CONDITIONS FOR SCALING BACK UNIVERSAL PRESCHOOL VITAMIN A SUPPLEMENTATION

POLICY BRIEF

ABSTRACT

Vitamin A deficiency (VAD) remains a widespread public health problem in many low- and middle-income countries (LMIC), despite changes in under-five mortality rates and morbidity patterns, and innovative intervention options. Vitamin A supplementation (VAS) programs have contributed to the reduction in under-five mortality rates, but alone do not address the underlying problem of inadequate dietary vitamin A intakes and VAD among preschool-aged children* in LMIC. Given the proven child survival benefits of VAS, decisions to scale back or shift from universal VAS should be based on information that verifies that vulnerable populations have an adequate and sustained vitamin A status from dietary sources and other interventions. This brief highlights a four-phase decision-making process developed by the Global Alliance for Vitamin A (GAVA) that includes (i) a situation analysis that identifies and compiles existing data on vitamin A nutrition, infections among preschool-aged children, and the reach and quality of implementation of VAD control programs, (ii) an assessment of the adequacy of existing data in terms of recency, representativeness and quality to inform whether additional information is needed, (iii) a description of the vitamin A status and vitamin A intake among preschoolers appropriately disaggregated by risk groups, and (iv) a recommendation to sustain, modify, or scale back VAS based on the context.

* Preschool-aged children include children aged 6 to 59 months.

BACKGROUND

Vitamin A deficiency (VAD) has been recognized as a major public health concern for decades [1]. In 1990, the UN World Summit for Children called for the "virtual elimination of vitamin A deficiency and its consequences, including blindness." Following this call, VAS and other vitamin A interventions were intensified and scaled up in many low- and middle-income countries (LMIC), contributing to the global reduction of VAD in preschool-aged children from 39% in 1991 to 29% in 2013 [2]. This overall improvement in vitamin A status was driven mainly by large reductions in VAD prevalence in East Asia, Latin America and the Caribbean. As of 2013, however, VAD prevalence remained high in Sub-Saharan Africa (48%) and South Asia (44%) [2].

KEY DEFINITIONS

Vitamin A intake: The amount of vitamin A taken into the body, from all sources.

Vitamin A status: The level of vitamin A in the body at a particular time, as measured by biochemical indicators.

Vitamin A nutrition: The sum of the processes by which we take in and utilize vitamin A. This includes vitamin A intake and any factors that may influence the intake, absorption and utilization of vitamin A, such as infection.

The scientific basis for providing twice-annual, high-dose vitamin A supplementation (VAS) for children aged 6 to 59 months in LMIC is unequivocal [3, 4, 5, 6]. VAS is associated with a reduced risk of all-cause mortality and nutritional blindness, as well as reduced incidence of diarrhoea [7]; the positive impacts of VAS have been demonstrated in diverse populations with varying levels of baseline VAD and where under-five child mortality rates range from 5.3 to 126.2 per 1000 child years [6]. The abundant evidence supporting the positive effect of VAS on child survival was translated into international guidelines, the most recent of which was released by the World Health Organization (WHO) in August 2011 [7]. VAS is considered one of the most successful public health interventions given its impact on child survival, the ease with which it is integrated into primary health care programs, and the ability for it to have high, sustained and equitable coverage in different contexts. It is one of the most widely implemented child survival interventions, and, since 2000, a total of 80 countries where preschool VAD is a public health problem have scaled up VAS [8].

VAS programs have contributed to the reduction in under-five mortality rates, but VAS programs alone do not address the underlying problem of inadequate dietary vitamin A intakes and VAD among preschool-aged children in LMIC. VAS improves vitamin A status, as assessed by plasma retinol concentration, for around 4 to 12 weeks and is intended to reduce children's risk of death and infections. In undernourished populations, other complementary interventions are needed to address the underlying causes of VAD and sustain adequate levels of vitamin A intake [9]. These include vitamin A-fortification of staple food items, increased production and promotion of carotenoid bio-fortified foods (e.g. beta-carotene fortified maize, orange fleshed sweet potato), interventions which promote dietary diversification including animal source foods, use of micronutrient powders, promotion of breastfeeding, and prevention and control of infectious diseases. These strategies, when implemented successfully and equitably to reach those at highest risk for VAD, aim to increase daily vitamin A intake and can help normalize vitamin A status and provide a reliable and sustained dietary safety net.

Many countries have implemented universal VAS for children aged 6 to 59 months for close to 20 years, and a few of these countries have seen reductions in VAD in parts or all of their preschool-age population. Policy-makers and program managers are rightfully beginning to ask – "*when is it appropriate to scale back or shift from universal VAS?*"

THE GAVA FRAMEWORK: A FOUR-PHASE PROCESS TO GUIDE DECISION-MAKING ON WHEN TO SCALE BACK UNIVERSAL VAS

During a technical consultation in 2012, the Global Alliance on Vitamin A (GAVA) and its partner organizations agreed that the decision on whether or not to scale-back universal VAS in a given population requires careful consideration due to the life-saving impact VAS has among preschool children living in areas of high VAD prevalence and child mortality. The consultation further concluded that VAS should not be withdrawn until there is high-quality evidence assuring that vitamin A status in the population is acceptable and that the population is consuming adequate amounts of vitamin A from their diets. In contexts where the adequacy of vitamin A status and intake vary between subpopulations, scale-back of VAS should only be considered in subpopulations where both status and intake are acceptable.

Following the consultation, GAVA and its partners developed a four-phase process to help countries assess progress made towards the sustained elimination of VAD in preschool-aged children (Figure 1). The first three phases involve the collection, assessment and review of data related to vitamin A nutrition, and the framework presented in the final phase guides the decision-making process on when to scale back preschool VAS programs.

PHASE 1: SITUATION ANALYSIS

GAVA recommends that countries conduct a situation analysis to identify and compile existing data that reflects vitamin A nutrition among preschool-aged children in the population. This includes recent population-level dietary intake data and biochemical data on vitamin A status that can be disaggregated by key sub-populations, including children 6 to 11 months of age, children 12 to 23 months of age, children 24 to 59 months of age, socio-economic groups and relevant sub-national divisions.

In addition to vitamin A status and intake, the GAVA framework encourages countries to consider additional contextual factors influencing vitamin A status to ensure that any program adjustments are fully informed. Countries should inventory and review data regarding all activities and interventions that may have an influence on the vitamin A nutrition of preschool-aged children. This

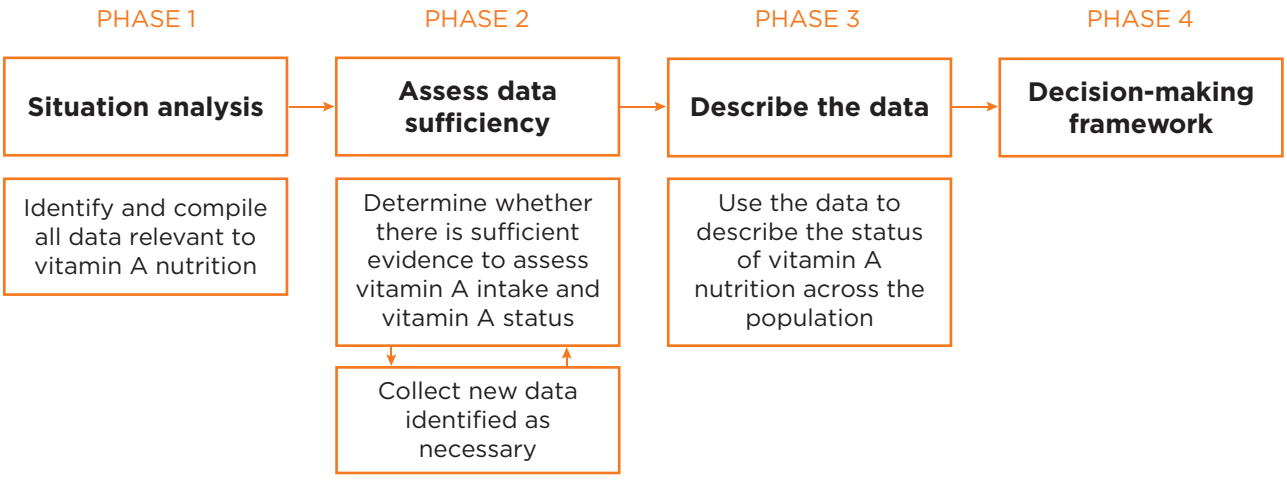

Figure 1: Four-phase process for evidence-based decision-making regarding the scale-back of VAS programs.

includes the presence, strength and coverage of interventions that address vitamin A intake (e.g. production of vitamin A-fortified or carotenoid-bio-fortified foods, or programs promoting dietary diversity), and data on various indicators related to vitamin A status and VAS program impact (morbidity, mortality, immunization rates, exclusive breastfeeding, etc.). The situation analysis should also include data on political and environmental factors that might expose the country or region to a high risk of shocks or stresses (e.g. drought, flooding, disease outbreaks, market fluctuations and conflict) known to influence vitamin A nutrition. Examples of relevant data to include in the situation analysis are listed in Table 1.

Data collected during the situation analysis will be used to guide the collection of missing data if needed, navigate the decision-making framework in Phase 4, and support the planning and execution of the recommendations in the framework.

Biological indicators[1]	• Biochemical measures of vitamin A status and any ancillary information required to interpret these measures (e.g. serum retinol along with markers of inflammation such as C-reactive protein and alpha-1-acid glycoprotein) • Prevalence of night blindness and xerophthalmia
Dietary intake and food availability	• Breastfeeding patterns (e.g. duration and rates of exclusive breastfeeding and continued breastfeeding) • Nutrient intake data for the consumption of vitamin A by children aged 6 to 59 months from all sources (prevalence of habitual vitamin A intake below the estimated average requirement or adequate intake, and mean total daily vitamin intake) • Market and household food availability of foods containing vitamin A
Health and illness indicators	• Anthropometric status (stunting, wasting) • Prevalence of low birthweight • Incidence of measles and diarrhoea • Deaths due to diarrhoea and infectious causes • Under-five mortality rate and infant mortality rate • Immunization coverage for children 12 to 23 months of age
Vitamin A-fortification of foods[2]	• Adequacy of vitamin A concentration in vitamin A-fortified foods, according to industry standards for micronutrient fortification • Coverage of adequately fortified vitamin A-fortified foods, including staple foods, condiments, and processed foods • Consumption of vitamin A-fortified foods among preschool-aged children (e.g. percentage of children consuming vitamin A-fortified foods, frequency of consumption, quantitative intake estimates) • Coverage and adherence of MNP programs

[1] The biological indicators are the only measures sufficient to determine prevalence of VAD.
[2] The situation analysis should only include data on vitamin A-fortified foods appropriate for consumption by young children.

PHASE 2: ASSESS DATA SUFFICIENCY

In the second phase, program managers should assess the sufficiency of the data collected during the situation analysis. Overall, program managers should assess whether or not the data is sufficient to:

a. Determine the vitamin A intake of preschool-aged children (including key sub-populations) from all sources of vitamin A; and

b. Estimate the prevalence of VAD among preschool-aged children (including key sub-populations) from biochemical data on vitamin A status.

To be considered sufficient, the sources of data should be high-quality, recent (i.e. <five years old), statistically representative of the population group being assessed, appropriately timed, and measured alongside other characteristics that will allow disaggregation of data. In terms of appropriate timing, the data should account for seasonal variations in food availability, vitamin A status and vulnerability to VAD to ensure that the data does not over- or underestimate indicators of vitamin A nutrition based on the timing of data collection. Also, biochemical data should not include data from preschool-aged children who received a high-dose vitamin A supplement in the eight weeks prior to sample collection. The data should include relevant sample characteristics such as region, gender and age, and the vitamin A status of vulnerable subpopulations should be assessed to ensure that inequalities are identified. Relevant subpopulations should be representative and accessible [12], and possible characteristics to identify populations at risk may include societal segmentations such as refugee groups and displaced persons, and socioeconomic factors such as income level, water supply and level of sanitation, and access to health and social services [10].

If program managers are adequately able to estimate these two parameters using available data, they can continue to Phase 3.

Identifying information gaps

If information is missing or insufficient, efforts and resources should be directed towards filling critical information gaps before proceeding. The collection of high-quality and representative dietary intake and biochemical data among preschoolers is challenging and requires expertise in appropriate sampling, data collection, data management and analysis. Tools such as the Center for Disease Control's Micronutrient Survey Toolkit can help guide the planning and implementation of micronutrient surveys [12] while the International Dietary Data Expansion (INDDEX) project [13] and the US National Cancer Institute [14] provide guidance on the collection and use of dietary data.

Before initiating data collection efforts, program managers must identify information gaps, assess which data would best suit the needs of the country, and decide how to prioritize the collection of missing data. Figure 2 shows an example of the prioritization of data collection in contexts where biochemical data is missing or insufficient. If the need to collect additional data is identified, it may be economical to obtain the data along with the surveillance of other relevant micronutrient and nutrient deficiencies [10].

PRIORITIZING DATA COLLECTION FOR DECISION-MAKING

Biochemical surveys are expensive and require specialized expertise. In contexts where biochemical data is missing or insufficient, program managers should first assess whether or not a survey is justified before planning a survey.

Step 1. Assess sufficiency of data on vitamin A intake and vitamin A programs, and fill in data gaps

- Is there high-quality, representative data on dietary intake of vitamin A, collected in the last five years?
- Does this data suggest that dietary intake of vitamin A is sufficient?

Step 2. Assess if data on vitamin A intake and vitamin A programs suggest that a positive shift in vitamin A status since the last biochemical survey is plausible

- Does the data suggest that dietary intake of vitamin A has improved since the last biochemical survey?
- Does the data suggest that VAD control programs were put in place and/or improved since the last biochemical survey?

If there is sufficient information to suggest that a positive shift in vitamin A status since the last survey is plausible, then a biochemical survey may be justified.

Figure 2: Steps for prioritizing data collection for decision-making on the scale-back of VAS for preschool-aged children.

PHASE 3: DESCRIBE THE DATA

Vitamin A nutrition should be described across different subpopulations of children aged 6 to 59 months. To better understand the distribution of the vitamin A nutrition of preschool-aged children, data should be disaggregated according to relevant indicators that may increase vulnerability to VAD.

Describe VAD prevalence

The WHO recommends universal VAS in settings where VAD prevalence is a public health problem [7]. To assess whether VAD is currently a public health problem in a given population, public health managers should collect biochemical data with a representative cross-sectional survey. The biomarker(s) used to assess VAD should follow current global guidance on the measurement of vitamin A status. While existing WHO guidance on VAD management suggests that VAD is no longer a public health problem when VAD drops below 2% [10], such low levels are difficult to detect in a cross-sectional survey. So, for practical purposes, GAVA recommends applying the range considered by WHO to be a mild public health problem (VAD ≤10% of children aged 6 to 59 months) as a cut-off to begin to consider scaling back VAS.

Using representative data on the prevalence of VAD, countries should determine whether the prevalence of VAD remains elevated (>10%) or has been reduced (≤10%) in all subpopulations. This analysis should consider subpopulations according to geography and age. The result of this assessment is used to navigate the first step of the GAVA decision-making framework.

Describe vitamin A intake

Describing the dietary sufficiency of vitamin A involves the integration of multiple sources of data, including individual dietary intake surveys, nutrition-related household surveys, food composition data, national food balance sheets, and the adequacy, coverage and consumption of vitamin A-fortified foods. Using representative data on vitamin A intake, program managers should determine if the nutrient intake data for the consumption of vitamin A by children aged 6 to 59 months from all sources is adequate in the entire population, adequate in some subpopulations, or inadequate for all population groups. Adequacy of vitamin A intake should examine the intake distribution of vitamin A in relation to the adequate intake (children aged 6 to 11 months) or estimated average requirement (children aged 12 to 59 months). This assessment will guide program managers in navigating the second step of the GAVA decision-making framework.

PHASE 4: DECISION-MAKING FRAMEWORK

Depending on the prevalence of VAD and the vitamin A intake patterns of the population, program managers are guided by a specific set of policy recommendations in the GAVA decision-making framework (Figure 3). Overall, the decision-making framework advises that semi-annual universal VAS should only be scaled back in populations where there is high-quality evidence suggesting that vitamin A intake and vitamin A status are adequate among preschool-aged children. The scaling-back process may involve reducing the targeted age range, targeting specific geographic areas or removing the program completely. For contexts where vitamin A intake and vitamin A status among preschool-aged children are not adequate, the framework recommends alternative policy actions to maintain or modify VAS programming.

Data collected during the situation analysis is used to navigate the framework as well as support countries in planning and executing the recommendations in the framework.

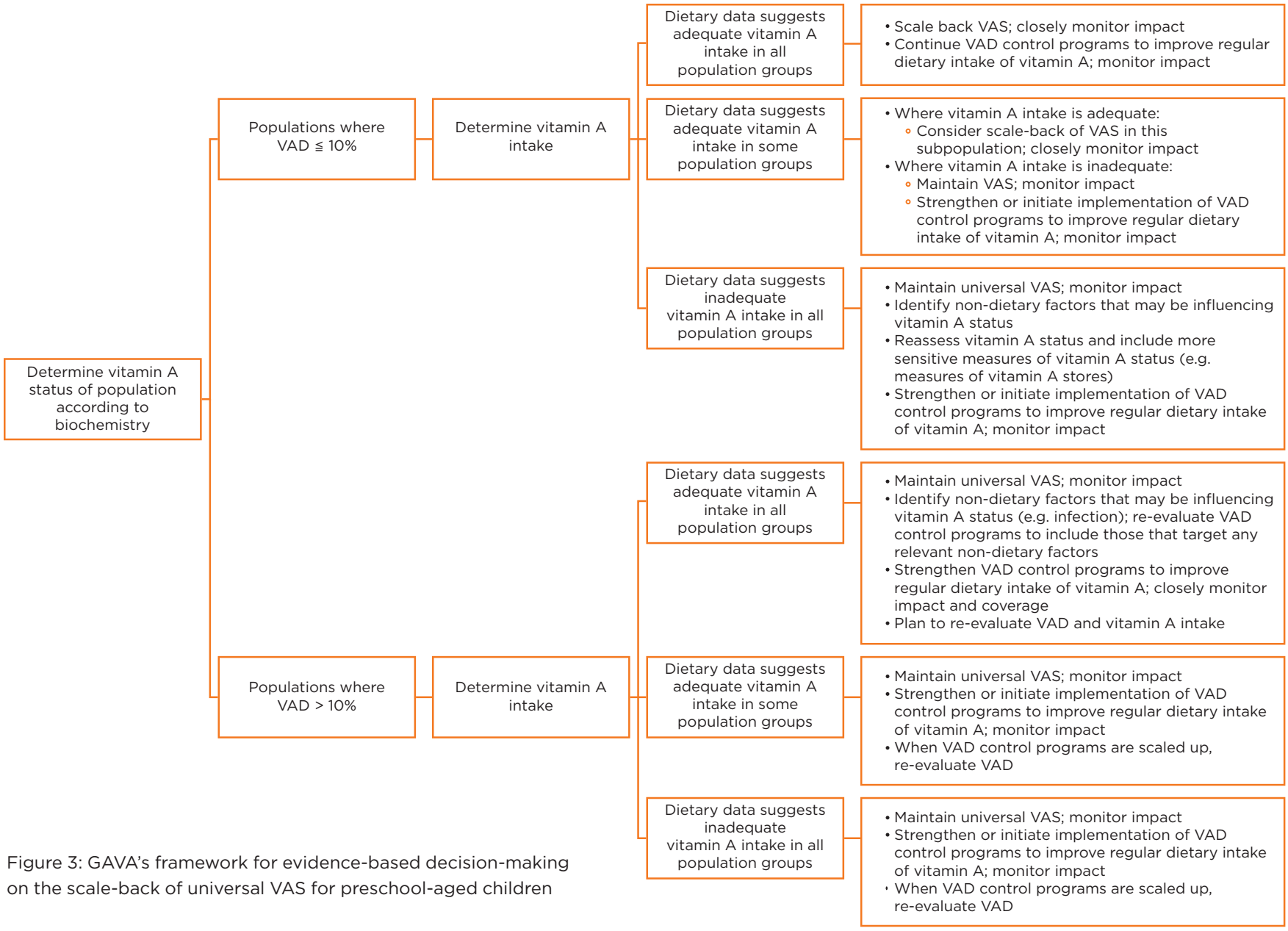

Figure 3: GAVA's framework for evidence-based decision-making on the scale-back of universal VAS for preschool-aged children

CONCLUSION

Although considerable improvements have been made in VAS programming over the last two decades, recent evidence suggests that global VAS coverage has declined and many countries are experiencing difficulty maintaining previously high coverage rates for VAS [15]. In addition, many countries implementing VAD control programs are doing so without sufficient evidence, which affects the ability of program planners to understand the current status and trends in VAD and allocate resources effectively [16]. Despite these current global challenges, some countries have seen significant reductions in VAD in preschool-aged children and may be ready to consider scaling back universal VAS.

This brief emphasizes the need for national-level, high-quality, representative data on vitamin A status to inform decision-making regarding VAD control programs. When there is strong evidence assuring that vitamin A intake is improved and vitamin A status is acceptable, program managers are advised to consider scaling back universal VAS as there is no longer any potential benefit from the mortality impact of the program. Depending on the epidemiology of VAD and the different risk profiles present within the population, the scaling-back process may involve reducing the targeted age range, targeting specific geographic areas or removing the program completely. Once scaled back, it is important to continue to closely monitor vitamin A status in targeted groups and nationally representative populations to confirm sustained control of VAD.

This brief summarizes the evidence needed to support decision-making on scaling back vitamin A supplementation programs, but the recommendations in the framework should be considered along with other risks, benefits and costs associated with the VAS program. Modeling tools can also support this process by helping program managers identify the most suitable combination of interventions to efficiently and cost-effectively control VAD [17].

The Global Alliance for Vitamin A

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