which supplementation is implemented by mobile distribution teams in populations located more than 10 km from a fixed or advanced health post, and distribution may take place in a centrally located site or door-to-door.

Effective social information, communication, and mobilization

A country-wide mobilization campaign is designed and implemented to mobilize the population around vitamin A supplementation at NIDs/NMDs. This social mobilization campaign uses nationwide mass communication media (television and radio), as well as regional and district-level communication channels such as visual supports (fliers, posters, banners), local theater/mobilization groups, and radio and television spots in region- or district-appropriate languages. The involvement of policy makers, decision makers, and opinion leaders in rallying the population around vitamin A supplementation at NIDs/NMDs is crucial. This involvement takes place at all levels. At the regional and district levels, the involvement of local administrative authorities and traditional and spiritual leaders with their public endorsement and support of vitamin A supplementation ensures mass social participation at NIDs/NMDs. At the central level, this involvement includes debriefing sessions with the Prime Minister, the President of the National Assembly and the Head of State, followed by press conferences and press releases by the Minister of Public Health and the representatives of major development partners. The launch day of NIDs/NMDs has been declared a holiday to encourage the active participation of employed caregivers in NIDs/NMDs. The President of the Republic of Niger launches the campaigns himself; all government ministers and a large delegation of the diplomatic corps accompany the president at this ceremony. This high-profile event is widely disseminated through the national television and radio networks.

Responsiveness and flexibility of Ministry of Public Health and development partners

In order to make the most efficient use of resources, it is important to take advantage of opportunities to integrate vitamin A supplementation into other programs. It has been critical that the Ministry of Public Health and its partners be able to respond to opportunities, and, conversely, act quickly to maintain coverage if other distribution mechanisms are not available. In 2003, NIDs for polio eradication were planned for the entire country; however, six weeks before their implementation, new surveillance data led to the decision to restrict the polio eradication campaign to 13 districts. The Ministry of Public Health and its partners were able to react quickly enough to ensure micronutrient distribution independently of the immunization campaign in the remaining 29 districts.

Perspectives

Programmatically, the challenges are now to ensure that twice-yearly universal vitamin A supplementation is sustained as a regular ("routine") strategy of increasing cost-effectiveness, and to ensure that twice-yearly universal vitamin A supplementation does not delay, displace, or weaken the implementation of other VAD control strategies, but that it drives an integrated, effective, and sustained nationwide assault on VAD that includes the following four other key components.

Improved infant and young child feeding

The meta-analysis by Beaton et al. [2] showed that the mortality reductions in children 6 to 24 months of age made up more than 70% of the total mortality reduction in children 6 to 59 months of age following vitamin A repletion. Optimal infant and young child feeding is therefore crucial for the effective control of VAD. Breastmilk is vital in keeping an adequate vitamin A intake in infants in the first six months of life and possibly throughout infancy [15]. In Niger, breastfeeding indicators reveal a suboptimal situation, as only 2% of infants 0 to 3 months of age are exclusively breastfed [16]. In West Africa, Gambia, Ghana, and Mali have proved that well-designed community- or facility-based programs can bring about significant improvements in the rates of early initiation of breastfeeding, exclusive breastfeeding, and prolonged breastfeeding.

Maternal postpartum vitamin A supplementation

When the vitamin A content of human milk is suboptimal due to the suboptimal vitamin A status of the mother, vitamin A supplementation of women in the early postpartum period becomes key in improving women's vitamin A status and the vitamin A content of breastmilk [17]. Although it is a policy of the Ministry of Public Health, maternal postpartum vitamin A supplementation coverage in Niger is still low, as only an estimated 16% of mothers are provided with a high-potency vitamin A supplement within the 40 days following delivery (28% of women living in urban areas and 14% of women living in rural areas) [18]. NMDs have been used both as an awareness-raising and as a delivery mechanism for maternal postpartum vitamin A supplementation. Since 1999, over 50% delivering within the 40 days (the traditional lying-in period) prior to an NMD have received a high-potency vitamin supplement.

Improved vitamin A dietary intake

Dietary improvement approaches need to be an integral part of a sustainable strategy to control VAD. In the past 10 years, significant progress has been achieved globally in the design and implementation of dietary approaches, particularly the new generation of projects that integrate production, nutrition education, and behavior-change communications strategies [19]. In Niger, a behavior-change communications strategy focusing on increasing liver consumption resulted in significant improvements in liver intake [20]; similarly, a homestead food-production approach focusing on increasing the production of micronutrient-rich crops—including the introduction of orange-fleshed sweet potatoes—resulted in significant improvements in production and consumption [21].

Vitamin A fortification of locally available foods

Fortification of widely consumed foods with vitamin A can be crucial for improving the vitamin A status of the general population, and that of women of reproductive age in particular. In Niger, the production of centrally processed foods is limited (most processed foods that are consumed are imported) and the private sector is weak. A National Food Fortification Committee was created in January 2003 to encourage and monitor food-fortification initiatives. The Committee includes representatives of the Ministry of Public Health, Rural Development, Finance and Economy, and Agriculture and Industry, as well as representatives of the Chamber of Commerce, the National Consumers' Associations, food processing companies, the World Health Organization (WHO), UNICEF, the Food and Agriculture Organization (FAO), and Helen Keller International (HKI). A formerly state-owned peanut oil refinery in Maradi, which was out of operation since 1990 and privatized in 2001, began production of peanut oil in 2002. Annual production is currently about 20,000 metric tons, with a capacity for 65,000 metric tons. This is the sole large-scale producer of cooking oil in the country, and it is being targeted for vitamin A fortification through a public–private partnership, as the national committee and the refinery owner have both agreed to pursue vitamin A fortification of this oil. National food-consumption surveys show that an estimated 85% of women of reproductive age consume cooking oil regularly (three to seven times per week).

Conclusions

African and other world leaders have made a commitment to reduce mortality rates in children by two-thirds between 1990 and 2015 [22]. Epidemiological evidence shows that in sub-Saharan Africa, the effective control of VAD has the promise to be among the most cost-effective and high-impact policy and program actions towards this goal. In Niger, a sustained coalition for child survival between the government and its development partners has ensured high coverage (more than 80%) of vitamin A supplementation twice yearly since December 1998. This successful program in Niger—one of the poorest countries in sub-Saharan Africa—along with those in Ghana and Zambia [23] shows that among the many challenges that African countries will need to face in the coming years, VAD control is one that can be overcome. The need is urgent, and the solutions are known, effective, and affordable.

Acknowledgments

This paper is a product of Helen Keller International (HKI), developed with a grant from the Micronutrient Initiative (MI), Ottawa, Canada, and with financial assistance by the Canadian International Development Agency (CIDA). Support for the integration of vitamin A supplementation into NIDs and for the organization of NMDs come from MI, CIDA, UNICEF, the US Agency for International Development (USAID), and Leiner Health Products. The opinions expressed in this paper do not necessarily reflect those of UNICEF, MI, CIDA, or the Ministry of Public Health in Niger.

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