BENEFIT Partnership – 2021 Annual Report

Bilateral Ethiopian-Netherlands Effort for Food, Income and Trade Partnership

Dawit Alemu, Irene Koomen, Legesse Abate, Mirjam Schaap, Tewodros Tefera, Remko Vonk

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1 PCU

2 REALISE

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Executive Summary

1. Introduction

The bilateral project entitled 'Bilateral Ethiopian Netherlands Effort for Food, Income and Trade Partnership (BENEFIT Partnership)' supported by the Dutch Government through the Embassy of the Kingdom of the Netherlands (EKN) has, since 2016, been implementing four agricultural development programmes (ISSD – Integrated Seed Sector Development, CASCAPE - Capacity building for Scaling up of evidence based Practices in agricultural production in Ethiopia, ENTAG - Ethiopia-Netherlands Trade for Agricultural Growth and SBN – Sesame Business network). In 2018 a fifth programme, REALISE - Realising Sustainable Agricultural Livelihood Security in Ethiopia, joined the BENEFIT partnership. The Partnership aims at increasing food and nutrition security, brokering Dutch expertise, and stimulating trade.

In 2021 the BENEFIT partnership has targeted the engagement with relevant stakeholders for effective communication and handling over of demonstrated evidences to ensure scaling, uptake and institutionalization. Accordingly, taking into account the lessons learnt in the last five years of implementation (2016 – 2020), the priority implemented activities were (i) facilitation of the organization of the engagement events related with policy dialogues to ensure communication of demonstrated evidences and best practices; (ii) facilitation of the joint engagement at national level with other initiatives such as the Agricultural Growth Programme (AGP), Productive Safety Net Program (PSNP), the Agricultural Transformation Agency (ATA) and the World Bank, for aligned and synergetic engagement with policy and development partners for scaling and effective embedding and institutionalization of demonstrated evidences; (iii) promotion of the mandate zonation approach to ensure the engagement of BENEFIT partnership implementing partners, the 10 universities and regional agricultural research institutes (RARIs) in further developing respective agricultural research and outreach programs in collaboration with the Ministry of Agriculture (MoA) extension directorate; (iv) contributed to the Roadmap for Food System Transformation through submission of a variety of game changers and participation in workshops; (v) facilitated incorporation of one timad package into the MoA extension to ensure the inclusiveness of the advisory service to reach women farmers, poor farmers and land constrained youth groups; and (vi) facilitated the documentation of the lessons learnt in the implementation of the different activities of REALISE programmes along with sharing of the already documented evidences of CASCAPE, ISSD, SBN, and ENTAG.

The 2021 annual report presents the major achievements under each of the BENEFIT outcome indicators followed by the major challenges faced, opportunities, key lessons learnt and the way forward.

2. Major achievements in 2021

The major achievements of the BENEFIT partnership in 2021 were:

- The demonstrated evidences of innovations were considered in the recently developed/revised national extension package;
- Proactively engaged in the design of the national pluralistic extension service roadmap of the MoA;
- Proactively engaged in the national debate in the transformation of the national seed sector along with designing of diverse priority intervention options;
- Facilitated the institutionalization of the mandate zonation approach of the National Agricultural Research System (NARS), MoA has decided to pilot it in the four regions (Amhara, Oromia, SNNPR and Tigray), and the BENEFIT partnership was engaged in providing a training of trainers (ToT) to actors engaged both at national and regional level;

- The continued facilitation of the operation of target commodity specific stakeholders' platforms (seed, pulses, rice) has played crucial in creating linkage among relevant stakeholders, discuss on major challenges and opportunities;
- The active participation in the Ethiopian Food System Dialogue on UN Food Summit has allowed the consideration of the key evidences of innovations demonstrated by BENEFIT partnership as game changers;
- The Conference on Guiding seed sector transformation organised by ISSD Africa and its partners, had one day dedicated to the achievements of ISSD Ethiopia;
- Documentation of sector transformation in the sesame sector by SBN has informed the policy dialogue;
- Documentation and sharing of key lessons in book of proceeding and Best fit Practices (BFP) of the last three years' experience of REALISE programme supported the institutionalization process at regional and national levels;
- The different evidences of innovation relevant for PSNP context that have been demonstrated by REALISE programme have informed the design of the next phase of PSNP esp. in relation to the consideration of livelihood component.

Figure 1 Overview map implementation woredas of all BENEFIT programme (2016-2021)

The total reach of the BENEFIT partnership (Figure 1) is summarized based on the result chain outputs which are related with (i) enhancing portfolio collaboration among BENEFIT programmes, (ii) increasing quality and quantity of agricultural production, (iii) improving markets and trade, (iv) improving the enabling environment for the agricultural sector, and (v) enhancing partnership for synergy.

Impact	Improved sustainable food, income, trade and nutrition security of rural households in Ethiopia			
outcome	Pillar 1: Increased quantity and quality of sustainable agricultural production		Pillar 2: Market Dynamics	Pillar 3: Improved enabling environment
outcome indicators	<p># of farmers reached with increased productivity (ISSD, CASCAPE, SBN, ENTAG, REALISE)</p> <p>(2016-2020) 7,071,225 (2020) 565,865 (2019) 2,029,894 (2018) 1,813,946 (2017) 1,750,775 (2016) 910,745</p>	<p># of hectares of farm land used more eco-efficiently (ISSD, CASCAPE, SBN, REALISE)</p> <p>(2016-2020) 1,378,741 (2020) 72,095 (2019) 341,338 (2018) 114,998 (2017) 564,858 (2016) 285,452</p>	<p># of companies with supported plan to invest, trade or provide services (ISSD, SBN, ENTAG)</p> <p>(2016-2020) 1,161* (2020) 52 (2019) 60 (2018) 1,048 (2017) 260</p>	<p># of substantial policy changes / reforms contributed to (ISSD, CASCAPE, SBN, ENTAG)</p> <p>(2016-2020) 27** (2020) 14 (2019) 25 (2018) 19 (2017) 7 (2016) 5</p>
	<p># of farmers reached with improved access to input markets (ISSD, SBN, REALISE)</p> <p>(2016-2020) 4,138,372 (2020) 373,977 (2019) 972,482 (2018) 1,388,861 (2017) 1,340,439 (2016) 62,613</p>	<p># of farmers reached with improved access to output markets (SBN, ENTAG)</p> <p>(2016-2020) 113,743 (2020) 29,326 (2019) 35,094 (2018) 32,363 (2017) 11,914 (2016) 5,046</p>		
output	Improved stakeholders capacity in agricultural practices (knowledge and skills)			
output indicators	<p># of persons reached / trained with improved technology and skills (ISSD, CASCAPE, SBN, ENTAG, REALISE)</p> <p>(2016-2020) 225,367 (2020) 15,326 (2019) 61,692 (2018) 56,982 (2017) 86,085 (2016) 5,282</p>		<p># of trained farmers in sustainable agricultural production and practices (ISSD, CASCAPE, SBN, REALISE)</p> <p>(2016-2020) 803,755 (2020) 102,839 (2019) 180,261 (2018) 261,334 (2017) 241,228 (2016) 18,093</p>	

* Unique companies supported plan to invest, trade or provide services

** Unique substantial policy changes / reforms contributed to.

Figure 2 Key partnership indicators: 2016 - 2021 achievements

Major challenges in 2021

- The frequent change of officials in the partners' organization esp. in the MoA has slowed/limited the pace of institutionalization of some of the evidences of innovations;
- The COVID-19 pandemic has affected the full implementation of some of the planned activities esp. conducting in-depth studies that required face-to-face interviews. This has pushed to design of other approaches;
- The security situation overall in the country and in Tigray in particular has hinder timely implementation of planned activities (regional engagement events and auditing in Tigray region).

Institutionalisation

Handing over & sharing outputs and lessons learned:

- The documented evidences of innovations have been shared in the form of manuals (extension manuals for diverse commodities), lesson books (SBN, REALISE), and outlooks (business opportunity reports on herbs, spices, poultry);
- Ensuring the incorporation of the evidences in different public documents (strategies, policies, directives, extension packages etc) has been found crucial for institutionalization of the demonstrated evidences;
- The secondment of BENEFIT partnership expert at the MoA has played crucial role in creating strong linkage for engagement and mainstreaming of the different BENEFIT partnership evidences of innovation.

Institutionalisation of 2016-2020/21 approaches, results and outcomes:

- As a programme targeting demonstration of evidences of innovation in the areas of policy, practices and institution, the BENEFIT partnership continued to finalize the planned activities of innovation from REALISE programme and ensuring the communication of the evidences demonstrated since the start of the programme in 2016;
- The main channels/means considered for effective institutionalization were (i) proactive engagement in policy dialogues, (ii) ensuring the consideration of evidences in the different strategic documents of the MoA, and (iii) documentation of evidences for reference.

FARMLAND REACHED

77,490 ha
reached with **BEST**
FIT AGRICULTURAL
PRACTICES

247,512 ha
where **IMPROVED**
SESAME PRODUCTION
is practiced

1,407,649 ha
covered with **QUALITY**
SEED of farmer-preferred
varieties

ETHIOPIA

2016–2021
221
woredas

FARMERS REACHED

7,071,225
farmers have improved
productivity

4,138,372
farmers have improved
ACCESS TO INPUTS

803,755
farmers **TRAINED** on
sustainable agricultural
production & practices

225,367
men and women
TRAINED on improved
technology and skills

125
TECHNOLOGIES
validated

392 VARIETIES
of 35 crops shared
with farmers

85,556 farmers
directly having access to
SEED OF NEW VARIETIES

229,758 ha
reached with
NUTRIENT
dense crops

1,164,063
farmers reached
with **NUTRIENT**
dense crops

ACCESS TO CROP VARIETIES AND TECHNOLOGIES

IMPROVED NUTRITION

POLICY CHANGE

REACH OF YOUNG PEOPLE

REACH MARKET ACCESS AND BUSINESSES

16 businesses
supported by **GRANTS**
to help innovate

1,161 businesses
supported in
MARKET LINKAGES

113,743 farmers
with **ACCESS TO**
OUTPUT MARKETS

163,316 female
farmers **INCREASED**
productivity

66,830 female
farmers have improved
ACCESS TO INPUTS

39,293 female
farmers directly
having access to **SEED**
OF **NEW VARIETIES**

266 **JOBS** created
FOR **YOUNG PEOPLE**
(Internship + funded projects)

175,892 youth
trained in agricultural
production

1 Introduction

The 2021 BENEFIT annual report presents the fifth year of implementation of the BENEFIT Partnership, which unites five programmes namely ISSD, CASCAPE, ENTAG, SBN and REALISE, and the umbrella unit PCU. This half year BENEFIT report presents the achievement and progress made during the no-cost extension period from January to August 2021 by the REALISE program and umbrella unit PCU. As per the planned activities the focus areas for the stated period were (i) ensuring adequate engagement with relevant stakeholders including policy makers and development practitioners using the consolidated documentation of demonstrated evidences and innovations along with the different communication products prepared; (ii) communication of the consolidated experiences of mainstreaming of crosscutting issues mainly gender and nutrition in all BENEFIT programmes for scaling and possible embedment to the wider networks working in gender and nutrition mainstreaming; and (iii) enhancing the alignment with relevant initiatives including ATA, AGP, PSNP and public programmes for synergetic joint engagement both at policy and development level.

As a continuation from the previous years, there were three major channels used in implementing the focus areas and communicating the diverse evidences. The first was through the regular engagement with the Ministry of Agriculture (MoA) through the continued case specific meetings with the state minsters and respective directors (Agricultural Sector Development, Agricultural Inputs and Outputs Marketing, and Natural Resources and Food Security Sectors) and the engagement and communication of evidences by the BENEFIT seconded expert within the MoA. These engagements were more oriented to specific demonstrated evidences in one side and ensuring alignment with MoA initiatives by sharing specific assignments and seconded expert participation.

The second channel was through active engagement in the different technical committees and taskforces of the Rural Economic Development & Food Security committee (RED&FS) that has enabled the partnership to communicate better the demonstrated evidences. The BENEFIT Partnership has continued serving as the co-chair of the Agricultural Input and Output Marketing Development technical committee, as a member of Agricultural System Transformation technical committee, Policy and Governance taskforce, Extension and Capacity Building taskforce, and Agricultural Research and Technology taskforce. This has allowed the consideration of the BENEFIT evidences as an input for the implementation of the different planned activities of the different Technical Committees and Task Forces.

The third channel was active utilization of opportunities that emerged through invitations in recognition of BENEFIT staff expertise and demonstrated evidences at ground level by the MoA, the Ethiopian Institute for Agricultural Research (EIAR), and other development partners like ATA to participate in policy dialogues, events and to be a member in different committees and taskforces.

This annual report is structured based on the result chain and considers the achievements made, challenges faced and lessons learnt by the REALISE programme and the PCU.

Accordingly, the report covers achievements in the areas of (i) Collaborative BENEFIT portfolio, (ii) increasing quality and quantity of sustainable agricultural production, (iii) enhancing market dynamics, (iv) improving enabling environment, (v) social inclusion and nutrition, (vi) enhancing partnership for synergy and (vii) key lessons learnt. Detail of the food & nutrition security indicators and the final report of REALISE and an executive summary of the WorldBank funded CASCAPE Nutrition and Gender (CaNaG) project are presented in Appendix 1 to 3 resp. An end of partnership brochure has also been developed separately

2 Increased quality and quantity of sustainable agricultural production

ISSD, CASCAPE, SBN, REALISE and to a lesser extend also ENTAG, have contributed to the objective of increasing the quality and quantity of sustainable agricultural production. In 2021 only the REALISE programme had limited activities under this impact area. The REALISE programme engaged partners from the start to collaborate on addressing the complex problems in PSNP areas and pave ways for smooth institutional embedding of major innovations of the programme. During the no cost extension, linkages were strengthened among partners, documentation of process and results and sharing were undertaken. Accordingly, finalization of target innovation and documentation of the different demonstrated evidences were given due attention.

Summary achievements (2016-2021)

7,071,225 farmers reached with increased productivity (direct and indirect);
683,809 farmers reached directly: 24% ሺ and 76% ቸ ; 24% youth under 35 years;
4,138,372 farmers reached with improved access to input markets (direct and indirect);
87,999 persons reached/trained with improved technology and skills directly:
37% ሺ and 63% ቸ ; 25% youth under 35 years.
518,310 trained farmers in sustainable agricultural production & practices directly:
30% ሺ and 70% ቸ ; 24% youth under 35 years.

1,378,741 hectares of farm land used more eco-efficiently (direct and indirect)

2.1 Outcomes achieved by BENEFIT programmes

REALISE - Practices, seeds and capacity building

(i) Finalizing innovation activities

Validated Labour and time saving Multipurpose thresher for scaling: Introduction, testing and validation of multi-purpose thresher, which was planned to be under taken in 2020, was delayed due to COVID-19 and the subsequent lockdown measures and travel restrictions. In February 2021, the Woldia University cluster has validated and tested the machine with farmers in Timtimat kebele (North Wollo zone, Wadila woreda) through Ediget-Behibret Seed Production & Multiplication farmers' cooperative. As per the validation for wheat, the machine performance indicates the need only three hours to thresh 5 quintals (0.5 MT) using four men. It would have taken two days, four men and seven oxen to thresh five quintals under the traditional method proving that the thresher is labour and time saving. In the traditional threshing process two-three women labour inputs is needed for winnowing and transporting the grain in addition to preparing and serving food and drinks to those involved. In addition, the machine minimizes post-harvest loss as well as grain/seed quality loss through breakage. The cooperative will deliver paid threshing services for the surrounding farmers. The cooperatives received multipurpose thresher through revolving fund scheme. The cost will be recovered in three years' time and the repayment will be used to buy a new one for other kebeles targeted by REALISE. The woreda office of agriculture, the cooperative promotion office and the administrative office agreed to facilitate the grant management, which is key measure for scaling in a sustainable manner. In addition, the introduction of labour-saving technology is aimed to assess the impact of labour-saving technologies on traditional labour division and gender relation. Hence, it has research element on it to generate evidence for future decision making, the results are communicated to relevant stakeholders for scaling.

(ii) Documentation and publication

One of the major activities in the no cost extension was finalization of the documentation and publication of demonstrated evidences of innovation. Documentation of the process of innovation, results and lesson learnt is important for various uses such as institutional embedding and to use as bases for further piloting and scaling of the results.

Accordingly, due emphasis was given during the period to document and the following evidences of innovation were documented and published:

- a. **Best fit practice manuals:** Twenty-four best fit practices manuals (BFP manuals) were finalized with 82.7% achievements against the plan. The manuals were need based after their importance was assessed by extension office (department/bureau of agriculture) and research centres. BFP manuals were mainly on the crops or cropping system new to a given area (like finger millet, sweet potato, intercropping, double cropping, home gardening, vermi-composting, mung bean, etc). Some of the manuals which were left out were deprioritized by BoA while some were considered in the articles of the REALISE proceedings.
- b. **One timad package manual:** REALISE compiled manuals of 'One timad packages' on five crops (sweet potato, potato, wheat, sorghum and faba bean), published in one low cost booklet and submitted in both hard and soft copies to MoA to facilitate the up-take.
- c. **Proceedings:** It was planned to finalize 17 working papers during no cost extension of the programme. The working papers were converted to articles, reviewed by programme staff and presented to stakeholders in a workshop and published 34 article papers in one programme proceedings. This is double of the number of the planned working papers. The proceedings covered all the four pathways (practice, seed, capacity and system innovation) of the programme.
- d. **Stories of change:** Stories of change were documented on 22 topics in four major areas and published in one booklet. The major areas are: 1) Improving crop productivity for bridging food gap months (on 7 topics) which include stories of farmers where improved crop productivity made a significant contribution to bridge food gap months; 2) Nutrition sensitive agriculture (8 topics), stories such as on selected home gardening, use of orange fleshed sweet potato and quality protein maize; 3) Support to women and youth (5 topics) stories of change on improving household resilience involving women in the process of innovation testing and promotion, and youth on off-farm income generation as a means of self-employment; and environmental sustainability (2 topics), stories on benefit of use of organic fertilizer and intercropping.

3 Improved markets and trade

ISSD, ENTAG and SBN, contributed through various activities to the objective of improved markets and trade. During 2021 activities focussed on institutionalisation.

113,743 farmers reached with improved access to output markets

1,161 unique companies with supported plan to invest, trade or provide services

3.1 Outcomes achieved by BENEFIT

The BENEFIT partnership has continued its engagement with relevant stakeholders to improve the marketing systems and trade of key target commodities. The major achievements in this regard are related with (i) the initiation of the consideration of spices at the ECX trading platform, (ii) the active participation in the discussions of the role of the private sector in the agricultural policy reform, (iii) sharing of experiences to ATA initiative on enhanced domestic oil crop production to supply emerging domestic edible oil processing industry, (iv) engagement and sharing of experiences for improved agricultural input marketing, and (v) engagement with MoA, EKN and private actors in the seed sector.

- i. BENEFIT has conducted consultative meetings with ECX on the organization's plan to incorporate spices in its trading platform. Accordingly, ENTAG's experience on the spice sub-sector coordination along with lessons learnt were shared to assist ECX in choosing its commodities as well as setting up the right system to facilitate the trading;
- ii. Engaged in the different taskforces of the preparation of the agricultural policy reform document of the MoA. One of the areas was how to enhance the role of private sector in agricultural sector. In this regard, BENEFIT partnership building the evidences of ENTAG, ISSD and SBN actively engaged in this process;
- iii. Collaboration with ATA in creating market linkages for enhanced supply of oilseeds to the emerging edible oil domestic industry. One of the priority commodities targeting import substitution are oilseeds and the domestic edible oil processing industry is boosting its capacity considerably, which demands the need to increase domestic production and improve the market linkage with the industry. Accordingly, the BENEFIT partnership, building on the experiences and innovations demonstrated by SBN and ENTAG, has been active engaged and shared its experiences to the key actors engaged in this initiative;
- iv. Engaged in improving agricultural input marketing through (i) co-chairing the agricultural input marketing taskforce of the RED&FS platform, and (ii) facilitating discussion among MoA, EKN and key private actors on vegetable seed sector.
 - With regards to the RED&FS platform, the main issues addressed were:
 - Facilitation the development of out-growers and contract farming system (guideline, manuals, standard contracts, awareness creation);
 - Supporting the design, implementation, and coordination of strategic interventions to enhance the input supply system and infrastructures related with (i) development of Early Generation Seed (EGS) production and marketing system, (ii) designing strategic input reserve system, and (iii) conducting capacity gap assessment of agricultural input dealers and strengthen their capacity based on the recommendations.
 - With regards to the facilitation of discussion among MoA, EKN and key private actors, the key achievements reached were (i) some articles of the directive for local multiplication of

unregistered varieties for seed export that need attention of revision by the ministry were identified, (ii) mechanisms for timely provision of inspection service discussed and agreement was reached for the companies to provide detail schedule of inspection to the ministry, and (iii) the online window for import permit application was recognized as great improvement of the service provision. However, the companies found it difficult to use the window efficiently. Accordingly, it was agreed that EHPEA to organize a training.

4 Improved enabling environment for the agricultural sector

As a programme that targets demonstration of evidences for wider development, different interventions for improving the enabling environment have implemented by the different the BENEFIT partnership programmes and the BENEFIT portfolio. These interventions covered a range of activities including: (i) identification of relevant policy issues for further discussions based on prevailing challenges and opportunities, (ii) documentation of demonstrated evidences for the identified priority issues, (iii) engagement with relevant stakeholders to ensure the communication of demonstrated evidences through different forums mainly workshops, and (iv) contribution & facilitation of the design of new directives and regulations.

Contributed to 27 unique substantial policy changes / reforms (regulations, directives, and procedures)

4.1 Outcomes achieved by BENEFIT and its programmes

The Partnership activities in 2021 focussed on:

- The demonstrated evidences of innovations were considered in the recently developed/revised national extension package;
- Proactively engaged in the design of the national pluralistic extension service roadmap of the MoA;
- Proactively engaged in the national debate in the transformation of the national seed sector along with designing of diverse priority intervention options;
- Facilitation of the institutionalization of the mandate zonation approach of the National Agricultural Research System (NARS), MoA has decided to pilot it in the four regions (Amhara, Oromia, SNNPR and Tigray), and the BENEFIT partnership was engaged in providing a training of trainers (ToT) to actors engaged both at national and regional level;
- The continued facilitation of the operation of target commodity specific stakeholders' platforms (seed, pulses, rice) has played crucial in creating linkage among relevant stakeholders, discuss on major challenges and opportunities;
- The active participation in the Ethiopian Food System Dialogue on UN Food Summit has allowed the consideration of the key evidences of innovations demonstrated by BENEFIT partnership as game changers;
- The Conference on Guiding seed sector transformation organised by ISSD Africa and its partners, had one day dedicated to the achievements of ISSD Ethiopia;
- Documentation of sector transformation in the sesame sector by SBN has informed the policy dialogue;
- Documentation and sharing of key lessons in book of proceeding and Best fit Practices (BFP) of the last three years' experience of REALISE programme supported the institutionalization process at regional and national levels;
- The different evidences of innovation relevant for PSNP context that have been demonstrated by REALISE programme have informed the design of the next phase of PSNP esp. in relation to the consideration of livelihood component.

REALISE - System innovation pathway

Mainstreaming of evidences of integrated recommendation mapping (IRM) & soil resource mapping

REALISE tested and validated innovation recommendation mapping (IRM) for four use cases: 1) Sweet potato in Arsi and East Hararghe zones of Oromia; 2) Maize-common bean intercropping in Silte zone

of SNNP; 3) Potato in Lay Gayint woreda of Amhara; and 4) Wheat-faba bean rotation in Southern Tigray Zone. To ensure application of the tested and validated use cases, two IRM validation workshops were organized. The participants included farmers, experts from regional bureau of agriculture and researchers from research institutes and universities closer to the IRM locations.

For the soil resource mapping laboratory analysis of soil samples was completed during the no cost extension period. That enabled the soil resource map production for 15 REALISE/PSNP woredas at semi detailed scale (1:50k) and produced a soil resource dataset. The handing over of the data set and the final report was done for Amhara and SNNP regions while the report finalization lagging for Tigray and Oromia region due to the impact of security problems.

Mainstreaming of 'One timad package' approach

Following the testing and validation of the 'One timad package' approach as a resilient, low-cost low risk and customized extension system, several engagements and events were organized to ensure the mainstreaming of the approach into the National Extension system. The most important engagements were (i) briefing the different officials of the MoA including the State Minister of Agriculture Sector Development, national PSNP technical committee and senior experts, to ensure the consideration of the approach in the national extension package; (ii) briefing about the approach to a World Bank organized experience sharing webinar on African and Asian agricultural extension; and (iii) organization of regional workshops to facilitate the regional level institutionalization of the approach.

Mainstreaming scalable youth employment options

One of the key intervention of REALISE has been exploring evidences for scalable youth employment options within the context of PSNP. Accordingly, youth employment options were tested and validated for scaling in the area of (i) small scale commercial poultry production and marketing, (ii) integrated nursery management and seedling marketing, and (iii) improved charcoal making and marketing. The key factors for scaling of such youth employment options were found to be:

- skill development both technical and managerial
- ensuring availability of finance for start-up
- creation of market linkages at initial stage of the business operation
- ensuring adequate linkage with relevant public organizations for timely addressing emerging challenges.

The experiences and key lessons for scaling the validated innovative youth employment options were share at national and regional level workshops by engaging relevant actors including Federal Ministry of Agriculture include representative of the State Minister for Inputs, Rural Job Creation Directorate Director, Agricultural Extension Directorate Director, Hides and Skin Development Directorate of Ministry of Trade and Industry

Institutionalization of mandate zonation of actors of the National Agricultural Research System

Recognizing the diverse agro-ecologies and the need to test and validate available agricultural technologies, the BENEFIT partnership engaged with the MoA to institutionalize the concept of mandate zonation, which is an approach where members of the NARS (RARIs and HLIs) are mandated to undertake testing and validation of available agricultural technologies and innovations in their respective areas of operation. Accordingly, the MoA has decided to pilot in the main four regions (Amhara, Oromia, SNNPR and Tigray) and the BENEFIT partnership was asked and provided a Training of Trainers at national and regional level for key stakeholders engaged in the piloting process.

5 Mainstreaming social inclusion and nutrition

The BENEFIT Partnership has documented the evidences of engaging women and youth in diversification of agricultural production considering high-value crops (sweet potato, papaya etc.) for ensuring increased food and nutritional security. The evidences are prepared as production manuals for consideration in the national agricultural extension package under the PSNP context.

The CASCAPE Nutrition and Gender project has been working in parallel with the CASCAPE programme. CANAG was completed in the first half of 2021, the main findings were (see also Appendix 3 for a complete summary):

- Many CANAG beneficiaries indicated they are planning to continue working with the introduced technologies. However, beneficiaries require longer term support by the agriculture and health extension system if they want to successfully continue and expand NSA. For instance accessing good quality and affordable seed, and improving crop and animal health services a continued support until they becomes a business cases for sustainability,.
- To further improve dietary diversity among rural households, the evidence clearly indicate the to continue and scale out the implementation of an integrated set of NSA interventions, encompassing technologies that (i)increase the production of diverse foods, (ii) increase produce's shelf-life, and (iii) reduce women's labour burden.
- Dietary diversity of children and child feeding practices need to be given more attention though SBCC strategies, as improvements in dietary diversity were less for children than for their mothers.
- One of the major constraints related to the CANAG home gardens was access to water. In the effort to scale up home gardening for enhanced dietary diversity, attention should be paid to the introduction and scaling of small and micro scale water harvesting and irrigation technologies. Also, the introduction of drought resistant vegetables is important. Amaranths is a promising vegetable because of its drought resistance.
- Many home gardens suffered from pests and diseases. Our home garden manuals include elaborate advice on integrated pest and disease management solutions, but continued efforts are needed to make sure that beneficiaries receive practical and frequent support by agricultural extension staff on this matter.
- Investments in access to feed and veterinary services will contribute to the scalability of the introduced pullets and dairy goat technologies.
- Introducing post-harvest and labour saving technologies together with NSA production technologies such as vegetable home gardens can allow for prolonged availability of nutrient dense foods, increase women's time for other activities, and improve the diversity of her and her family's diet. Access to such technologies can be improved by organizing interested beneficiaries in groups or working with existing groups, facilitating access to (in)formal credit and linking groups to suppliers. Local governments can increase the availability of the technologies by training for instance youth groups to manufacture and sell these technologies.
- Gender transformative agricultural and nutrition approaches need to support women's ability to make decisions about (1) agricultural production in the home gardens and farms; (2) household nutrition; (3) access to, and control over resources that will allow her to strengthen production and nutritional intake both for herself and her family; (4) control and use of income; (5) access to and control of opportunities; and (6) reducing workload and control over her own time. There is need for increased awareness on these elements of women participation and their contribution to agricultural production. Therefore, we recommend local governments including the Woreda Agriculture Office, the Woreda Health Office and Woreda Women, Children and Youth Affairs Office to streamline their gender equality related efforts.
- The vegetable seed system is an important bottleneck in the scaling of home gardens at this moment, which demands scaling of ISSD validated innovations like LSB incubation and SPC promotion to enhance local vegetable seed production. Bulk purchasing of imported vegetable seed by cooperatives may be an effective short-term solution.

6 Enhanced partnership for synergy

Coordination of the partnership for synergy among BENEFIT programmes and with other development programmes has been implemented by the BENEFIT Partnership Coordination Unit (PCU) mainly through facilitation of:

- Alignment of programmes and their collaboration;
- Collaboration and alignment with other projects and programmes;
- Facilitation of policy engagement;
- Mainstreaming social inclusion and nutrition, and
- Fostering collaboration in BENEFIT portfolio in terms of (i) BENEFIT portfolio management; (ii) provision of centralized administrative services (finance, human resource management etc.) to the four BENEFIT programmes; and (iii) communication and use of evidence-based information through an effective M&E system linking the four BENEFIT programmes and other partners.

6.1 Alignment and collaboration

Engagement of BENEFIT programmes with relevant public and private initiatives to ensure effective alignment and synergy has overall been successful. Accordingly, the following activities have been done: (i) joint engagement with the seed sector development units of the MoA together with ATA as members of the National Seed Advisory group and facilitated the National Seed Forum organized on March 10th, 2021; (ii) continue with BENEFIT partnership engagement and implementation of planned activities of the RED&FS platform. BENEFIT partnership has continued in serving as a co-chair of the Agricultural Inputs and Outputs Marketing Development Technical committee and member of the Agricultural Systems Transformation Technical Committee (AST TC) and Policy and Governance Technical committee. Under AST TC, BENEFIT is also a member of the two taskforces i.e. Research and Technology Taskforce and Extension and Capacity Building Taskforce. The different evidences demonstrated by BENEFIT have been able to be mainstreamed like the seed sector transformation agenda, the concept of mandate zonation of effective linkage of ARIs, HLIs and MoA/BoA at zone level and customized extension approaches; and (iii) initiated the consideration of BENEFIT target commodities in the ECX marketing platform (spices); (iv) organised a session on seed sector transformation in Ethiopia as part of the international conference on Guiding seed Sector Transformation (see: <https://issdafrica.org/2021/05/20/register-now-conference-on-guiding-seed-sector-transformation-in-africa-durable-solutions-to-systemic-problems/>)

6.2 Policy engagement

The policy level engagements were facilitated in diverse areas. The following policy engagements were the most important ones in last six months:

- Participation in the preparation as technical committee member and at high level discussion on the national agricultural extension roadmap, which has created the opportunity for mainstreaming of the evidences of extension innovations by BENEFIT to be considered;
- Engaged in the preparation of a draft pluralistic extension system proclamation. This is important given the dominance of the public extension system and the need to diversify the actors engaged in the extension services to ensure provision of inclusive, market-oriented and demand driven extension services that can improved the livelihoods of different social categories of smallholders. Once, the proclamation is enacted, it will require design and development of implementation directives and procedures, which will be also the focus as next step;
- Engaged and contributed in the national forum on enhancing the supply and marketing of oil crops as part of promoting the emerging domestic edible oil industry. The different evidences of SBN and ENTAG were presented as experiences;

-
- Given the consideration of the mandate zonation approach to be piloted in selected zones in the four regions (Amhara, Tigray, Oromia and SNNPR), BENEFIT partnership was engaged as member of member of steering committee and technical committee that are responsible for overlooking the implementation of the approach. In addition, BENEFIT Partnership was engaged in providing ToT for implementers in the targeted zones across the target regions that has helped to ensure proper understanding of the approach, its objectives and implementation modalities;
 - Continued with facilitation of the operation of target commodity specific stakeholders' platforms (seed, pulses, rice), which were crucial for creating linkage among relevant stakeholders, discuss on major challenges and opportunities;
 - Engaged in the Ethiopia Food System dialogue as part of the UN Food System Summit and contributed in sharing BENEFIT Partnership evidences of innovation as Game Changers. The main evidences of innovation shared as game changers are i) policy innovation concept on food safety assurance system contribution, (ii) one timad extension package for PSNP context (customized agricultural extension), (iii) financial grantee fund scheme and financial literacy, (iv) Innovation Recommendation Mapping (IRM) approach, (v) weather forecasting, (vi) scalable rural youth employment options, and (vii) agricultural technology testing and validation for diversified food production and increased the supply of nutrient-dense foods

6.3 Fostering collaboration in BENEFIT portfolio

6.3.1 Monitoring and Evaluation

As the no-cost period of implementation, the 2021 M&E continued to mainly focused on result harvesting and documentation of lesson learnt at the partnership level. The end review of the partnership was supported by making all information, data and reports available. Interviews with major stakeholders were organised focusing on REALISE results

6.3.2 Communication

The communication interventions in 2021 targeted facilitating internal and external communications towards sharing the demonstrated evidences since the start of the implementation of all the BENEFIT partnership programmes to relevant partners (policy makers, development practitioners), build consistent branding and share knowledge and information for effective management. An end-of programme booklet and selected programme specific publications are available through www.benefitethiopia.org

- BENEFIT partnership 2016-2021, key achievements of 5 programmes
- ENTAG Impact 2016-2020
- Agricultural sector transformation is a team work: Experiences and lessons learned of the Sesame Business Network support programme in Ethiopia
- Innovations for Food and Livelihood Security, Experience of REALISE

7 Institutionalisation and way forward

7.1.1 Handing over / sharing lessons learnt

- The documented evidences of innovations have been shared in the form of manuals (extension manuals for diverse commodities), lessons learned books (SBN, REALISE), and outlooks (Business Opportunity Reports on herbs, spices, poultry);
- The documentation of the demonstrated evidences of innovation at policy, strategy, practices and institution levels by BENEFIT Partnership over the past five years, which will be communicated at the closing event;
- Ensuring the incorporation of the evidences in different public documents (strategies, policies, directives, extension packages etc.) has been found crucial for institutionalization of the demonstrated evidences;
- The secondment of BENEFIT partnership expert at the MoA has played crucial role in creating strong linkage for engagement and mainstreaming of the different BENEFIT partnership evidences of innovation.

7.1.2 Institutionalisation and sustainability of results

- As a programme targeting demonstration of evidences of innovation in the areas of policy, practices and institution, the BENEFIT partnership continued to finalize the planned activities of innovation from REALISE programme and ensuring the communication of the evidences demonstrated since the start of 2016;
- The main channels/means considered for effective institutionalization were (i) proactive engagement in policy dialogues, (ii) ensuring the consideration of evidences in the different strategic documents of the MoA, and (iii) documentation of evidences for reference.
- Selected engagements: facilitated the institutionalization and alignment events of the digitalization of the national seed information systems together with the MoA; (ii) provision of ToT for professionals leading the national piloting for scaling on the mandate zonation approach for enhancement of technology/innovation introduction, testing, and validation within the pluralistic extension system;
- Consideration of evidences in the different strategic documents: Some of these were related with (i) mandate zonation approach in the national pluralistic extension strategy, (ii) BENEFIT experiences in the National import substitution strategies for wheat and rice, and (iii) experiences of BENEFIT consideration of spices in the ECX trading platform;
- Documentation: experiences of the different BENEFIT programs have been documented and some of these are: (i) The BENEFIT Partnership: Stories of Success (2016-2021), (ii) Agricultural sector transformation is teamwork: Experiences of the Sesame Business Network support programme in Northwest Ethiopia; (iii) BENEFIT-REALISE stories of change

7.1.3 Way forward

- Finalize the documentation and publication of the BENEFIT Partnership achievements and key lessons as a legacy of the BENEFIT partnership contribution in Ethiopia;
- Consider the different lessons learnt in further WUR engagement in Ethiopia including the RAISE-FS, TRAIDE and Ethio-Netherlands Seed Partnership programmes.

Appendix 1 Detailed information key performance indicators

In line with the guideline for reporting results in the thematic area Food and Nutrition security, the five BENEFIT programmes report on the following key performance indicators.

Impact	Improved sustainable food, income, trade and nutrition security of rural households in Ethiopia			
outcome	Pillar 1: Increased quantity and quality of sustainable agricultural production		Pillar 2: Market Dynamics	Pillar 3: Improved enabling environment
outcome indicators	# of farmers reached with increased productivity (ISSD, CASCAPE, SBN, ENTAG, REALISE)	# of hectares of farm land used more eco-efficiently (ISSD, CASCAPE, SBN, REALISE)	# of companies with supported plan to invest, trade or provide services (ISSD, SBN, ENTAG)	# of substantial policy changes / reforms contributed to (ISSD, CASCAPE, SBN, ENTAG)
	(2016-2020) 7,071,225 (2020) 565,865 (2019) 2,029,894 (2018) 1,813,946 (2017) 1,750,775 (2016) 910,745	(2016-2020) 1,378,741 (2020) 72,095 (2019) 341,338 (2018) 114,998 (2017) 564,858 (2016) 285,452	(2016-2020) 1,161* (2020) 52 (2019) 60 (2018) 1,048 (2017) 260	(2016-2020) 27** (2020) 14 (2019) 25 (2018) 19 (2017) 7 (2016) 5
output	# of farmers reached with improved access to input markets (ISSD, SBN, REALISE)	# of farmers reached with improved access to output markets (SBN, ENTAG)		
	(2016-2020) 4,138,372 (2020) 373,977 (2019) 972,482 (2018) 1,388,861 (2017) 1,340,439 (2016) 62,613	(2016-2020) 113,743 (2020) 29,326 (2019) 35,094 (2018) 32,363 (2017) 11,914 (2016) 5,046		
output	Improved stakeholders capacity in agricultural practices (knowledge and skills)			
output indicators	# of persons reached / trained with improved technology and skills (ISSD, CASCAPE, SBN, ENTAG, REALISE)		# of trained farmers in sustainable agricultural production and practices (ISSD, CASCAPE, SBN, REALISE)	
	(2016-2020) 225,367 (2020) 15,326 (2019) 61,692 (2018) 56,982 (2017) 86,085 (2016) 5,282		(2016-2020) 803,755 (2020) 102,839 (2019) 180,261 (2018) 261,334 (2017) 241,228 (2016) 18,093	

* Unique companies supported plan to invest, trade or provide services

** Unique substantial policy changes / reforms contributed to.

Disaggregated data partnership key performance indicators 2016 – 2021

Indicator	ISSD (2016-2020)	CASCAPE (2016-2020)	ENTAG (2016-2020)	SBN (2016-2020)	REALISE (2018-2020)	Total (2016-2020)
Indicator P1 EKN 1.1: Number of farmers reached with increased productivity (total)	4,652,906	1,433,961	23,174	631,909	329,275	7,071,225
Indicator P1 EKN 1.1: Number of farmers reached with increased productivity (direct)	108,318	195,485	2,337	311,724	65,945	683,809
women	31,420	44,759	92	59,714	27,331	163,316
men	76,898	150,726	2,245	252,010	38,614	520,493
under 35	18583	56231	963	69940	16186	161903
over 35	89,735	139,254	1,374	241,784	49,759	521,906
% women	29%	23%	4%	19%	41%	24%
% men	71%	77%	96%	81%	59%	76%
% under 35	17%	29%	41%	22%	25%	24%
% over 35	83%	71%	59%	78%	75%	76%
Indicator P1 EKN 1.1: Number of farmers reached with increased productivity (indirect)	4,544,588	1,238,476	20,837	320,185	263,330	6,387,416
Indicator P1 EKN 1.2: Number of hectares of farmland used more eco-efficiently (total)	562,104	290,120	-	521,560	4,957	1,378,741
Indicator P1 EKN 1.3: Number of farmers reached with improved access to input market (direct & indirect)	3,831,560	-	-	146,295	160,517	4,138,372
Indicator P1 EKN 1.3: Number of farmers reached with improved access to input market (direct)	105,036			60,378	36,919	202,333
women	29,816			23,797	13,217	66,830
men	75,220			36,581	23,702	135,503
under 35	20600			19228	11206	51034
over 35	84,436			41,150	25,713	151,299
% women	28%			39%	36%	33%
% men	72%			61%	64%	67%
% under 35	20%			32%	30%	25%
% over 35	80%			68%	70%	75%
Indicator P2 EKN 2.1: Number of companies with support plan to invest, trade or provide service	51	-	1,010	100	-	1,161
Indicator P2 EKN 2.2: Reached # of farmers with improved access to output markets	-	-	11,353	102,390	-	113,743

Indicator	ISSD (2016-2020)	CASCADE (2016-2020)	ENTAG (2016-2020)	SBN (2016-2020)	REALISE (2018-2020)	Total (2016- 2020)
Indicator P3 EKN 3.1: Number of substantial policy changes/reforms contributed to	5	9	5	6	2	27
Indicator EKN O 1.1: Number of persons reached/trained with improved technology and skills (direct + indirect)	185,915	11,023	165	16,454	11,810	225,367
Indicator EKN O 1.1: Number of persons reached/trained with improved technology and skills (direct)	54,552	7,057	165	14,447	11,778	87,999
women	21,190	1,506	28	3,507	5,989	32,220
men	33,362	5,551	137	10,940	5,789	55,779
under 35	12767	977	0	3344	4505	21593
over 35	41,785	6,080	165	11,103	7,273	66,406
% women	39%	21%	17%	24%	51%	37%
% men	61%	79%	83%	76%	49%	63%
% under 35	23%	14%	-	23%	38%	25%
% over 35	77%	86%	100%	77%	62%	75%
Indicator EKN O 1.2: Number of trained farmers in sustainable agricultural production & practices (direct + indirect)	111,244	20,664	-	635,331	36,516	803,755
Indicator EKN O 1.2: Number of trained farmers in sustainable agricultural production & practices (direct)	31,612	19,074		431,108	36,516	518,310
women	10,666	10,725		118,920	17,568	157,879
men	20,946	8,349		312,188	18,948	360,431
under 35	8079	2861		103362	11497	125799
over 35	23,533	16,213		327,746	25,019	392,511
% women	34%	56%		28%	48%	30%
% men	66%	44%		72%	52%	70%
% under 35	26%	15%		24%	31%	24%
% over 35	74%	85%		76%	69%	76%

Partnership key performance indicators 2016 - 2021

Number of farmers reached with increased productivity (TOTAL in Thousands-K)

Number of farmers reached with improved access to input & output markets (TOTAL in Thousands-K)

Number of persons reached/trained with improved technology and skills (TOTAL in Thousands-K)

Number of trained farmers in sustainable agricultural production & practices (TOTAL in Thousands-K)

Number of companies with support plan to invest, trade or provide service

Number of substantial policy changes/reforms contributed to

Appendix 2 REALISE final report 2018 – 2021

Executive summary

Introduction

REALISE (Realising Sustainable Agricultural Livelihood Security in Ethiopia) is one of the five programmes in the BENEFIT Partnership. The programme was designed for three years (2018-2020) and funded by the government of the Netherlands through its embassy in Addis Ababa. Wageningen University and Research (WUR) in the Netherlands contracted the programme and provided management and technical supports. The REALISE programme has been implemented by eight Ethiopian universities (Arba Minch, Arsi, Bahir Dar, Haramaya, Hawassa, Mekelle, Oda Bultum and Woldia) forming eight clusters. The programme was aligned with the Productive Safety Net programme (PSNP) of the Ethiopian government and operated in 60 PSNP woredas. The programme collaborated with relevant stakeholders: the federal and four regional agricultural research institutes (EIAR, SARI, OARI, TARI and ARARI), Ministry of Agriculture and the four regional bureaux of agriculture (BoAs) and the PSNP office.

At impact level, REALISE aimed to contribute to improved sustainable food security, income and trade among food insecure rural households in Ethiopia. The programme goal is to achieve enhanced human, organizational and institutional capacities for validating, adapting and scaling best fit practices

for smallholder agriculture for increasing productivity and thus improving sustainable livelihoods in chronically food insecure PSNP woredas.

Programme outcomes are:

1. Developed best fit practices, that meet expressed needs and have the potential to contribute to increased productivity and resilience, are available for scaling in selected PSNP Woredas;
2. Increased availability, timely delivery and use of quality seed of new, improved, and/or farmer preferred varieties through diverse channels;
3. Enhanced human, organizational and institutional capacities for matching, adapting, validating and scaling best fit practices; and
4. A conducive environment exists for the institutionalization of evidence-based system innovation.

The programme started operating in 2018 with establishing cluster teams and conducting a participatory rural appraisals (PRA) and a baseline. In the following two years (2019 and 2020), it undertook different trials and studies in the four pathways. Under the practice and seed pathways, it conducted validation, crowdsourcing, demonstration and pre-scaling of best fit practices and established/strengthened linkages in the seed system. It also provided training to research and extension experts and piloted innovations and some in-depth studies to address systemic bottlenecks.

The REALISE programme has generated sufficient and convincing evidence to inform PSNP. The most amplified achievements are stated as follows:

1. Customized advisory services. REALISE sufficiently demonstrated that segmenting the target community will help to provide tailored made services which improve efficiency and effectiveness
2. One timad package designed for PSNP will be an entry point to the poor start using improved technology thereby to increased productivity (more than three-fold productivity increase is demonstrated) significantly reduce food gap months
3. The nutrition sensitive agriculture focusses and the introduction of nutrient dense crops such as orange flesh sweet potato, quality protein maize, biofortified haricot bean, home garden vegetables, fruit trees like papaya, passion fruit and pulses contributed to increase diet diversity
4. Social inclusion demonstrated how targeted action design to engage women and youth create synergy and empowerment
5. The pilot interventions generate sufficient evidences (income, nutrition, knowledge and skill gains) to inform PSNP to be more adaptive and agile.

After completing the three years of programme life, a no cost extension was granted to the programme for six more months (January - June 2021) to finalize documentation and sharing, and facilitate institutional embedding of its key findings.

In this end of programme report, major achievements, challenges and lessons learned for the duration of the programme (2018-2021) and the exit strategies are presented.

Major achievements

- The treatment (REALISE programme participant) group experienced only 2.8 food gap months compared with the treatment who experienced 3.06 months. The impact for PSNP households who participated in REALISE interventions and without was 3.11 and 3.57 moths respectively. The Food Gap Months (FGMs) difference between control and treatment was significantly different.
- There was also improvement in diet diversity between the control (non-participants) and treatment groups. However, the improvement for PSNP households who were participated in the programme intervention was much better.
- The asset improvement was measured through Tropical Livestock Unit (TLU) as proxy indicator, which show improvement for the treatment (2.06) compared to the control (1.95). PSNP households participating in the REALISE programme owned 2.22 TLU as compared to non-participant households with 1.47 TLU (Figure A2.1). The difference is statistically significant.

Figure A2.1 Comparison of household assets of groups participating in REALISE and those not participating.

- REALISE programme organized four policy dialogue events over the programme life. The policy dialogue themes were weather information for agricultural investment and risk management, one timad package as a show case for customised extension services, scalable youth job creation and social inclusion and nursery development for business and decentralised seedling supply. The dialogue on one timad package influence the MoA to design a national package to be piloted in four regional states.
- Four ALERTs (rapid assessment communication) were produced during COVID 19 partial lockdown to give insight and propose implementation action in PSNP areas. The alerts well taken by the Food Security Coordination and Extension Directorate and regional bureaus.
- The capacity building interventions on in-situ training, development agents, subject matter specialist and decision makers improved their knowledge and skills. The institutional and manpower capacity to test, validate and scale best fit agricultural practices that fit wide range conditions are enhanced through well designed and planed trainings to farmers, grass root level professionals, experts and heads of office.
- A book and 24 best fit practices compiled and shared with MoA, World Bank and PSNP technical task force for the incorporation of the key achievements into PSNP V Program Implementation Manual (PIM).

Quality and quantity of sustainable production

The REALISE programme contributed to increased quality and quantity of sustainable production through practice, seed and capacity building.

- 328,836 smallholder farmers either directly (41%) or indirectly (through cross visit and field days) accessed innovations tested/validated by the REALISE programme with the participation of 39% female farmers; from the directly involved ones, 24.6% were young farmers (see Table 1).
- 37,830 hectares of land was covered by best fit practices through practice and seed innovations, out of which 4914 hectares was covered by directly involved smallholder farmers.
- 122 best fit practices have been validated and identified for increased productivity out of which 60 were new practices to a given cluster in a given year.
- 24 best fit practice manuals have been finalized during the no cost extension period;
- A one timad package approach has been compiled for five crops (wheat, sorghum, faba bean, potato and sweet potato), revised jointly with experts from Ministry of Agriculture;

- 211,963 smallholder farmers accessed or were informed of best fit practices under the practice pathway;
- Productivity of major crops increased, for the farmers involved in REALISE interventions, with an average increase of 346% over the baseline yield;
- 22,863 farmers (45% female) directly accessed nutrition dense crops of legumes, fruits, orange fleshed sweet potato, quality protein maize and vegetables. Of these farmers, 10,000 received papaya seedlings;
- 232,403 smallholder farmers accessed directly or were informed about quality seeds in different ways;
- The crop variety portfolio of participating farmers (/) increased 260% over the baseline;
- 59 linkages were strengthened/established and supported between seed producers, seed users and service providers;
- 1059 woreda experts and heads of woreda office of agriculture were trained on innovations related to the programme;
- 36,516 smallholder farmers in the target areas received in-situ training on best fit practices;
- 18,110 participants comprising farmers, experts, researchers, policy makers, NGO staffs and private sector actors attended field days organised by the university clusters. Out of the total participants 29% were female.

Improved enabling environment

- Soil resource maps for 15 REALISE/PSNP woredas of Ethiopia have been prepared at semi detailed scale (1:50k) and a soil resource dataset was produced;
- The base map and related dataset were handed over to MoA and other partners to be used for similar semi-detailed soil resource mapping in the future;
- The training and backstopping provided by ISRIC contributed directly to the strengthening of capacity of experts of the Soil Resource Information and Mapping Directorate of the Ministry of Agriculture of Ethiopia to facilitate institutionalization of the approach to further survey and map soil resources of the country at the same scale;
- The innovation recommendation mapping (IRM) method was used to assess and identify optimal areas for four use cases:
 - growing two sweet potato varieties (Adu and Hawassa 09 in Arsi and Adu in East Hararghe zones) in Oromia region
 - maize-common bean intercropping in SNNP region, Silte zone
 - wheat-faba bean rotation in Southern Tigray (Oflla, Endamekhoni and Emba Alaje Woredas), and
 - potato (Belete) in Lay Gayint woreda of Amhara region as an evidence for the importance of the method for planning scaling.
- The IRM activity has been finalized during the no cost extension: two validation workshops were conducted in February 2021 in the two regions (Oromia and SNNP) to get feedback from relevant stakeholders in the IRM, and an IRM result paper was presented at the REALISE national conference;
- The innovation recommendation maps can be used mainly for planning scaling but also by breeders to develop varieties adaptable to different areas as classified by the IRM;
- 13 pilot activities were implemented to generate evidence on scalable youth employment opportunities, improving household resilience through women empowerment, affordable extension packages for smallholder farmers, and increasing access to weather information for smallholder farmers to inform their investment decisions and reduce risk.

Collaboration

- REALISE established strong collaboration with federal level stakeholders such as the Ministry of Agriculture PSNP/Food security coordination office, the extension directorate and soil information and mapping directorate and the Ethiopian Agricultural Research Institute (EIAR);
- Validation of fertilizer type and rate was conducted jointly by EIAR, ATA and REALISE in 2019 following soil fertility maps developed by ATA. ATA shared shapefile formats of soil fertility maps with EIAR and provided technical support on conducting the validation. Researchers from EIAR conducted trials across locations because of the laboratory and human capacity. REALISE was interested to have crop and area specific fertilizer recommendations for PSNP areas;

- Validation trials were repeated for bread wheat and teff in 2020. The results indicate that the highest grain and straw yields of bread wheat were attained from the application of 150% recommended nitrogen and phosphorous (RNP) (62–30 N–P ha⁻¹) from NPS and urea fertilizer sources and the application of 150% of recommended N and P (69–25 N–P ha⁻¹) from NPSB and Urea fertilizer for teff. The regional bureaus of agriculture were linked to the research centres which conducted the validation;
- The clusters have been collaborating with their respective bureau/office of agriculture at region, zonal, woreda and kebele levels, food security offices, and Regional Agricultural Research Institutes (RARIs)/ agricultural research centres.

Challenges, opportunities, lessons learned and way forward

Challenges

- The movement restrictions due to COVID-19 pandemic affected follow up of the implementation, and stakeholder gatherings for training and workshops where webinar were not possible;
- The 2021 no cost extension for the programme was approved for three months (January - March) for the clusters (regional team) and thus some experts were leaving the programme earlier and this created challenges to finalize report writing and publications;
- It was challenging to clustering PSNP households as they are scattered;
- In Mekelle cluster, final data collection was not possible because of security problems and communication was severely affected;
- Frequent turnover of development agents and focal persons in some cases resulted in dealing with new experts new to the programme;
- Short life (three years) of the REALISE programme did not allow us to properly see our contribution to the food security of PSNP households. Whereas the increase in diet diversity and decrease in food gap months achieved are both statistically significant, they are still short of the target;
- The locust invasion that occurred in 2020 damaged crops including those in our target woredas; and
- REALISE, just like CASCAPE, was instrumental in bringing results from agricultural research across the country to all farmers that have suitable agro-ecologies for these innovations. REALISE transcended regional boundaries by doing so. This process still needs adequate institutionalisation in an increasingly regionally organised country.

Opportunities

- Presence of supportive government offices that encourage alignment (extension, PSNP, research, NGOs) that facilitated taking up/mainstreaming of the demonstrated evidences;
- Presence of knowledge, experience and expertise within and outside the programme and the collaboration of all parties concerned with the programme;
- Availability of crop varieties and crop management practices from CASCAPE, ISSD and EIAR/RARIs that are suitable to diverse agro-ecologies;
- Active involvement of agricultural extension staffs in different woredas in the implementation of REALISE activities during the COVID-19 pandemic helped to properly undertake the planned activities and tremendously improved working relationships with them, which will contribute to institutional embedment of REALISE approaches and practices;
- Interest of farmers to test and adopt new technologies; and
- Strong stakeholders' collaboration at national, regional, zonal, woreda and kebele levels.

Lessons learned

- Targeting of context specific interventions has allowed identification of proven technologies relevant for specific agro-ecologies and socio-economic conditions;
- Involving relevant institutions from the very beginning, inception of the programme, smoothened implementation and helped the process of institutional embedding;
- Diversification of the cropping systems (such as intercropping and relay cropping) helps to avail food during periods of critical food shortage;
- Active involvement of the extension staff at zone, woreda and kebele levels is very crucial for successful implementation of the project activities as well as for creating a sense of ownership on the interventions, paving the way for institutional embedding;

- Action research coupled with building on existing experience of other projects enhanced the implementation capacity and helped to see impact more quickly;
- Supporting youths during preparation stage until they started getting income from off-farm activities, increased their participation (e.g., PSNP paid youths in a form of wage to work on fruit nursery until the group started selling seedlings as source of income);
- With locally adapted best fit practices and technical support, PSNP farmers can achieve increased yields to reduce food gap months;
- To achieve the reduction of food gap months and the increase in diet diversity, a longer, more consistent presence of active provision of information and technical support; and
- Customising extension services can improve inclusiveness of the PSNP farmers including women and youth.

Way forward

With REALISE coming to an end, it is clear that a programme like REALISE can have an important impact on the PSNP 5. It is recommended that the inclusion in PSNP 5 of REALISE type of activities is essential to enhance the impact of livelihood pathway.

Quality and quantity of sustainable agricultural production

Practice, Seed and Capacity building pathways

The REALISE programme contributes to increased quality and quantity of agricultural production through its practice, seed and capacity pathways. Best fit practices on crops and forages were matched and validated in REALISE intervention PSNP woredas. Practices including crops/varieties that are tested/validated for conditions similar to PSNP woredas were demonstrated and pre-scaled.

Best Practice validation, adaptation and pre-scaling

In the three project years, a total of 122 best fit practices have been validated and identified for increased productivity after conducting over 240 trials out of which 60 were new practices to a given cluster in a given year. The best fit practices are related to locally adapted crop varieties (suitable to relay cropping because of early maturity, escape low-moisture stress, higher yield) crop management (better agronomic practices, in-situ moisture conservation), cropping systems (intercropping and relay cropping), and intensification through supplementary irrigation. The validated best fit practices were presented to officials and experts at woreda and regional level for further application and improving productivity. The programme targeted to validate and recommend 60 best fit practices (Figure A2.2) in which it succeeded. In addition, the programme prepared 24 best fit practice manuals mainly for new crops or practices new adaptive to specific areas. Examples of new crops include finger millet in Sire woreda, Arsi zone, sweet potato in Dodota woreda, mung bean in some woredas of eastern Amhara, open pollinated maize in different woredas, and rue (*Ruta graveolens* L.) in woredas of Tigray for which manuals have been prepared. Example of new practices are intercropping and Zai pits with integrated soil fertility management in woredas of East Hararghe zone, vermi-compost in different woredas of Amhara region. The manuals have been handed over to MoA and will be utilized by chronically food insecure PSNP woredas. Preparation of best fit practice manuals was an additional task which was not initially targeted by the programme.

The one timad package approach has been compiled for five crops (wheat, sorghum, faba bean, potato and sweet potato) as an experience of the programme and handed over to MoA. The package involves use of integrated fertilizers (organic and inorganic) and preparation of inputs (seed and inorganic fertilizers) in small packs. The approach is applicable to any crop produced by smallholder farmers with fragmented landholding and who are resource poor. The ministry together with the REALISE programme revised the one timad package to fit it to the manual format of the ministry. The manual will be used by bureaus of agriculture as supporting document for pre-scaling one timad package.

Overall, 211,963 smallholder farmers accessed directly or were informed about best fit practices (indirectly) under the practice pathway. This is a 135% achievement over the programme target,

which was 90,000 (Table A2.1). Out of the total reach of smallholder farmers, 36% were female beneficiaries.

Productivity of major crops increased on average by 365% (ranging from 179% to 568%) over the baseline data and 69% over CSA data for participating smallholder farmers while the target productivity was 30% (Table A2.2). Yield increment for open pollinated maize over CSA data (6%) is low partly because CSA maize yield is aggregate for hybrid and open pollinated maize varieties and across locations. Yield of teff (1.6t/ha) obtained in woredas of Woldia cluster under PSNP condition is good as it was produced under low-moisture stress condition though it is lower than CSA teff yield (1.75t/ha). CSA yield data does not provide productivity for different varieties and locations.

Figure A2.2 Total number of best fit practices validated and recommended

Table A2.1 Number of farmers reached with best fit practices in the two years programme life

Year	Direct			Indirect			Total			% Female
	Male	Female	Total	Male	Female	Total	Male	Female	Total	
2019	5,368	3,485	8,853	26,768	16,177	42,945	32,136	19,662	51,798	38
2020	21,199	13,568	34,767	82,644	42,032	124,676	103,843	55,600	159,443	35
Total/ average	26,567	17,053	43,620	109,412	58,209	167,621	135,979	75,262	211,241	36
Target	90,000									30

Table A2.2 Productivity of major crops

	Yield (t/ha)					% yield increase over the baseline	% yield increase over CSA data
	2019	2020	Mean	Baseline (national)	CSA (2017/18)		
Major crops							
Maize (hybrid)	6.77	5.00	5.88	0.88	3.94	568	49
Maize (OPV)	3.32	5.01	4.16	0.88	3.94	373	6
Sorghum	4.66	3.45	4.06	0.76	2.73	434	49
Wheat	3.41	3.06	3.24	1.16	2.74	179	18
Finger millet	3.15	2.73	2.94	0.81	2.26	263	30
Food barley	3.63	2.82	3.23	0.99	2.16	226	50
Teff	1.70	1.51	1.61	0.46	1.75	250	-8
Red haricot bean	3.22	3.63	3.43	0.63	1.72	444	99
Faba bean	3.76	3.80	3.80	0.64	2.11	494	80
Mung bean	1.82	1.6	1.70	0.37	0.37	359	359
Potato	27.14	32.15	29.60	5.66	13.92	423	113
Sweet potato	29.27	26.85	28.10	6.02	34.58	367	-19
Average % increase over baseline and CSA						365	69
Programme target (% over baseline)						30	

Nutrition sensitive agriculture

In total 22,863 smallholder farmers included nutrition dense crops into their farming practices with 45.6% participation of female farmers. The crops were quality protein maize, orange fleshed sweet potato, fruits (papaya, mango and avocado, banana), and vegetables (head cabbage, kale, Swiss chard, carrot and beetroot). In 2020, vegetable crops and papaya were demonstrated or pre-scaled by all clusters as home-gardening. Out of the total, over 10,000 farmers planted papaya along with other fruits and vegetables. Passion fruit has been introduced in 2020 to PSNP farmers by Arsi and Hawassa clusters.

Increased access to quality seed of adaptive and farmers' preferred varieties

Increased production and dissemination/marketing of quality seed

Overall, 234,403 smallholder farmers accessed directly or were informed about (indirectly) quality seeds with a participation of 37% female farmers. The total number of beneficiaries is 95% achievement over the programme target (120,000) (Table A2.3). This number took into consideration farmers who were involved directly in validation, demonstration, pre-scaling and crowdsourcing and those who are members of primary seed producer's cooperatives. Farmers who can get information from those that were directly involved, the number of farmers who potentially access quality seeds from cooperatives and who visited farms during field days were considered as the group that benefited indirectly.

Table A2.3 Number of farmers reached with quality seeds

Year	Direct			Indirect			Total		
	M	F	T	M	F	T	M	F	T
2019	8,027	5,565	13,592	34,581	23,713	58,294	42,608	29,278	71,886
2020	22,726	16,273	38,999	82,427	41,091	123,518	105,153	57,364	162,517
Total	30,753	21,838	52,591	117,008	64,804	181,812	147,761	86,642	234,403
Target									120,000

Increased demand for and availability of new, improved, and/or farmer preferred varieties among farmers

The crop variety portfolio of participating smallholder farmers was increased on average with 260% 160% over the baseline (Figure A2.3). In 2017/18, in the baseline study, 68 varieties were recorded for all clusters. In the two years interventions, the programme introduced 177 varieties in the farming system of participating farmers with the aim to diversify the crop/variety portfolio by 50%. Double counting could exist when a given variety was introduced to different woredas by clusters.

Figure A2.3 Existing (baseline) and introduced number of crop varieties (2019 and 2020) and target and achieved diversity

Linkages established between seed producers and seed users for sustainable seed supply

Overall, 59 linkages were either strengthened or established between seed producers, seed users and service providers with 97% increase over the target. In strengthening the linkages, members of the primary seed producers' cooperatives/unions received trainings, supported construction of seed storage and DLS for storage of potato seed tubers. Strengthened linkages enabled the stakeholders to easily share information on availability of seeds and thus farmers able to access quality seed/ seed tuber.

Capacity Building

The capacity of extension, NGOs and other service delivery mechanisms to disseminate best fit technologies through implementing scaling strategies is enhanced

Under the capacity building plan, 1059 woreda experts and heads of woreda office of agriculture of which 19% female were given ToTs on innovations related to the programme (Table A2.4) and 36,516 smallholder farmers in the target areas received in-situ training on best fit practices (Table A2.5). Among farmers received in-situ training, 44% were female and 32% were youth farmers. 18,093 farmers of which 29 % were female attended field days (Table 5) organised by the university clusters.

Table A2.4 Number of woreda experts and office heads received training of trainers (ToTs) on development of different innovations and approaches and participants in field days

	Number participants in ToT			Number of farmers participated in field days		
	Male	Female	Total	Male	Female	Total
2019	454	87	541	5,296	2,237	7,533
2020	401	117	518	7,522	3,038	10,560
Total	855	204	1,059	12,818	5,275	18,093
Target			250			
% increase			323.6			

Table A2.5 Number of farmers received in-situ trainings on best fit practices

Year	Male			Female			Total
	<35	≥35	Total	<35	≥35	Total	
2019	1,950	2,483	4,433	1,374	1,521	2,895	7,328
2020	3,932	12,216	16,148	4,384	8,656	13,040	29,188
Total	5,882	14,699	20,581	5,758	10,177	15,935	36,516

National and regional annual review and planning workshops

Three regional institutionalization workshops were conducted by a group of REALISE university clusters: Amhara (Bahir Dar and Woldia University), Oromia (Arsi, Haramaya and Oda Bultum University) and SNNPR (including Sidama region by Hawassa and Arba Minch University) involving mainly regional stakeholders, representatives from hosting university, BoA, RARI and Food Security Coordination, cooperative and farmers. Each university cluster presented major achievements, challenges and lessons learnt to the stakeholders. Subsequently, the participants discussed the importance of having a programme such as REALISE, particularly in PSNP areas to support chronically food insecure households. The institutions identified innovations that could be embedded in the local institutions and shared roles and responsibilities. At all regional workshops, it was underlined that REALISE programme has demonstrated encouraging achievements in a relatively short programme life, three years.

National stakeholder's conference

REALISE programme held a one-day national conference on 26 March 2021 in Addis Ababa to share its achievements over the last three years and discuss key institutionalization issues for ensuring continuity of the programme approaches and results. The conference followed the three regional institutionalization workshops organized in Amhara, Oromia and SNNP. Over 35 participants representing government organizations, universities, research institutions, NGOs, the World Bank and programme staff attended the conference held on 26 March 2021 at Swiss Inn Nexus Hotel in Addis Ababa. It was discussed that the programme has unique design of the programme that was appreciated by the participants included (i) the design process that was based on lessons from relevant programmes, baseline data and scoping studies; (ii) context specific clear targets and innovation pathways; (iii) the programme's unique institutional arrangement; (iv) the strong partnership & coordination; (v) its leadership, regular communications; (vi) inclusion of cross cutting issues (climate, nutrition, youth, and women); and (vii) its focus on institutionalization process. At the end of the conference, the MoA Extension Directorate affirmed its commitment to lead the mainstreaming of customized extension package on 'one timad' package and follow up on inclusion of BFPs within the national extension packages. In the remaining time, the programme will continue facilitating the institutionalization process with relevant stakeholders and high-level officials. During regional institutionalization workshop universities, Bureau of agriculture and regional Agricultural Research Institutes have shown their commitment to embed some of the BFPs and approaches in their routine.

Improved enabling environment

A conducive environment for the institutional embedding of evidence-based system innovation

Soil characterization and mapping

Conducting soil resource survey and mapping at semi detail scale (1:50k) was requested by the Soil Information and Mapping Directorate of Ministry of Agriculture. The major aim was to build capacity of Ethiopian experts mainly experts of the MoA in using the same methodology for further soil resource mapping activities.

In 2019, a MoU was signed between MoA and the BENEFIT partnership and a task force comprising of seven members representing MoA, ATA and the BENEFIT partnership to support the implementation of soil resource and recommendation mapping was established. For conducting soil resource mapping, 18 REALISE/PSNP woredas were selected, surveyors and assistant surveyors were identified from MoA, and other local institutions. Training was provided by the REALISE programme in collaboration with International Soil Reference and Information Centre (ISRIC). The training mainly focused on pre-field, field and post-field activities, with specific emphasis on a shared approach in collecting soil data adhering to similar standards for producing a coherent dataset of high quality for soil characterization and mapping. A high resolution (50 meter), country wide base map for soil/land resource mapping has been prepared by ISRIC. The base map with this fine resolution is a major breakthrough and important deliverable for the country to improve its capacity in soil mapping and characterization. The capacity building was materialized through hands-on training and strong backstopping by ISRIC on digital soil mapping.

The following outputs were handed over to the MoA: The base map, which was handed over to the ministry and other partners and stakeholders in the workshop organized on 9 March 2020. ii) Countrywide 50 meter-covariates: country-wide 300 covariate representing country-wide soil forming factors, at 50 m resolution was handed over to MoA by ISRIC/REALISE. These consistent countrywide covariates are instrumental for the MoA to carryout similar tasks on soil resource characterization and mapping missions and to successfully implement and institutionalize digital soil mapping in Ethiopia. iii) Soil characterization in 15 selected REALISE woredas: Using the data (both from the field and the laboratory), ISRIC has produced the soil-landscape resources maps for each woreda at a final scale of 1: 50,000 to be used as a basis for similar future endeavours. This achievement is the first of its kind for agricultural development purposes. The MoA pledged to scale the experience gained to 480 woredas in the coming 10 years.

Innovation Recommendation Mapping

The Innovation Recommendation Mapping (IRM) is a software tool that runs a GIS based multi-criteria programme that allows users to generate maps, based on biophysical aptitude and socio-economic feasibility, which evaluate where best fit innovations are suited for a specific area. The main outputs/benefits of using the IRM tool are (1) identification of suitable/unsuitable locations, and (2) major production constraints (such as climate, soil, topography, crop diseases, soil, and accessibility). Information on the constraints and opportunities for the use of land provides basic tools for better crop management practices and guides decisions on optimal utilization of land resources in a sustainable way. Overall, the IRM outputs show how and where best fit innovations can be scaled in specific areas to increase the adoption rate and bring greater impact.

The CASCAPE project and WUR have developed IRM as a scaling tool. The IRM tool was further improved and developed later with the support of REALISE, the sister programme of CASCAPE, including the inclusion to analyse different cropping systems (e.g. crop rotation and intercropping practices).

Under the REALISE programme, the IRM method was used to assess and identify optimal areas for growing sweet potato (Hawassa 09 and Adu varieties) in Oromia Region (Arsi and East Hararghe zones), maize (BH546) and common bean (Hawassa Dume) intercropping in SNNP Region (Silte zone) using available biophysical data to achieve food self-sufficiency in PSNP households. The IRM for

Oromia and SNNPR was led by experts from the Soil Information and Mapping Directorate (SIMD) of MoA with training and backstopping from WUR and Mekelle University senior experts in IRM. The involvement of experts from SIMD aimed at capacity building of a relevant institution. Besides, the tool was implemented for modelling optimality of wheat-faba bean rotation in Tigray Region (Ofa, Endamohoni and Emba Alaje Woredas) and Irish potato (Belete variety) in Amhara Region (Lay Gayint Woreda) based on collated biophysical and socio-economic data using pair-wise multi-criteria evaluation. Besides analysis and modelling the sole crop suitability, IRM method supported by REALISE demonstrated that cropping systems such as crop rotation and intercropping can also be analyzed and modelled by the IRM tool. The IRM results show that appropriate management measures such as application of organic matter, lime, and soil and water conservation practices should be given due attention in those area where soil and landscape are limiting factors. The IRM outputs for Oromia and SNNP have been validated by stakeholders including research institutes, agricultural extension and farmers.

As an output from IRM exercises in REALISE, all IRM for the four use cases have been finalized; the results of the IRM was also presented at the national conference organized by the REALISE programme and will be published as a technical paper.

Fertilizer type and rate validation

In 2019, REALISE has initiated collaborative activities with the EthioSIS project of ATA, the Ethiopian Institute for Agricultural Research (EIAR) and Ministry of Agriculture (MoA) with a tripartite MoU agreement to undertake site and crop specific fertilizer validation trials. The fertilizer validation activities have been implemented by five Agricultural Research Centres under EIAR with the involvement of ATA and REALISE on four major cereal crops (maize, sorghums, teff and wheat) which are occupying a significant position in terms of area coverage and volume of production.

In 2020, the experiment was repeated for bread wheat and teff. The finding shows that applying multi-nutrients balanced fertilizer or conventional fertilizers in Dodota and Silti districts in the lowlands of Arsi and Selte zones, respectively significantly boosted the yield of bread wheat and teff. The highest grain and straw yields of bread wheat were attained from the application of 150% of the recommended nitrogen and phosphorous (RNP) ($62-30 \text{ N-P ha}^{-1}$) from NPS and urea fertilizer sources. Similarly, the highest grain and straw yields of teff were obtained from the application of 150% of recommended N and P ($69-25 \text{ N-P ha}^{-1}$) from NPSB and Urea fertilizers. The results can be used by the woreda for scaling to other farmers to increase productivity of these 2 crops.

System innovation for ensuring enabling environment through pilots and In-depth studies

The system innovation pathway of REALISE is designed to generate new insights and evidences by addressing systemic bottlenecks through piloting of innovative practices and conducting in-depth studies. As the PSNP areas where the REALISE programme is operating are experiencing systemic challenges that could not be addressed by technology transfers and conventional approaches, piloting nonconventional approaches and knowledge generation is critically important. The system innovation pathway, therefore, gave the programme an opportunity to pilot promising innovative practices and study systemic bottlenecks to inform action and initiate policy dialogues. The programme involved top professionals and government officials during the early planning and incorporated their view in the designing of the pilot interventions and defining in-depth studies. The implementation brought together regional (research, extension, private sectors, NGOs) and grassroots level actors (woreda office of agricultures, development agents, youth and women) to facilitate joint learning and inform actions.

Pilots

Different pilot activities were conducted on resilience (small scale poultry production, small ruminant fattening and dairy goats), scalable youth employment (business-oriented poultry production and marketing, integrated nursery management, improved charcoal making technology and essential oil extraction from Eucalyptus and low-cost low risk interventions (fertilizer micro-dosing and one timad package) involving 668 beneficiaries (Table A2.6).

Table A2.6 Summary of pilot experiments

Innovation piloted		M	F	T
Small-scale poultry production for nutrition, income and resilience building (Arsi & Haramaya)	Resilience	0	70	70
Piloting of small ruminants (goat & sheep) fattening for income and resilience building (Haramaya & Woldia)	Resilience	0	56	56
Dairy goat production for nutrition and resilience building (Mekelle)	Resilience	0	35	35
Sub total		0	161	161
Small scale commercial poultry production for youth employment (Hawassa & Woldia)	Scalable youth employment	21	15	36
Integrated nursery development for youth employment (Arsi)	Scalable youth employment	19	0	19
Improved charcoal making technology for youth job creation (BDU)	Scalable youth employment	8	12	20
Sub total		48	27	75
Essential Oil Extraction from Eucalyptus globulus (Hawassa)	Scalable youth study employment			
Pilot study of fertilizer micro-dosing on the yield of Sorghum in Moisture deficit Areas of Eastern Amhara Region (Woldia)	Low cost low risk	4	1	5
One timad package (Bahir Dar, Haramaya, Hawassa & Woldia)	Low cost low risk	279	148	427
Sub total		283	149	432
Total		331	337	668

Resilience

Under the resilience theme, 161 female farmers participated in the pilots with a focus on egg production, dairy goats, fattening of small ruminants and keeping dual purpose chickens. Production of eggs led to increased consumption of eggs which in turn improved diet diversity of PSNP households.

From the total dairy goats provided to PSNP female headed households, 70 gave birth to offspring and 60 were pregnant for the second time. Initially dairy goats were provided to improve milk consumption. However, keeping dairy goats in Southern Tigray and fattening of small ruminants (sheep and goats) in eastern Amhara and eastern Oromia, enabled female farmers to generate income and build assets which will help them to be resilient to different shocks.

Distributing five-seven dual purpose chicken helped the female farmers. However, allocating time for managing a small number of chickens seems challenging and needs more evidence to consider it as a viable approach for building resilience.

From preliminary results, fattening of small ruminants showed to be a very important approach to build resilience of PSNP farmers. To avoid dependency, the programme linked payments to rural saving and credit cooperatives (RUSACCO). The money is being paid to RUSACCO and the RUSACCO in Woldia University cluster already started to allocate money for additional beneficiaries from the collected money in a way of scaling the approach where a 2nd round loan was distributed, 33,960 Birr revenue per person was achieved.

Scalable youth employment

Three initiatives were validated – poultry production, papaya nurseries and charcoal.

Small scale commercial poultry production and marketing followed a value chain approach, linking sources of breeds, feed and health inputs and markets with the youth or youth group. In Hawassa cluster, day-old chicken purchased from Debre Zeit Agricultural Research Centre were managed by a youth group and the group was selling pullets. The youth generated income while the local people also got access to pullets. Jobs were created, and an annual net profit of Birr 180,000.00 was obtained from 4000 improved poultry breed supplied to smallholder farmers. Capacity building to youth groups on business plan development and business management is very important; market access is also an issue with increased involvement youth in one-day chicken production process. In Woldia cluster, pullets were supplied to individual youth and the youths were selling full grown chicken. The results

were: jobs created, organic scaling of the business model, 2nd round loan distribution (RUSACCO revolves the grant to three new jobless youth), timely loan repayment and 42,163 Birr revenue per person per cycle achieved.

In integrated nursery management, in 2020 the involved group produced 9,184 Maradol papaya seedlings and 2,246 locally adapted papaya variety seedlings and 4,736 passion fruit seedlings and already sold more than 95% of their produce and earned 396,720 Birr. In the process of nursery development, PSNP paid the youth group for living until they started selling seedlings, which is a very important step in realizing job creation in such type of activity where income cannot be obtained immediately. Currently, seedlings were purchased by different projects, and the youth group are not sure whether or not the market demand for seedlings will be sustainable.

Improved charcoal making technology for youth job creation was piloted, group organization finalized, training on business development was given, and a Green Mad Retort external combustion chamber kiln construction was completed. Charcoal making, selling and evidence generation will continue. Bahir Dar University is willing and continued working on the improved charcoal making with the youth group and supported over 80% of the investment.

Low cost low risk

Considering the inclusiveness of poor and marginalized PSNP farmers, integrating organic fertilizer and inorganic fertilizer and packaging inputs (seed and fertilizers) in small size was piloted in the 'one timad package' approach. MoUs with woreda office of agriculture (WoA) and multipurpose cooperatives were signed by each cluster involved to implement the one timad package. Use of organic fertilizer (compost in this case) with inorganic fertilizers improved the yield of tested crops. A manual on one timad package prepared by the REALISE programme has been handed over to MoA to nationally consider use of organic fertilizer with inorganic fertilizer and packaging of inputs (seeds and fertilizers) in small sizes that fit to one timad (a quarter of a hectare). The challenge in Ethiopia is variability of quality of compost which makes recommending application rates difficult.

In-depth studies

Eight in-depth studies on nutrition, risk management, future scenarios, synthesis of literature review on rural youth employment and a case study on youth employment in Arsi zone have been initiated out of which six were completed (Table A2.7). The main objectives of the in-depth studies were to generate evidence and feedback on systemic and sector related issues to initiate policy level dialogue and action. The findings of all the in-depth studies are compiled in reports, policy briefs and scientific articles which can be used to initiate dialogues with policy makers and ensure wider circulation to stakeholders and partners.

Table A2.7 Summary of in-depth studies

Topics of in-depth studies	Category	Respondents			Remark
		M	F	T	
Dissemination of weather information to the PSNP community towards reducing the risk of climatic variability (Tigray)	Resilience	78	42	120	Quasi experiment, Done
Integrated nutrition development for resilience building in selected PSNP woredas of Tigray	Nutrition	0	180	180	Quasi experiment, Done
Total		78	222	300	
Assessment of scalable youth employment opportunities and interventions: the case of PSNP Woredas of Ziway Dudga and Nagelle Arsi woredas	Scalable youth employment				Study, done
A Synthesis of Literature Review on Policies and Interventions for Rural Youth Employment in Ethiopia	Scalable youth employment	Done			Study, done
Maternal and child nutritional status, household food security, and crop diversity analysis in Selected PSNP woredas of Southern Ethiopia	Nutrition				Study, done
Pro poor saving, credit and insurance services in western Amhara region	Low risk				Study, done
Seasonal youth migration in Lay Gaynt and Shebel Berenta Woredas	Future scenario				Study, not done
Population Pressure, Migration and Land Use Dynamics: The Case of PSNP Communities of Eastern Ethiopia	Future scenario				Study, not done

Mainstreaming social inclusion and nutrition

The pilot interventions and the in-depth studies were mainly initiated to deal with systemic bottlenecks and issues of social exclusion among the youth, women and economically weak section of the community. Most of the pilot interventions designed to ensure social inclusion and income integration of the marginalized section of the community. REALISE demonstrated that if appropriate interventions are designed and institutional support is provided to women and youths, the poor and vulnerable groups can actively participate in development activities and profit from equitable distribution of benefits. The pilot activities ensure better income, better knowledge and skills in business management, diversified food intake, participation in decision making and access to and control over resources. In the total of 13 pilot activities implemented or started in 2019, 441 participants were reached out of which 59% were women and 47% were youth. The figures show adequate attention has been given by REALISE programme to ensure social inclusion.

Targeted Action

Time and labour-saving technologies were identified, introduced and promoted to the beneficiary farmers as part of the targeted action interventions. The technologies were potato digger in Mekelle, teff row planter in Bahir Dar, multi-crop thresher in Woldia, and an enset processing devices and maize sheller in Arba Minch University clusters. Except for the potato digger planned by Mekelle University cluster, all technologies were demonstrated to the farmers. The feedback also showed how farmers evaluate time and labour saving technologies. In 2019, Hawassa demonstrated enset processing devices in two woredas (Kachabira and Bona Zuria) targeting 40 women (20 per woreda). The cluster collaborated with Wolaita Sodo Rural Development Technology Centre for technology production and provision of technical training to the target farmers. Multi-crop thresher introduced by

Woldia cluster looks costly. As a result, seed producers cooperative owned the thresher and provide services of threshing on payment basis.

COVID alerts

REALISE published its findings from a rapid assessment conducted on the impact of COVID19 on four selected areas: Effect of COVID-19 on PSNP programme operations and its beneficiaries; Agricultural Casual Labourers with a particular focus on Sesame Belt Migrants from Amhara And Tigray; the Impact of Covid-19 On Agricultural Casual Labourers In PSNP Areas; and effect of COVID 19 On Agricultural Inputs Availability and Supply. The alerts complement other efforts, for example by MoA, that provide insights and status of agricultural inputs supply such as seed and fertilizers in PSNP areas.

Monitoring & Evaluation

The overall reach of the REALISE programme is presented in Table A2.8

Table A2.8 REALISE Programme summary of target and reach

Performance indicator	Programme target	Programme reach			Total
		2018	2019	2020	
Regions	4		4	5	5
Woredas	60		61	61	61
Hectares of farmland (direct & indirect)			15,367	22,463	37,830
Hectares of farmland (direct)		42	1,354	3,560	4,956
Hectares of land (indirect)			14,013	18,903	32,916
Farmers reached (direct and indirect)	210,000	439	134,552	194,284	329,275
Farmers (direct)		439	22,445	43,061	65,945
M =<35		57	2,568	6,224	8,792
M >35		222	10,241	19,302	29,543
F =<35		33	1,501	5,803	7,304
F >35		127	8,135	11,732	19,867
% of F	30%	41%	43%	41%	41%
Farmers (indirect)			112,107	151,223	263,330
M			61,349	101,473	162,822
F			50,758	49,750	100,508
% of F			45%	33%	38.2%
Farmers' organizations			9	75	84
SMEs / entrepreneurs			5	5	10
Platforms			4	9	13
Knowledge and research institutes	16		16	17	17
Research and extension staff trained	250		541	518	1059
Banks and MFIs			7	3	10
Improved technology/practices	60		68	54	60 (*)
Best fit practice manuals	0		0	24	24
Policy dialogue			0	4	4
Studies in strategic bottle neck (in-depth studies)			6	4	10
MSc study supported			4	4	8
Evidence-based policy options			3	8	11
Private sector association			1	12	13
Productivity increased against the baseline (%)	30		81-1073	35-900	

(*) the number reflects the unique number of improved practices finally delivered at the end of the programme.

Conclusion and recommendations

Achievements

- REALISE programme achieved its primary outcomes, reduced months of food gaps, enhance diet diversity intake, improve capacity of partners and target community to validate, demonstrate and scale best fit practices and initiate policy dialogue and present key achievements findings to regional and national stakeholder.
- The pilot interventions demonstrated ways of resilience building, job creation and contributed to food security, income generation, nutrition improvement, institutional innovation and scaling.
- Six in-depth studies pertaining to scalable youth employment opportunities, weather information dissemination, nutrition, pro-poor financial services and end line survey carried out and the preliminary findings have been generated.
- The social inclusion of women, youth and economically marginalised section of the community through context specific and tailored made interventions ensures economic integration, sense of self-worth and empowerment.
- Special reports, policy briefs and brochures were prepared and dialogue were initiated with key partners to facilitate institutional embedding.
- Heads at woreda offices participated in technical training together with organized youths, before starting the actual work in the pilot activities, which ensured stakeholders commitment in supporting youth with required technical and resource gaps.

Challenges, opportunities and lessons learnt

Challenges

- The incidence of COVID-19 pandemic and the associated mobility restriction and partial shutdown affected the national level scenario study planned and sharing of finalised in-depth studies Piloting of essential oil extraction and future scenario as in-depth study were parked due to mobility restrictions of COVID-19 pandemic;
- Motivation of relevant woreda experts in supporting and guiding the organized youth was low, and it needed much effort to engage some of them in the activity; preference was given to shortcut approaches for success among youths and other potential beneficiaries;
- Poor input supply systems and inadequate capacity of suppliers for some inputs such as pullets, feed, vaccine, machineries etc.;
- Lack of qualified consultants for some of the intended in-depth studies;
- The short life span of REALISE programme hampered the evidence generation and institutionalization; Shortage of skilled manpower for construction of the improved charcoal technology and it associated huge cost.

Lessons learned

- The pilots and in-depth studies provided adequate evidence on what works and what does not work;
- The pilot interventions ensure social inclusion particularly for women, youth and poor farmers;
- Stakeholders require time and space to endorse new way practices and way of doings;
- Small ruminants are important entry points for resilience building while poultry is of more importance for job creation and income generation;
- Non-agricultural investments such as essential oil extraction and charcoal making technology require huge investment, market linkage, multi-institutional players and proven market demand. A clear commitment from partners and availing financial resources are required;
- The round table discussion with stakeholders and expert panel helped to remain focused in conducting pilot interventions and in-depth studies.
- Principle of layering and sequencing of interventions creates synergy and collaboration with partners.

Way forward

Any future similar programme needs to consider systemic bottlenecks like population pressure combined with fragmentation and decreasing farm size.

Overview of outputs

List of Training of Trainers topics conducted by REALISE clusters

- Methods and use of bottom up planning
- Validation of new technologies
- Promotion of nutrition sensitive agriculture
- Approach and data collection in crowdsourcing and participatory variety selection
- Post-harvest management of major crops
- Approaches for demonstration of improved agricultural technologies (finger millet production, tie-ridge technology, quality protein maize, etc)
- Approach of pre-scaling agricultural practices (potato, wheat, teff, etc)
- Importance and implementation of one timad package
- Preparation and use of compost and vermin-compost
- Establishment of home gardening (fruits and vegetables)
- Importance and preparation of seed small packs
- Production of quality and management
- Importance and approach of climate smart agriculture
- Agricultural input-output value chain
- Integrated pest management

List of documents

a. Best fit practice manuals

Crop/commodities	No. of BFP manual	Varieties	Region	University cluster	Type
Common bean	2	Hawassa Dume	SNNP	AMU	Nutrient dense pulse crop for nutrition and income
		Nasir, Dinkenesh & SER 125	Oromia	OBU	
Mung beam	1	Boreda, Rasa & Erkab	Amhara	WU	Nutrient dense pulse crop for nutrition and income
Maize	3	BH 547	SNNP	AMU	Major cereal staple food crop
		Melkasa 4	Oromia	AU	
		Melkasa 2	Oromia	AU	
Sorghum	1	Jiru, Dibaba, Adele	Oromia	OBU	Major cereal staple food crop
Finger millet	2	Boneya, Tadesse & Tessema	Oromia	AU	Staple food crop promoted for climate resilient
		Merbe 1 Aksum	Tigray	MU	
Wheat	1	Ogelcho	Amhara	BDU	Major cereal staple food crop
Tef	1	Quncho & Bosset	Tigray	MU	Major cereal staple food crop
Maize-common bean intercropping	1	Melkasa II Dursitu, Tinike, Babile and Awash 2	Oromia	HrU	Crop diversification and intensification for food and nutrition security
Double cropping of tef and common bean	1	Quncho Awash 2	Oromia	OBU	Crop diversification and intensification for food and nutrition security
Irish potato	3	Belete & Gudene	SNNP	AMU	Root crop for food and nutrition security
		Belete	Amhara	BDU	
		Belete	Amhara	WU	
Onion	1	Adam red, Bombay & red king	Oromia	OBU	Game changer crop for cash generation
Home garden vegetable production	2	Head cabbage	Tigray	MU	Nutrient dense crop for nutrition and income
		Beat root, Carrot, kale, switch chard, tomato	Oromia	OBU	
Sweet potato	1	Hawassa 09, Awassa 83 and Adu	Oromia	AU	Nutrient dense crop
Vermin compost	1	Major crops	Amhara	BDU	Soil fertility management

Crop/commodities	No. of BFP manual	Varieties	Region	University cluster	Type
Zai pit	1	Maize on Melkasa 2 variety	Oromia	HrU	Soil and moisture conservation
Dairy goats	1	Begait	Tigray	MU	Nutrition and income
Rue	1	Local	Tigray	MU	Herbal crop for medicine and spice
	24				

- b. One timad package guideline (in Amharic language)
- c. Innovation briefs
 - Creating Employment for Rural Youth: developing human capital and business models
 - Improving Women's Livelihoods: resilience building through access to livestock assets
 - Piloting Innovative Extension Services: small size input packages and weather information
- d. BENEFIT-REALISE: Stories of change
- e. REALISE book: Innovations for Food and Livelihood Security: Experience of REALISE
 1. Introducing and Demonstrating Finger Millet Packages in the traditional Food System
 2. Contribution of Maize-Common Bean intercropping for Food and Nutrition Security in Productive Safety Net Programme Areas
 3. Promoting Improved Sweet Potato Production Packages in Moisture Stressed Woredas of Oromia
 4. Improved Bread Wheat Technologies for Enhanced Livelihoods of Farming Households in Selected Moisture Stressed Woredas of Oromia Region
 5. Improved Potato Production Technology in Productive SafetyNet Programme areas of Western Amhara Region
 6. Pre-Scaling up of Common Bean Varieties in Simada and Enebsie Sar Medir Woredas of Amhara Region
 7. Participatory Bread Wheat Variety Selection in PSNP Farmers of Western Amhara
 8. Context Specific Technology Packaging for Smallholder Farmers: The Case of 'One Qindi Package' for Potato Production in East Hararghe
 9. Context Specific Technology Packaging for Smallholder Farmers: The Case of One Timad Package for Bread Wheat Production in East Hararghe
 10. Zai Pits Integrated with Soil Fertility Management for Maize Production in Moisture Stress areas of East Hararghe
 11. Performance of Food Barley in Kachabira Woreda of Kambata Tembaro Zone SNNPR
 12. Performance of Open-pollinated Maize Varieties in the Dry mid Highlands of Southern Ethiopia
 13. Performance of Triticale in the Highland Agro-Ecologies of Southern Ethiopia
 14. Evaluation of Food Barley Genotypes in Tigray Region
 15. Evaluation of Released Bread Wheat Genotypes in Tigray Region
 16. Demonstration of Improved Common Bean Varieties in PSNP Woredas of West Hararghe Zone
 17. Pre-Scaling of Double Cropping Teff after Haricot Bean in Habro and Oda Bultum Districts of West Hararghe
 18. Demonstrating Groundnut Variety in Oda Bultum District of West Hararghe Zone
 19. Improved Onion Technologies for Food Security of Productive Safety Net Households in West Hararghe
 20. Validating Highland Sorghum Technologies in Doba Woreda of West Hararghe Zone
 21. Promoting Improved Mung bean Production Technologies in Eastern Amhara
 22. Promoting Improved Potato Production Technologies in the Highlands of North Wollo, Eastern Amhara
 23. Validating and Promoting Early Maturing Sorghum Varieties in Moisture Stress Areas of Eastern Amhara
 24. Nutrition Sensitive Agriculture in Eastern Amhara
 25. The Contribution of Home Gardening to Food and Nutrition Security in five Districts of western Amhara
 26. Participatory Variety Selection of Haricot bean, Teff and Sorghum in selected Woredas of Southern Ethiopia
 27. Crowdsourcing Farmer's Preferences for Varieties and Traits of Sorghum in Ebinat Woreda

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28. Customized Agricultural Extension Services: A Showcase from Ethiopia
 29. Biophysical Aptitude and Socio-Economic Feasibility Analysis for Scaling of best Practices under Rain-fed Agriculture
 30. Tailor-made and Integrated Approach for Rural Youth Employment
 31. Determinants of Household Dietary Diversity in Productive Safety Net areas of west Amhara
 32. Assessment of Pro-Poor Financial Services in West Amhara
 33. Access to Weather Information in Reducing Shocks to ensure Food Security in Tigray Region
 34. Small-Scale Poultry Production for Youth Employment in eastern Amhara

f. Alerts

- Effect of COVID-19 on PSNP programme operations and its beneficiaries
- The Effect of COVID-19 On Agricultural Casual Labourers: A Case of Sesame Belt Migrants from Amhara And Tigray
- The Impact of COVID-19 On Agricultural Casual Labourers In PSNP Areas
- Effect of COVID-19 On Agricultural Inputs Availability and Supply

Appendix 3 Executive summary CaNaG

Increasing dietary diversity among women and children in rural Ethiopia through Nutrition Sensitive Agriculture

Anniek Elemans, Jennie van der Kolk, Katherine Pittore, Desalegn Haileyesus

Introduction

In Ethiopia, important improvements have been made in the fight against chronic malnutrition. From 2000 to 2019, the national prevalence of chronic malnutrition (stunting) in children under 5 years old has reduced from 58 to 37 percent. However, despite improvements that have been made, malnutrition is still highly prevalent and Ethiopia still has one of the highest levels of stunting in Africa (Ministry of Finance and UNICEF Ethiopia, 2019).

An important factor contributing to the high prevalence of malnutrition in Ethiopia is poor dietary diversity. In Ethiopia, only 12 percent of women are able to consume an adequately diverse diet, consuming food from at least 5 food groups each day (EPHI and ICF, 2019). When taking a closer look at the Ethiopian diet, we see that rural households have less diverse diets than urban households (EPHI and ICF, 2019), and women in all age groups are more affected by both food and micronutrient deficiency than men (Elezaj *et al.*, 2020).

Considering these dynamics and the fact that 79 percent of Ethiopians live in rural areas and are primarily engaged in farming and livestock rearing activities (World Bank, 2019), initiating and strengthening the agriculture sector and specifically nutrition sensitive agriculture (NSA) is critical. NSA is a food and nutrition-based approach to agricultural development that focuses on year-round availability, access and consumption of diverse, safe and nutritious foods of plant and animal source, and sustainable agricultural systems in order to overcome malnutrition and its consequences (Ministry of Agriculture, 2017).

In 2017, the Government of Ethiopia published the National Nutrition Sensitive Agriculture Strategy. The overall goal of the NSA strategy is to contribute to improving the nutritional status of children and women by increasing the quantity and quality of food available, accessible and affordable and promoting utilization of diverse, nutritious and safe foods for all Ethiopians at all times (Ministry of Agriculture, 2017).

The CANAG (CASCAPE Nutrition and Gender) project was initiated to support the Ethiopian Ministry of Agriculture and its Second Agricultural Growth Program (AGP2) with the implementation of its Nutrition Sensitive Agriculture efforts. The project was funded by the European Union through a World Bank-executed Multi-Donor Trust Fund and was implemented from May 2018 to May 2021.

The overall goal of the CANAG project was to increase the consumption of a diversified diet for women of reproductive age and their children. This was achieved by supporting households to produce and consume more diverse foods, and supporting women in those households with practical skills and technologies to take a more active role in making decisions in the household, especially decisions effecting food consumption for themselves and their children (see figure 1).

Figure 1 Conceptual model of pathways linking agriculture, gender and nutrition (adapted from Spring, March 2014).

Approach

The CANAG project was coordinated and technically supported by Wageningen University and Research, and implemented by teams at five Ethiopian partner universities: Addis Ababa, Bahir Dar, Hawassa, Jimma and Mekelle University Cluster. The project coordination unit and universities worked in close alignment and collaboration with various stakeholders, such as the Agricultural Growth Program 2 (AGP2) and the Food and Nutrition Coordination Office (FNCO) at the Ministry of Agriculture, the Bureau of Agriculture and various other government, non-governmental and private organizations, including the Woreda Health Office, the Woreda Women, Children & Youth Affairs Office, Melkassa Agriculture Research Center, the CDSF project by Agriteam, local seed suppliers and Village Savings and Loan Associations (VSLAs).

Together with AGP2, twelve woredas were selected in four regional states (Tigray, Amhara, Oromia, SNNP), so that various agro-ecologies were covered through the woreda sample. With the help of the woreda government offices, women in reproductive age and their children below two years old were selected as project beneficiaries.

The project sought to validate a number of different NSA technologies including those which increase household access to diverse foods such as home gardening, dairy goats and pullet production, technologies to reduce post-harvest losses including pot-in-pot cooling facilities, and technologies to reduce women's workloads such as fuel efficient stoves, water transport carts and potato diggers. The various technologies were distributed to women in both female and male headed households. The introduction of technologies was accompanied with various capacity development interventions (for instance on-site training on home garden management by Development Agents) and social and behaviour change communication interventions (for instance cooking demonstrations, experience sharing visits, radio campaigns and community workshops).

After a period of time using the technology, data was gathered about the women's experience of using the technology, including questions about how it impacted their workload as well as other questions to understand the economic, social and environmental sustainability of the technology. Based on this data, manuals were developed for the promising technologies. These manuals were given to woreda agricultural officers to support other farming households in adopting NSA technologies.

The CANAG project, in addition to understanding the benefits and potential challenges of introducing various NSA technologies, was also interested in understanding if and how these technologies were able to improve the diets of women and young children. For this purpose, mothers' and children's dietary diversity data was collected at baseline and endline to identify any changes over the course of the project.

Finally, the project looked at factors influencing the wider adoption of NSA technologies, such as intra-household dynamics and access to vegetable seed. The intra-household dynamics pilot study aimed to increase the reflective capacity of household and community members in relation to women's and men's contribution to food production, processing and consumption. Through this process the participants could identify what is needed to improve the food value chain at household and community level. The seed system study aimed to identify challenges and opportunities in the Ethiopian vegetable seed system as a means to improve farmers' access to affordable and quality vegetable seed.

Results

The next paragraphs present the most important evidence generated by the CANAG project.

Vegetable home gardens

Home gardens, or small scale production of nutrient dense vegetables and fruits for own consumption, is one of the most common ways for households to increase access to nutrient dense vegetables and fruits. By providing training on management, seed access, pest control and water management of home gardens, combined with nutrition education and training, the project was able to increase diet diversity of project participants. More than 90% of the women beneficiaries, supported by their husbands, would continue with the home garden in both the dry and the rainy season, without project support. The

home gardens were also shown to be economically viable, with beneficiaries earning at least as much as they invested.

Dairy goats and sheep

Animal source foods are an important source of nutrients, especially for young children. In order to increase household access to animal source foods, the project piloted dairy goats. Female beneficiaries and their husbands were positive about this technology, and in general those who received animals were able to access necessary support services, including veterinary services. Monitoring the prevalence of disease as well as farmers' access to feed are important to ensure future scalability.

Pullets

One of the cheapest forms of animal source foods is eggs. In an earlier phase of the project, young chicks were distributed to beneficiaries, however many of these chicks died because farmers were not able to access the correct feed or adequate veterinary services. The CANAG project supported youth groups who raised young chicks and then distributed three month old pullets to beneficiaries. While beneficiaries were on the whole positive about the intervention, ensuring support to access feed and veterinary services remains important and is a necessary pre-condition before introducing pullets to farmers.

Post-harvest technologies

When fewer (nutrient-rich) foods get wasted due to proper storage, more remains available for consumption in the household. Moreover, food that is left-over, if stored appropriately, can be sold to generate additional income for the households. In the CANAG project, two technologies were piloted to increase the length of time foods will last after they are harvested: pot-in-pot, a simple no-energy cooling technology which can be built using local technologies and uses evaporation to cool foods, and PICS bags, which are a type of storage bag which reduces infestations by insects and this increases food storage time. They can also be used to process some foods. These post-harvest technologies are easy to understand, save time and are manufactured locally. However, in some areas the pot-in-pot and the PICS bag are hard to find or completely unavailable if the participants want to buy it themselves. This would be a limitation for the scaling of these post-harvest technologies and requires efforts by the BoA in linking beneficiaries to suppliers.

Labour saving technologies

Labour saving technologies were introduced in the CANAG project as a way to reduce women's labour burden. We found that most of the tested labour saving technologies decreased this labour burden, however scalability remained a question due to challenges around cost of purchasing the technology, accessibility of the technology and knowledge and skills to fix and repair the technologies. Seasonality is important to consider when introducing a labour saving technology, as technologies are designed to reduce the labour burden during a specific time in the agricultural year.

Diet diversity

Analysis of the dietary diversity data revealed that the CANAG project was able to increase mothers' mean dietary diversity from 3.6 to 4.1 food groups, a difference which was found to be statistically significant. However, data collected from the children of these mothers (aged 6 to 24 months) did not find an increase in dietary diversity, suggesting that additional support is needed to translate household improvements in access to nutritious foods to changes in the diets of young children.

Intra-household dynamics

In order to support women's decision making a tool to support intra-household decision making was piloted. Households participating in this study started by expressing a general satisfaction on the existing resources sharing, access and control over resources in their households. However, upon reflection on the implications of women's limited decision making in the home, they expressed a willingness to work towards equal access to and control over the household's resources in order to strengthen food production and nutritional well-being of the family. This includes a commitment to address the barriers that women face such as lack of access to information, lack of equal access and opportunities,

cultural practices, and embedded traditional gender roles in the society. Some commitments to change include awareness creation training focusing on household gender equality, connecting women with credit and saving institutions, empowering women through asset building interventions, and promoting equal access opportunities.

Seed system

Good quality seeds are essential for home gardening, because good seeds can reduce problems with pests and diseases and can increase yield. During the project we faced difficulty in accessing good quality seeds. In many places farmers had to travel long distances to access vegetable seeds and they were only available in large packages, making them hard for farmers to afford. For scaling up home gardens, improvements to the vegetable seed system are necessary. One short term solution is the introduction of micro-packaging and distribution of seeds by cooperatives. In the medium to long term, farmers' domestic production of vegetable seeds can be supported. In order to support increased domestic production of vegetable seeds, a number of factors need to be in place including strengthened vegetable seed regulatory frameworks, improved quality control mechanisms and certification schemes and strengthening the capacity of existing seed producer companies.

Conclusions and recommendations

CANAG has shown that an integrated set of interventions, focusing on the production of diverse and nutritious food, nutrition education and women empowerment, can improve the diet diversity among women. During the period of the project (mid 2018 – end of 2020), we reached more than 60,000 direct beneficiaries and almost 240,000 indirect beneficiaries. This shows that with limited budget and comparatively little time a high number of beneficiaries can be reached and supported in adopting nutrition sensitive agricultural strategies. As said, we have seen that this translates into improvements in diets of women. However, household improvements in access to nutritious foods did not translate to improvements in the diets of young children.

It is essential that this positive movement and evidence do not get lost and efforts to improve nutritional status among women and children are being continued.

Consequently, we would like to suggest the following recommendations for AGP2 and FNCO at the Ethiopian Ministry of Agriculture:

- Many CANAG beneficiaries indicated they are planning to continue working with the introduced technologies. However, beneficiaries require longer term support by the agriculture and health extension system if they want to successfully continue and expand NSA, for instance on accessing good quality and affordable seed, improving crop and animal health, and getting the support of more family members, to name a few.
- To further improve dietary diversity among rural households, we recommend to continue and scale out the implementation of an integrated set of NSA interventions, encompassing technologies to increase the production of diverse foods, to increase produce's shelf-life, and to reduce women's labor burden.
- Dietary diversity of children and child feeding practices need to be given more attention through SBCC strategies, as improvements in dietary diversity were less for children than for their mothers.
- One of the major constraints related to the CANAG home gardens was access to water. Therefore, attention should be paid to the introduction and scaling of small and micro scale water harvesting and irrigation technologies. Also, the introduction of drought resistant vegetables is important. Amaranths is a promising vegetable because of its drought resistance.

- Many home gardens suffered from pests and diseases. Our home garden manuals include elaborate advice on integrated pest and disease management solutions, but continued efforts are needed to make sure that beneficiaries receive practical and frequent support by agricultural extension staff on this matter.
- Investments in access to feed and veterinary services will contribute to the scalability of the introduced pullets and dairy goat technologies.
- Introducing post-harvest and labor saving technologies together with NSA production technologies such as vegetable home gardens can allow for prolonged availability of nutrient dense foods, increase women's time for other activities, and improve the diversity of her and her family's diet. Access to such technologies can be improved by organizing interested beneficiaries in groups or working with existing groups, facilitating access to (in)formal credit and linking groups to suppliers. Local governments can increase the availability of the technologies by training for instance youth groups to manufacture and sell these technologies.
- Gender transformative agricultural and nutrition approaches need to support women's ability to make decisions about (1) agricultural production in the home gardens and farms; (2) household nutrition; (3) access to, and control over resources that will allow her to strengthen production and nutritional intake both for herself and her family; (4) control and use of income; (5) access to and control of opportunities; and (6) reducing workload and control over her own time. There is need for increased awareness on these elements of women participation and their contribution to agricultural production. Therefore, we recommend local governments including the Woreda Agriculture Office, the Woreda Health Office and Woreda Women, Children and Youth Affairs Office to streamline their gender equality related efforts.
- The vegetable seed system is an important bottle neck in the scaling of home gardens at this moment and needs attention from the national government. Bulk purchasing of imported vegetable seed by cooperatives may be an effective short-term solution, whereas in the medium or longer term more work could be done by the research extension system to develop varieties that are suited to the unique agro-ecological conditions in Ethiopia. Improving the regulatory framework, while of course important, is more of a longer-term solution.

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More information

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Appendix 4 List of abbreviations and acronyms

AGP	Agricultural Growth Program
AMU	Arba Minch University
ARARI	Amhara Regional Agricultural Research Institute
AST	Agricultural Systems Transformation
ATA	Agricultural Transformation Agency
AU	Arsi University
BDU	Bahir Dar University
BENEFIT	Bilateral Ethio-Netherlands Effort for Food Security; Income and Trade
BFP	Best fit Practices
BoA	Bureau of Agriculture
CaNaG	CASCADE Nutrition and Gender
CASCADE	Capacity building for Scaling up of evidence based Practices in agricultural production in Ethiopia
CSA	Central Statistical Agency
DA	Development Agent
DFID	Department for International Development
DLS	Diffused Light Storage
ECX	Ethiopian Commodity Exchange
EGS	Early Generation Seed
EHPEA	Ethiopian Horticulture Producers Exports Association
EIAR	Ethiopian Institute of Agricultural Research
EKN	Embassy of the Kingdom of the Netherlands
ESA	Ethiopian Seed Association
FGMs	Food Gap Months
GTP	Growth and Transformation Plan
HLIs	Higher Learning Institutes
HrU	Haremaya University
HwU	Hawassa University
IRM	Innovation Recommendation Mapping
ISRIC	International Soil Reference and Information Centre
ISSD Ethiopia	Integrated Seed Sector Development in Ethiopia
M&E	Monitoring and Evaluation
MFI	Micro Finance Institute
MoA	Ministry of Agriculture
MU	Mekelle University
NARS	National Agricultural Research System
NGO	Non-Governmental Organization
NSA	Nutrition Sensitive Agriculture
OARI	Oromia Agricultural Research Institute
OBU	Oda Bultum University
PCU	Partnership Coordination Unit
PIM	Project Implementation Manual
PMU	Project Management Unit
PSNP	Productive Safety Net Program
RARI	Regional Agricultural Research Institute
REALISE	Realising Sustainable Agricultural Livelihood Security in Ethiopia
RED&FS	Rural Economic Development & Food Security
RSE	Regional Seed Enterprise
RUSACCO	Rural saving and credit cooperatives
SARI	South Agricultural Research Institute
SBCC	Social and Behaviour Change Communication
SBN	Sesame Business Network
SIMD	Soil Information and Mapping Directorate
SMEs	Small and Medium Enterprises
SNNP	Southern Nations Nationalities and People
SNNPR	Southern Nations Nationalities and Peoples Region

TA	Technical Assistance
TARI	Tigray Agricultural Research Institute
TC	Technical Committee
TLU	Tropical Livestock Unit
TOT	Training of Trainers
UN	United Nations
WCDI	Wageningen Centre for Development Innovation
WoA	Woreda Office of Agriculture
WU	Woldia University
WUR	Wageningen University and Research

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the potential
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