



Source: UNICEF

## Scaling Life-Saving Interventions Faster *Case Studies Series*

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### *Vitamin A Supplementation (VAS)*

Vitamin A supplementation (VAS), orally administered by capsule, is given to children worldwide who are affected by malnutrition and micronutrient deficiencies. Vitamin A deficiency (VAD) is the leading cause of preventable blindness among children globally. Lack of vitamin A also significantly increases the risk of severe illness and/or death from common childhood illnesses, such as measles or diarrheal disease. In an ideal world, to prevent these symptoms, at-risk children would receive their first dose of vitamin A at the age of 6 months and receive subsequent doses every 4 to 6 months until the age of 5. VAS boosts immunity and provides life-saving protection to children at risk, but only when administered every 4 to 6 months, which can prove to be challenging.

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Anna Clarke Harrison

*This case study is part of a series that explores pathways and important factors that contribute to the development and uptake of global health interventions—from proof of concept to scale-up.*

LAUNCH & SCALE  
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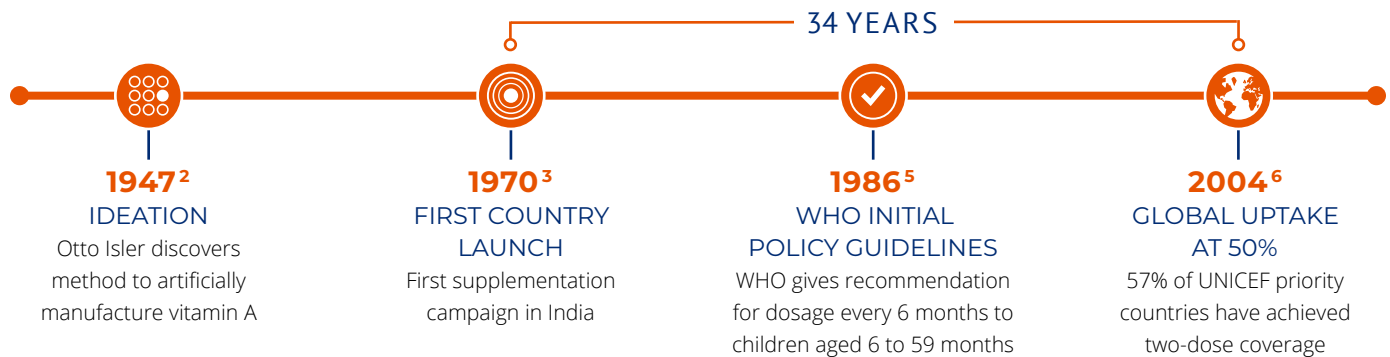
# Vitamin A Supplementation (VAS)

Vitamin A Supplementation, orally administered by capsule, is given to children at risk of blindness and other severe childhood illnesses from vitamin A deficiency (VAD).

**GLOBAL BURDEN OF DISEASE:** AN ESTIMATED 190 MILLION CHILDREN WERE AFFECTED BY VITAMIN A DEFICIENCY IN 2019<sup>1</sup>

**IDEATION TO 50% GLOBAL SCALE:** 57 YEARS (1947-2004)<sup>2,3</sup>

**TOTAL DISTRIBUTION:** 10 BILLION CAPSULES DISTRIBUTED WORLDWIDE SINCE 1997<sup>4</sup>



Vitamin A deficiency (VAD) is a serious public health problem that affects children in low- and middle-income countries (LMICs). A lack of vitamin A in the diet is associated with higher measles and diarrheal disease infection rates and is a primary cause of morbidity and mortality in the developing world.<sup>7</sup> VAD is also the leading cause of preventable blindness in children. Around half of those who lose vision due to VAD die within a year of their vision loss.<sup>7</sup> In 2019, it was estimated that about 190 million children are affected by VAD.<sup>1</sup> The most common way to combat VAD is to provide two oral doses of vitamin A supplementation (VAS) per year to children aged

6 months to 5 years.<sup>2</sup> Vitamin A supplementation ensures an immediate solution to children lacking proper micronutrients. Since 1998, VAS has reduced overall child mortality by 23%.<sup>2</sup> While vitamin A food fortification has been explored in recent years, oral administration of vitamin A in a liquid form has proven to be most effective in its immediate and lasting impact.

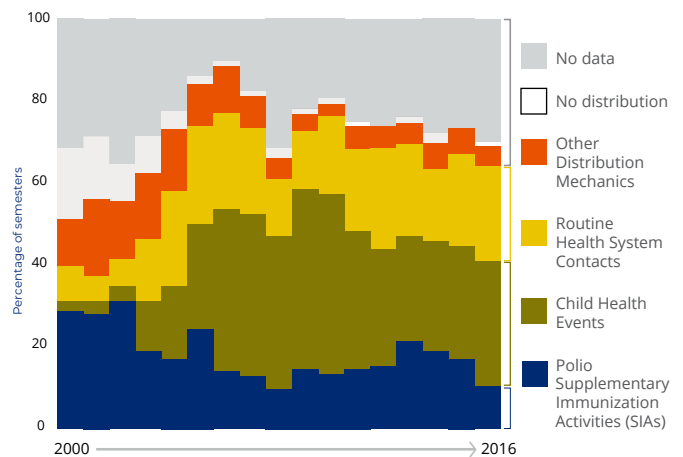
Vitamin A was first artificially created in 1947 by Otto Isler and his colleagues.<sup>3</sup> This was the critical first step that opened the door for VAS exploration as it provided health experts with a readily available

and sustainable supply of the micronutrient.<sup>3</sup> VAD was known to cause night blindness, but its effects on overall health and nutrition of children were still unknown, consequently few people studied the deficiency. However, in the 1970s, an ophthalmologist studying night blindness through randomized controlled trials discovered that periodic controlled dosages of vitamin A could prevent VAD as well as other common illnesses and malnutrition effects in children.<sup>3</sup> Soon after this discovery, India launched the first National Prophylaxis Programme against nutritional blindness in 11 states.<sup>8</sup> The program was extended to all states after the pilot tests of providing oral doses of vitamin A to young children showed promising results.<sup>8</sup> However, the program was ultimately unsuccessful due to the inherent weaknesses in India's health infrastructure such as poor delivery systems and a small health workforce.<sup>8</sup>

Two years after India's program launch, USAID and WHO worked together to create the International Vitamin A Consultative Group with a goal to work with policymakers, program administrators, and scientists to resolve the global problem of VAD.<sup>3,9</sup> While the International Vitamin A Consultative Group made strides in bringing global awareness to VAD, their efforts did not lead to actual country-led VAS programs, which meant that rates of VAD did not decrease.<sup>3</sup> The Vitamin A Consultative Group then partnered with the WHO to undertake global surveys, endorse country plans to address VAD, and collaborated with countries to discuss the impact of VAD on their populations.<sup>4</sup> While this effort increased awareness and some country-level interventions to prevent VAD, it took another decade for the World Health Organization (WHO) to publish the first policy guidelines.<sup>4</sup> During this 10+ year gap from the first-in country launch to the publishing of the first guidelines, there were few coordinated efforts to scale up the intervention and no clear best practices were established. The efforts of minimizing the impact of VAD were undefined and scattered during this time. Eventually, the first guidelines relating to VAS were published in 1986, which catalyzed advancement of the intervention.<sup>4</sup> These guidelines, regularly updated approximately every ten years (first in 1997, and most recently in 2011), have served as the foundational guideposts for international organizations such as Nutrition International to develop VAS efforts.<sup>10,11</sup>

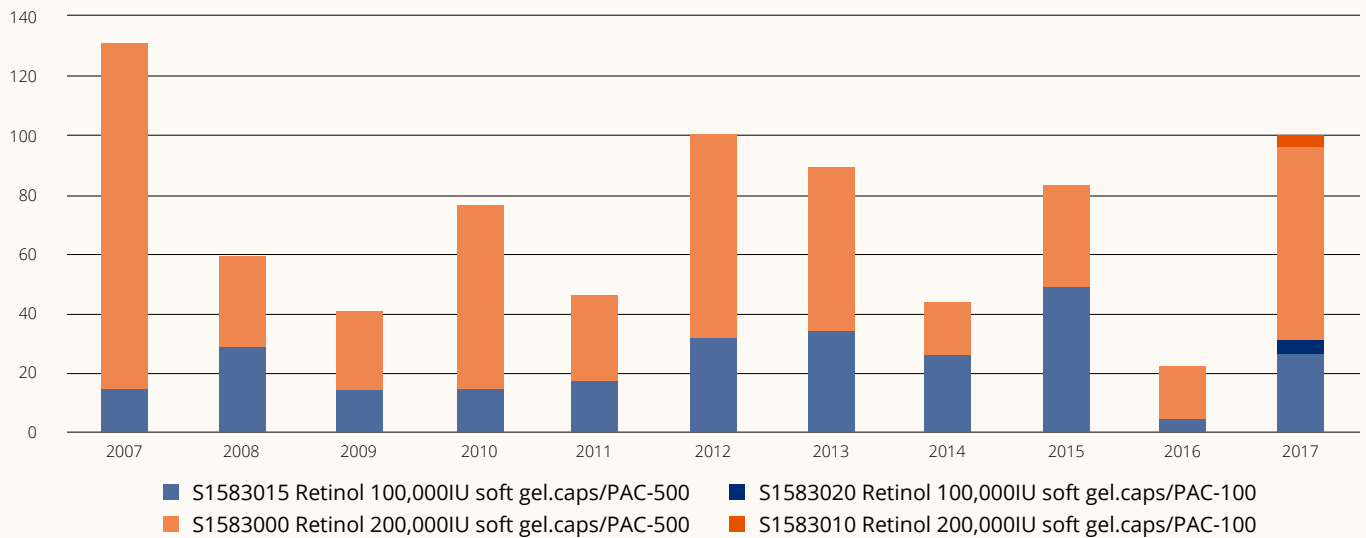
In the late 1990s, VAS was integrated with national immunization days and administered alongside other childhood immunizations, most notably the polio vaccination.<sup>12</sup> This method of simultaneously delivering multiple health interventions quickly rose in popularity in following years, and the concept of Child Health Days was born.<sup>12</sup> Figure 1 below shows the transition in VAS delivery format from polio immunization campaigns to Child Health Days and other distribution mechanisms such as measles immunization campaigns.<sup>2</sup> Child health events and door-to-door delivery has been effective in achieving high coverage rates of VAS; however, many LMICs lack a large and strong enough health system to tailor the events to local needs and subsequently sustain high coverage rates. In 2008, around 37% of VAS was delivered through child health events and coverage rates were high.<sup>13</sup> By 2014, only 27% of VAS campaigns utilized child health events resulting in declines in VAS coverage rates.<sup>13</sup> Child Health Days are one of the most equitable ways to deliver VAS as they bring services directly to the communities who need them the most.<sup>13</sup> However, in order to continue to effectively utilize Child Health Days, there needs to be a coordinated effort to make them an integral extension and booster of the regular health system. By strengthening the links between health systems and their end users, Child Health Days will be able to reach and protect the most vulnerable children in a sustainable and impactful way.

Figure 1. **Common Delivery Platforms for Vitamin A Supplementation 2000-2016<sup>2</sup>**



Source: UNICEF global databases, 2018. Based on administrative reports from countries.

Figure 2. UNICEF Vitamin A Procurement 2007-2017



Source: UNICEF Supply Division, 2018.

In 2000, UNICEF identified 82 priority countries where childhood mortality rates and the incidence of VAD were high.<sup>14</sup> Less than one-third of these priority countries have consistently achieved high coverage (80%) of VAS in the past 10 years.<sup>2</sup> VAS peaked in 2009 when 78% coverage was achieved globally and 270 million children were protected from VAD; but its coverage has declined ever since.<sup>2</sup> In 2009, 27 priority countries had high rates of two-dose coverage but by 2016, global coverage rates dropped dramatically, with only 10 priority countries achieving 80% coverage, leaving more than one-third of children at-risk unprotected from the effects of VAD.<sup>2</sup> Between 2015 and 2016, VAS in countries with the highest under-five mortality dropped by half due to the reduction in external and internal country child health funding.<sup>2</sup> At the same time funding was decreasing, the decline in polio eradication campaigns hurt VAS coverage rates, as VAS was often delivered alongside polio vaccines.<sup>2</sup> As a result of these trends, the number of children unprotected from VAD tripled, and rose from 19 million in 2015 to 62 million, one year later, in 2016.<sup>2</sup> As efforts to standardize routine VAS delivery and minimize program “drop-out” gain priority, coverage rates are gradually rising. However, there is still significant room for improvement and the need to reach and maintain a higher rate of global coverage.<sup>2</sup>

While global coverage of VAS seems to be struggling, there are some key examples of VAS champions and

one particularly successful and sustainable delivery program that serve as a source of hope for the future of VAS. Nutrition International and UNICEF are two of the biggest global champions for VAS by leading advocacy and funding procurement of vitamin A capsules (VACs) and delivery costs.<sup>14</sup> Nutrition International works closely with national governments to generate awareness on the importance of VAS.<sup>4</sup> The organization is also one of the largest procurers of vitamin A capsules globally, procuring approximately 75% of the global need for VAS, which is approximately 480 million capsules per year.<sup>4</sup> Every year since 1998, the organization has procured at least 500 million doses from manufacturers.<sup>4</sup> Since 1997, Nutrition International and its partners have provided a total of 10 billion vitamin A capsules worldwide.<sup>4</sup> UNICEF, a large partner of Nutrition International and a strong advocate for VAS, also ensures that procurement and delivery of vitamin A capsules stays consistent across LMICs. UNICEF procures around 70 million doses of vitamin A per year.<sup>15</sup> Figure 2, published in 2018, shows the vitamin A capsules that UNICEF has procured for global distribution since 2007.<sup>15</sup>

In 1999, when UNICEF first started closely monitoring VAS, the global coverage rate was around 16%.<sup>12</sup> Since 2000, with global campaigns and country partnerships, global yearly coverage has averaged around 60%.<sup>12</sup> In 2018, Nutrition International and UNICEF were able to reach an estimated 150 million children in 55

countries with the recommended two doses of vitamin A, which is around 61% of target children.<sup>4</sup> One of the reasons that UNICEF and Nutrition International are able to regularly supply LMICs with necessary doses of vitamin A is due to the cost-effectiveness of VAS. A single vitamin A capsule only costs USD \$0.02 to manufacture and has a shelf-life of three years.<sup>4</sup> This means that surplus capsules are not a waste of investors' money and LMICs are able to repurpose any surplus they may have for future campaigns. Overall, a trend of success in combatting VAD can be seen in the steady increase in coverage rates since the onset of campaigns by international organizations.

Another source of hope for the future of VAS is the consistently successful VAS program in Nepal. Nepal has sustained over 80% coverage for the past 25 years.<sup>16</sup> One key component of Nepal's program are Female Community Health Volunteers (FCHVs).<sup>16</sup> The FCHVs mobilize communities and ensure widespread engagement. Having FCHVs in the community provides ongoing advocacy and community awareness and assures that the register of children eligible for the program is continually updated.<sup>16</sup> Furthermore, community members trust the program and are frequently reminded of the times and date of distribution, as well as the importance of VAS, which increases compliance.<sup>16</sup> Largely due to the efforts of FCHVs, children were less likely to miss doses or "drop-out" of the program, and the coverage rate was maintained.<sup>16</sup> The local community engagement in the program, coordinated with the government's approach to capsule distribution and public communication about the program contributed to this success. Nepal is an example of a strong government-implemented and donor-funded VAS program, maintained by local engagement.<sup>16</sup> That this program has proven itself sustainable and effective through civil wars, natural disasters, and changes in government, is further testament of its success.<sup>16</sup> Nepal could be used as a model to increase and sustain VAS coverage in other countries, especially those where coverage has fallen due to a lack of funding and/or ineffective delivery. Other countries such as Senegal which utilize community-based or door-to-door delivery modalities similar to Nepal's are able to achieve high rates of VAS coverage.<sup>17</sup> This means that a push for all countries to adopt child health events with community-based components could greatly increase global coverage rates.

In conclusion, with unsustainable delivery modalities, limited healthcare infrastructure, and insufficient funding, the global coverage of VAS will likely continue to decline despite global champions like UNICEF and Nutrition International's work and advocacy. Reliance on immunization campaigns as the main modality of VAS has also been disappointing as such campaigns are reduced or eliminated whenever budgets are constrained. Delivering VAS as a component of Child Health Days is a necessary component of modernizing VAS and increasing coverage; however, countries have struggled with making these events a part of their routine healthcare system. As VAD impacts upwards of 150 million children per year and makes their chances of contracting measles and diarrheal disease higher, a strong and sustainable VAS program should be a priority for all affected countries.<sup>1</sup> Unfortunately, the momentum surrounding new research on efficient delivery methods for VAS has slowed in recent years. Public attention, Ministry of Health prioritization, additional champions, and innovative delivery mechanisms are needed to push VAS over the final threshold to reach and maintain 80% global coverage.

#### KEY INSIGHTS TO LAUNCH AND SCALE

**The lack of sustainable methods of community-based delivery of VAS has limited the consistent uptake of this effective intervention.** The transition away from using polio vaccination campaigns for VAS delivery has resulted in a significant decline in VAS coverage. Child health events have the potential to be a sustainable and effective delivery modality for VAS; however, few countries have fully integrated child health events within their health systems which has made them unsustainable. The exception is countries like Nepal, which utilize FCHVs and other community-based delivery modalities for their VAS programs. The successful Nepal model is based on strong national support, ongoing external champions, financial and technical contributions, local engagement, and most importantly, the use and integration of the FCHVs as a community-based delivery system.

**Fragmentation and slow development in the early, critical planning years has resulted in disjointed and unsustainable scale-up of VAS.** From first launch in India in 1970 to the publishing of the first WHO guidelines in 1986, the development

of VAS initiatives was disjointed and occurred across many sectors without coordination. There were global initiatives and talk of how to address VAD, but there were no collaborative global efforts to effectively implement the intervention. Overall, the global efforts to create guidelines were delayed, and research efforts were scatter-shot, without cross-learning or application. This led to a lack of standardized best practices, including best delivery practices, which significantly limited the ability of VAS to reach scale in many countries. In recent years, there has been a coordinated effort to address VAD; however, the scattered and unsustainable work done early in the intervention's history are still serving as a large barrier to achieving universal coverage.

**A lack of public attention to the root problem has led to low priority of the issue at national and international levels.** VAD has been a persistently harmful condition but it has never been a problem that draws public attention or been designated as a priority for global aid organizations in the way that HIV has, for example. While VAS has been a priority for many global NGOs and many countries, there have never been large-scale funding or significant campaigns as there have been for other maternal and child health interventions. The lack of public attention has contributed to a 60+ year process from ideation to scaling, with some success but ultimately failure to achieve sustainable global coverage. A coordinated campaign effort with a focus on child health events and sustainable delivery modalities could reach the root problem of poor VAS coverage rates and push the intervention over the 80% coverage rate in the long-term.

**A broader coalition of champion international organizations is needed to achieve and sustain high coverage rates.** Organizations such as Nutrition International and UNICEF have made significant contributions to the VAS global effort, especially in public awareness, local advocacy and funding for procurement. A broader coalition including delivery system innovators and public-private partnerships might succeed in growing financial support and implementing sustainable delivery. In short, a more unified global effort is needed to recognize VAD as a serious global health issue that merits an integrated effort.

## COVID IMPACT

It is yet unclear whether the current COVID-19 pandemic will affect the delivery of VAS to those in need. However, based upon evidence that maternal, newborn and child health services have been interrupted, it is reasonable to assume that VAS has also been disrupted. Children may not only miss their first annual dose, but also the second in this long-standing pandemic. We thus expect that the COVID-19 pandemic will contribute to a global dip in VAS coverage. On a positive note, The Global Alliance for Vitamin A has published COVID-19 guidelines for adjusting VAS programs and ensuring they follow safe practices for preventing the spread of COVID-19.<sup>18</sup>

## ABBREVIATIONS

**VAS:** Vitamin A Supplementation  
**VAD:** Vitamin A Deficiency  
**LMICs:** Low and middle income countries  
**WHO:** World Health Organization  
**FCHVs:** Female Community Health Volunteers

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