Canadian International Food Security Research Fund

Understanding the CIFSRF Phase Two portfolio’s contribution to improved nutrition

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Acknowledgements and disclaimer
The authors of this report are solely responsible for the opinions and ideas in this synthesis, including any errors and omissions. The views expressed do not necessarily reflect those of IDRC or ODI.

Abbreviations

CIFSRF Canadian International Food Security Research Fund
DFS Double-fortified salt
FAO Food and Agriculture Organization of the United Nations
FNS food and nutrition security
GIZ German Corporation for International Cooperation
IDRC International Development Research Centre
PDS Public Distribution System, India
UNICEF United Nations International Children’s Fund

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Executive Summary

This paper looks at the Canadian International Food Security Research Fund’s (CIFSRF) Phase 2 (2013-2018) research-for-development contributions and potential contributions to the nutrition of vulnerable, low-income people. This contribution analysis draws on five of six in-depth field studies undertaken to CIFSRF Phase 2 projects, as well as desk reviews of five nutrition-focused projects. Combined, these represent projects that have been operating in 11 countries: Benin, Bolivia, Cambodia, Colombia, Ethiopia, India, Tanzania, Kenya, Uganda, Nigeria, and Vietnam.

Key strategies employed by these projects to boost nutrition include: promoting dietary diversity and more nutritious crops (7/10 projects); fortifying staples (4/10 projects); value-added food processing (6/10 projects), and encouraging better diets, health, and hygiene practices through nutrition education (10/10 projects).

Likewise, gender concerns have been mainstreamed throughout the portfolio, which seeks preferentially to include women as participants and/or beneficiaries with a view to improving the status of women and girls.

While promoting improved diet quality, with a specific focus on micro-nutrient intake is central to most projects, some also work on reducing protein deficits through increased consumption of fish, dairy, or pulses. Only India small millets involves boosting a basic staple grain, and even in this case the aim is to boost intake of micronutrients, fibre, and protein, rather than energy. This micronutrient focus is relevant, since micronutrient deficits represent the most common and widespread nutritional disorders in the world.

The degree of innovation varies across this section of CIFSRF projects. Some, such as crop improvement or home gardening, entail relatively familiar innovations. The inclusion of iron in iodized salt, or the promotion of fermented foods to alter and improve gut health, are more novel innovations.

Projects are yielding the expected changes in people’s behaviour that are likely to lead to better food and nutrition security. Table A provides some of the headline nutrition contributions of the ten projects reviewed.

These contributions have been made possible by CIFSRF’s strong research partnerships, boosted by their attention to policy influence. Contributions by both Canadian and international partners have been both technical and social, while CIFSRF project management has encouraged and facilitated a flexible approach as well as organized training workshops on scaling up and gender.

Policy influence has extended from sub-national to national levels, the result of competent teams with strong reputations and close connections with policymakers.

Are the improvements to food and nutrition security seen likely to be sustained? For most activities, probably yes, particularly where the economics favours sustainability. In some however, particularly where public goods need public support, or where private gains stand to accrue in imperfect rural markets where public intervention is strategic, support for a longer time would allow activities to become self-sustaining. Likewise, in most cases, the move from self-sustaining, to self-replicating will require further support. Spill over effects are not always as high or automatic as expected.

In sum, while CIFSRF’s portfolio has already made strong contributions to people’s diet quality and nutrition, its latent potential contribution may be an order of magnitude greater – particularly if the momentum can be sustained, with the uptake of proven technologies and processes expanded.
<table>
<thead>
<tr>
<th>Project</th>
<th>Headline contributions to improved nutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolivia Amazon fish</td>
<td>112,957 new consumers of fish between 2015 and 2017. Average consumption in fish farming families up 12kg/year</td>
</tr>
<tr>
<td>Cambodia home gardens</td>
<td>3,888 household (19,440 individuals) have improved and diversified their diets</td>
</tr>
<tr>
<td>Colombia potatoes</td>
<td>Improved potato variety available to 6.5M Colombian consumers. 70% of 200 direct participant households improved their nutrition and health</td>
</tr>
<tr>
<td>East Africa fermented food</td>
<td>Probiotic yoghurts consumed by over 200,000 people</td>
</tr>
<tr>
<td>Ethiopia pulses</td>
<td>Nutrition education reaching 23,059 individuals. More than 35,000 consumers ate pulse-containing foods, boosting protein consumption.</td>
</tr>
<tr>
<td>India double-fortified salt</td>
<td>Reached approximately 25M beneficiaries by early 2018, expected to increase to around 66M by mid-2018</td>
</tr>
<tr>
<td>India small millets</td>
<td>210 tonnes of value-added products and 1,015 tonnes of bulk small millets have reached 550,000 consumers.</td>
</tr>
<tr>
<td>Tanzania fortified oil</td>
<td>Over 140,000 litres of fortified oil produced and sold, increasing vitamin A consumption for 645,772 consumers.</td>
</tr>
<tr>
<td>Vietnam complementary foods</td>
<td>Mothers of 22,248 under-twos received nutrition counselling</td>
</tr>
<tr>
<td>West Africa vegetables</td>
<td>Project reached a total of 337,931 farmers (51% female) in 36 months. Seasonality of indigenous vegetable production has been reduced.</td>
</tr>
</tbody>
</table>
1. Introduction

1.1 Background: the Canadian International Food Security Research Fund (CIFSRF)

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.

1.2 Questions and methods

In July 2017, IDRC commissioned the Overseas Development Institute to assess CIFSRF’s contribution to changes in productivity, incomes, nutrition for participants in CIFSRF projects, most of them smallholder farmers.

This paper synthesises nutrition effects of the CIFSRF Phase 2 projects. The overarching question is that of the contribution of CIFSRF projects to improved nutrition for project participants, and the lessons that may be derived from that experience. It addresses the following questions:

1. Overall, did the projects address issues that are to be expected, given current global knowledge of nutrition? Were any significant issues overlooked?
2. Did they promote technologies and techniques that are compatible with the livelihoods of intended beneficiaries?
3. Who benefited, in what form and to what degree?
4. What impact did it have and how sustainable it is anticipated to be?
5. What lessons can be drawn from early impacts? What factors made for success or prevented success? How effective were the research partnerships formed under CIFSRF in generating results and impacts?

This paper forms part of a set of three syntheses of impacts on income, nutrition and sustainable increase in productivity, plus an overall synthesis of all results and impacts of the CIFSRF Phase 2.

To gather data to address these questions, six of the 18 Phase 2 projects were visited between September and November 2017 to interview project participants, project staff and other stakeholders and to see activities in the field. Selected after being identified by IDRC staff as likely to show significant and revealing results, these were: Cambodia homestead food; Colombia potatoes; Ethiopia pulses; India small millets; Nepal terrace farming; and Tanzania fortified sunflower oil.

In addition, desk reviews were carried out for the other twelve projects in the Phase 2 portfolio, drawing mainly on original proposals and technical reports. [See Annex A for a list of these projects, with their full titles.] Five of the six projects visited in the field, and five of the dozen projects have been selected as the focus of this review, for their emphasis on nutrition.

Most of the data feeding into this review were collected by the end of December 2017. They have been complemented by final technical reports received from most of the projects that were available by mid-May 2018.

The rest of this paper is set out as follows:

- Section 2 briefly sets the context for nutrition in food and nutrition security programmes. It outlines the framework used to document changes in nutrition and discusses the relevance of activities carried out to improve nutrition (Questions 1 and 2).
- Section 3 sets out the analysis of the programme’s contribution (and potential future contribution) to nutrition, including who benefited, in what form, and to what degree (Question 3), what impacts were seen, an assessment of likely sustainability, and the contribution of the research partnerships (Questions 4 and 5).
- Section 4 concludes, discussing key findings, and drawing out lessons and headline factors of success, (Question 5).
2. Thinking about nutritional status and diets

2.1 Malnutrition globally

Malnutrition takes many forms. It refers to deficiencies, excesses or imbalances in a person's intake of energy or nutrients — carbohydrates, fats, proteins, vitamins and minerals. Two broad groups of conditions constitute malnutrition:

1. Undernutrition: inadequate intake and use of calories, protein, vitamins and minerals. Manifested in stunting (low height for age), wasting (low weight for height), underweight (low weight for age), anaemia, goitre, blindness, etc.; and,

2. Overweight and obesity: excess intake of food, raising the risk of diet-related non-communicable diseases such as heart disease, stroke, diabetes, and some cancers (WHO, 2016).

Under-consumption of dietary energy and protein is still a problem for hundreds of millions of people. Under-consumption of micronutrients affects billions. Most of them live in the developing world, where the greatest concern is the inadequate nutrition for infants that impairs their mental and physical development and puts them at a life-long disadvantage. In addition, women and girls are at a higher risk of being affected by malnutrition.

Progress on reducing the incidence of stunting among children has been slow. Up to one-third of infants in the developing world are stunted. Some 159 million under-fives were stunted (chronic malnutrition) and 50 million wasted (acute malnutrition) in 2011 (WHO, 2016).

Increasingly, however, concern is less about energy and protein intake, and more about deficits of key minerals and vitamins — particularly iron, iodine, vitamin A and zinc — that affect an estimated 2 billion or more people. For example, of 528 million women of reproductive age, some 29% are affected by anaemia; half of which might be amenable to iron supplementation (WHO, 2016).

Heavy human costs of undernutrition apply, with underweight estimated to cause 3.75 million deaths annually worldwide, along with more than 0.75 million caused by each of iron deficiency, vitamin A deficiency, and zinc deficiency (Horton, 2017). Economic losses from undernutrition are also large, with productivity losses to underweight, iodine and iron deficiency leading to physical and cognitive impairments that can equate to half to 2% of the GDP in highly affected countries (Horton, 2017).

At same time, the over-consumption of food, coupled with lives that are increasingly sedentary, is producing large numbers of people who are overweight and obese. Moreover, over-consumption of some kinds of food may be combined with under-consumption of nutrients, so that malnutrition manifests in multiple ways in the same individual. In poorer countries, it is becoming increasingly common to find some members of a household suffering from undernutrition while others are overweight (WHO 2016).

While the incidence of overweight and obesity is highest in high-income countries, prevalence is rising fast in emerging economies and even some low-income countries. Globally, there were an estimated 42 million overweight or obese under-fives in 2013 (6.3%) (Mendis et al., 2014), while the percentage of adults who were overweight or obese grew from 23% in 1980 to 34% in 2008, with the vast majority of this increase seen in the developing world (Keats and Wiggins, 2014).

What factors influence people’s nutrition, particularly the nutrition of children, who form the focus for most nutritionists? The first 1000 days, from conception to age two is widely regarded as the paramount window in which to establish good nutritional status, allowing a person to continue to grow and thrive. A widely-adopted framework used to describe malnutrition outcomes in children comes from UNICEF (1991) – see Figure 1. While other food and nutrition security frameworks, such as that of FAO which uses four pillars — availability, access, utilisation, and stability — tend to emphasise food, the UNICEF framework recognises that the health environment is equally important for nutrition outcomes. This framework flows from the basic causes, including control of economic, natural and human resources, and in which access to education is key, through to three groups of underlying causes. These are: too little access to food, inadequate care for children and women, and insufficient health services and an unhealthy environment. These three clusters of factors feed the two immediate and interactive causes of malnutrition: inadequate intake of food, and disease.

1 For more information see: http://www.who.int/mediacentre/factsheets/malnutrition/en/
2.2 CIFSRF’s approaches to nutrition

Ten of CIFSRF’s 18 phase two projects arguably include a strong focus on nutrition or nutrition policy, while including ‘nutrition education’ components. These are: Bolivia Amazon fish, Cambodia homestead food, Colombia potatoes, East Africa fermented food, Ethiopia pulses, India double-fortified salt (DFS), India small millets, Tanzania fortified sunflower oil, Vietnam complementary foods, and West Africa vegetables.

While the eight remaining projects may indeed impact nutrition, they are less directly focused on this outcome. These projects include: CBPP vaccine, Côte d’Ivoire coconut disease, Ghana ICT extension, Kenya farm shop, Nanotech for fruits, Nepal terrace farming, Novel livestock vaccines, and Tanzania legumes. These projects are featured instead in the sister syntheses on ‘income’ and ‘sustainable increases in productivity’ described earlier. While clearly such projects do influence people’s diets and nutrition, they do not include strong nutrition education components (described below) which identify the other ten projects as nutrition-oriented.

In this review, CIFSRF’s contributions to nutrition are analysed along three lines, corresponding with internal IDRC/ CIFSRF programme thinking on nutrition (Table 1):

- Dietary diversity and more nutritious crops;
- Food fortification and value-added food processing; and,
- Nutrition education.

The first is about projects that broaden the production and consumption base to include a wider variety of crops or livestock, delivering a wider variety of nutrients — particularly micronutrients and protein. More nutritious crops may include those known to be high in micronutrients (for instance fish, fruit and vegetables promoted in Cambodia home gardens), as well as those that are biofortified (for instance, yellow potatoes promoted in Colombia.)

Where CIFSRF projects use this strategy, they operate through improving agricultural productivity of a wider consumption of animal products in the two cases to do with animal vaccines.

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1 With potentially very large impacts, for instance in increasing fruit consumption in the case of nanotech for fruits, or in boosting
range of items than previously cultivated, or of biofortified products. Agricultural projects work with NGOs and government extension partners, extending new practices, inputs, and technologies to food producers through training and other outreach. This is the case in eight of the projects: Cambodia homestead food, East Africa Fermented food, Ethiopia Pulses, Colombia potatoes, West Africa Vegetables, Bolivia Amazon Fish, and to a smaller extent, Vietnam complementary foods, and India small millets.

The second is about adding micronutrients to staple foods to boost their consumption, as well as about projects with activities that make (unfortified) micronutrient-rich processed foods more widely available. Two main avenues here include:

- Promoting production, distribution and sales of fortified products. Examples include East Africa fermented food — probiotics added to yogurt; India double-fortified salt (DFS) — iodine and iron added to salt; Tanzania fortified sunflower oil — vitamin A added to oil; and West Africa vegetables — green leafy vegetables added to bread, porridge and other foods; and

- Developing and supporting micro-, small- and medium-sized businesses that process food into nutritious products. Primarily the assistance is technical; on how to make the processed food products. The projects also provide business development support and advice, including bookkeeping and marketing, support to access existing schemes, or loans/grants (in cash or kind), through NGOs or other partners. Eight of the 10 projects in Table 1 include this kind of support: East Africa Fermented food, Ethiopia pulses, Vietnam complementary foods, India small millets, West Africa Vegetables, Tanzania fortified sunflower oil, Vietnam complementary foods, and to a lesser extent, Cambodia homestead food.

The third area, nutrition education, concerns informing people about healthy diets and food preparation; child feeding; and hygiene, including handwashing with soap at critical times, and safe water. Nutrition education was offered in three main ways:

- Training child care providers, mostly mothers, in best practices in child feeding, health, and sanitation. This was included in four projects (Cambodia home gardens, Colombia Potatoes, Ethiopia pulses, and Vietnam therapeutic foods);

- Some projects, notably India small millets, also trained food processors and vendors on hygiene in commercial food preparation and storage; and,

- Marketing and education campaigns. All of the 10 focus projects were involved in these to some extent. Campaigns disseminated information about health benefits of the various products involved, for instance to encourage consumption of healthy foods like vegetables, pulses, or yellow potatoes, to encourage people to adopt practices such as eating whole small fish, or to encourage replacing foods like unfortified oil and salt by fortified versions. Diverse means were used, including cooking demonstrations, social media, radio, young scientist vegetable clubs in schools, and outreach by self-help-groups.
<table>
<thead>
<tr>
<th>Project</th>
<th>Main intended beneficiaries</th>
<th>How: what element of nutrition?</th>
<th>Nutrition education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolivia Amazon fish</td>
<td>River fishers, fish farmers in Bolivian Amazon and consumers both local and national</td>
<td>Boosts availability of protein- and micronutrient-rich fish, including through better harvest management, better management to avoid fish mortality.</td>
<td>Training for fish vendors in better fish hygiene and handling practices to improve safety and quality. Better practices in fishing to preserve meat quality by keeping skin on until processing plant.</td>
</tr>
<tr>
<td>Cambodia homestead food</td>
<td>Farm families in rural areas, their neighbours and shoppers in their local markets, in three provinces: Kampot, Kampong Cham, Prey Veng; and one district of Phnom Penh.</td>
<td>Home garden production of vegetable, fruit, fish, and chicken. Harvesarts provide direct access for growers, while some is sold locally helping boost supply and moderate prices.</td>
<td>Behaviour change communications and activities on water, sanitation, child feeding, child health. Recipe demonstrations and education about e.g. benefits of eating vegetables, whole fish</td>
</tr>
<tr>
<td>Colombia potatoes</td>
<td>Rural households, five municipalities of rural Nariño</td>
<td>Improved potato yield and nutrient content. Improved availability of vegetables, fruit from home gardens to provide direct access for growers, as well as some earnings from sales</td>
<td>Project helps implement national programme on micro-nutrient sprinkles. Education in all aspects of nutrition, plus ancestral gastronomy, through ‘Family farming Communitarian Schools’ and ‘Shagras para la Vida’.</td>
</tr>
<tr>
<td>East Africa fermented food</td>
<td>Consumers in several districts of Kenya, Uganda, and Tanzania</td>
<td>Establishes small scale production of probiotic foods, particularly yoghurt, largely for sale. Incomes of small scale producers improved. Yoghurt in schools / orphanages. Yoghurt has longer shelf-life compared than milk</td>
<td>Nutrition education about probiotics (associated with improved gut health, better nutrient absorption, health outcomes.) Marketing campaigns for the probiotics</td>
</tr>
<tr>
<td>Ethiopia pulses</td>
<td>Smallholders in 7 zones and 15 districts of the Southern Nations, Nationalities, and People’s Region³ (SNNPR) of Ethiopia</td>
<td>Boosts numbers of smallholders growing chickpeas and haricot beans to improve availability of this protein-rich food. Improves direct access as well as incomes of producers; ensures affordable supply for consumers</td>
<td>Nutrition (especially protein) enhanced through preparation of pulse-based recipes and complementary feeds for children. Campaign to encourage pulse consumption</td>
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</tbody>
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¹ SNNPR has one of the highest incidences of protein-calorie and micronutrient deficiencies in the country. Previous research has established that the region has high potential for pulse production while the research and extension system has done little to promote their production.
<table>
<thead>
<tr>
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<th>Main intended beneficiaries</th>
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<th>Nutrition education</th>
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</thead>
<tbody>
<tr>
<td>India double-fortified salt (DFS)</td>
<td>Indian consumers using PDS shops – largely in three states Uttar Pradesh, Jharkhand and Madhya Pradesh.</td>
<td>Establishes manufacturing of salt fortified with iodine and iron at industrial scale. DFS is included in public distribution system at a subsidized price.</td>
<td>Nutrition education to promote use of DFS, including role in combating iron-deficiency anaemia</td>
</tr>
<tr>
<td>India small millets</td>
<td>Consumers of small millet foodstuffs Small-scale producers of small millet foodstuffs in Tamil Nadu and other Indian states</td>
<td>Improved availability of foods containing (less-polished) millet. Millet is grown in more diverse cropping systems than some of the alternative staple crops. (e.g. with pulses, indigenous greens)</td>
<td>Promotes consumption of small millets for their superior nutrient profile compared to traditional staples. Improves food safety of small millet foodstuffs through improvements in hygiene among producers</td>
</tr>
<tr>
<td>Tanzania fortified sunflower oil</td>
<td>Low-income consumers of sunflower oil in two provinces of rural western Tanzania, Shinyanga &amp; Manyara</td>
<td>Small and medium-scale processors helped to fortify crude sunflower oil with vitamin A. Retailers encouraged to stock the oil.</td>
<td>Campaign to promote consumption of oil to combat vitamin-A deficiency. Consumers also encouraged to buy using promotions such as vouchers.</td>
</tr>
<tr>
<td>Vietnam complementary foods</td>
<td>Young children in three northern provinces of Vietnam</td>
<td>Helps diversify farmers’ production</td>
<td>Nutrition training for parents of young children: complementary feeding to improve child nutritional status and health outcomes. Marketing of complementary foods</td>
</tr>
<tr>
<td>West Africa vegetables</td>
<td>Rural households in Benin and Nigeria</td>
<td>Boosts availability of three indigenous vegetable crops, and improves affordability</td>
<td>Boosts availability of processed foods containing vegetables. Information campaign around underutilised vegetables. Young-Vegetable-Scientists Clubs teach teens about benefits of healthy diets.</td>
</tr>
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Source: Author’s construction using IDRC documentation.

**Relevance of the CIFSRF approach to nutrition**

CIFSRF Phase 2 projects have taken a relevant approach to tackling malnutrition.

The focus of most of these ten projects is on improving dietary diversity and remedying micro-nutrient deficits — with a few concerned about protein (pulses, fish, or dairy), or fibre. Projects also stress the nutritional status of young children, largely through nutrition education, some with an explicit focus on under-twins, and pregnant or lactating women. Women are also strongly represented as participants. The targeted groups are appropriate. The longstanding impacts of nutrient deficiencies on unborn or young children clearly justify a focus on these groups.

That these projects have complemented a boost to nutrient availability or access with nutrition education:
to make sure that participants understand micro-nutrients, so they consume better diets; or so they learn more about child feeding and the health environment — and change their behaviour accordingly, is also welcome. Such communication is highly relevant to these projects, particularly since micro-nutrient deficiencies may be less obviously visible than some other forms of malnutrition such as energy and protein deficit.

The literature shows how important nutrition education, particularly that to do with health and care, is in accompanying some physical change, such as more vegetables produced, to achieve the desired, sustained, and even contagious impact.

Gender concerns are another critical factor driving nutritional outcomes — primarily the status of women and girls — which is known to factor heavily into household and individual nutrition status (see for example, Smith et al., 2003). Women’s access to resources, their capacity and standing in households and communities, and their time to spend on productive as opposed to reproductive activities are central.

CIFSRF projects do seek to promote nutrition through improving the status of women, consciously including and enabling women at many levels, while integrating gender strategies into the projects. Projects work for greater inclusion of women at all stages of the value chains, along with in some cases strategies to promote women’s status, save women time, and/or improve gender relations. Women emerge as project champions, as implementers, as partners, and as active beneficiaries within the projects: the strong leadership of women and predominantly female staff in Colombia; the DHAN’s women’s federation leader in Salem championing millet among her 40,000-strong federation, and in her own home; the women retailers of vitamin A fortified oil in Tanzania campaigning on its health benefits — are just a few examples.

This can result in more autonomy and influence in the hands of women. All ten nutrition-focused projects analysed aimed in some way to improve status of women project beneficiaries, and to ensure inclusion of women. The two vitamin and mineral fortification projects also aimed to help women, more as consumers; particularly since iron-deficiency anaemia and vitamin A deficiency disproportionately impact (pregnant and lactating) women.

Though the link between improving the status of women and girls’ and their nutrition as well as the nutrition of their family members is acknowledged here, this review does not investigate gender aspects in detail, as this is the subject of another CIFSRF-commissioned paper: “Typologies of change: gender integration in agriculture and food security research: A gender synthesis of Canadian International Food Security Research Fund projects” (Wong et al., 2018).

### 3. CIFSRF contributions and potential contributions to nutrition

All ten of the nutrition-focused projects are achieving their expected results in terms of changes to behaviours and diets. While it is not possible in all cases to quantify impacts as changes in nutritional status, it is reasonable to suppose these impacts are occurring. Earlier research (some in CIFSRF’s first phase) has drawn links between interventions being promoted and nutrition. In the case of Cambodia homestead food for example, home gardens have been shown to boost dietary diversity, which is accepted as a good proxy for improved nutrition. In the case of East Africa fermented food, consumption of probiotics has been shown to improve gut health and reduce diarrhoea. In the case of India double-fortified salt, consumption of DFS has been shown to reduce anaemia. In the case of West Africa vegetables, consumption of vegetables rich in polyphenols and other antioxidants has been shown to improve health.

Thus, where we have numbers of beneficiaries in terms of consumers, it is reasonable to suppose contributions to their nutritional status are being made. Table 2 summarises these for the 10 projects, as well as drawing out some potential future contributions.

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4 For some relatively recent examples, see Menon et al., 2007 on integrated health and nutrition in rural Haiti, or Greenland et al., 2016, on BCC for diarrhoea control in Zambia. Hoddinott et al., (2017) also showed diffusion effects, with neighbours of direct participants showing improved infant and young child nutrition knowledge in rural Bangladesh, while Hoddinott et al (2018) showed persistence of effects in the same country.

5 “The empirical results leave no doubt that higher women’s status has a significant, positive effect on children’s nutritional status... Further, they confirm that women’s status impacts child nutrition because women with higher status have better nutritional status themselves, are better cared for, and provide higher quality care to their children.” (Smith et al., 2003)
<table>
<thead>
<tr>
<th>Project</th>
<th>Element of nutrition</th>
<th>Contributions to improved nutrition</th>
<th>Potential future contribution to improved nutrition</th>
</tr>
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<tbody>
<tr>
<td>Bolivia Amazon fish</td>
<td>Increased availability of fish for home consumption among low-income consumers. Nutrition education on benefits of fish. Improved incomes for participating households, allowing for improved, diversified diets.</td>
<td>Fish consumption is increasing in fish farming families, and the general public. Increased incomes for indigenous farmers allows for improved family diets. Workers in fish processing are able to use fish fat in home baking and cooking.</td>
<td>Potential significant impact in areas of Bolivia with high rates of low income households that report poor nutrition. Two main pathways exist – 1) boosting incomes of fishers, fish farmers, processors, vendors, 2) making more fish available for local consumption.</td>
</tr>
<tr>
<td>Cambodia home gardens</td>
<td>Increased home garden and fish production leading to more diverse diet, richer in micro-nutrients and protein. Some value-added processing. Nutrition education on diets, water, sanitation, child feeding, hygiene</td>
<td>Project participants (3,888 households, est 19,440 individuals) have improved / diversified their diets. Reports of more exclusive breastfeeding, use of water filters, more handwashing. Reports of improved health of children Study in phase 1 showed the proportion of women with high dietary diversity scores increased from 7.7% to 36.8% during the 22 months of participation.</td>
<td>Project may be scaled out across more of Cambodia. Strong potential to replicate further across countries where Helen Keller International operates elsewhere in Asia, in Africa, and beyond</td>
</tr>
<tr>
<td>Colombia potatoes</td>
<td>Dissemination of new varieties of yellow potato with enhanced protein, micro-nutrients. Distribution of micro-nutrient powders Promotion of collective and individual home gardens Nutrition education on child feeding, hygiene, food preparation diets, ancestral knowledge</td>
<td>Three varieties of improved yellow potato available to 6.5 million consumers by March 2018. Dietary diversity and food security improved with increased production and consumption of fruit and vegetables. After implementation of Shagras para la Vida (among 500 smallholder home gardeners), number of households classified as food insecure decreased (82% to 41%) while the number of households classified as food secure increased (59% to 59%). Reported proportion of households with adequate diet diversity increased from 18% to 53%. 70% of the 200 households participating directly in the project improved their nutrition and health, learned proper eating and nutrition habits, recovered some ancestral foods. Lessons in hygiene/ care of children likely to produce significant effects.</td>
<td>Significant potential exists to expand the current production and consumption of the improved potatoes further (cultivated area now accounts for 16% of the total cultivated area of yellow potatoes). National potential for Colombia, and possibly expansion to other countries in the region and beyond.</td>
</tr>
<tr>
<td>Project</td>
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</table>
| East Africa fermented food    | Increased production of yoghurt to improve dietary diversity; replacement of less hygienic yoghurts with those produced to better food safety standards. Nutrition education introducing people to probiotic yoghurts (PY) which improve gut health, and contributing to more diverse diets rich in micronutrients | Health benefits of PY and other fermented foods have been documented, including weight gain, fewer skin rashes, reduced diarrhoea.  
In Kenya: PY regularly consumed by 300 children in 3 orphanages, probiotic porridge (PP) by 1200 children in 20 early childhood development centres. 18 production units produce 3,700 litres of PY per week. Regular consumers of PY estimated at around 5,000 (assuming 250ml / day / person, 3 days/week)  
In Tanzania: 84 production units produce 14,733 litres per week.  
In Uganda: 116 production units are producing 25,947 litres per week. Consumers estimated to number 200,000.  
63% of the 200 production units in Tanzania and Uganda are female owned, and 60% of the 945 people involved in the business (e.g. production, distribution and marketing) are female. | PY has high potential for further uptake among small-scale dairy farmers in East Africa, and possibly further afield where Heifer International has operations. Schools present a very promising marketing channel.  
In Kenya, there is high potential to mainstream production and consumption of probiotic porridge in early childhood development centres across the country. |
| Ethiopia pulses               | Improved production of pulses to combat protein deficiency among over 70,000 rural households. Nutrition education around child feeding, healthcare | People are producing and consuming more pulses with improved cooking techniques.  
51,068 farmers reached (42% female), with 3,324 organised into 665 seed producing clusters.  
23,059 members of farming households have benefitted from nutrition education, cooking demonstrations and skills training for mothers (99.3% female).  
More than 35,000 consumers used ready-to-eat, pulse-incorporated complementary food products.  
Private sector is producing and marketing pulse-based snacks and complementary foods.  
It appears that considerable increases in protein consumption and a concomitant reduction in calorie-protein malnutrition could be achieved. | Improved pulse production can easily be scaled-up further through extension service. Farmers are also sharing knowledge and seeds.  
Improved mother and child nutrition through preparation of pulse-based recipes and complementary feeds for children Possibility exists to further scale up nationally the improved mother and child nutrition through preparation of pulse-based recipes and complementary feeds through adoption of curriculum by Ministry of Health |
| India double-fortified salt    | Reduces iodine deficiency  
Reduces iron deficiency and hence less anaemia  
Consumers are made aware of benefits of DFS | Reached approximately 25M beneficiaries by early 2018, expected to increase to around 50M by mid-2018 as distribution through PDS continues through three states: Uttar Pradesh, Madhya Pradesh, Jharkhand). | Strong potential to reach millions more people if DFS goes country-wide across India.  
Strong potential for countries outside India to regulate for use of DFS |
<table>
<thead>
<tr>
<th>Project</th>
<th>Element of nutrition</th>
<th>Contributions to improved nutrition</th>
<th>Potential future contribution to improved nutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>India small millets</td>
<td>Small-scale millet dehullers are being produced and sold.</td>
<td>Over the project, 210 tonnes of value-added products and 1,015 tonnes of bulk small millets have reached 550,000 consumers. Target beneficiaries on low incomes report eating more millet, feeding their children more millet, and feeling healthier (better blood sugar control); but impacts and attribution not clear.</td>
<td>Plenty of unmet demand for small scale processing machines across India. Constant innovation by manufacturers. Scope among existing enterprises to supply larger markets, diversify products. Potential to replicate the model more widely or scale up via inclusion of millets in PDS, school feeding schemes.</td>
</tr>
<tr>
<td>Tanzania fortified oil</td>
<td>Increase intake of vitamin A and reduce vitamin A deficiency.</td>
<td>Over 140,000L of fortified oil was produced by SMEs and purchased by consumers, increasing vitamin A consumption for 645,772 consumers. Blood retinol levels increased in the intervention areas, with the most likely explanation for this being the consumption of fortified oils by consumers (Horton et al, 2017).</td>
<td>The project has proved that crude sunflower oil, most consumed by the poor in rural Tanzania, can be fortified with vitamin A. If the project is taken up again, or if the government includes crude sunflower oil in mandatory oil fortification policy and is able to monitor and enforce this, greater numbers might be reached sustainably.</td>
</tr>
<tr>
<td>Vietnam complementary foods</td>
<td>Production of therapeutic and complementary foods that are consumed by young children, improving their dietary diversity Nutrition education on child feeding, health and hygiene through counselling</td>
<td>Mothers of 22,248 children under 2 years received nutrition counselling and were encouraged to purchase ready-to-cook nutritious complementary food made from local produce and enriched with iron and zinc to fill the dietary gap in these essential nutrients. 2,550 pre-school children in 10 kindergartens received 2,899 kg of complementary instant porridge snacks over 4 months.</td>
<td>Potential exists to expand the model to other parts of Northern Vietnam or elsewhere in the country, and thereby to reach more undernourished infants.</td>
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<tr>
<td>Project</td>
<td>Element of nutrition</td>
<td>Contributions to improved nutrition</td>
<td>Potential future contribution to improved nutrition</td>
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<td>West Africa vegetables</td>
<td>Increased production of micronutrient-rich indigenous vegetables (IV) on many small-scale farms, with reduced seasonality, leading to higher consumption of micronutrient-rich vegetables. Young-Vegetable-Scientists' clubs set up to encourage healthy diets in teens Prisoners producing indigenous vegetables to earn extra cash.</td>
<td>Project reached a total of 337,931 farmers (50.6% female) in 36 months. 229,750 in Nigeria (51.6% female); 108,181 in Benin (46.3% female). Project has effectively surpassed target number of 255,000 farmers planned for the period. As well as more production and consumption of IV, seasonality of indigenous vegetable production has been reduced (more year-round production, post-harvest technologies to dry products), meaning people can consume them more often. Changes to nutritional status expected. New recipes for vegetable-fortified foods developed. These show improved nutritional and health-promoting values (significant increases in protein, vitamin C, and minerals) Progress made in extraction &amp; identification of bioactive compounds, especially polyphenols, antioxidants linked to e.g. reduced cancer</td>
<td>Seed systems are being set up, post-harvest technologies have low operational cost/maintenance, high ease of use. Strong potential to further scale up vegetable production, especially area of land devoted to IV, as well as further processing and marketing in Nigeria and Benin.</td>
</tr>
</tbody>
</table>
In those projects operating by improving dietary diversity and more nutritious crops, expected changes along the causal chain are being seen. People are growing or raising more nutritious foods, people, including poor consumers, are accessing these foods, and diets are improving, with likely positive implications for nutritional status. Nutrition education complements these projects, helping to justify and embed behaviour changes that lead to better health and nutrition. In Cambodia for instance, rural people interviewed in both intervention and control villages felt diarrhoea among children was declining. In intervention villages, this likely results in part from better water and sanitation, encouraged and facilitated through the project’s nutrition education. It may also result in part from national vitamin A drives. While the project is likely to have positively contributed, the extent is difficult to determine.

Projects aiming to fortify foods or produce nutritionally superior value-added foods are doing so, again very successfully. Nutrition education helps in all of these cases, largely through encouraging widespread purchase and consumption of the fortified or nutritionally superior foods. India DFS is the best example in terms of number of consumers reached – see Box A.

**Box A: India DFS and potential breadth of impact**

CIFSRF’s portfolio has already made strong contributions to people’s diet quality and nutrition. Its latent potential contribution may be an order of magnitude greater.

Take the example of the project that has so far reached the widest number of people: India double-fortified salt, operating in three Indian states with strong financial commitments by these state governments. If this can be sustained and scaled up nation-wide, further gains could be massive. If as much as half of India’s anaemia burden\(^6\) owes to iron deficiency, and even half of this can be addressed by regular consumption of double-fortified salt, the eventual contribution of this project could be enormous.

Iodised salt first became available for purchase in Michigan, May 1924. Currently, UNICEF estimates that 86% of the global population has access to adequately iodised salt\(^7\), with much of the progress achieved in the decade following a 1990 gathering of world leaders at the United Nations in New York, where a Declaration on the Survival, Protection and Development of Children was adopted.

If double-fortified salt can attract the same support and momentum – huge potential exists to bring iron-deficiency anaemia rates down in India and globally. If for example, 71% of India’s population had access to DFS in ten years’ time (estimates from 2009 suggest 71% of Indian households have access to adequately iodised salt\(^8\)) – this would mean reaching a population of over 950 million people, or 13% of the global population.

No project has used nutrition education in isolation: it complements the other two approaches, rather than acting as a stand-alone. Field study interviews show qualitatively that often people feel their health, or that of their children, has improved, and it is clear that projects are contributing\(^9\).

The division of approaches along three lines also prompts the question of which has been most effective in improving the nutrition of vulnerable people. Firstly, in a large portfolio such as CIFSRF it is expected and welcome that the range of approaches used is broad. Judgements on relative effectiveness however remain elusive. While it is clear that certainly none of the different pathways promoted have failed, further appraisal would need detailed studies of (often complementary) effects achieved, measured and expressed in comparable forms such as Disability Adjusted Life Years saved, or benefit-cost ratios.

While we know that projects more narrowly focused on fortification or supply of micronutrients tend to be less costly per beneficiary than those which reach fewer people with a deeper degree of intervention, this and health are also taking place in parallel in many cases – particularly notable in Asia. For example, more rural people are accessing piped water and improved sanitation, while diets are shifting to include more processed and western style foods.

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\(^6\) Anaemia is a severe health concern in India, with 2011 estimates suggesting prevalence of 59% among children 6-59 months, 48% among non-pregnant women aged 15-49, and 54% among pregnant women in the same age bracket.

\(^7\) [https://data.unicef.org/topic/nutrition/iodine-deficiency/](https://data.unicef.org/topic/nutrition/iodine-deficiency/)

\(^8\) [http://www.who.int/bulletin/volumes/91/7/12-110833/en/](http://www.who.int/bulletin/volumes/91/7/12-110833/en/)

\(^9\) At the same time, forces outside the projects are also clear contributors. Major significant changes in drivers of people’s diets and health are also taking place in parallel in many cases – particularly notable in Asia. For example, more rural people are accessing piped water and improved sanitation, while diets are shifting to include more processed and western style foods.
varying depth of impact complicates comparisons across projects.

Finally, a few qualifications to the broadly positive analysis so far might be added.

First, standing back to consider the full portfolio in CIFSRF’s second phase, the presence or absence of nutrition education becomes conspicuous. Of the nine projects aiming to help farmers produce a wider range of nutritious foods, four have strong nutrition education components\(^\text{10}\), one some nutrition education\(^\text{11}\), and the remaining four\(^\text{12}\), negligible nutrition education. Would those projects have been stronger with the addition of this element? Perhaps. With scarce resources, however, these last four projects may have consciously decided not to pursue nutrition education to avoid diluting core efforts. Context also matters – in areas where public health programmes are already delivering nutrition education (we do not have data on this), CIFSRF may not need to double efforts.

Second, while in large part the expected food security outcomes are being achieved, or on track to be achieved; in one aspect expected outcomes may not be forthcoming.

A few CIFSRF projects hoped for high levels of adoption of innovations by non-participants, by learning from others within their communities. It is not clear that this applies in all cases to the extent that was hoped.

In Cambodia for instance, the project hoped each home gardener would encourage four neighbours to take up similar practices. Our fieldwork could not corroborate this. Only a few of the home gardeners we spoke to mentioned sharing inputs with a neighbour or recruiting a neighbour into adopting practices. Though some non-participating members of the communities showed an interest in learning from village model farmers, they were not as many as were hoped for.

In the West Africa vegetables project, the plans were overly optimistic in terms of acreage that adopters would plant; estimating that in 36 months, the project would convert 100,000 hectares of new area to indigenous vegetables, and an impressive achievement regardless of figures mooted at the outset.

Moreover, interested farmers are likely to try out on a small scale at first and expand if they are happy with results — as appears to have begun happening among chickpea and haricot farmers in Ethiopia, where the demand for seeds is reported to be exceeding the supply, and where farmers report a desire to increase planted area beyond expectations.

**Productive partnerships at the heart**

Contributions by both Canadian and international partners have been both technical and social, with implementers aware that the technical innovations at the centre of most of the projects are best implemented within a context of making more prosaic measures that allow innovations to function.

For each of the country cases explored, the partnerships — between grantees, other project implementers, partners, and IDRC staff — have been fruitful. In the best cases, both groups of scientists have worked effectively to realise the technical innovations need to be embedded in a particular social context, and have been able to collaborate effectively to do so. The CIFSRF funders have been flexible enough to allow this; other funding agencies might have insisted on following proposals to a stricter blueprint. Box B provides some examples.

**Box B: Some examples of successful CIFSRF partnerships**

Canadian partners were able to bring an economic or a gender lens to the question of nutrition, applied to Tanzania fortified sunflower oil and in Cambodia home gardens.

Partnerships have been highly complementary. For India small millets, for example, the focus of McGill staff and students is on researching, developing, and analysing useful technologies and methodologies around millet and associated foods. One of the local partners, TNAU, also carries out research, the technologies and techniques developed in McGill and TNAU research settings are incorporated into practical training sessions. Finally another local partner, DHAN, with its wide reach on the ground, and its advocacy and self-help experience acts as an interface between the science of

\(^\text{10}\) Colombia potatoes, Cambodia homestead food, Ethiopia pulses, and West Africa vegetables.

\(^\text{11}\) Bolivia Amazon fish

\(^\text{12}\) Nepal terrace farming, Kenya farm shop, Ghana ICT extension, and Tanzania legumes
McGill/TNAU and both the awareness and practical needs of target beneficiaries.

Canadian partners had a clear role in bringing respected researchers together from different countries (e.g., Brazilians to Bolivia and Vietnamese to Brazil), helping to enable learning opportunities. Canadian partners’ relationship-building and convening skills, together with their ability to provide connections was key.

**Policy influence augments success**

Policy influence has been a central thrust of CIFSRF from its inception, and food and nutrition security policies at sub-national and national levels have been influenced by teams in CIFSRF’s second phase. This policy influence results from competent teams with strong reputations and close connections with policymakers. The focus of CIFSRF on influencing policy is one of its key strengths, and several projects have successfully carried out influential or strategic policy workshops.

Some cases also involve research that fills knowledge gaps or provide evidence to support narratives around effectiveness of various adopted approaches or technical innovations. For example, the team assembled in the Cambodia case has been interested from the first phase in generating robust evidence around efficacy of home gardens in terms of their impacts on people’s incomes, and dietary diversity scores, as this was viewed as an existing evidence gap. The attention to this kind of research across the CIFSRF programme is in itself a contribution to future food and nutrition security. Box C provides some examples.

**Box C: Some examples of CIFSRF policy influence**

The HKI team at the core of Cambodia home gardens have strong experience of food and nutrition security programming, and are highly regarded in Cambodian nutrition policy circles. They advised the government on its current National Strategy for Food Security and Nutrition 2014–2018, and are advising on the next five-year strategy (2019–2023).

In the case of Ethiopia pulses, the successful implementation of project activities required a great deal of relationship building by project staff at Hawassa University. The project leadership succeeded in persuading many actors — including the Women’s Bureau, the Bureau of Agriculture, the Ministry of Health’s nutrition department, and other research institutes — to contribute to the project’s success, sometimes against their initial inclinations.

The relationship between the University of Saskatchewan and Hawassa University was integral to project success. The partnership started out with a relatively narrow focus on improved soil fertility through pulse production and has expanded with CIFSRF funding, first to address the question of how to bring new varieties to farmers and then how to ensure that farming families consumed the extra protein produced.

4. Conclusions

Though diverse in their scope and approaches, it is evident the nutrition-focused projects in CIFSRF’s portfolio have achieved much in a relatively short time. Much of this owes to successful CIFSRF research partnerships that have a) allowed for the development and tailoring of technologies and practices that improve nutrition, while b) concurrently influencing policy at different levels.

The ten nutrition-focused projects examined here are resulting in the expected changes to peoples’ behaviour, that can reasonably be expected to lead to improvements in nutrition. The technologies, techniques and practices being promoted are appropriate given the context, welcomed by project participants and beneficiaries. Careful and flexible project design and selection, as well as highly competent project teams have made this possible in a remarkably short space of time.

People are realising better nutrition through various pathways: by improving their dietary quality and diversity, raising, selling, and consuming more nutritious crops and livestock, accessing fortified foods, and new value-added products rich in micronutrients. Many, at the same time, have benefited from nutrition education: new knowledge about nutrition, child feeding practices, water, sanitation and hygiene that can improve their health and that of their children.

Three further points are worth emphasising as elements contributing to CIFSRF’s phase two nutrition achievements to date. The first is their championing of women’s status and women’s inclusion in projects. From the start, CIFSRF has mainstreamed women and girls, to good effect. Attention to women’s status and women’s time and education correlate strongly with better nutrition. Much of this impact so far may not be immediately or easily quantified, but the qualitative evidence base suggests it is highly significant.

The second is the importance of combining nutrition education with agricultural approaches to improve diets.
The links between agriculture, food, diet, nutrition, and health are often overlooked in agricultural development projects. That many CIFSRF projects have widely appreciated and sought to use nutrition education, and within this, to some extent also focused on health and care drivers of malnutrition, is a very welcome inclusion.

Thirdly, CIFSRF management has been flexible in its approach, not insisting on blueprints. This ability to be flexible and adaptable enough to move with projects to tackle unforeseen challenges has been a boon for some CIFSRF projects. Challenges will arise in research and development projects; even if not predicted at the outset in a risk matrix. Having the adaptability and, crucially, staff capacity to devote to troubleshooting in these instances can make a big difference.

**Sustainability and legacy**

Are the improvements to nutrition security seen likely to be sustained? What can be done to increase the likelihood of future improvements in food and nutrition security?

In activities to promote **dietary diversity and more sustainable crops**, much of the sustainability depends on people continuing to access key inputs, particularly propagative material such as seeds or seed fish. In cases including Colombia potatoes, Cambodia homestead food, and West Africa vegetables, sustainability depends to some extent on development of economically viable seed markets, or in the Cambodia case, on retaining seed. Such systems seem well on the way to being established. In the Colombia case for instance, three of the four associations now producing seed potatoes have profitable models.

Sustainability might also be enhanced in some cases by longer NGO support – to provide material inputs, business support, and further technical assistance, which might push what have proven to be viable short-term projects, into patterns of longer-term viability. This would probably help embed agricultural practices for home gardeners in Cambodia for instance. In this case, the vast majority of households interviewed did however maintain they were keen to continue. Given how much has already been achieved through CIFSRF, it would be a shame for some of these gains to be lost in the short run, for want of a little more support.

In terms of **fortified foods**, or nutritionally superior value-added foods, again, much of the sustainability question is one of economics. In some elements of some cases, the economics favour sustainability. Demand for certain small millet products is growing in India for instance, particularly among the middle classes. Demand seems strong for probiotic yoghurts in East Africa, particularly following marketing campaigns. It is not difficult to imagine these elements being sustained and even accelerated. In some cases, notably India DFS, government buy-in may be crucial to sustainability, given inclusion of the DFS in public distribution must be financially supported by the state government. Lobbying could encourage the government to maintain support, as might positive results of any project evaluation. In the case of fortified sunflower oil in Tanzania, again, longer support could make the difference between project activities becoming self-sustaining or not—see Box D.

**Box D: Further support would boost Tanzania fortified sunflower oil’s sustainability**

Over the course of a 2017 field visit to Shinyanga and Manyara, it became clear that production and distribution of fortified oils might be difficult to sustain in the absence of financial and logistical support from the Mennonite Economic Development Association (MEDA). Small and medium enterprises (SMEs) producing the oil lacked finances and/or storage capacity necessary to ensure continuous production of fortified oil, which in turn meant that distributors and retailers were finding it difficult to maintain the distribution channels created by the project. Simultaneously, SMEs reported demand for their fortified oil in easily accessible urban markets.

It is possible that with more extended support from MEDA, the SMEs might have increased their capacity to produce sufficient fortified oil to ensure a constant supply to rural distributors in Shinyanga and Manyara, for example by increasing their storage capacity of unprocessed sunflower seeds. Without support, including that of the national government, it is possible the project’s successes will prove short-lived.

**Nutrition education**, gains seem likely to be sustained. People who have new access to water filters, or who have learnt to wash their hands with soap at key times, or to feed their children in certain ways are reporting satisfaction with these changes and are seeing improvements. They are not likely to suddenly stop such new behaviours, unless their circumstances change dramatically. This seems reasonable to expect too for cases where people are eating more of certain foods — fruits and vegetables, fish, millets. If they can continue to access these foods and have developed a taste or routine for including them in their meals, this is likely to be sustained.
What key elements make the difference between a good short-term effort, and something that can be scaled up? CIFSRF has been careful to work with largely established and dedicated project teams and project partners, who have been working many years in their respective areas, enhancing potential sustainability. Many projects rely implicitly or explicitly on the implementers carrying on similar activities after CIFSRF support comes to an end.

Projects have benefited from, in some cases, decades of prior work and experience. Building on solid and viable workstreams driven by extremely committed project leads with well-functioning teams has amplified the reach and influence of this programme.

Given most of the projects are driven by groups dedicated to food and nutrition who have been working in the area for many years, it is likely that some will find alternative sources of funding with which to continue projects. This was the case for some of the home gardeners supported in Cambodia under the first phase of CIFSRF. HKI found funding to extend support to them for longer, to try and embed practices and improve sustainability. DHAN has chosen small millets as an area to champion, and is setting up a ‘Small Millets Unit’ within DHAN to take forward this work. They have already attracted support from funders including GIZ for another large-scale small millet project totalling US$2.2M. Activities like these will help promote sustainability.

The research conducted under this programme ought to further contribute to sustainability. Several peer reviewed publications and policy briefs are expected from these projects, to share lessons and to help guide policy or similar work by other stakeholders. Evidence might be used to support other organisations to carry on similar activities. An evaluation of India double-fortified salt’s large-scale impact on nutritional status should prove that state governments’ investments in this project have been worthwhile; which should encourage them to continue. The same should also apply to studies on nutritional impacts from vitamin A fortification, or from home gardens, etc. Commissioning further studies on effectiveness are perhaps themselves a way to ensure sustainability. In Cambodia home gardens for instance, it would be useful to have a look back after five years or so to determine the extent to which practices adopted were maintained, and the depth of their impacts on the communities involved.

Already, almost 75 million people are estimated to have benefited nutritionally from CIFSRF Phase 2, with potential for many millions more if the momentum can be sustained, with the uptake of proven technologies and processes expanded.

References

Internal IDRC documentation (largely technical reports) on the 10 focus projects.

This synthesis also drew on reports on the six projects that were visited in the field:

- Keats, Sharada & J. Jeyaranjan, 2018, Scaling up small millet post-harvest and nutritious food products, Overseas Development Institute and IDA Chennai
- Keats, Sharada, Sim, Sokcheng, & Phon, Dary, 2018, Scaling up home gardens for food & nutrition security in Cambodia. Overseas Development Institute and Cambodia Development Resource Institute
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- Wiggins, Steve & Anita Ghimire, 2018, Nepal Terrace Farmers and SAKs, Overseas Development Institute (ODI) & Nepal Institute for Social and Environmental Research (NISER)
- Wiggins, Steve & Ricardo Vargas Meza, 2018, Expanding production of more nutritious yellow potatoes in Colombia, Overseas Development Institute


UNICEF, 1991


## Appendix A List of CISRF Phase 2 research projects

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<th>Full title of research</th>
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<td>Amazon fish for food (Bolivia)</td>
<td>Bolivia Amazon fish</td>
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<td>Scale up of Homestead Food Production for improved household food security and nutrition in Cambodia</td>
<td>Cambodia homestead food</td>
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<td>Development of a subunit vaccine for contagious bovine pleuropneumonia in Africa</td>
<td>CBPP vaccine</td>
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<td>Scaling up the production of more nutritious yellow potatoes in Colombia</td>
<td>Colombia potatoes</td>
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<td>Fighting lethal yellowing disease for coconut farmers (in Cote d'Ivoire)</td>
<td>Côte d'Ivoire coconut disease</td>
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<td>Novel livestock vaccines</td>
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<td>Promoting locally fortified sunflower oil using e-vouchers (in Tanzania)</td>
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<td>Scaling up improved legume technologies in Tanzania</td>
<td>Tanzania legumes</td>
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<td>Scaling up small-scale food processing for therapeutic and complementary foods for children in Vietnam,</td>
<td>Vietnam complementary foods</td>
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<tr>
<td>Scaling up fertilizer micro-dosing and indigenous vegetables production and utilisation in West Africa (Nigeria and Benin)</td>
<td>West Africa vegetables</td>
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