Acknowledgments & disclaimer

We thank all those who helped make this study possible, especially the MASAVA project team who were most helpful in arranging transport and accompanying us to the project sites. We also especially thank all the project participants and others interviewed who gave the time to answer our questions.

That said, the arguments and opinions presented here, as well as any errors and omissions, are those of the authors alone and do not necessarily represent the views of MEDA, IDRC, Sokoine University or the University of Waterloo.

Abbreviations

BASF  Badische Anilin und Soda Fabrik, German chemical company
BCC  Behaviour Change Communications
CIFSRF  Canadian International Food Security Research Fund
MASAVA  Project name, derived from the Kiswahili phrase “Mafuta ya Asili ya Alizeti yenye Vitamini A,” [“Natural Sunflower Oil fortified with Vitamin A.”]
MEDA  Mennonite Economic Development Association
M-Pesa  Money transfers via mobile phones
ODI  Overseas Development Institute
RT  Republic of Tanzania
TBS  Tanzania Bureau of Standards
TCDC  Tanzania Communications and Development Centre
TFDA  Tanzania Food and Drugs Authority
TNBS  Tanzania National Bureau of Statistics
UNHCR  United Nations High Comissioner for Refugees
UNIDO  United Nations Industrial Development Organization
Executive Summary

MASAVA sought to reduce the incidence of vitamin A deficiency in the Shinyanga and Manyara regions of Tanzania by supporting small and medium enterprises (SMEs) to fortify crude sunflower oil. To generate effective demand even among the poorest consumers, a behaviour change communications (BCC) campaign and system of eVouchers accompanied the production of the new product. This served the purpose of testing whether the private sector could contribute to efforts to reduce micronutrient deficiencies and whether this could be done by fortifying crude sunflower oil.

MASAVA’s effectiveness in addressing vitamin A deficiency has been demonstrated by the project’s research and this report identifies the contributions made to enhancing SME capacity and creating sustainable behaviour change among the poorest consumers. The data for this case study was primarily generated in the course of two weeks of fieldwork in Tanzania in September 2017, just as the Mennonite Economic Development Association (MEDA) was wrapping up its field work and some months after the BCC had concluded.

The contribution analysis detailed in this document looks at the logic of this research-for-development project and presents the causal chain from the project activities, capacity changes, and behaviour change to intended results, following the framework developed by John Mayne (2008). For this project, there are two theories of change: one for the production and marketing of fortified sunflower oil by SMEs; and the other for consumers of the fortified oil.

The theory of change for producers and retailers is fairly simple: the project’s activities are firstly to train and support SMEs to fortify crude sunflower oil, particularly ensuring that the product meets standards prescribed by the Tanzania Bureau of Standards (TBS) and the Tanzania Food and Drugs Authority (TFDA). Secondly, MASAVA trained retailers and distributors in the benefits of the product and in accessing the subsidy through the eVoucher system.

The MASAVA project identified and trained three SMEs that had sufficient processing capacity and were able to comply with basic health standards. These enterprises were motivated by the possibility of increasing their turnover as well as the new government regulations on fortification. MASAVA created the technical capacity necessary for them to act on these motivations and reduced the risk of failure or financial loss by creating reliable markets through the BCC. As a result, 142,000 litres of fortified oil were produced and sold over the lifespan of the project.

While MASAVA’s support to the SMEs was crucial and made it possible for fortified oil to be produced, the combination of fluctuating prices for sunflower seeds, finance and storage constraints meant that producers did not manage to produce fortified oils consistently. High transport costs aggravated these difficulties. In September 2017, none of the three SMEs involved in the project were producing fortified oil in significant quantities.

319 retailers sold the fortified oils and some contributed significantly to BCC efforts by educating their customers on the benefits of vitamin A consumption. eVouchers proved cumbersome for consumers, but the project responded by restructuring the subsidy in a manner that was more suitable to local conditions.

The activities for the second theory of change fall under the umbrella of the behaviour change campaign, which raised awareness of the importance of vitamin A and encouraged consumers to buy MASAVA’s fortified oils. Both men and women were targeted by the campaign to ensure that women would have support for their purchasing decisions. The campaign motivated consumers to improve their health and created the opportunity for dietary changes by making fortified oil available. Here the project benefited from the work carried out by government and NGOs, who had contributed to a general understanding of nutrition and the importance of varied diets.

These capacity changes led to behaviour changes: consumers purchased the oil, first at the subsidised price and later at a premium. The direct benefits of this are that consumers increase their consumption of fortified oils, leading to a reduction in vitamin A deficiency.

Unfortunately, behaviour changes were affected by the fact that fortified oil was initially only available in quantities of 1L or more, while many poor consumers prefer to buy their oil in quantities of 50 or 100ml. Once project innovations made this possible, even the poorest consumers were no longer excluded. Later, shortages of the fortified oil reduced the ability of consumers to increase their vitamin A uptake.

In September 2017, fortified oil was no longer readily available in some of the intervention areas visited as both enterprises in Singida had temporarily ceased production, mainly for financial and storage capacity reasons. The third enterprise had ceased production indefinitely for reasons outside of the project’s remit.
These constraints apply both to the question of sustainability and scaling-up. Before the project can be expanded to other regions, it is necessary to find solutions to the constraints experienced by SMEs and to test how sustainable distribution networks prove to be in the absence of MEDA’s regular assistance. Further, efforts at scaling-up fortification by SMEs are likely to encounter difficulties in identifying a sufficient number of enterprises that have the capacity to follow TFDA and TBS guidelines and standards.

On the consumer side, there is some evidence that behaviour changes could be maintained in the absence of the subsidy: sales continued in project areas after the end of the subsidy in May 2017 and, in some cases, expanded into areas not previously serviced by the project.

The project demonstrated that unrefined sunflower oil could not only be fortified but that small and medium enterprises could contribute to Tanzania’s fortification drive. The oil also proved palatable to consumers and contributed to the reduction in vitamin A deficiencies. The sale of 142,000 litres of fortified oil by MASAVA may have reached as many as 400-500,000 individuals.

The project primarily targeted women with its BCC, as they make the food purchasing decisions on behalf of their households. Nevertheless, this was supported by messages and activities targeted directly at men, so that they would support their wives in their decisions.

Canadian partners contributed not only to the development of the project, but played an important supporting role throughout the project. In particular, partners at the University of Waterloo assisted Sokoine University in creating the observational trial to test the potential of fortification and, according to a collaborator at Sokoine University, brought an economic lens to the question of nutrition.
## Overview

### Colour coding:

<table>
<thead>
<tr>
<th>Unsatisfactory: very little achieved</th>
<th>Some gains, but achieved less than expected</th>
<th>Some progress: about half of what was expected</th>
<th>Largely successful: most objectives achieved</th>
<th>Highly successful: all objectives achieved, in some cases by more than expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>White: not assessed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th><strong>Project activities, deliverables and results</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tanzania MASAVA</strong></td>
</tr>
<tr>
<td>Theory of change</td>
</tr>
<tr>
<td>Activity</td>
</tr>
<tr>
<td>Changes to capacity, behaviour</td>
</tr>
<tr>
<td>Results</td>
</tr>
<tr>
<td>Impact</td>
</tr>
</tbody>
</table>

### Sustainability and scaling-up

<table>
<thead>
<tr>
<th>Sustainability</th>
<th>SMEs struggling to maintain continuous supply of fortified oil without assistance.</th>
<th>Consumers expressed strong desire to continue to use the oil, even where it had become difficult to source. Consumers educating each other on its benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaling-up</td>
<td>Will require further assistance to SMES and incentives for retailers (which may be created through enforcing of fortification policy by government)</td>
<td>Will require further BCC to expand markets and, possibly, to encourage continued consumption of fortified products, unless government enforces fortification policies and consumer choice becomes less important.</td>
</tr>
</tbody>
</table>

### Specific outcomes

<table>
<thead>
<tr>
<th>FSN</th>
<th>Large number of households reached with fortified oil. Evidence that vitamin A deficiency decreased in intervention areas. MASAVA worked to make it possible for SMES to contribute to the government’s food fortification agenda.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>Not primarily about income.</td>
</tr>
<tr>
<td>Sustainable agriculture</td>
<td>Not about sustainable agriculture.</td>
</tr>
<tr>
<td>Gender</td>
<td>Primary target group were women. Men educated on benefits of vitamin A consumption so that they would support women in their decision to purchase more expensive oil. Provided opportunities for a number of female retailers to increase their turnover. Lack of mobile phone penetration among women contributed to the decision to change from a consumer-based to a retailer-based discount. Project ensured that women were included in the training provided to SME staff.</td>
</tr>
<tr>
<td>Unexpected findings</td>
<td>SMEs expect to tap into urban and international markets with fortified oil. Retailers engaged in community education activities.</td>
</tr>
</tbody>
</table>

### Research Partnership and Policy Influence

<table>
<thead>
<tr>
<th>Research partnership</th>
<th>Very active collaboration between Sokoine and the University of Waterloo, producing evidence on the benefits of fortification and the use of eVouchers to implement subsidy. Three dissertations are in progress (1 Tanzanian PhD, 1 Canadian PhD, 1 Canadian MSc), from which 8 papers will be</th>
</tr>
</thead>
</table>

---
submitted to peer-reviewed journals. Two additional papers will be submitted on business models and eVouchers.

| Research contribution to policy or wider results | Interactions with the TFDA and TBS as well as Ministries involved with nutrition interventions has created possibility for policy change that will facilitate SME participation in fortification. Particularly, the policy has been in discussion with the TFDA to allow SMEs to use lower grade tanks (i.e. food grade plastic) for fortification so that they can compete with larger enterprises. Results from the project were disseminated to international organisations, national government, including the Prime Minister's Office, TFDA, Tanzania Food and Nutrition Centre and the Ministry of Health. |
1. Introduction

The MASAVA project sought to reduce the incidence of vitamin A deficiency in the Shinyanga and Manyara regions of Western Tanzania by supporting small and medium enterprises to fortify the crude sunflower oil that is widely consumed in the regions. To generate effective demand even among the poorest consumers, a behaviour change communications (BCC) campaign and system of eVouchers accompanied the production of the new product. Through this approach the project tested whether the private sector could contribute to efforts to reduce micronutrient deficiencies and, specifically, whether this could be done using the research by the University of Waterloo and Sokoine University that had demonstrated that crude oil could be fortified with vitamin A and would remain stable for at least 6 months.

MASAVA’s effectiveness in addressing vitamin A deficiency has been demonstrated by the project’s research and this report identifies the contributions made to enhancing SME capacity and creating sustainable behaviour change among the poorest consumers. Given that project outcomes, especially in terms of the levels of vitamin A consumed, are well-documented, the focus of this contribution analysis are the processes and the activities that led to these successes. This report also ascertains the contributions made by other actors in Shinyanga and Manyara that may have facilitated project successes.

This report is part of a wider review of projects funded under the second Phase of the Canadian International Food Security Research Fund (CIFSRF) and so follows the same structure as the other country case studies: it begins by describing the research method, available evidence and the limitations of the study. The second section details logic and theories of change for the two key elements of the MASAVA project, before testing these. The final section assesses how sustainable observed behaviour changes are likely to be and the implications for scaling-up, while also reflecting on implications for gender dynamics and unexpected outcomes.

Project activities fall into four main categories: increasing SME capacity, developing an eVoucher system to subsidise fortified sunflower oil, creating behaviour change among consumers, and conducting research on the effectiveness of the project’s approach. The activities that fall under the first two categories were the primary responsibility of the Mennonite Economic Development Association (MEDA), while the BCC was sub-contracted to the Tanzania Communications and Development Centre (TCDC). The University of Waterloo and Sokoine University of Agriculture were responsible for generating the research outcomes.

1.1 Research Methods

Six projects, including the MASAVA project, were purposely selected from the portfolio of CIFSRF Phase II projects to draw out the lessons in the areas of nutrition, food security and sustainable agriculture from some of the most successful projects.

The data for this case study was primarily generated in the course of two weeks of fieldwork in Tanzania in September 2017. The research was conducted by the two authors of this report, one of whom is a member of ODI staff and the other an independent consultant based in Tanzania, with considerable logistical support from MEDA.

In the course of this research, the team met with members of the implementing organisations, fortified oil producers, consumers, health professionals and brand ambassadors. In addition, we sought out civil servants and employees of NGOs working in the areas of health and nutrition better understand the project’s environment. Discussions with interviewees were informed by the project’s theory of change and focused on the motivations, opportunities and capabilities framework developed by John Mayne (Mayne, 2008).

The data collection tools used were:

- **Semi-structured interviews**: project staff and implementing partners, including TCDC, brand ambassadors and health workers. Beyond those directly involved with the project, interviews were conducted with civil servants and NGO employees working in the field of health, nutrition, and agriculture.

- **Focus Group Discussions** were held to discuss consumer experiences with them.

- **Desk review of project documents and publications**: project documents and various publications that documented project results were reviewed as part of the contribution analysis.

For a list of individuals and institutions consulted see appendix 1.
2. Review of the Project

2.1 CIFSRF Background

The Canadian International Food Security Research Fund (CIFSRF) was designed to address global problems of food and nutritional insecurity through applied, collaborative, results-oriented research. CIFSRF is a program of Canada’s International Development Research Centre (IDRC) undertaken with the financial support of the Government of Canada, provided through Global Affairs Canada. Phase 1 (2009-2014) focused on testing innovations, while Phase 2 (2013-2018) aims to both test scaling-up methods/mechanisms and to scale up practical solutions to: increase food production, raise income for farming families, and improve nutrition. The emphasis in Phase 2 was to harness the best of the private, public and not-for-profit sectors to expand CIFSRF’s research portfolio so innovations reach more people and have a greater impact globally to improve food security.

CIFSRF set the parameters of the Phase 2 research projects by requesting certain similar elements, such as a need to have: a team of diverse partners (including at least one private sector or business partner, at least one Canadian partner and at least one developing country partner) in order to scale up pilot-tested agricultural innovations; a scaling-up plan; a business model with a proof of concept and value proposition; a gender strategy; rigorous research plan and methodology to test the scaling-up; policy uptake plan; as well as a comprehensive exit strategy. All projects needed to address the three cross-cutting themes of the program: gender equality, environmental sustainability, and good governance. While the project were autonomous, the strategic calls allowed for a level of consistency across the projects.

While 18 projects were funded as independent projects in CIFSRF Phase 2 through competitive calls, the projects received significant group training and capacity building from IDRC over their duration, including specific workshops and mentoring on: scaling up, research methodology, gender integration, communications, and monitoring and evaluation. The overall quality of the various project strategies (e.g. scaling strategy, gender strategy, etc.) was not consistent across projects, reflecting the variable capabilities in each project team. IDRC Program Officers provided specific support on the development and implementation of these strategies, through workshops and direct technical advice. The group workshops facilitated by IDRC also allowed opportunities for cross-project collaboration and the sharing of lessons.

2.2 Project Background

The government of Tanzania launched its national fortification policy in 2013 to address the high levels of micronutrient deficiency caused by seasonal and monotonous diets in rural Tanzania and the resultant high disease burden (RT, 2013 cited in Horton et al. 2017). Women and children are particularly susceptible to vitamin A deficiency as cultural norms mean that they often consume fewer micronutrient rich foods, such as eggs and meat, than adult men (Leach and Kilama, 2009). According to the 2010 Tanzania Demographic and Health Survey, vitamin A deficiency was identified as a significant concern that affects 37% of women aged 15 to 49 nationwide (NBS and ICF Macro, 2010), and these deficiencies are particularly acute in the Shinyanga and Manyara regions (Dixon et al. 2015).

The fortification of edible oils with vitamin A is mandatory in Tanzania, but only large-scale enterprises have the capacity necessary to comply with TFDA (Tanzania Food and Drugs Authority) standards or the scale to be able to absorb the additional costs. As a result, fortified products are generally only available in urban and more affluent areas, where consumers purchase processed foods from supermarkets. In rural districts, such as Manyara and Shinyanga, however, few consumers regularly purchase fortified, processed foods. Poor consumers do buy cooking oils, but these tend to be produced by small or medium-sized enterprises that produce only crude oils, which were thought to be ill-suited to fortification. The MASAVA project tests the potential for small-scale private sector actors to provide fortified oils to the markets accessed by the rural poor.

To this end, MASAVA tested two emerging technologies: the use of mobile phone eVouchers to provide subsidies for consumers of fortified oil and crude sunflower oil fortification. Both eVouchers and the fortification of crude oils were developed by Canadian partners, the latter in collaboration between MEDA and BASF. These two technologies would address vitamin A deficiency, through market-friendly
mechanisms, by assisting three SMEs\(^1\) to produce fortified crude oil, which would be sold at subsidised rates to consumers who were made aware of the importance of vitamin A and the fortified oils through a targeted BCC.

The project had four specific research objectives:

1. To test if crude sunflower oil could be fortified under market conditions prevalent in Shinyanga and Manyara, i.e. whether retinol levels are sufficiently stable.
2. To test the sustainability of an SME model without subsidies, assistance with supply chains or finance.
3. To learn whether eVouchers can be used to promote fortified oil.
4. To determine whether consumption of fortified oils addresses vitamin A deficiency.

The project was implemented in Shinyanga and Manyara regions due to the high levels of micronutrient deficiency, preference for sunflower oil (especially in Manyara) and the prevalence of SMEs in Singida with adequate capacity to be able to participate in and benefit from the project. Vitamin A deficiency is so widespread in rural Tanzania that all districts for which data exists could have benefited from the project. Nevertheless, Manyara has the third highest levels of vitamin A deficiency in the country as 43.9% of the population are deficient (surpassed only by Pwani and Kagera regions). Shinyanga has a slightly lower rate, but 36.8% of its population are still deficient. Higher levels of vitamin A consumption in Shinyanga are thought to be due to a preference for palm oil, which is frequently imported and fortified to levels higher than recommended by the TFDA (Dixon et al. 2015).

### 2.3 Theories of Change

The theories of change follow the format proposed by John Mayne, and begin with the project activities that lead to capacity changes, followed by behaviour changes and finally yield results and impact. For this project, there are two theories of change: one for the production and marketing of fortified sunflower oil by SMEs; and the other for consumers of the fortified oil.

The theory of change for producers and retailers is fairly simple: the project’s activities are firstly to train and support SMEs to fortify crude sunflower oil, particularly ensuring that the product meets standards prescribed by the Tanzania Bureau of Standards (TBS) and the Tanzania Food and Drugs Authority (TFDA).\(^2\) Secondly, MASAVA trained retailers and distributors in benefits of the product and in eVoucher use. The eVoucher permitted consumers to purchase fortified sunflower oil at approximately the same price as unfortified oil, by issuing consumers with a voucher number on their mobile phone. From September 2016 until May 2017, the eVoucher system was changed to an eWallet system where retailers, rather than consumers received the subsidy for oil sold.

These activities resulted in capacity changes for SMEs, retailers and distributors, namely gains in knowledge and skills. Retailers, distributors and producers are motivated by anticipated profits to take part in the project. Here the external factors that would enable the project’s success are government support and the existence of wider markets that private sector actors could tap into as well as the capacity of retailers and consumers to deal with the eVoucher system as a result of their experience working with MPESA, for example.

The direct benefits the project intends to achieve through these behaviour changes is the sale of fortified sunflower oils into supply chains that reach poor consumers in Shinyanga and Manyara. In combination with the second theory of change – consumer behaviour change – this will result in a reduction of vitamin A deficiencies in both regions.

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\(^1\) Initially, the project was to assist four SMEs, but only three that had sufficient capacity to be able to benefit from the project’s assistance could be identified in Manyara and Shinyanga regions.

\(^2\) The project intended to work with four SMEs, but only three could be identified that had adequate capacity and only two of these were still producing fortified oil in September 2017.
**Figure A Theory of Change for Oil Producers and Marketers**

<table>
<thead>
<tr>
<th>Enabling narrative: Where the project benefited from what others had done</th>
<th>Intervention narrative: What the project did</th>
<th>Assumptions: Things entirely outside the project’s control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases in incomes result in more purchases of fortified oils and more diverse diets</td>
<td><strong>Results:</strong> SMEs/retailers produce/sell fortified oil profitably. <strong>Impact:</strong> fortified oils available on the market in Shinyanga and Manyara.</td>
<td>Stable economic environment for imports of retinol and machinery</td>
</tr>
<tr>
<td>Government support continues</td>
<td><strong>Behaviour Change</strong> 1. SMEs begin production of fortified oil 2. Retailers stock and sell fortified oil</td>
<td>Steady supply of sunflowers for production</td>
</tr>
<tr>
<td>Access to affordable machinery/repair services</td>
<td><strong>Reaction:</strong> 3 SMEs produce fortified oil; 319 retailers sell fortified oil</td>
<td></td>
</tr>
<tr>
<td>Infrastructure investments reduce cost of production/distribution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobile phone coverage/ownership available for eVouchers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C: retailers/consumers trained in eVouchers by other service providers (e.g. MPESA)</td>
<td><strong>Capacity Changes</strong>  <strong>Capabilities:</strong> knowledge and skills for production/retail  <strong>Opportunities:</strong> reliable markets for vitamin A oil  <strong>Motivation:</strong> producers/retailers motivated to increase incomes  <strong>Reach:</strong> 3 SMEs trained; 319 retailers trained</td>
<td>Producers/retailers have capacity to participate.</td>
</tr>
<tr>
<td>O: Govt support for fortification; existence of urban/international markets for fortified products</td>
<td><strong>Activities</strong> Train 3 SMEs to fortify oil; provide them with equipment and financing for seeds  Train retailers/distributors to use eVouchers</td>
<td></td>
</tr>
<tr>
<td>Innovation: crude sunflower oil fortification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The activities for the second theory of change fall under the umbrella of the behaviour change campaign, implemented by the TCDC. The campaign raised awareness of the importance of vitamin A generally and encouraged consumers to buy MASAVA’s fortified oils.

The BCC organised bike races, cooking and cultural shows, road and clinic shows, and engaged religious leaders and village health workers as well as broadcasting radio shows (though only to a limited degree so as to avoid spreading BCC messages to control communities). These activities motivated consumers to improve their health by consuming fortified oils, and created the opportunity to realise these by making fortified crude oil available.

Consumer capabilities may have been assisted by previous government efforts, for example the provision of megadoses of vitamin A to children, which would have raised awareness among mothers of the importance of this micronutrient. The theory of change assumes that consumers do not have persistent preferences for other oils, e.g. palm oil.

These capacity changes then lead to behaviour changes and consumers purchase fortified sunflower oil, first at the subsidised price and, once the subsidy is phased out, will pay a premium for the oil. The assumption is that poor consumers can afford to purchase vegetable oil at all. On the other hand, increases in average incomes in Shinyanga and Manyara may enable these capacity changes.

The direct benefits, i.e. results, of this are that consumers increase their consumption of MASAVA oils, leading to a reduction in vitamin A deficiency (impact).
The assumption here is that no adverse shocks lead to a reduction in intake of vitamin A from other sources. The impact may also be achieved by consumers purchasing imported oils that are fortified at higher levels or through other nutrition interventions, such as megadoses.

2.4 Testing the Theories of Change

2.4.1 Theory of change for oil producers and marketers

Activities

The MASAVA project trained three SMEs (which produced three brands of fortified oil Singida Sunshine, Sweet Drop and Shams), rather than the intended four as only three enterprises could be identified with sufficient processing capacity and the ability to comply with basic health standards. In fact, oil for consumption in Shinyanga region was produced by two SMEs in Singidia (approximately 300 km away), as there were no suitable, sunflower oil producers in Shinyanga. Oil for Manyara region was produced in Babati by the third SME.

554 retailers were registered and trained, compared to the target of 600. This was largely due to a reluctance by retailers to invest time in a product that would represent only a small percentage of their turnover.

Changes to capacity and behaviour

Retailers

Of the 554 retailers, 319 redeemed one or more vouchers, meaning that they had acquired the skills to use the eVoucher system, saw an opportunity in the retail of the oil and believed this would increase their income. Where retailers did not redeem vouchers this seems to have been for a number of reasons: lack of consumer demand in areas where sunflower oil was not widely consumed or where consumers preferred to purchase sunflower oils in much smaller quantities (50ml scoops), problems with the eVoucher system or the distribution network.

There was a great deal of variation in the quantities of oil sold by retailers: 65% conducted 50 transactions or less between November 2015 and August 2016, but three conducted more than a thousand (Horton et al. 2017b). Some retailers also reported difficulties in getting the oil, especially in Shinyanga, where they depended on a network of distributors rather than purchasing the oil directly from the factory, as many retailers did in Manyara.

In order to facilitate the work of retailers, the project switched from an eVoucher system (where each consumer had to redeem their vouchers individually) to an eWallet (where retailers received the subsidy directly and passed this on to consumers).

Distributors also reported difficulties in ensuring a continued supply of fortified oil, for example when retailers failed to pay their debts in a timely fashion or could not arrange for the transport of fortified oil from Singida to Shinyanga. On these occasions, MEDA provided loans or transported oil to retailers in order to ensure a continuous supply of fortified oil.

SMEs

The three SMEs identified and trained all took up the opportunity of producing fortified oil, motivated both by the possibility of increasing their turnover as well as the new government regulations on fortification that they assumed would be enforced in the future. MASAVA not only created the capacity necessary for them to do this, but also reduced the risk of failure and financial loss by creating reliable markets through its BCC.

With the assistance of the project, just over 140,000 litres of fortified oil were produced over the lifespan of the project. Once the TFDA had approved the quality of the oil, stability of its retinol content and packaging, pilot oil distribution began in the second half of 2015.

MEDA’s assistance to SMEs to ensure that the oils produced achieved the standards set by the TFDA, in terms of quality, packaging, and production processes, was particularly critical. Both of the SMEs interviewed felt that meeting these standards was the greatest impediment to producing fortified oil and that without the assistance provided by MEDA staff this hurdle would have remained insurmountable. Nearly as important was the purchase of food grade tanks for the production of fortified oil by MEDA. These interactions also allowed MEDA to build excellent working relationships with policy makers, to whom they were able to provide valuable insights on the difficulties experienced by SMEs attempting to adhere to these standards.

However, the combination of fluctuating prices for sunflower seeds coupled with cash and storage constraints of SMEs meant that all three producers struggled, and on occasion failed, to produce fortified oils consistently. This was due to the fact that sunflower seeds are more expensive some months after harvest, making oil production uneconomical for small enterprises and consumers purchase oils produced by medium and large enterprises.

As SMEs also lacked the financial and storage capacity to purchase enough seeds to maintain constant
production levels throughout the year, enterprises were sometimes forced to stop production until seed prices fell sufficiently. MASAVA had to provide additional assistance to SMEs, in the form of loans, to ensure smooth supply levels throughout the course of the project.

Equally problematic was the high cost of transport, for the two producers based in Singida (who produced Singida Sunshine and Sweet Drop), who were supplying markets 300 km away. As a result, distributors of the oil experienced difficulties maintaining regular supplies of fortified oil in the markets of Shinyanga’s intervention areas and, on occasion, MEDA assisted retailers by bringing oil from Singida in a project vehicle.

In addition to transport and production costs, the Sweet Drop factory in Singida was experiencing difficulties purchasing spare parts and had ceased producing fortified sunflower oil for this reason. The factory manager claimed that spare parts could not be purchased for cost reasons, but as the spare parts were relatively cheap this may only have been a consideration in combination with the high cost of sunflower seeds at this time of year.

Finally, the third SME based in Manyara (producing Shams) had – most likely permanently – ceased to produce sunflower oil in early 2017. However, this was due to circumstances outside of MASAVA’s control as the owner had been arrested on corruption charges related to his other business interests. Prior to this, Shams sales outpaced the other two oils because the Babati business already had excellent distribution networks and consumers in Manyara region prefer sunflower to other oils, thus facilitating the activities of the behaviour change campaign.

At the time of our fieldwork in Tanzania in September 2017, therefore, none of the three SMEs involved in the project were producing fortified oil in significant quantities (see table A for a list of SMEs). Only one producer in Singida was producing a small amount of fortified oil. This led to a shortage of fortified sunflower oil in local markets and where the fortified oil was available there was a limited choice in the size of the packaging. For example, in Shinyanga town the oil was only available in 20L containers (and therefore also in scoops of 50ml) but not in smaller packages of 1, 5 or 10L.

<table>
<thead>
<tr>
<th>Brand, production location</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singida Sunshine, Singida</td>
<td>Producing very small quantities of fortified oil in September 2017 due to price of sunflower seeds</td>
</tr>
<tr>
<td>Sweet Drop, Singida</td>
<td>Temporarily not producing fortified oil in September 2017 as awaiting spare parts</td>
</tr>
<tr>
<td>Shams, Babati</td>
<td>Not producing oil, as owner arrested</td>
</tr>
</tbody>
</table>

Given MASAVA’s critical contribution to the development of SME capacity and supply chains, the contribution of other actors in this sphere was relatively limited, but a conducive environment was important to project success. The Tanzanian government’s decision to make the fortification of cooking oils mandatory was essential in persuading both of the SMEs interviewed to join the research project, as this means that markets are guaranteed for fortified oils beyond the project’s duration. Both SMEs in Singida and a number of retailers also spoke of having gained business skills through their local traders’ associations or UNIDO’s training programme in the last few years, increasing their capacity to participate in MASAVA. Nevertheless, these capacities remain limited and MEDA’s assistance remained crucial throughout the project.

2.2.3 Delivery of project results

Over the project’s lifespan, some 142,000 L of fortified oil were produced by the SMEs. All SMEs faced some difficulties in maintaining constant supplies for the reasons discussed above. Despite these challenges, both of the Singida producers expressed a desire to continue or even expand their production of fortified oil in order to comply with government regulations as well as to access urban and international markets, such as UNHCR refugee camps in Uganda, Rwanda and Western Tanzania.3

The majority of retailers trained by MEDA sold fortified oil produced by one of the three SMEs in 2017.

Delivery of impacts

The MASAVA project successfully demonstrated that, with some assistance, the private sector can contribute to efforts to deliver nutrition solutions in the Manyara rather than for reasons that might shed light on the theory of change.

3 The third SME, Shams, ceased to produce fortified oils as its owner had been arrested on charges of corruption.
and Shinyanga regions of Tanzania. Fortified oils were available on the market in Shinyanga and Manyara regions while the project was active in 2017. However, shortages were being experienced by September 2017 when our fieldwork took place due to the production challenges experienced by the SMEs.

2.4.2 Theory of change for consumer behaviour

Activities

The Tanzania Communications and Development Centre (TCDC) conducted the campaign to raise awareness of the importance of vitamin A and the benefits of fortified oils among poor consumers in Shinyanga and Manyara. The campaign consisted of radio programmes as well as targeted advertising at health clinics, road shows, and cooking shows. Events such as bicycle races and football games were also held, mainly to ensure that men were also reached. The project estimates that almost 100,000 people were reached through these information dissemination activities.

Research into which of the BCC activities were the most effective continues, however, initial analysis suggests that for men radio was the most important source of information on vitamin A and MASAVA’s oils, while for women it was clinic demonstrations (Horton et al, 2017).

Changes to capacity and behaviour

Our discussions with consumers suggested that the BCC was successful in increasing consumer awareness of the importance of vitamin A. Respondents were able to list benefits of vitamin A consumption and believed that increasing their consumption of the promoted oils would improve their health (though some voiced concerns that the fortified oils seemed to cause allergies). The surveys conducted by MASAVA to accompany its BCC suggest that in intervention areas those who were aware of fortification increased from 17.5 to 77.8% of respondents. Coupled with the availability of fortified oil in local markets, the expected (though incomplete) capacity changes were achieved among consumers.

Consumers also suggested that the credibility of those who had assisted in disseminating the core messages of the BCC were important. Consumers were most comfortable trying out the new oils when these were recommended by religious leaders at their place of worship, medical staff at clinics or by trusted retailers. These relationships of trust allowed the project to counter rumours about the new projects that emerge, such as fears around the new oil containing contraceptives or high levels of cholesterol.

As important to the acceptance of the oil as its vitamin A content was the perception that the oil was of good quality and that the taste was comparable, or better than, unfortified sunflower oils.

The capacity changes resulted in significant, if not complete, behaviour changes: Of those aware of fortification and its benefits, 33.4% used fortified oils daily and 48.3% used it more than three times a week (Horton 2017). Sales statistics reported by TCDC and MEDA demonstrate that the BCC resulted in the redemption of vouchers and the sale of 142,000 litres of fortified oils.

The most significant contribution of the MASAVA project to an increase in the consumption of vitamin A through fortification, was at the level of capacity changes resulting from the BCC. Here the knowledge of the benefits of vitamin A are most significant as they not only resulted in the purchase of fortified oil but allowed consumers to attribute improvements in health to these dietary changes. As a result, the motivation to change diets, including possibly a willingness to pay a premium for fortified oil, can be maintained beyond the life of the project.

Of these sales, the majority were in the Manyara region rather than Shinyanga. This is thought to be due to the fact that consumers were accustomed to eating sunflower oil in Manyara, while in Shinyanga other vegetable and palm oils were popular. Also, the producer based in Manyara had a more sophisticated distribution network and the advantage of producing oil closer to the market (Horton et al. 2017).

Behaviour change was affected by the fact that oil was initially only available in quantities of 1L or more, which exceeded the purchasing power of the poorest consumers. Poor households in Tanzania often purchase their cooking oil daily, in scoops of 50 or 100ml. Once project research had demonstrated that retinol is stable in unrefined sunflower oil for several weeks, even in open containers, the oil could be sold in scoops from 20L containers. Once these 20L containers were made available to retailers for scooping, even the poorest consumers were able to benefit from the project. This change in packaging led to a substantial increase in the demand for fortified oil in 2016.

Mobile phone ownership facilitated access to the subsidy in the form of eVouchers, but again may have excluded the poorest consumers. Delays in issuing the vouchers due to an unreliable mobile phone network also discouraged some consumers and retailers. This
problem was resolved by the MEDA team by introducing the eWallet, where retailers rather than consumers accessed the subsidy, so keeping the price of fortified oil at the same level as unfortified sunflower oil. Again, this resulted in the oil being available to more customers, thus enabling behaviour change.

There is some evidence that these behaviour changes could be maintained in the absence of the subsidy: sales continued in project areas after the end of the subsidy in May 2017 and, in some cases, expanded into areas not previously serviced by the project. However, at the time of our fieldwork, consumers, retailers and health workers complained of an intermittent supply of the oil in both Manyara and Shinyanga, and many said that they had not been able to source the oil for several weeks or even months.

Consumers generally stated that they would be willing to pay a premium for the oil as they had seen significant health improvements among their family, especially children. Health workers confirmed that they believed this to be the case, as some had even been trying to arrange for transport to bring larger quantities of the oil into their communities, at a premium.

At the level of behaviour changes, the project benefited from the work carried out by other actors, who had contributed to an increased understanding of nutrition and the importance of varied diets to improving health. While consumers did not generally report knowing about the benefits of vitamin A prior to coming into contact with TCDC’s messages, they were aware of the need to eat a variety of foods in order to stay healthy. These lessons had been spread by government health workers and non-governmental projects such as Mwanzo Bora. Likewise, the project built on the social capital of religious leaders, who have built trust with their communities through their involvement with other health campaigns. A general suspicion of imported oils, even those that are likewise fortified with several vitamins, including A, helped to increase demand for the MASAVA brands.

**Delivery of project results**

MASAVA delivered on project results as 142,000 litres of oil were purchased, resulting in an increase in the consumption of vitamin A by women and children.

The project did not collect data on how oil is used and consumed within the family, so it remains unclear whether the project achieved its gender-specific goal of increasing the amounts of vitamin A consumed by women and children. However, retinol samples collected by the project demonstrated improvements for women and children and so it is unlikely that the oil was predominantly consumed by men. This was further corroborated by discussions with consumers. Both men and women who reported purchasing the oil were aware of the importance of vitamin A for all household members and especially children and lactating mothers.

**Delivery of impacts**

Consumers spoke of having witnessed impressive health improvements – including improved eye sight, better skin health and improved performance at school by children – and being disappointed that the product was no longer available. Many noted that they had seen improvements in their children’s health, particularly their skin and eyesight, and expressed concern at the potentially negative health effects of fortified oil shortages.

These statements are confirmed by MASAVA’s research results, where blood retinol levels were tested in both intervention and control areas before and after the project’s implementation. Retinol levels increased in the intervention areas, with the most likely explanation for this being the consumption of fortified oils by consumers (rather than other interventions such as megadoses, deworming programmes or even as a result of weather conditions and improved harvests). As the project conducted only an observational rather than a random control trial, there is a possibility that other factors were at play. However, other evidence available to the project suggest that alternative explanations – such as a more reliable supply of megadoses or dietary diversification as a result of rising incomes – are less probable (Horton et al, 2017).

3. Analysis

3.1 Sustainability and Scaling-Up

3.1.1 Sustainability

**Sustainability of fortified sunflower oil production**

As government support for fortification is likely to continue and urban consumers are able and willing to pay a premium for quality products, SMEs believe that they will continue to find a market for any fortified oil produced. Whether they will continue to feed into the supply chains that will provide poorer, rural consumers with access to fortified oils is, however, less certain.

While project activities were ongoing, MEDA was available to assist producers, distributors and retailers so that a relatively constant supply of fortified oil was
achieved for poor consumers in in Shinyanga and Manyara. Production and supply chains came under pressure after July 2017, when MEDA field activities had ceased.

In September 2017, fortified oil was no longer readily available in some of the intervention areas visited, in both Shinyanga and Manyara, as both enterprises in Singida had temporarily ceased production and production of Shams, in Manyara, had ceased indefinitely. Both of the Singida enterprises intended to resume the production of fortified oil as soon as possible; one enterprise was waiting to source spare parts for its machinery, the other was planning on resuming production once sunflower seeds were again available on the market.4 It remains to be seen whether the production and distribution of fortified oils can be sustained in the absence of financial and logistical support. However, without MEDA’s support, SMEs lack the finances and/or storage capacity necessary to ensure continuous production of fortified oil, which in turn means that distributors and retailers will find it difficult to maintain the distribution channels created by MASAVA. Simultaneously, SMEs reported demand for their fortified oil in easily accessible urban markets and it remains to be seen whether fortified oils will continue to reach the poorest consumers in Shinyanga and Manyara without the support provided by MEDA.

It is possible that with more extended support, the SMEs would have increased their capacity to produce fortified oil sufficiently to ensure a constant supply to distributors, for example by increasing their storage capacity of unprocessed sunflower seeds. Without this kind of support, it is not improbable that the project’s successes will prove to be short-lived.

On the other hand, the project proved very successful at creating demand among consumers. The message that vitamin A was essential to health and that its intake could be increased easily and affordably through the consumption of fortified sunflower oil. Consumers reported noticing the difference in their and their children’s health, making it likely that demand for the product would be sustained.

As a result issues of sustainability are linked to the business model; in particular the difficulties that SMEs face in ensuring that they can supply the oil at competitive prices throughout the year. This is only possible for SMEs that have access to sufficient capital to purchase sunflower seeds directly after harvest, when they are at their cheapest. In addition, without support to the distribution network, SMEs are likely to find urban markets easier and cheaper to access than those that are more remote and rural.

### 3.1.2 Scaling-Up

The project has demonstrated that it is possible to generate effective demand for oil at subsidised rates and, to a limited extent, that this demand can be maintained after the phasing out of subsidies. As MASAVA’s research has shown, increasing vitamin A consumption by supporting SMEs to produce fortified, crude sunflower oil is cost-effective compared to treating the symptoms of vitamin A deficiency and so there is considerable scope for scaling-up the geographical range of a project like MASAVA to other parts of Tanzania and Africa, where market conditions are similar, a mandatory fortification policy is in place and a shelf-life of 6 months is sufficient (Horton et al, 2017).

However, before the project can be expanded to other regions, it is necessary to find solutions to the production difficulties experienced by the SMEs in Singida and to test how sustainable distribution networks prove to be in the absence of MEDA’s regular assistance. In the absence of MEDA’s help, the risk that any fortified oil produced is exported or sold into easier-to-reach urban, middle class markets is too great. MEDA’s proposed work to improve the sunflower seed supply chain may go some way to smoothing production levels.

Efforts at scaling-up fortification by SMEs are likely to encounter difficulties in identifying a sufficient number of enterprises that have the capacity to follow TFDA and TBS guidelines and standards. Despite the high levels of support, MASAVA was only able to identify three, rather than four, SMEs that met the basic food health standards and had sufficient production capacity for fortification to be economically viable. There were no enterprises that met these specifications in Shinyanga.

It is likely, therefore, that scaling-up efforts will need to be accompanied by other interventions to increase the capacity of SME oil producers. It is also not improbable that without MEDA’s assistance the two enterprises still active in Singida will struggle to maintain a constant supply of fortified oil.

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4 It is unclear whether Shams plans to resume the production of fortified oil as the business was not operating and no representatives were available for interview at the time of fieldwork.
On the other hand, scaling-up the production of fortified sunflower oil and generating demand for its supply, may also provide economies of scale, both for sourcing inputs and technologies for the production of the fortified oil as well as in creating BCCs to create sustainable demand for the product.

3.2 Specific Outcomes

3.2.1 Food and nutrition security

The project’s main aim was to address vitamin A deficiency in Manyara and Shinyanga regions by involving the private sector in the production, distribution and retail of fortified oil. MASAVA successfully demonstrated that the fortification of unrefined, fortified sunflower oil can play an important role in reducing vitamin A deficiencies.

The project demonstrated that unrefined sunflower oil could retain retinol sufficiently for normal market conditions and that consumers would switch to these oils, if they were informed of their benefits through a BCC. As a result, 142,000 litres of fortified oil were sold, which may have reached as many as 400-500,000 individuals.

Research conducted by Sokoine and Waterloo universities demonstrated that the presence of fortified oil in Shinyanga and Manyara markets is the most likely explanation for the reduction in vitamin A deficiencies in children and their (lactating) mothers (Horton et al, 2017).

3.2.2 Income Security

Not applicable.

3.2.3 Sustainable Agriculture

Not applicable.

3.2.4 Gender

One of the project’s stated aims was to improve vitamin A deficiency among women and children in Shinyanga and Manyara regions, by making the vitamin available in a food product that is consumed by all members of the household and not preferentially by men. As purchasing food and cooking are generally activities conducted by women, the focus of the project was on reaching women directly. The project’s reports also state that interventions to educate men on the benefits of vitamin A consumption, improved their willingness to provide additional money to their wives for the MASAVA oils.

Some of our interviews with consumers provided further anecdotal evidence to confirm this: both religious leaders and a number of male consumers confirmed that they encouraged their wives to purchase the oil. Further, religious leaders had attempted to impress on their male congregants that they should encourage their wives to cook with MASAVA oils. Other female interviewees, however, were not concerned about their husbands’ opinions as they felt empowered to make all of the household decisions around food purchases. Some reported that their husbands did not know that they had now been eating fortified oil for months.

The focus on women also seems to have helped some of the more enthusiastic, female retailers of oil, who used their social networks to drum up customers and increase their sales of the new oils. As they interacted with other women more regularly and informally, they were able to expand their customer base and increase their sales to women who were making household consumption decisions.

3.2.5 Unexpected Outcomes

Perhaps the most important and positive unexpected outcome was the extent to which retailers worked to bring MASAVA’s health and nutrition messages to their customers, both out of a sense of social obligation as well as to expand their businesses. In a similar vein, the number of customers who reported encouraging other members of their community to purchase the oil was perhaps surprising. They spoke of seeing significant health improvements in themselves and their children and were, as a result, sufficiently convinced to suggest it to their friends, neighbours or family members who were not part of the same household. They also reported preferring the oil for its taste and quality.

Though there were some reports of consumers being suspicious towards the oil, fearing that it contained contraceptives, this did not seem to be an opinion that was at all widespread. Only a few of our interviewees had heard of these rumours at all and none gave them any credence.

Finally, SMEs reported identifying urban and international markets for their oils, which they had not anticipated at the project outset. While this may be a positive outcome for the SMEs themselves, this increases the risk that they will supply easier to reach markets in the future.

3.3 Research Partnership and Policy Influence

3.3.1 Research Partnership

Canadian partners contributed not only to the development of the project, but played an important supporting role throughout the project. In particular,
partners at the University of Waterloo assisted Sokoine University in creating the observational trial to test the potential of fortification and, according to a collaborator at Sokoine University, brought an economic lens to the question of nutrition. In other words, while Sokoine University has experience of more direct nutrition interventions, they had not attempted to deliver these through private sector actors in the past.

In terms of the research objectives for this Phase of the project, the project was able to shed light on each of its four research questions. It demonstrated that crude sunflower oil could be used as a vehicle for increasing vitamin A consumption, where turnover of produce is sufficiently rapid as in Manyara and Shinyanga regions. In addition, MASAVA showed that retinol was sufficiently stable for oil to be sold by the scoop from 20 L containers, making it accessible to poorer consumers. Likewise, experiments with eVouchers demonstrated that a subsidy system administered at the retailer rather than consumer level was less cumbersome for market participants. The evidence generated by testing blood retinol levels in intervention areas and counterfactual communities makes a robust case for fortification and that the increases in vitamin A consumption can indeed be attributed to MASAVA’s interventions.

### 3.3.2 Policy influence

The project built close relationships with the government of Tanzania as well as disseminating results at international meetings with a variety of stakeholders (GAIN, WHO, Micronutrient Initiative).

Interactions with policymakers in Tanzania in the Prime Minister’s Office and at the TFDA were particularly important. Here the project was able to bring several issues to the attention of policymakers, including difficulties experienced by SMEs in complying with standards and how this affected the ability to reach poor consumers with fortified oils. In addition, they made policymakers aware of the problems caused for local producers by subsidised, fortified palm oils.

As a result of these efforts, the project was asked to submit a policy brief to the government in September 2017, to feed into deliberations on fortification and import strategies.
## Appendix 1: List of Interviews

<table>
<thead>
<tr>
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<th>Organisation</th>
<th>Date</th>
<th>Location</th>
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<td>Nadira Saleh</td>
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<td>6.9.2017</td>
<td>London, UK/Waterloo, Canada</td>
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<td>Prof. Mosha Research Co-Lead</td>
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<td>Coordinator</td>
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<td>22.9.2017</td>
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<tr>
<td>Prof. Horton</td>
<td>University of Waterloo</td>
<td>29.7.2018</td>
<td>London, UK / Waterloo, Canada</td>
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**Appendix 2: Prevalence of vitamin A deficiency by region in Tanzania**

![Map of Tanzania with vitamin A deficiency prevalence by region]
Appendix 3: References


