Food and Agriculture Organization of the United Nations

Production choices and nutrition related implications in Ethiopia

Baseline report on the Improved Nutrition through Integrated Basic Social Services with Social Cash Transfer (IN SCT) Pilot Programme

unicef for every child

Production choices and nutrition related implications in Ethiopia

Baseline report on the Improved Nutrition through Integrated Basic Social Services with Social Cash Transfer (IN SCT) Pilot Programme

Ervin Prifti, Silvio Daidone and Alejandro Grinspun

Food and Agriculture Organization of the United Nations (FAO)

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 2018

ISBN 978-92-5-130398-6

Contents

Acknowledgements

The corresponding author of this report is Ervin Prifti. Contact information: ervin.prifti@fao.org, tel. +390655938.

Apart from the main authors listed above, Noemi Pace and Maria Angelita Ruvalcaba from the Social Protection team based in the Social Policies and Rural Institutions Division (ESP) at FAO contributed to this report, providing useful comments.

We are grateful for constant advice and collaboration from Lisa-Marie Ouedraogo, Vincenzo Vinci and Remy Pigois at the United Nations Childrens' Fund. Finally, we would like to thank: the Government of Ethiopia for permitting us to undertake this research and granting access to the data; staff at the International Food Policy Research Institute for their invaluable input and generosity with their time in helping with the management, the interpretation and the analysis of the data used in this paper. All errors included in the report are the sole responsibility of the authors.

Abbreviations

ANOVA	Analysis of Variance
CT	Cash Transfer
EA	Enumeration Area
EC	Ethiopian Calendar
FAO	Food and Agriculture Organization of the United Nations
GoE	Government of Ethiopia
ha	Hectares
HH	Household
IDS	Institute of Development Studies
IFPRI	International Food Policy Research Institute
IN-SCT	Improved Nutrition through Integrated Basic Social Services with Social Cash Transfer
MOLSA	Ministry of Labour and Social Affairs
PDS	Permanent Direct Support
PLW	Pregnant and Lactating Women
PSNP	Productive Safety Net Programme
PW	Public Works
SCT	Social Cash Transfer
SCTPP	Social Cash Transfer Pilot Programme
SNNP	Southern Nations, Nationalities and People's region
TDS	Temporary Direct Support
UNICEF	United Nations Children's Fund
USD	United States Dollar

Executive summary

The **Improved Nutrition through Integrated Basic Social Services with Social Cash Transfer (IN-SCT)** is a three-year pilot programme implemented by the Government of Ethiopia, with funding from UNICEF and Irish Aid. The programme started in the end of 2015 and currently covers two districts (*woredas*) in each of the following regions: Oromia and the Southern Nations, Nationalities, and Peoples' Region (SNNP). The IN-SCT is an integral part of the **Productive Safety Net Programme (PSNP) in the latter's fourth phase (2015-2018)**. The IN-SCT programme aims to enhance access to social services by fostering co-responsibilities for two groups of PNSP clients: Permanent Direct Support clients, receiving 12 months of transfers per year; and Temporary Direct Support clients, Public Works clients who are temporarily transitioning to the Direct Support components, based on certain circumstances, such as being pregnant or lactating or being a caretaker of a malnourished child, and are receiving six months of cash transfers with soft conditionalities. The IN-SCT programme expands the PSNP4 by offering an integrated package of multi-sectoral nutrition services. In SNNP, the programme supports the nutrition-sensitive interventions under PSNP and also undertakes activities to improve the quality of health services offered. In Oromia, a less intensive version of the IN-SCT programme is being implemented.

This report aims to show how production choices are linked to nutrition and consumption behaviour. To do so, we first provide a snapshot of the rural livelihoods in the SNNP region by focusing on outcomes that allow us to gauge the economic and productive impacts of the IN-SCT, including agricultural production and other income-generating activities, labour supply, the accumulation of productive assets and access to credit and transfers. We then link some of these outcomes to indicators such as food consumption and household dietary diversity and study their patterns across the outcome distributions. We provide descriptive statistics from the baseline household survey conducted for the evaluation of the IN-SCT Pilot Programme in SNNP region. A baseline survey for the impact evaluation, including both quantitative and qualitative components, was conducted April–May 2016 in both SNNP and Oromia regions, though the sample for Oromia has not been included in the study, given the lack of a comparison group and the absence of nutrition-sensitive agricultural interventions.

The general framework for **empirical analysis** consists of an ANOVA F-test to compare the sample means across all treatment arms and pairwise t-tests to compare the treated arm with each of the control arms. Comparisons of variables across treatment arms based on participation in the IN-SCT/PSNP (T), PSNP (C2) or neither (C1), help to inform the degree of comparability of the household samples for important determinants of outcome indicators. The empirical analysis is based on two samples drawn from the SNNP region: one that covers households with pregnant and lactating women or with children under two (SNNP1 sample) and another that covers households with children under five (SNNP2 sample).

On the **farm input** aspect we look at the fixed and variable input endowments of the farm-households. Starting with land, households in the SNNP1 sample operate around 2 ha of **land**, twice as much as their fellow villagers in the SNNP2 sample. Generally, land is evenly distributed across treatment arms in both samples.

Overall, the share of households in the SNNP1 and the SNNP2 samples that raise/herd any **livestock** is 69 percent and 66 percent respectively. The average number of Tropical Livestock Units (TLU) is below one in both samples, indicating that herd size is generally small. The most common animals are cattle, as households own on average at least one animal in this category. The herd size is unequally distributed across treatment arms. This is driven mostly by differences between the treated group (T) and the first control group (C1), as herd size is consistently higher in the latter.

Surveyed households appear poorly equipped with respect to **assets and agricultural tools**. Only half of the households own any plow components or a *maresha*, a local version of an animal-powered plough. Ownership of agricultural tools is unevenly distributed across the three treatment arms. **Durable goods** are mostly an indicator of wealth and higher quality of life. In both samples, only one-third of households has a bed in the house and one-fifth owns a table. Cell phones have almost the same diffusion as beds, being owned by one-third of the households.

Our data shows evidence of a poorly developed **credit market**. Overall, access to production loans is low, as only eight percent of the sample had access to such loans, regardless of the sample. Access to consumption loans is more common: around one in every five households declares to have used this type of credit. The variables related to credit use are generally unbalanced across the three treatment arms.

On the **production side** we look at crops, livestock by-products, non-farm enterprises and paid labour. Almost all households cultivate some land during the year, either in the short or in the long season. Agriculture takes place mostly in the long season, during which around 90 percent of households do some farming, as compared to only 24 percent in the short season. The most widely spread crop is **maize:** around 80 percent of households grow it, followed by other cereals such as teff (26 percent), sorghum (19 percent) and wheat (17 percent). On average, households produce 254 kg of maize during the year in the SNNP1 sample and 226 kg in the SNNP2 sample. For some crops the F-test rejects the null hypothesis of equal means across the three treatment arms. What drives the imbalances appears to be a higher production in the group of non-clients (C1), which is almost twice as high as in the joint treatment group (T).

We also analyse the degree of **market participation** by looking at the share of households that sell part of their produce. Overall, we find a low degree of market involvement as only one out of five households sells any produce, in both samples. The most sold commodity is teff. Sales variables are unbalanced across treatment arms too.

The share of households that engage in the **production of livestock by-products** is low. The most common of these are eggs and milk. Almost 10 percent of households produce eggs and four percent produce milk. The three treatment arms are engaged, to differing degrees, in livestock by-products.

In both SNNP1 and SNNP2 samples, a small proportion of households run a **non-farm business** (four and three percent, respectively). In both samples, households in the control groups C1 and C2 are more engaged in non-farm business activities than households in the treatment group.

We look at the **supply of paid labour** both for the whole household as well as for children aged under15. In the SNNP1 sample, almost 4 percent of the households have at least one member engaged in paid labour in the non-agricultural sector and 13 percent in the agricultural sector. In the SNNP2 sample, households seem slightly less involved in agricultural (9 percent) and non-agricultural (3 percent) paid labour. Agricultural paid labour supply is generally unevenly distributed across the three treatment arms. Child labour is almost absent in our sample.

Overall, variables appear unbalanced across the three treatment arms in both samples. This is because the pure control group (C1) seems better endowed with production factors relative to the other two treatment arms. C1 also performs better in terms of farm production and other income-generating activities. This circumstance implies the need to properly control for these baseline differences when estimating the impacts of the programme, be it with a Propensity Score Matching (PSM) or a Difference-in-Difference approach.

Irrespective of the treatment arm, the vulnerable rural households included in the survey have low levels of endowments, with 2 ha of cultivated land on average and few small agricultural implements, limited access to credit or markets (with only 20 percent households engaged in crop markets), limited crop diversification (2.5 crops grown), low productivity (less than one tonne of maize per hectare of land) and involvement in non-farm activities. At first glance, it would seem very difficult for these households to break off from poverty traps and achieve food security, let alone self-sufficiency. This, in fact, is corroborated by further analysis in which we show that the more land households operate, the greater number of livestock they own and quantity of crops they produce, the more diversified their diet is. Those in the bottom two quintiles of the land and livestock distribution clearly have insufficient productive resources to protect them from shocks, to ensure an adequate diet and enable them to build pathways out of poverty.

1. Introduction

In 2005, the Government of Ethiopia set up the Productive Safety Net Programme (PSNP) as part of a strategy to address chronic and transitory food insecurity in the country. Since its start, the PNSP has been Ethiopia's main rural safety net for food insecure households. The programme provides cash and/or food transfers to chronically and transitorily food insecure households in the following regions: Afar, Amhara, Dire Dawa, Harari, Oromiya, SNNP, Somali and Tigray.

During its initial phases (Phase 1 and 2, spanning from 2005–2009 and 2009–2011, respectively), the PSNP provided cash or food to people with predictable food needs to enable them to improve their livelihoods and become more resilient to shocks in the future. In phase 3 (2011–2015), the PSNP expanded its coverage and succeeded in improving both the timeliness of cash transfers and the quality of public works. Phase 3 also saw an increasing shift from food to cash transfers. PSNP4, launched in 2015, has the goal of enhancing resilience to shocks and improving livelihoods, food security and nutrition for rural households vulnerable to chronic or recurrent food shocks (World Bank, 2010). This new, fourth phase of the PSNP reaches about eight million beneficiaries nationwide and responds to the Social Protection Policy, validated in 2014, by including a series of of new programme elements which aim to provide a a transition towards a system of integrated service delivery in social protection and disaster risk management (Schubert, 2015).

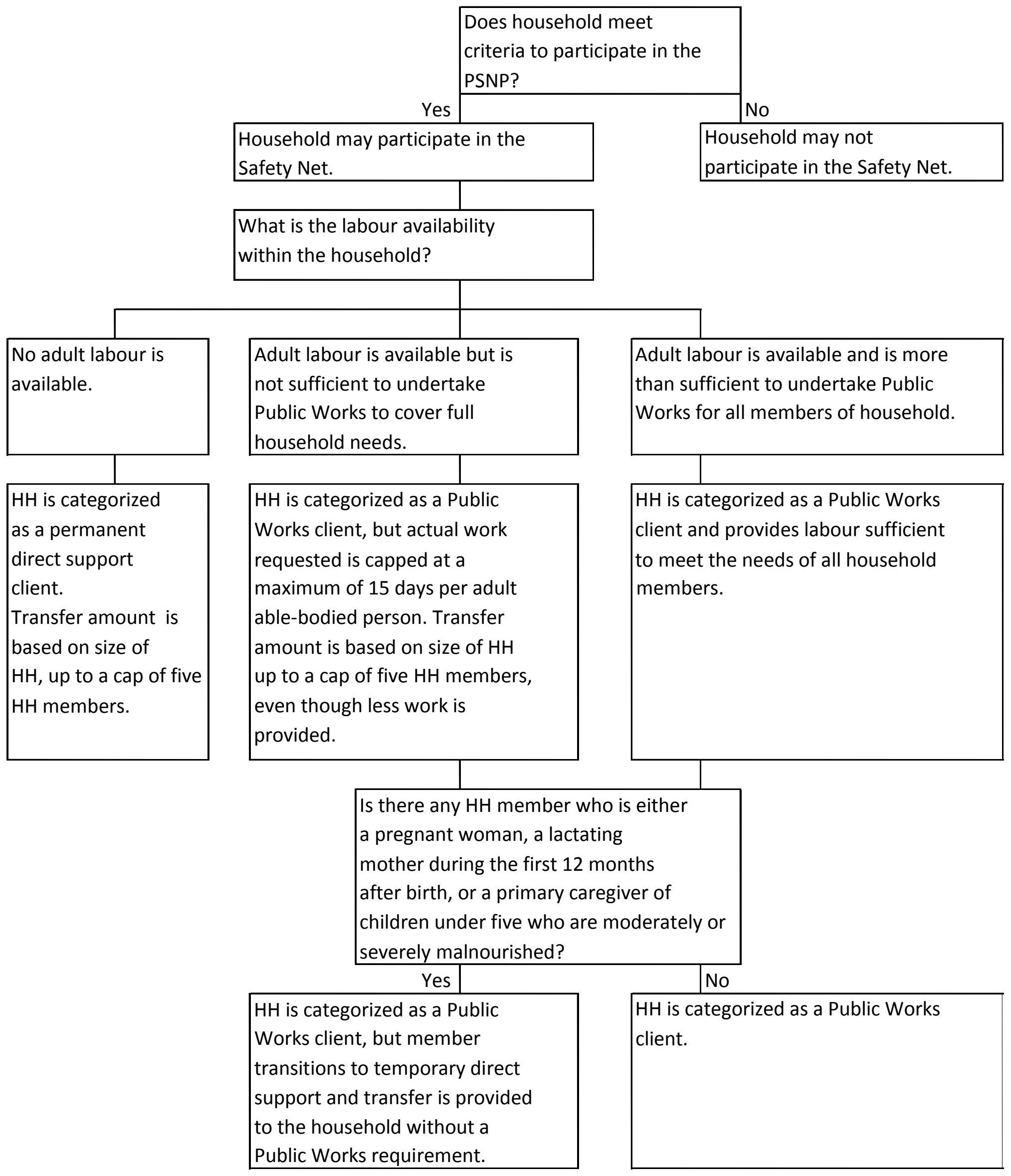
In the current phase of PSNP4, households that have able-bodied adult labour engage in public works (PW) and receive transfers for six months of the year. Public Works (PW) focus on integrated community-based watershed development, covering activities such as soil and water conservation measures and the development of community assets such as roads, water infrastructure, schools and clinics. The objective of these works is to contribute to livelihoods, disaster risk management and climate resilience, and nutrition. Households without labour capacity are recipients of permanent income support. Permanent direct support (PDS) clients receive 12 months of unconditional transfers and are linked with social protection services. In turn, "pregnant women and lactating mothers and primary care-givers of malnourished children must not participate in public works but are still eligible for the public works and links to social services component" (Ministry of Agriculture of Ethiopia, 2014). Within this component, PW clients are designated to Temporary Direct Support (TDS) clients. The TDS consists of six months of unconditional cash transfers per household without a public works requirement. Soft conditionalities link TDS clients to existing health and nutrition services with a general focus on maternal, newborn and child health services. From pregnancy until the child turns one year old, PSNP clients are expected to comply with certain co-responsibilities, which are intended to improve their health and nutrition status as well as their child's well-being. Finally, clients are supposed to remain in the PSNP for a number of years until they reach the graduation threshold.[1] However, due to the recurrent drought as well as continuous challenges presented by the Graduation Prediction System, this graduation component of the PSNP is currently not being implemented.[2] Figure 1 provides a visual representation of the correspondence between labour availability and households' participation into the various safety net components of PSNP4 (PW, PDS and TDS), while Table 1 summarizes the eligibility criteria for each component (Ministry of Agriculture of Ethiopia, 2014).[3]

[1] Households whose food security status has improved sufficiently that they no longer need transfers are expected to graduate from the programme. The key criteria for graduation is that "households achieve food sufficiency in the absence of external support". Both targeting and graduation use a combination of administrative and community targeting.

[2] In practice, clients are re-targeted each year for PW, while PDS clients receive support throughout the year and usually the same households would be re-targeted because ofo the absence of graduation at the time.

[3] For a more detailed explanation of the PSNP4, the reader is referred to the official Productive Safety Net Programme Phase IV, Programme Implementation Manual (Ministry of Agriculture of Ethiopia, 2014).

Figure 1: **Labour availability and households' participation in PSNP safety net components**



Source: Adapted from Ministry of Agriculture of Ethiopia (2014).

Table 1: Households' eligibility criteria for PSNP4 components

Permanent direct support component:	• community member; • chronically food insecure – have faced continuous food shortages (food gaps of three months or more per year) in the last three years; • those who have become suddenly food insecure as a result of a severe loss of assets (financial, livestock, means of production), especially if linked to the onset of severe chronic illness, such as AIDS; • no adequate family support or other means of social protection and support; • no adult able-bodied labour provider.
Public works and temporary direct support component:	• community member; • chronically food insecure – have faced continuous food shortages (food gaps of three months or more per year) in the last three years; • those who have become suddenly food insecure as a result of a severe loss of assets (financial, livestock, means of production), especially if linked to the onset of severe chronic illness, such as AIDS; • No adequate family support or other means of social protection and support; • with at least one adult member able to participate in Public Works.

While the PSNP is expected to make a substantial contribution to the goal of enhancing resilience to shocks and improving livelihoods, food security and nutrition, achieving this goal requires support from other interventions as well as a more general enabling environment ranging from basic infrastructure, taxation, rule of law and the like. This is why the Government of Ethiopia has adopted a more holistic vision and decided to integrate the PSNP by piloting the Improved Nutrition through Integrated Basic Social Services with Social Cash Transfer (IN-SCT) Pilot Programme with the following objectives:

1. Contribute to reduction of poverty and undernutrition of food insecure households.
2. Increase access to basic social services, with a focus on health and nutrition services.
3. Generate information on the feasibility, cost-effectiveness and impact of multisectoral interventions administered by the Ministry of Labour and Social Affairs (MoLSA) and integrated into the PSNP4.

Under the umbrella of the PSNP4, the programme builds largely on the successes seen, and the lessons learned, during the previous phases of the PSNP and includes a number of innovations, following largely operational reccomendations drawn from the Tigray Social Cash Transfer Pilot Programme (SCTPP):

a. Multisectoral collaboration and coordination platforms to support a systems approach are established and strengthened between the Ministry of Agriculture, Health and Labour and Social Affairs at regional, *woreda* and *kebele* levels and within the PSNP donor working group.
b. Linkages between IN-SCT clients and social services and case management are facilitated by several instruments such as the establishment and capacity building of Community Based Social Protection Committees in all *kebeles*, the deployment and training of social workers, and the set-up of a Management Information System as a case management tool.
c. A wide array of nutrition-sensitive interventions are adopted to address the the deep root causes of stunting and malnutrition, such as: increased targeting of food insecure and vulnerable households (with pregnant and lactating women, and malnourished children); expansion of programme coverage and duration during shocks; mobilization of the communities to identify and plan nutrition-sensitive Public Works (latrine construction, health posts construction, etc.); promotion of childcare centres at Public Works sites; support to nutrition-sensitive income generating activities (e.g. milk centres); improved caring practices and health seeking behaviour. Access to social services is enhanced through co-responsibilities for two groups of PNSP4 clients: PDS clients, receiving 12 months of transfers per year, and TDS clients, which includes pregnant and lactating women and caregivers of malnourished children, who are usually part of the PW component, but which transition to the Direct Support during these special life circumstances.[4] Co-responsibilities for TDS clients vary depending on the reason for which households are seeking support: a) pregnant women are expected to attend four antenatal care visits and attend behavioural change communication (BCC) sessions as informed by the Health Extension Worker (HEW); b) lactating women with a child aged under one year have to attend one post-partum health facility visit, attend growth-monitoring-promotion or BCC sessions and provide uptake of routine immunisation on behalf of the child as informed by the HEW; 3) caregivers of malnourished children have to attend BCC sessions provided by HEWs or the health development army as informed by the HEW, bring their child to the closest health facility for monthly check-ups and participate in treatment (e.g. community management of acute malnutrition or targeted supplementary feeding) as advised.
d. Gender equity is strengthened by ensuring special provisions for women during PW, such as a 50 percent reduction in time spent in physical PW for women and transfer from PW

[4] In the PSNP4 implementation manual, co-responsibilities are also defined as "soft-conditionalities", pointing out that the household is informed that basic monitoring on their responsibilities is undertaken, although no penalties are enforced. For PW clients, failure to fulfil Public Works requirements, or to participate in Public Works substitutes such as community-based training sessions, will result in client households being penalized through deductions from their transfer.

to direct support for pregnant and lactating women from the date of their first antenatal care appointment up to one year post-partum.

e. E-payments are scaled up to deliver the cash transfer, providing a great number of benefits such as: proximity and cost reduction for clients; financial inclusion; easier monitoring and better auditability; and secure and theft-free technology.

Using both the same beneficiary lists as well as the same benefit level as the PSNP4, the Government of Ethiopia is piloting the IN-SCT programme in the SNNP and Oromia regions, with funding from UNICEF and Irish Aid. The pilot in the SNNP region supports also nutrition-sensitive agricultural interventions such as the rehabilitation of existing Farmer Training Centres (FCTs), the establishment of nutrition clubs at schools and of school gardens. These interventions are implemented by Concern Worldwide. The two *woredas* of SNNP in which the pilot is implemented are Halaba Special and Shashego (Figure 2: Regions of Ethiopia). [5] In the Oromia region, a less intensive version of the IN-SCT programme is being implemented in the *woredas* of Dodota and Adami Tulu (Devereux et al., 2016b). The selection of the *woredas* was carried out by the respective Agency of Labour and Social Affairs (ALSAs) in collaboration with MOLSA and UNICEF. Selection criteria were the following: i) coverage of the respective *woreda* by PSNP and sufficient capacity of the respective *woreda* Offices of Labour and Social Affairs; ii) within each of these PSNP *woredas*, the SCT pilot will focus its interventions in the PSNP *kebeles*. Currently, IN-SCT targets 9 750 children under one year of age in food insecure households, 30-000 adolescent girls and 12 000 pregnant and lactating women.

Figure 2: Regions of Ethiopia

[5] Administrative units of Ethiopia are organized in four levels: regions, zones, *woredas* (districts) and *kebeles*. *Kebeles* are neighbourhood associations, and are the smallest unit of local government in Ethiopia.

Previously to the IN-SCT, one SCT pilot was implemented by Tigray's Bureau of Labour and Social Affairs (BoLSA) with technical support from UNICEF and financial support from Irish Aid in two *woredas* of the Tigray region from 2011–2014. The pilot, known as the Tigray Social Cash Transfer Pilot Programme (SCTPP), has been subject to a rigorous impact evaluation by the International Food Policy Research Institute (IFPRI) and the Food and Agriculture Organization of the United Nations (FAO). This Impact Evaluation of the Tigray pilot scheme revealed that the programme had a remarkable effect in reducing food insecurity, increasing dietary diversity and social capital, while impacts on school outcomes, nutrition and economic activities were modest (Behrane et al., 2015; Asfaw et al., 2016). These results were corroborated by qualitative evidence showing: 1) that the size of the transfer was too small to generate detectable effects in many domains, so that the SCTPP ended up playing a protective rather than a transformative role; and 2) a lack of statistical power (i.e. an insufficient number of observations to detect impacts) rather than an actual absence of impact. In other terms, some impacts may have been missed because the sample size was somehow insufficient to detect them.[6]

The IN-SCT programme's evaluation aims to provide lessons on linking clients with basic services, with a focus on nutrition, and at enhancing the role of social workers in managing co-responsibilities of PDS and TDS clients. IFPRI, the Institute of Development Studies (IDS) at University of Sussex and Cornell University are the institutions responsible for conducting this impact evaluation of the IN-SCT programme focusing mainly on outcomes related to food security, hygiene, access to health, nutritional status, knowledge and practices. Under this framework, they carried out a quantitative baseline survey from April to May 2016. FAO contributed to this evaluation, focusing on outcomes that allow for an estimation of the economic and productive impacts of the IN-SCT, including agricultural production and other income-generating activities, labour supply, the accumulation of productive assets, access to credit, etc. In this baseline report we provide a snapshot of the rural livelihoods in the SNNP region selected for the IN-SCT impact evaluation, describing summary statistics for key selected variables and a comparison of the treatment and comparison groups from the baseline survey. We then link production choices to nutrition and consumption behaviour in the sample, and discuss their implications from a programming/policy point of view. A brief overview of the study design and of the sampling methods are also reported, whereas for a more detailed account of these aspects we refer the reader to the Baseline Report (Devereux et al., 2016b) and the study Inception Report (Devereux et al., 2016a).

[6] Statistical significance is the probability that the observed difference between two groups is the result of chance. With a sufficiently large sample, a statistical test will almost always demonstrate a significant difference, unless there is no effect whatsoever; yet very small differences, even if significant, are often meaningless. Thus, for readers to fully understand the results of an analysis, it is important to report both the effect size and the significant p-value. In the IN-SCT evaluation, as compared to the Tigray SCTPP evaluation, it might be even more difficult to find impacts, because of an additional degree of complexity represented by the number of treatment arms (one treatment and two comparisons groups). Power calculations provided in the baseline report (Devereux et al., 2016b) show the extent to which we should expect an impact for one indicator. However, impact evaluations typically assess more than simply one indicator and in this study we will have three impacts per indicator (see Table 1). This suggests that the future impact analysis at follow-up is likely to be quite conservative.

2. Research design and IN-SCT sample

The quantitative data collection is based on a baseline household survey, conducted by IFPRI and IDS from April to May 2016. Follow-up household surveys will be conducted after 12 (qualitative) and 24 months (qualitative and quantitative). The objective of this rigorous Impact Evaluation is to quantify the overall impact of the joint implementation of IN-SCT *and* PSNP relative to a pure control group, of the incremental effect of the IN-SCT component with respect to a group of clients that receives only the PSNP, and of the PSNP alone relative to a pure control group. The sample design makes it possible to compare outcomes and characteristics between (i) clients of the combined IN-SCT and PSNP programmes, (ii) clients of the PSNP alone, (iii) and households not participating in either the IN-SCT or the PSNP. In addition, the sample of PSNP clients includes PW, PDS and TDS clients, while TDS clients are further disaggregated between pregnant women and those with children under age of two.

The baseline survey was conducted across six *woredas*: two in Oromia and four in SNNP. Using these *woredas* as sample strata, two-stage cluster sampling was conducted in which Enumeration Areas (EAs) were randomly sampled from within each *woreda*. The number of sampled EAs in SNNP was 48 in Shashego and Halaba, 32 EAs in Kedida Gamela and Analimo. In Oromia, 12 and 15 EAs were sampled in Dodota and Adami Tulu, respectively. In the second stage, households were randomly sampled from the household listing according to the sample strata for that EA, based on PSNP beneficiary status and household demographic status (pregnant or lactating women, child aged under five and child aged 6–23 months).

There are three distinct household survey samples, one in Oromia and two in the SNNP Region. The Oromia sample was collected with the purpose of conducting programme monitoring for PSNP and to undertake an operational assessment of the implementation of the programme. Because of a lack of a comparison group, and since the additional package of nutrition-sensitive agricultural interventions is only provided in SNNPR, the Oromia sample will not be presented in this report.

The SNNP1 (mother/child) sample includes 1 920 households. It is designed to provide the data to estimate the impact of the IN-SCT programme on pregnant and lactating women and on children aged 6–23 months in terms of health practices and nutrition knowledge. The sample is stratified along two dimensions:

- demographically:
  - pregnant and lactating women (576 households)
  - children aged 6–23 months (1 344 households)

- by beneficiary status:
  - Treatment (T): TDS IN-SCT clients (672 households)

- Control C1: non-clients of IN-SCT and PSNP in the same IN-SCT *kebeles* (672 households)[7]
- Control C2: PSNP clients in non-IN-SCT *woredas* (576)

The SNNP1 sample provides a useful structure for the impact analysis. The Treatment (T) and Control (C1) samples are used to estimate the average impact of the IN-SCT programme on temporary recipients of cash, relative to a counterfactual in which similarly poor households containing a pregnant or lactating woman or a child aged 6–23 months do not receive any components of the IN-SCT or PSNP programmes, or receive only some of the IN-SCT services. By comparing these two samples, we are able to quantify the *joint* impact of the IN-SCT and PSNP.

In turn, the Treatment and Control C2 samples will be used to estimate the average impact of the IN-SCT programme on temporary recipients of cash relative to TDS clients who did not receive the complementary nutrition services and interventions offered by the pilot. This analysis measures whether the IN-SCT programme had an incremental effect on outcomes for pregnant and lactating women and children aged 6–23 months, over and above any impacts of the six-monthly cash transfers provided by the TDS component of the PSNP programme itself.

Finally, the Control C1 and C2 samples are used to estimate the impact of the temporary cash support (TDS) provided by PSNP relative to a counterfactual of no programme for pregnant and lactating women and children aged 6–23 months. In this analysis, C2 is the TDS treatment, while C1 is the comparison group with no programme.

The SNNP2 (household) sample includes 1 200 households. It is designed to provide the data to estimate the impact of the IN-SCT programme on household level outcomes related to food security, programme participation and overall well-being. The sample selection criteria includes households with at least one child under five years of age. This sample is stratified by beneficiary status:

- Treatment: IN-SCT clients receiving support from the Public Works and Permanent Direct Support - PDS (540 households).

- Control C1: non-clients of IN-SCT and PSNP in the same IN-SCT *kebeles* (360 households).

- Control C2: Household benefiting from the PSNP (PW and PDS), which reside in non-IN-SCT *woredas* (300 households).

[7] Throughout the report, for both the SNNP1 and SNNP2 samples, we use the term 'non-clients' for households belonging to the first comparison group as a synonym for non-beneficiaries, in order to maintain the same notation used by Devereux et al. (2016a; 2016b). The households in the C1 group in both samples are comparable to their corresponding treatment groups in terms of demographic characteristics, but are not eligible for the IN-SCT because they lack one or more criteria required by the programme.

A visual summary description of samples collected for the evaluation of IN-SCT programme is provided in Table 2.

Table 2: **Description of sample and evaluation objectives**

Sample	Selection criteria	Treatment group	Comparison group	Type of impact	Caveats
SNNP1 (1 920 HH)	Households with PLW and children under two years of age	T	C1	IN-SCT	Possible spillovers to some C1 HHs receiving some of the IN-SCT services
		T	C2	IN-SCT on TDS clients	
		C2	C1	TDS	
SNNP2 (1 200 HH)	Households with at least one child under five years of age	T	C1	IN-SCT	Possible spillovers to some C1 HHs receiving some of the IN-SCT services
		T	C2	IN-SCT on PW and PDS clients	
		C2	C1	PW and PDS	

Note: T in SNNP1 are TDS IN-SCT clients. T in SNNP2 are IN-SCT clients receiving PW and PDS.

3. Descriptive analysis

3.1. Methodology

In order to check that the treated group is comparable with the two control groups in terms of observed characteristics that capture income-generating activities and labour supply in both SNNP1 and SNNP2 samples, we carry out one-way analysis of variance (ANOVA) for each variable. ANOVA is used to determine whether there are any statistically significant differences between the means of three or more independent groups, such as in the evaluation design of the IN-SCT programme. Specifically, it tests the null hypothesis:

4. $$H_0: \mu_T = \mu_{C1} = \mu_{C2} \qquad (1)$$

where μ_T, μ_{C1} and μ_{C2} are the group means for the treatment group, the first control group and the second control group respectively. ANOVA uses F-tests to statistically test the equality of means. The F statistics are based on the ratio of the between-groups variability (numerator) and the within-group variability (denominator). If the one-way ANOVA returns a statistically significant result, we accept the alternative hypothesis that there are at least two group means that are statistically significantly different from each other. One-way ANOVA is an omnibus test statistic, meaning that it cannot tell which specific groups were significantly different from each other statistically, but only that at least two groups were. To determine which specific groups differed from each other, we use *post hoc* pairwise comparisons to check which group is causing the *imbalance*. Establishing that treated and control groups are observationally equivalent at baseline allows the analyst to attribute to the programme (and not to pre-existing baseline differences) any differences in output or input use measured at follow-up. However, we are likely to observe many significant differences between the treatment and comparisons samples given the evaluation design of the IN-SCT programme, which is not based on a randomized assignment to the groups.

The tables with all of the descriptive statistics are organized as follows, from left to right. Under the column 'All' we provide the overall sample average. Under the columns 'T', 'C1' and 'C2' we report group means for the treatment group, the first comparison group (non-clients of IN-SCT and PSNP in the same IN-SCT *kebeles*) and the second comparison group (PSNP clients in non-IN-SCT *woredas*), respectively. In these first four columns we also report, in parenthesis, the p value associated with the null hypothesis that the mean is zero. Under the fifth and sixth columns we report the mean differences between T and C1 groups and between T and C2 groups respectively. For these two differences we report, in parenthesis, the p value of the null hypothesis that the two means are equal. Finally, the last column shows the p-value of an ANOVA F-test for the null hypothesis that the sample mean of a given variable is the same in all three treatment arms.

In this report we are faced with the issue of multiple comparisons. This issue arises when the same null hypothesis is tested for multiple outcomes or across multiple treatment arms. Classical hypothesis tests assess statistical significance by calculating the probability under a null hypothesis of obtaining estimates as large as, or larger than, the observed estimate. When multiple tests are conducted, however, classical p-values are incorrect – they no longer reflect the true probability under the null. A Type I error occurs when a researcher falsely concludes that an observed difference is 'real' when, in fact, there is no difference. The Type I error rate is usually set to 0.05. This means that the researcher is willing to commit a Type I error 5 percent of the time. But when we move to the world of multiple comparisons this simple testing framework is no longer sufficient. In the world of multiple testing, the Type I error rate is called Family-Wise Error Rate (FWER). The FWER is the probability of incorrectly rejecting even one null hypothesis in a sequence of hypotheses.[8] In order to control the FWER, we employ the Holm-Sidak correction (McDonald, 2008).[9]

3.2 Production inputs and assets

We start by describing the SNNP1 and SNNP2 samples in terms of the fixed and variable input endowments of the farm households. In particular, we present summary statistics for land, livestock, agricultural assets and tools, labour, durable assets and access to credit. Comparisons of input variables across sample strata by treatment status related to participation in the IN-SCT/PSNP (T), PSNP (C2) or neither (C1) help to inform the degree of comparability of the household samples for important determinants of outcome indicators.

Land

At baseline, most eligible households had cultivated or owned land in the past 12 months (92 percent). In Table 3 we provide the amount of operated land for both SNNP1 and SNNP2 samples, by treatment group. Overall, the SNNP1 sample households cultivate on average 2.1 ha of land, with some variation across groups, even though for the IN-SCT TDS clients (group T) the size of operated land is statistically the same with respect to the PSNP clients in non-IN-SCT *woredas* (C2 group) and the C1 group. In the SNNP2 sample the size of the land across the three groups is roughly half of that in the SNNP1 sample. This means that the SNNP1 sample of households is endowed with relatively more land, compared to the SNPP2 sample. This is not very surprising given that the SNNP1 sample includes PW clients that are only temporarily moving to TDS, while the SNNP2 sample is comprised of households that are probably worse off, because it includes PDS clients who are labour constrained. In the SNNP2 sample the size of operated land in the treated group is statistically different from the first control group. This explains why the ANOVA test for the equality of means across all three treatment arms rejects the null hypothesis.

---

[8] Suppose we have three null hypotheses, all of which are true. When the null hypothesis is true, but we nevertheless reject it in favour of some alternative, we commit a Type I error. If we set *alpha* (the Type I error rate) to be 0.05, we have a [$1-(1-0.05)^3=14.21-(1-0.05)^3=14.2$] chance of rejecting at least one of them.

[9] The procedure behind the Holm test is to first find all of the p-values for all of the individual tests we were performing and then rank them from smallest to largest. We compare the smallest to $\alpha=\alpha_T/k$ where α_T is the Type I error rate. If we fail to reject the null hypothesis for the first step, then we stop here. If we reject it, then we compare the next smallest to $\alpha=\alpha_T/(k-1)$. Again, we stop here if we fail to reject the null hypothesis; if we do reject it, we continue on and use $\alpha=\alpha_T/(k-2)$.

Table 3: Operated land in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
Operated land	2.11	3.81	1.76	0.46	2.05	3.35	0.82
	(0.14)	(0.47)	(0.06)	(0.00)	(0.75)	(0.65)	
SNNP2							
Operated land	1.04	1.38	1.02	0.37	0.36	1.01	0.03
	(0.00)	(0.00)	(0.00)	(0.00)	(0.60)	(0.03)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Livestock holdings

Livestock activities represent an important component of household livelihoods. Evidence from sub-Saharan Africa suggests that livestock is one of the assets where income from cash transfers is invested, especially poultry and small ruminants (Daidone et al., 2017). Overall, the share of households in the SNNP1 and the SNNP2 samples that raise/herd any livestock is 69 percent and 66 percent, respectively. Table 4 shows the average number of owned animals in terms of Tropical Livestock Units (TLU), by sample and treatment arm. The number of TLUs is below one in both samples. This aggregate indicator of livestock ownership is differently distributed across treatment arms in both samples, herd sizes in the first control group (C1) are higher relative to the other two groups. Members of the C1 group are non-clients who may not qualify for treatment and, therefore, may be better off relative to the T group that benefits from the incremented programme (IN-SCT and PSNP) and relative to the C2 group that benefits from the PSNP only. We also show the average herd size for four groups of animals; namely, cattle (oxen, bulls, cows, heifers and calves), small ruminants (sheep and goats), pack animals (horses, mules and donkeys) and poultry. The most common animals in both samples are cattle, with most households owing more than one animal in this category. The herd size is unequally distributed across treatment arms for all groups except for poultry. This is driven mostly by differences between the treated group (T) and the first control group (C1), as herd size is consistently higher in the latter. Unlike in the SNNP1 sample, households do not breed poultry in the SNNP2 sample. In order to have an indea of how our findings compare to those from a similar context, we compare the findings with those of the baseline report for the evaluation of Tigray's Social Cash Transfer Pilot Programme (SCTPP) . The programme was implemented in two *woredas* – Hintalo and Abi Adi. In Hintalo, the average number of small ruminants was 0.4 per household, while in Abi Adi each household had on average 0.7 small ruminants (Berhane et al., 2015).

Table 4: Livestock ownership in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
Any livestock (% HH)	0.69	0.63	0.82	0.63	-0.20	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	
TLU	0.74	0.53	1.25	0.41	-0.71	0.12	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	
# cattle	1.18	0.83	2.00	0.66	-1.17	0.17	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.05)	
# small ruminants	0.65	0.58	0.95	0.36	-0.37	0.22	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
# pack animals	0.20	0.13	0.35	0.10	-0.22	0.02	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.77)	
# poultry	0.85	1.04	0.95	0.52	0.08	0.52	0.40
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(0.13)	
SNNP2							
Any livestock (% HH)	0.66	0.62	0.79	0.59	-0.17	0.02	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.99)	
TLU	0.84	0.65	1.38	0.48	-0.73	0.17	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	
# cattle	1.32	0.99	2.18	0.81	-1.19	0.19	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.33)	
# small ruminants	0.75	0.73	1.11	0.29	-0.38	0.44	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
# pack animals	0.26	0.20	0.45	0.11	-0.26	0.09	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.03)	
# poultry	0.01	0.01	0.01	0.00	-0.00	0.01	1.00
	(0.59)	(0.90)	(0.78)	(0.00)	(1.00)	(0.97)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Agricultural assets and tools

Assets and agricultural tools are a crucial input in farm production. Previous research has shown that cash transfers have an important impact on this group of outcomes (Daidone et al., 2017). Table 5 reports the share of households owning a certain agricultural tool, by sample and treatment arm. Surveyed households appear poorly equipped with tools. Only half of the households own any plough components or a *maresha*, a local version of an animal-powered plough. Other instruments for plooughing soil, such as hoes and shovels, are owned only by one-third of the households. Sickles and axes are the most widely spread tools, as at least two out of three households own one. In general, the average number per household is below one for all tools, regardless of the sample. Ownership of agricultural tools is unevenly distributed across the three treatment arms since, for almost all variables, the F-test rejects the null hypothesis of equal means. The pairwise tests indicate that the imbalances stem from significant differences between the treated and both the first and the second control groups. In particular, the first control group made of non-clients (C1) is consistently better equipped with tools than the T group of the clients of the joint programmes (IN-SCT and PSNP), while the PSNP-only clients (C2) are less equipped relative to the T group. For the variables measuring the number of tools owned by each household we build an aggregate index through Principal Component Analysis (PCA), a method to reduce the dimensionality of data by synthesizing in one variable the information contained in many variables. The new index captures the variability of the original variables across households and is used to conduct a single test instead of testing each variable. The downside of this approach is that the index values have no concrete meaning. The F-test shows that the index is unevenly distributed across the treatment arms in both samples. In the baseline sample for the evaluation of Tigray's SCTPP, asset ownership appears lower than in our sample. In particular, almost 35 percent of the sample owns some plough components and 20 percent of the sample owns at least one hoe (Berhane et al., 2015).

Table 5: Number of tools in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
plough components	0.56	0.58	0.76	0.29	-0.19	0.29	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
5. *miran*	0.33	0.31	0.49	0.17	-0.18	0.14	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
6. *maresha*	0.54	0.55	0.75	0.28	-0.20	0.27	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
sickle	0.76	0.72	0.83	0.73	-0.11	-0.01	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	
axe	0.67	0.66	0.75	0.58	-0.09	0.08	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.04)	
hoe	0.39	0.37	0.41	0.38	-0.04	-0.01	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.97)	(1.00)	
shovel	0.32	0.31	0.41	0.23	-0.10	0.08	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	
wheelbarrow	0.21	0.23	0.28	0.12	-0.05	0.11	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.51)	(0.00)	
animal cart	0.01	0.00	0.01	0.00	-0.01	0.00	0.91
	(0.01)	(0.82)	(0.08)	(0.95)	(0.88)	(1.00)	
hand cart	0.02	0.01	0.04	0.01	-0.03	0.00	0.00
	(0.00)	(0.07)	(0.00)	(0.35)	(0.01)	(1.00)	
Ag asset index	-0.07	-0.11	0.45	-0.64	-0.56	0.53	0.00
	(0.12)	(0.12)	(0.00)	(0.00)	(0.00)	(0.00)	
SNNP2							
plough components	0.57	0.57	0.76	0.31	-0.20	0.26	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
miran	0.35	0.35	0.50	0.15	-0.15	0.21	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
maresha	0.55	0.55	0.75	0.29	-0.20	0.26	0.00

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
sickle	0.74	0.70	0.81	0.71	-0.10	-0.01	0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	
axe	0.72	0.72	0.80	0.60	-0.08	0.12	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.06)	(0.01)	
hoe	0.28	0.26	0.29	0.31	-0.03	-0.05	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(0.76)	
shovel	0.33	0.33	0.43	0.22	-0.10	0.11	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.01)	
wheelbarrow	0.31	0.36	0.39	0.09	-0.04	0.27	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.99)	(0.00)	
animal cart	0.00	0.00	0.01	0.00	-0.01	-0.00	1.00
	(0.37)	(1.00)	(0.82)	(1.00)	(0.91)	(1.00)	
hand cart	0.02	0.01	0.06	0.01	-0.06	-0.00	0.00
	(0.00)	(0.75)	(0.00)	(0.94)	(0.00)	(1.00)	
Ag asset index	0.12	0.21	0.52	-0.63	-0.31	0.84	0.00
	(0.99)	(0.99)	(0.00)	(0.00)	(0.97)	(0.02)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Durable assets

Durable goods are mostly an indicator of wealth and quality of life; only some of them are directly connected to the farm production process. As with regard to agricultural tools, here we look at the average of a group of variables, each of which is equal to one if the household owns the good and zero otherwise. This allows to estimate the share households that owns a certain good. We notice that, in both samples, only one-third of households has a bed in the house and one-fifth owns a table. Telecommunications equipment, such as mobile phones and radios, take on an important role in non-food consumption choices, as is demonstrated by their spread. Cell phones have almost the same diffusion as beds. However, only one in every fifteen households owns a radio at home. Bicycles, an important means of transportation in rural areas, are also very rarely found in the sample (one in every one hundred households). This group of variables is unevenly distributed across treatment arms, as the F-test rejects the null hypothesis of equal means in almost all of the cases. The reason is that the non-beneficiary group (C1) appears wealthier than the joint treatment group (T). We use PCA to aggregate the information contained in the variables with the number owned of each good into one index. The average number of goods, as measured by the index, is also unevenly distributed across the three treatment arms.

Table 6: Number of durable goods in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
bed	0.31	0.24	0.41	0.28	-0.17	-0.04	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.55)	
table	0.20	0.10	0.21	0.29	-0.11	-0.19	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
stove	0.05	0.04	0.07	0.03	-0.03	0.01	0.03
	(0.00)	(0.00)	(0.00)	(0.00)	(0.19)	(1.00)	
radio	0.13	0.10	0.19	0.08	-0.10	0.01	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	
cell phone	0.32	0.27	0.43	0.27	-0.16	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	
solar panel	0.03	0.01	0.05	0.02	-0.04	-0.02	0.00
	(0.00)	(0.19)	(0.00)	(0.00)	(0.00)	(0.12)	
torch	0.51	0.48	0.55	0.49	-0.07	-0.01	0.51
	(0.00)	(0.00)	(0.00)	(0.00)	(0.24)	(1.00)	
bicycle	0.01	0.00	0.02	0.00	-0.02	0.00	0.00
	(0.02)	(.)	(0.02)	(.)	(0.01)	(.)	
dur index	-0.04	-0.38	0.49	-0.23	-0.88	-0.15	0.00
	(1.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.33)	
SNNP2							
bed	0.28	0.21	0.40	0.28	-0.19	-0.07	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.14)	
table	0.18	0.10	0.20	0.32	-0.10	-0.22	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
stove	0.02	0.01	0.03	0.01	-0.02	0.01	0.42
	(0.00)	(0.07)	(0.01)	(0.89)	(0.59)	(1.00)	
radio	0.14	0.11	0.20	0.13	-0.09	-0.02	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	
cell phone	0.29	0.24	0.39	0.27	-0.15	-0.04	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.94)	
solar panel	0.03	0.02	0.04	0.02	-0.02	0.00	0.73
	(0.00)	(0.01)	(0.00)	(0.26)	(0.53)	(1.00)	
torch	0.54	0.52	0.64	0.46	-0.12	0.06	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.63)	
bicycle	0.01	0.01	0.02	0.00	-0.02	0.00	0.10
	(0.00)	(0.75)	(0.04)	(1.00)	(0.12)	(1.00)	
dur index	0.06	-0.29	0.65	-0.04	-0.94	-0.25	0.00
	(1.00)	(0.00)	(0.00)	(1.00)	(0.00)	(0.09)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Credit

As a result of missing or incomplete markets, credit and liquidity constraints are often binding in many rural parts of Africa (Triki and Faye, 2013). This translates into foregone investment opportunities and suboptimal resource and time allocation, which is one of the leading causes of poverty traps.

We find evidence of a poorly developed credit market in our data. Table 7 shows descriptive statistics for the share of households that have obtained production (prod) or consumption (cons) loans and the share of households that have given out loans, regardless of the purpose. Overall, access to production loans is low, as only eight percent of the sample had access to this type of credit, regardless of the sample and the treatment arm. Access to consumption loans, probably represented by purchases on credit at local petty trade shops, is more common in the sample as around one every five households declares to have used this type of credit. C1 groups still appear to be relatively better off than the other treatment arms in both samples: they tend to give out more loans, probably because they have more liquidity, and they are less in need of taking consumption loans.

Table 7: Share of households that obtained or gave out loans in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
prod loans	0.08	0.08	0.09	0.06	-0.01	0.02	0.38
	(0.00)	(0.00)	(0.00)	(0.00)	(0.86)	(0.35)	
cons loans	0.23	0.30	0.19	0.18	0.10	0.12	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
given loans	0.06	0.04	0.10	0.04	-0.06	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	
SNNP2							
prod loans	0.07	0.07	0.07	0.07	0.00	0.00	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(1.00)	
cons loans	0.18	0.20	0.18	0.12	0.02	0.08	0.05
	(0.00)	(0.00)	(0.00)	(0.00)	(0.59)	(0.01)	
given loans	0.06	0.03	0.14	0.02	-0.11	0.01	0.00
	(0.00)	(0.00)	(0.00)	(0.07)	(0.00)	(0.47)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

3.3 Farm production and income generating activities

This section shows summary statistics on farm production and non-farm sources of income. Farm production includes both crops and livestock activities, while other sources of income include non-farm enterprises, paid labour and unearned income through transfers.

Crop production and use

Ethiopian agriculture is characterized by two crop production seasons named *Meher* and *Belg* seasons. *Meher* is a long rainy season, which normally occurs from June to September. The *Belg* season is a short rainy season, which normally occurs from February to May, mostly in limited areas of the country and including parts of SNNP and Oromia regions. Generally, the *Meher* season rain provides ideal crop growing moisture for the longer maturing crops.[10] We aggregated crop production from the two seasons for simplicity of reading, even though there are some obvious seasonal patterns in crop planting. Table 8 shows the share of households cultivating land and growing a certain crop, by sample and treatment arm. We notice that almost everyone is engaged in crop production during the year, either in *Belg* or in *Meher*. However, in the short season (*Belg*), only 24 percent of households cultivate some land. Agriculture takes place mostly in the long season, during which around 90 percent of households farm. Table 8 also shows the share of households that grow a given crop for the main cultures. The most widely spread crop is maize: around 80 percent of the households grow it, followed by other cereals such as teff (26 percent), sorghum (19 percent) and wheat (17 percent). Coffee, chat, enset and haricot beans are grown by around 10 percent of the sample. Overall, land cultivation is similarly distributed across the three treatment arms. However, the F-test for the rest of the variables rejects the null hypothesis of equal means across the three treatment arms, with the exception of teff and haricot beans. In particular, the share of those growing maize is much smaller in the PSNP-only group (C2) as compared to the T group, benefiting from the joint IN-SCT and PSNP programme, regardless of the sample.Figure 3 provides a visual representation of the spread of all crops in our sample. In the *woredas* of Hintalo and Abi Adi in the Tigray region, where the SCTPP was implemented, different production choices prevail. Households in Hintalo, for instance, most commonly produce sorghum (almost 60 percent of the households) wheat (30 percent) and teff (18 percent) (Berhane et al., 2015).

[10] The *Meher* harvest season goes from *Meskerem* (September) to *Yeaktit* (February), while crops harvested between *Megabit* (March) and *Nehase* (August) are considered part of the *Belg* season crop. The survey instrument asks questions concerning the *Meher* 2007 Ethiopian Calendar (EC) and the *Belg* 2007 EC crop seasons, spanning from September 2014 to February 2015 and from March to May 2015.

Figure 3: Share of households producing a given crop

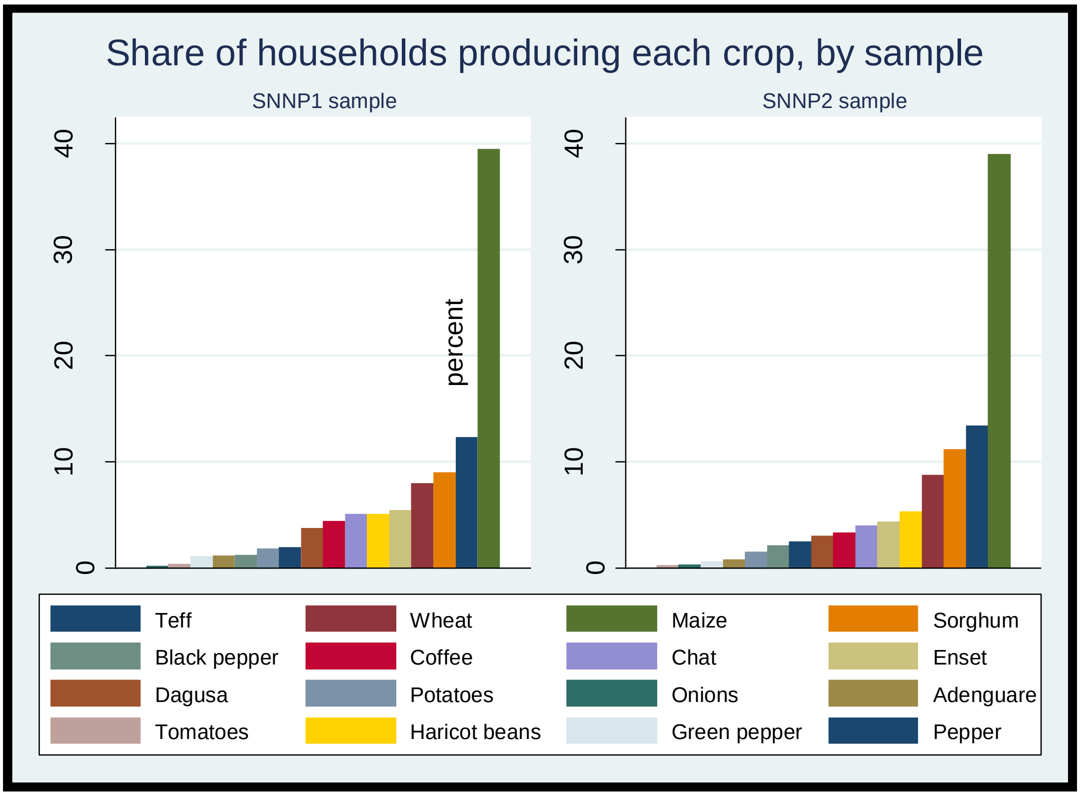


Table 8: Share of households producing crops in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
overall	0.93	0.92	0.94	0.92	-0.02	-0.01	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.77)	(1.00)	
during *Belg*	0.24	0.17	0.20	0.36	-0.04	-0.20	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.57)	(0.00)	
during *Meher*	0.88	0.86	0.89	0.89	-0.02	-0.03	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.97)	(0.92)	
teff	0.26	0.24	0.30	0.23	-0.06	0.01	0.30
	(0.00)	(0.00)	(0.00)	(0.00)	(0.10)	(1.00)	
wheat	0.17	0.11	0.17	0.23	-0.06	-0.12	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	
maize	0.82	0.88	0.91	0.66	-0.03	0.22	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.88)	(0.00)	
sorghum	0.19	0.23	0.27	0.04	-0.04	0.18	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.42)	(0.00)	
coffee	0.09	0.05	0.08	0.16	-0.04	-0.12	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	
chat	0.11	0.08	0.14	0.10	-0.06	-0.01	0.03
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	
enset	0.11	0.01	0.02	0.35	-0.00	-0.34	0.00
	(0.00)	(0.10)	(0.04)	(0.00)	(1.00)	(0.00)	
haricot Beans	0.11	0.10	0.10	0.12	-0.00	-0.02	1.00
SNNP2							
	0.89	0.88	0.89	0.91	-0.01	-0.03	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(1.00)	
during *Belg*	0.24	0.20	0.21	0.35	-0.01	-0.15	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(0.00)	
during *Meher*	0.83	0.82	0.85	0.85	-0.03	-0.04	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.97)	(0.99)	
teff	0.27	0.27	0.31	0.24	-0.03	0.04	0.97
	(0.00)	(0.00)	(0.00)	(0.00)	(0.99)	(1.00)	
wheat	0.18	0.14	0.16	0.29	-0.02	-0.15	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(0.00)	
maize	0.80	0.85	0.86	0.59	-0.01	0.26	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(0.00)	
sorghum	0.23	0.29	0.27	0.05	0.01	0.24	0.00
	(0.00)	(0.00)	(0.00)	(0.01)	(1.00)	(0.00)	
coffee	0.07	0.02	0.04	0.19	-0.02	-0.17	0.00
	(0.00)	(0.01)	(0.00)	(0.00)	(0.46)	(0.00)	
chat	0.08	0.07	0.09	0.09	-0.02	-0.02	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(1.00)	
enset	0.09	0.00	0.01	0.38	-0.01	-0.38	0.00
	(0.00)	(.)	(0.67)	(0.00)	(0.03)	(0.00)	

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
haricot Beans	0.11	0.11	0.12	0.09	-0.00	0.02	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(1.00)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

In Table 9 we show summary statistics for the harvested quantities (in kg) for the main crops in the last *Meher* and *Belg* seasons in the SNNP1 and SNNP2 samples. The most important crop is maize, with a harvest of 254 kg in the SNNP1 sample. Other important crops in this sample include wheat (33 kg), teff (31 kg) and sorghum (25 kg). While the harvest of cereals, coffee and beans is similar in the SNNP1 and SNNP2 samples, the harvest of enset and chat is much higher in the SNNP2 sample. Maize is also the main crop in the SNNP2 sample, although with a lower harvest (226 kg). For most crops the F-test does not reject the null hypothesis of equal means across the three treatment arms. There are, however, a few unbalanced variables. The imbalance in the maize harvested clearly stands out. What drives the imbalances appears to be a higher production in the group of non-clients (C1), which is almost twice as high as in the joint treatment group (T). Maize production in the latter group is also considerably higher than in the PSNP-only group (C2).

Table 9: Quantity harvested for main crops in the SNNP1 and SNNP2 samples, in kg

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(1.00)	
teff	30.68	34.44	35.30	20.75	-0.86	13.69	1.00
	(0.00)	(0.30)	(0.00)	(0.00)	(1.00)	(1.00)	
wheat	32.75	23.47	29.51	47.75	-6.04	-24.28	0.76
	(0.00)	(0.05)	(0.00)	(0.00)	(1.00)	(0.71)	
maize	253.89	232.97	397.93	110.99	-164.96	121.98	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
sorghum	24.97	36.12	32.50	2.69	3.62	33.43	0.49
	(0.00)	(0.32)	(0.00)	(0.00)	(1.00)	(0.59)	
coffee	4.48	0.84	2.20	11.56	-1.36	-10.72	0.34
	(0.18)	(0.01)	(0.05)	(0.60)	(0.51)	(0.48)	
chat	1.40	0.19	3.20	0.75	-3.01	-0.55	0.99
	(0.77)	(0.01)	(0.96)	(1.00)	(0.84)	(1.00)	
enset	6.18	0.00	0.14	20.72	-0.14	-20.72	0.00
	(0.00)	(1.00)	(1.00)	(0.00)	(1.00)	(0.00)	
haricot Beans	12.23	10.28	11.99	14.87	-1.71	-4.59	1.00
	(0.00)	(0.00)	(0.00)	(0.06)	(1.00)	(1.00)	
SNNP2							
teff	28.04	25.42	36.14	22.36	-10.73	3.05	0.40
	(0.00)	(0.00)	(0.00)	(0.00)	(0.13)	(1.00)	
wheat	28.00	18.32	29.91	45.64	-11.59	-27.32	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.23)	(0.00)	
maize	226.73	232.42	310.01	99.83	-77.59	132.59	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
sorghum	24.60	28.14	33.37	5.08	-5.24	23.06	0.00
	(0.00)	(0.00)	(0.00)	(0.10)	(1.00)	(0.00)	
coffee	4.45	0.51	6.21	10.29	-5.71	-9.78	0.81
	(0.28)	(0.45)	(1.00)	(0.00)	(0.91)	(0.00)	
chat	38.31	80.62	1.66	0.34	78.96	80.28	1.00
	(1.00)	(0.99)	(0.99)	(0.90)	(0.99)	(1.00)	
enset	30.47	0.00	0.00	136.33	0.00	-136.33	0.35
	(1.00)	(0.00)	(0.00)	(0.98)	(0.00)	(0.49)	
haricot Beans	11.96	11.18	15.35	8.90	-4.17	2.28	1.00
	(0.00)	(0.00)	(0.00)	(0.01)	(1.00)	(1.00)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Table 10 shows summary statistics for the yield of the main crop. Maize yield appears almost 50 percent higher in the SNNP1 sample relative to the SNNP2 sample, which is mainly made up by poor households with reduced labour capacity that benefit from PDS.

However, this number is much lower than the Ethiopian national average (2,325 kg/ha), reflecting the fact that the PSNP programme targets the most destitute households. This measure of productivity is evenly distributed across the three treatment arms, regardless of the sample.

Table 10: Maize productivity in the SNNP1 and SNNP2 samples, kg/ha

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1	956.06	1139.99	854.51	852.06	285.48	287.93	1.00
	(0.00)	(0.03)	(0.00)	(0.00)	(1.00)	(1.00)	
SNNP2	640.63	618.25	678.34	635.41	-60.09	-17.16	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.88)	(1.00)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Negative shocks related to crop production, such as weather anomalies, harmful insects or weeds can have an important influence on livelihoods.Table 11 shows summary statistics for the share of households that have suffered a given shock, by sample and treatment arm. We focus on six types of shocks: low temperatures, storms, floods, plant diseases, insects and weeds. The most common shocks are low temperatures. In the SNNP1 sample, 20 percent of the farmers have suffered such exposure, followed by insect attacks (15 percent). In the SNNP2 sample, exposure to shocks is slightly lower. Shocks play an important role particularly for the T-C2 pairwise comparison, as these groups of households are selected from different areas. Different starting conditions in terms of exposure to shocks may confound the impacts computed with propensity score matching and even with double-difference methods. Only exposure to insect attacks has affected differently the joint treatment arm (T) relative to the PSNP-only arm (C2). In both the SNNP1 and SNNP2 samples, the pairwise test rejects the null hypothesis of equal exposure. The rest of the shocks affect the T-C2 pair to a similar extent. Looking at the three treatment arms jointly, half of the shocks are evenly distributed at baseline.

Table 11: **Share of households affected by negative shocks in crop production in the SNNP1 and SNNP2 samples**

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
% households afected by:							
low temperatures	0.20	0.18	0.19	0.22	-0.00	-0.04	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(0.60)	
wind storms	0.08	0.08	0.09	0.09	-0.01	-0.01	0.17
	(0.00)	(0.00)	(0.00)	(0.00)	(0.99)	(1.00)	
floods	0.09	0.08	0.10	0.10	-0.02	-0.02	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.91)	(0.99)	
plant diseases	0.12	0.09	0.14	0.13	-0.05	-0.05	0.03
	(0.00)	(0.00)	(0.00)	(0.00)	(0.20)	(0.23)	
insects	0.15	0.10	0.19	0.16	-0.10	-0.06	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.05)	
weed damage	0.03	0.03	0.03	0.04	-0.00	-0.01	0.99
	(0.00)	(0.08)	(0.08)	(0.01)	(1.00)	(0.96)	
SNNP2							
% households afected by:							
low temperatures	0.14	0.15	0.08	0.17	0.07	-0.02	1.00
	(0.00)	(0.00)	(0.01)	(0.00)	(0.08)	(1.00)	
wind storms	0.05	0.01	0.03	0.10	-0.02	-0.09	0.74
	(0.00)	(0.58)	(0.35)	(0.00)	(0.75)	(0.00)	
floods	0.09	0.08	0.08	0.12	0.00	-0.04	0.14
	(0.00)	(0.00)	(0.02)	(0.00)	(1.00)	(0.81)	
plant diseases	0.12	0.09	0.12	0.17	-0.03	-0.08	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.88)	(0.17)	
insects	0.11	0.07	0.08	0.17	-0.01	-0.09	0.94
	(0.00)	(0.00)	(0.01)	(0.00)	(1.00)	(0.05)	
weed damage	0.02	0.00	0.01	0.05	-0.01	-0.05	0.53
	(0.05)	(0.00)	(0.90)	(0.08)	(0.40)	(0.01)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Whether a farm household sells part of its produce or not is a good indicator of market participation. Table 12 shows a low degree of market involvement as, in both samples, only one out of five households sells any produce. The marketing period is the *Meher* season, when most of the farm production takes place. Only 2-3 percent of the sample sells any produce during the *Belg* season. We also report the share of households that engage in market transactions with the two most widely sold crops, namely teff and *wasera*. Almost all sales concern teff (19 percent of the households) and only a small fraction of the sample (less than one percent) sells *wasera*.

Table 12: Share of households selling crops in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
overall	0.21	0.21	0.25	0.15	-0.04	0.06	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.07)	(0.02)	
during *Belg*	0.02	0.02	0.04	0.02	-0.02	0.00	0.18
	(0.00)	(0.00)	(0.00)	(0.01)	(0.15)	(0.98)	
during *Meher*	0.19	0.20	0.23	0.14	-0.03	0.06	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.54)	(0.01)	
teff	0.19	0.20	0.23	0.14	-0.03	0.06	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.65)	(0.00)	
wasera	0.00	0.01	0.00	0.00	0.00	0.01	0.70
	(0.04)	(0.21)	(0.35)	(0.00)	(1.00)	(0.25)	
SNNP2							
overall	0.22	0.18	0.26	0.24	-0.08	-0.06	0.02
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.06)	
during *Belg*	0.03	0.02	0.06	0.03	-0.04	-0.01	0.00
	(0.00)	(0.01)	(0.00)	(0.03)	(0.00)	(0.86)	
during *Meher*	0.20	0.17	0.22	0.22	-0.05	-0.05	0.29
	(0.00)	(0.00)	(0.00)	(0.00)	(0.20)	(0.19)	
teff	0.20	0.17	0.23	0.22	-0.06	-0.05	0.13
	(0.00)	(0.00)	(0.00)	(0.00)	(0.06)	(0.13)	
wasera	0.01	0.01	0.01	0.00	-0.01	0.01	0.68
	(0.04)	(0.35)	(0.21)	(0.00)	(0.88)	(0.65)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Garden production

The adult female survey asked women if they had cultivated a garden in the previous 12 months.[11] Almost nine percent of the women in the SNNP1 sample had, with no significant differences across the groups (Table 13). Home gardens can greatly influence households' dietary diversity as they are usually cultivated with vegetables, which represent an important source of vitamin intake.[12] Given the importance of home gardens, their spread in the sample seems rather low. We also look at the main reasons why households choose not to cultivate a home garden. Figure 4 shows that out of 1 730 households that do not cultivate a garden, 60 percent cite lack of sufficient land, while 16 percent say that they lacked seeds and other inputs.

[11] Questions around home gardening have been administered in the SNNP1 sample only.

[12] This idea finds empirical support in Daidone et al. (2017). The authors evaluate a combination of a social protection programme – the CGP – and an agricultural intervention – the Linking Food Security to Social Protection Programme (LFSSP) in Lesotho. The LFSSP combined training on homestead gardening and nutrition with the distribution of vegetable seeds. Daidone et al. (2017) find that households more than tripled carrot, beetroot and onion harvests (all three included in the LFSSP package) over the study period, and experienced significant increases in the production of peppers, tomatoes and other types of vegetables not included in the LFSSP package.

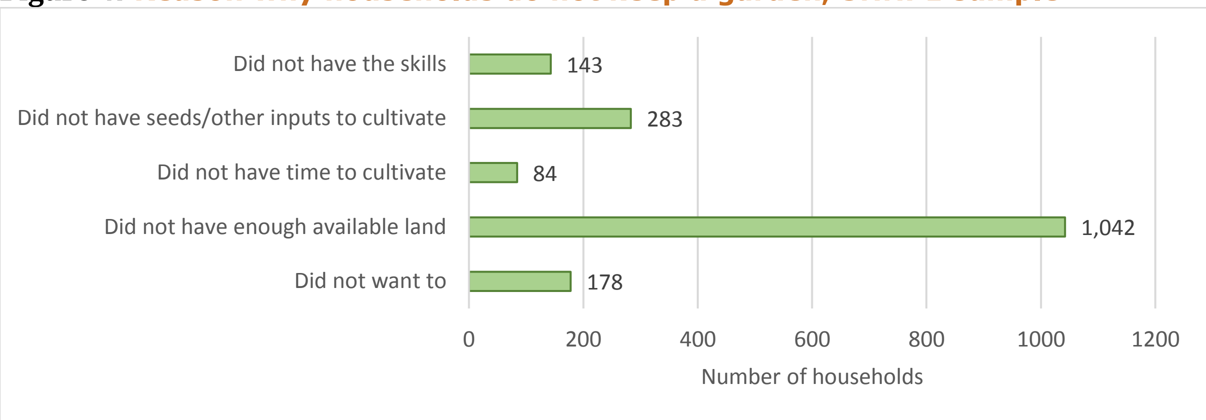
Hence, more than three-quarters of the households would keep a home garden if they had the land and inputs needed to do so, and only ten percent of them chose intentionally not to cultivate a garden.

Table 13: Share of women cultivating home gardens in the SNNP1 sample

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
garden	0.09	0.08	0.09	0.11	-0.01	-0.03	0.38
	(0.00)	(0.00)	(0.00)	(0.00)	(0.73)	(0.16)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

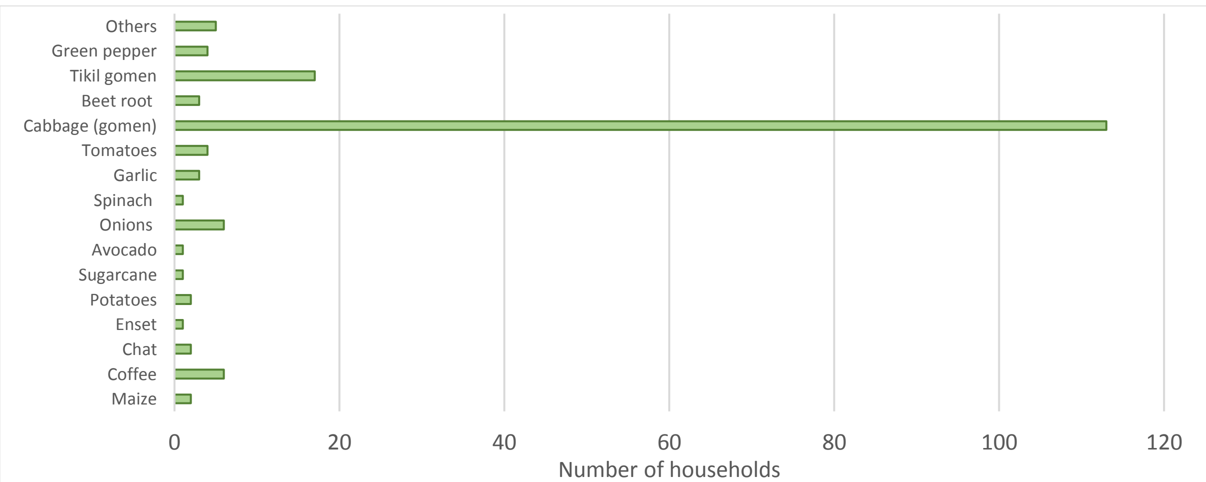
Figure 4: Reason why households do not keep a garden, SNNP1 sample



Note: Our elaboration from raw data.

Figure 5 shows the main type of crops grown in home gardens. Almost 67 percent of the households grow plain cabbage (*gommen*) in the garden and another ten percent grow other varieties of cabbage (*tikil gomen*). Vegetables such as tomatoes and onions are grown by less than five percent of the households.

Figure 5: Crops grown in the garden, SNNP1 sample



Note: Our elaboration from raw data.

Table 14 shows sample statistics by treatment arm for the average size of gardens and the share of housheolds that sell part of the produce from their gardens. The typical home garden is 0.1 hectares large, which is less than one-tenth of the operated farmland in this sample. Moreover, a quarter of the households sell some of the produce they obtain from gardens. It is clear that households in the second control group (C2) do better in terms of both garden size and market participation.

Table 14: **Garden size and share of sellers of gardens produce in the SNNP1 sample**

	All	T	C1	C2
SNNP1				
garden size (ha)	0.10	0.06	0.04	0.19
	(0.06)	(0.02)	(0.01)	(0.15)
HH that sold from garden	0.22	0.19	0.22	0.25
	(0.03)	(0.15)	(0.06)	(0.06)

Note: Column 1 shows the overall sample mean, columns 2–3 show group means.

Livestock by-products

This section reports statistics for livestock by-products, which are summarized in Table 15. We look at binary indicators, recording whether or not a farm household produced any of a given by-product in the previous 12 months, and income from sales of these by-products over the same time span. Only ten percent of households answered 'yes' to the question of whether or not they produced eggs over the 12 months preceding the survey. Despite their low diffusion, eggs are the most common by-product in the sample. In the SNNP1 sample, the share of households producing any milk or butter is four and two percent, respectively. The quantities produced on average by each household are also low (results not shown). The low share of households that engage in by-products production, and the consequently low quantities produced, are the result of the relatively small holdings of livestock documented in section 3.2 of this paper. The total income generated by the sale of by-products in the 12 months prior to the survey is around 18.8 birr (less than one USD[13]) in the SNNP1 sample. Most of the income comes from the sale of milk and eggs. In the SNNP2 sample, statistics on the share of households engaged in livestock by-products and sales are similar to those in SNNP1. Therefore, production of by-products and its commercialization are very low. This suggests that livestock is considered more like a safety asset, influencing access to informal credits, or a source of family savings and risk reduction, rather than a source of income and food supply. Given market imperfections permeating rural Ethiopia, this choice may have detrimental effects on rural households' diets (Hoddinott et al., 2015). The spread of by-products production is unevenly distributed across the three treatment arms in both samples. On the other hand, for the income variables, the F-test does not reject the null hypothesis of equal means. Looking at the pairwise comparisons, it is clear that the pure control group (C1) is more involved in livestock by-products than the joint programme clients (IN-SCT and PSNP) in group T. Moreover, involvement in group T is higher than in PSNP-only clients that constitute the second control group (C2). The total income from sales of livestock by-products in the previous 12 months is

[13] The average exchange rate during 2015 was around 20.5 birr per USD.

considerably lower in the SNNP2 sample (13.7 birr), dominated by the sales of eggs and butter. These findings are in line with those from the Tigray's SCTPP sample, where around ten percent of the households were selling some livestock by-products in the preceding 12 months (Berhane et al., 2015).

Table 15: **Livestock production in the SNNP1 and SNNP2 samples**

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
Share of households producing:							
eggs	0.10	0.11	0.12	0.05	-0.02	0.05	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.95)	(0.00)	
milk	0.04	0.03	0.07	0.02	-0.04	0.01	0.00
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.50)	
butter	0.02	0.01	0.03	0.00	-0.02	0.01	0.00
	(0.00)	(0.03)	(0.00)	(0.64)	(0.00)	(0.59)	
meat	0.00	0.00	0.01	0.00	-0.01	0.00	0.06
	(0.06)	(0.99)	(0.08)	(0.00)	(0.15)	(0.98)	
Income from sales (birr)							
eggs	7.68	9.63	9.55	3.14	0.08	6.49	0.04
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(0.02)	
milk	8.78	5.53	17.65	2.41	-12.12	3.11	0.90
	(0.25)	(0.11)	(0.70)	(0.30)	(0.91)	(0.91)	
butter	1.67	1.16	3.64	0.00	-2.48	1.16	0.11
	(0.01)	(0.45)	(0.05)	(.)	(0.38)	(0.30)	
meat	0.32	0.02	0.91	0.00	-0.89	0.02	0.99
	(0.99)	(0.99)	(0.99)	(.)	(0.97)	(0.97)	
total	18.75	16.80	31.77	5.98	-14.97	10.82	0.28
	(0.00)	(0.00)	(0.03)	(0.00)	(0.71)	(0.03)	
SNNP2							
Share of households producing:							
eggs	0.12	0.11	0.17	0.06	-0.06	0.06	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.04)	(0.01)	
milk	0.05	0.03	0.11	0.02	-0.07	0.01	0.00
	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.82)	
butter	0.02	0.01	0.05	0.01	-0.04	-0.00	0.00
	(0.00)	(0.12)	(0.00)	(0.29)	(0.00)	(1.00)	
meat	0.03	0.02	0.05	0.01	-0.04	0.01	0.00
	(0.00)	(0.01)	(0.00)	(0.35)	(0.01)	(0.92)	
Income from sales (birr)							
eggs	9.65	9.16	14.52	3.94	-5.37	5.22	0.52
	(0.00)	(0.00)	(0.02)	(0.02)	(0.91)	(0.18)	
milk	0.23	0.26	0.27	0.11	-0.01	0.15	1.00
	(0.37)	(0.75)	(0.92)	(0.97)	(1.00)	(1.00)	
butter	2.60	1.62	3.77	3.02	-2.15	-1.40	1.00
	(0.33)	(0.95)	(0.85)	(0.79)	(1.00)	(1.00)	

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
meat	0.04	0.00	0.12	0.00	-0.12	0.00	0.88
	(0.96)	(0.00)	(0.94)	(0.00)	(0.69)	(0.00)	
total	13.67	11.13	18.75	11.96	-7.63	-0.84	1.00
	(0.00)	(0.00)	(0.10)	(0.12)	(0.93)	(1.00)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Agricultural production and extension services

Extension services facilitate the access of farmers to knowledge, information and technologies. It assists them to develop their own technical, organizational and managerial skills and practices (Christoplos, 2010). The outcomes that are usually expected to benefit from extension services are relatd to productivity and household income, but they can be more broadly related to development, consumption, wellbeing and empowerment. However, the immediate pathway to reach to this broader set of outcomes passes through changes in farmers' agricultural practices, and in their knowledge base.

Table 16 and Table 17 show sample means by treatment arm for the probability of contact with a Development Agent (DA), which represents our proxy for access to extension services, in both the SNNP1 and SNNP2 sample, repectively. [14] Overall, extension services are relatively accessible in both samples as almost one-third of the households declare to have been in contact with a DA for issues related to crops production in the previous 12 months. The share of households that has benefited from extension services for issues related to livestock is between 11 and 13 percent. Access to extension services is unequally distributed across the three treatment arms regardless of the type of service and of the sample. What stands out is a lower access to these services by households in the second control group (C2).

Table 16: Contact with Development Agent, SNNP1 sample

SNNP1	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
Ext Service (crops)	0.30	0.34	0.28	0.27	0.06	0.08	0.02
	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.01)	
Ext Service (livestock)	0.11	0.15	0.12	0.07	0.03	0.08	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.26)	(0.00)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

[14] Development Agents work to facilitate PSNP implementation at the community and *kebele* levels. They have a wide range of responsibilities which include providing "training, technical assistance and mentoring to clients in the crop and livestock livelihoods pathway," among others (Ministry of Agriculture of Ethiopia, 2014).

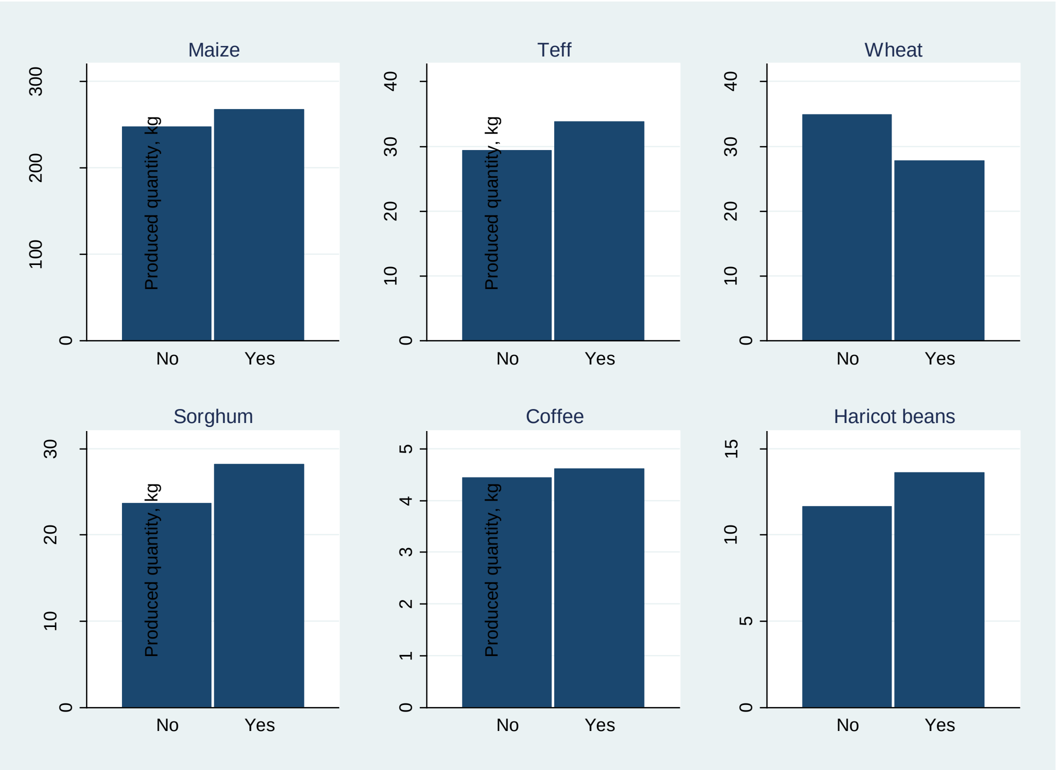
Table 17: Contact with Development Agent, SNNP2 sample

SNNP2	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
Ext Service (crops)	0.30	0.31	0.35	0.22	-0.04	0.09	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.23)	(0.02)	
Ext Service (livestock)	0.13	0.14	0.17	0.04	-0.03	0.10	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.42)	(0.00)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Figure 6 illustrates in merely descriptive terms[15] the relationship between access to extension services (on the horizontal axis) and crop production in the SNNP1 sample. For five out of six of the main crops – maize, teff, sorghum, coffe and beans – total production was higher for households that had used extension services than for those who had not. Figure 7 shows that a similarly positive pattern of association holds between extension and harvested quantities in the SNNP2 sample, although the relation seems much stronger than in SNNP1.

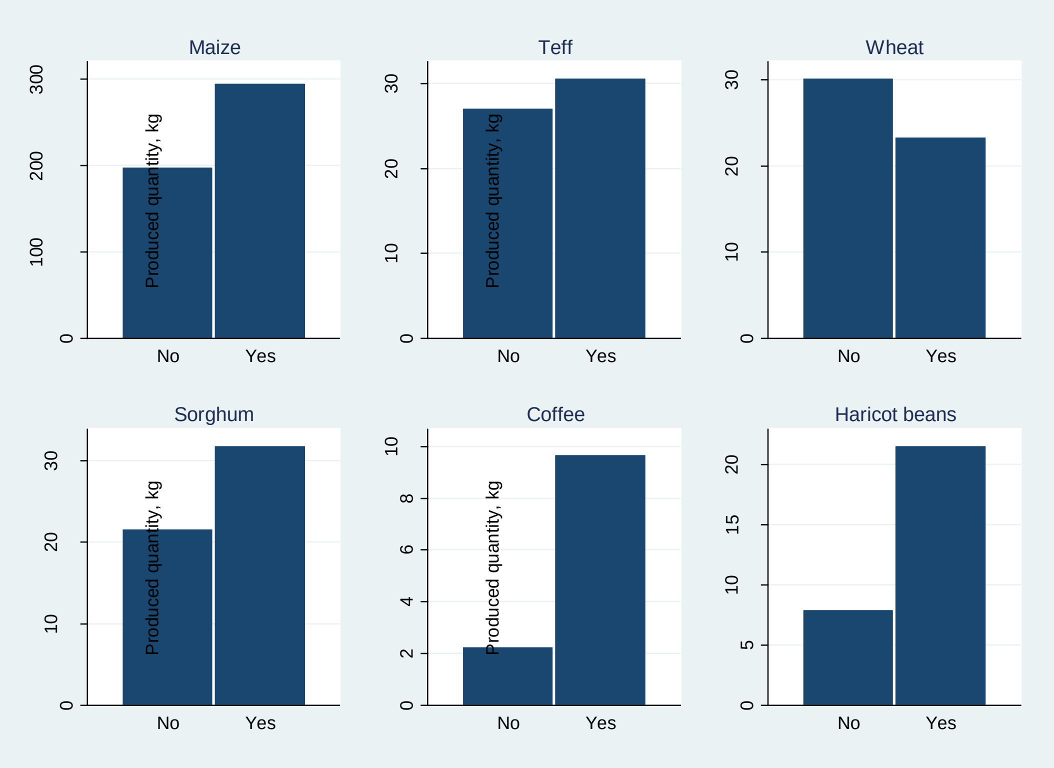
Figure 6: Crop production and access to extension services, SNNP1 sample



Note: Our elaboration from raw data.

[15] This analysis shows the association between extension services and some outcomes of interest. It has no causal interpretation since access to services was not randomized. Morover, we did not control for other variables so the results are not netted of the influence of other confounders.

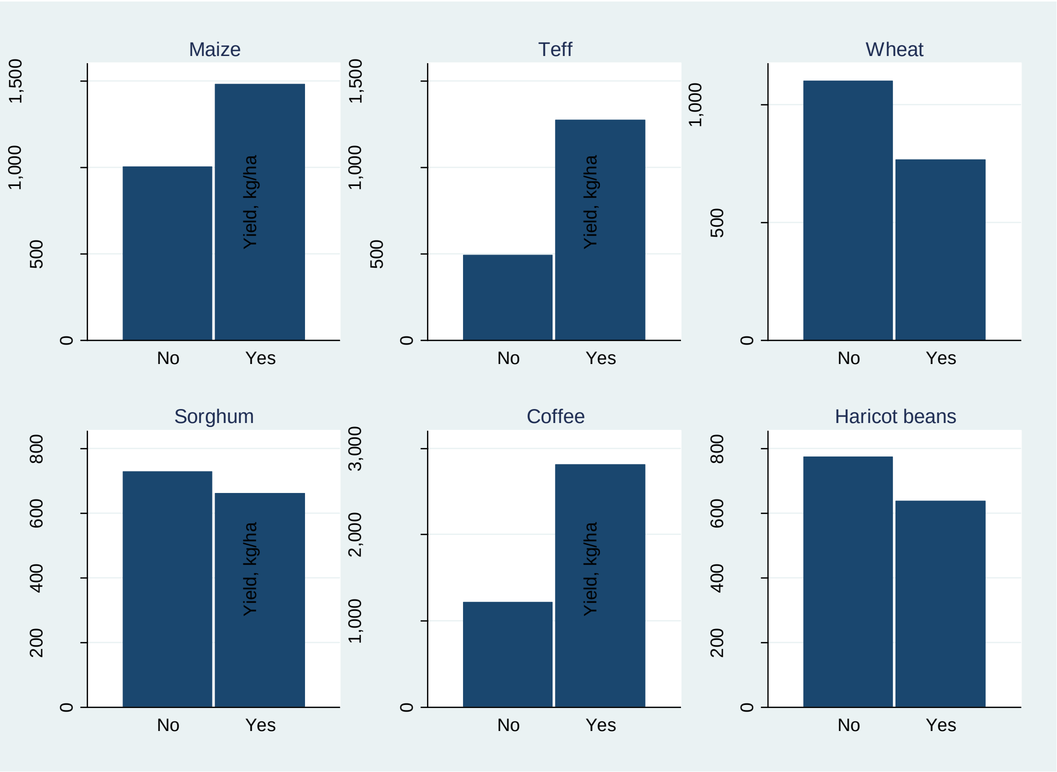
Figure 8: **Crop production and access to extension services, SNNP2 sample**



Note: Our elaboration from raw data.

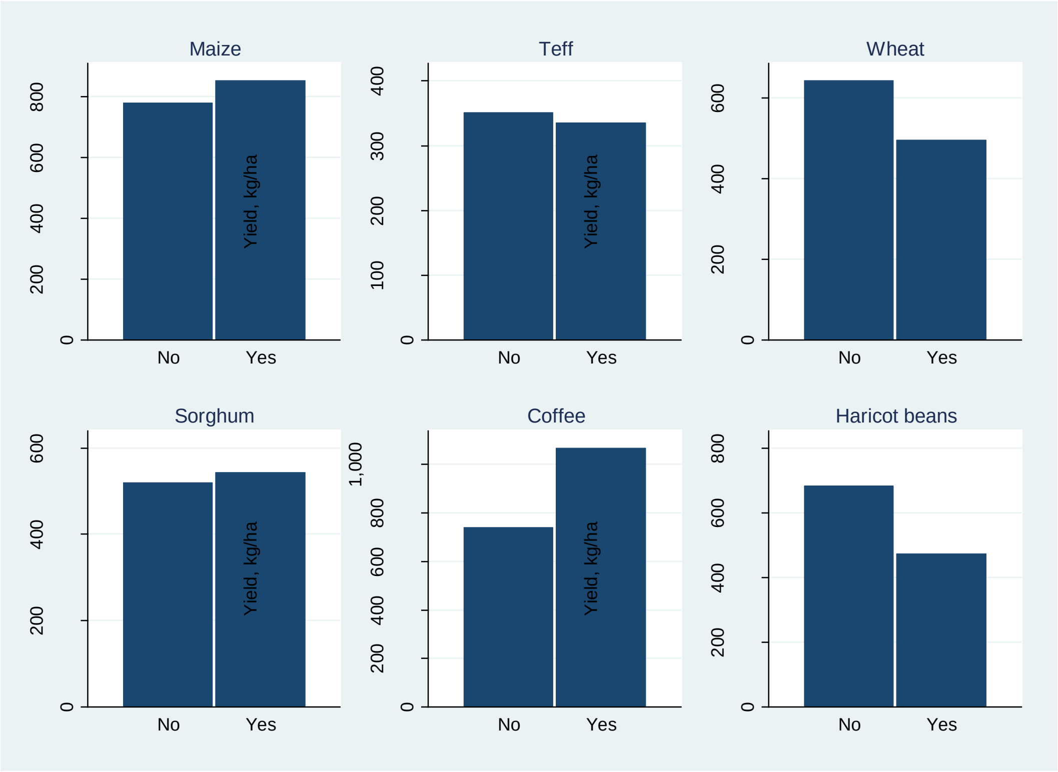
Figure 8 and Figure 9 repeat the analysis for yields of the same crops in the SNNP1 and SNNP2 sample, respectively. In this case, the results are less clear-cut, since only the yields for maize, teff and coffee are higher for those hoseholds who use extension services. A similar pattern holds true also in the SNNP2 sample, though teff yields are considerably larger for households making use of extenson services. However, in both samples, maize yields – the most widely grown crop — do seem to have benefited from extension services from development agents.

Figure 8: **Crop yields and contact with Development Agent, SNNP1 sample**



Note: Our elaboration from raw data.

Figure 9: **Crop yields and contact with Development Agent, SNNP2 sample**



Note: Our elaboration from raw data.

Figure 10 and Figure 11 illustrate the relationship between the use of extension services and livestock activities in the SNNP1 and SNNP2 samples, respectively. In the SNNP1 sample, extension services do not seem to have any influence on the number of Total Livestock Units (TLU), cattle, ruminants or pack animals owned by the household, while it seems to be negatively correlated with the number of poultry and income from the sale of livestock by-products. Figure 8, which refers to the SNNP2 sample, shows a different picture: with the exception of poultry, households that access extension services own more TLUs, cattle, ruminants, pack animals and earn more from the sale of livestock by-products.

Figure 10: **Livestock and access to extension services, SNNP1 sample**

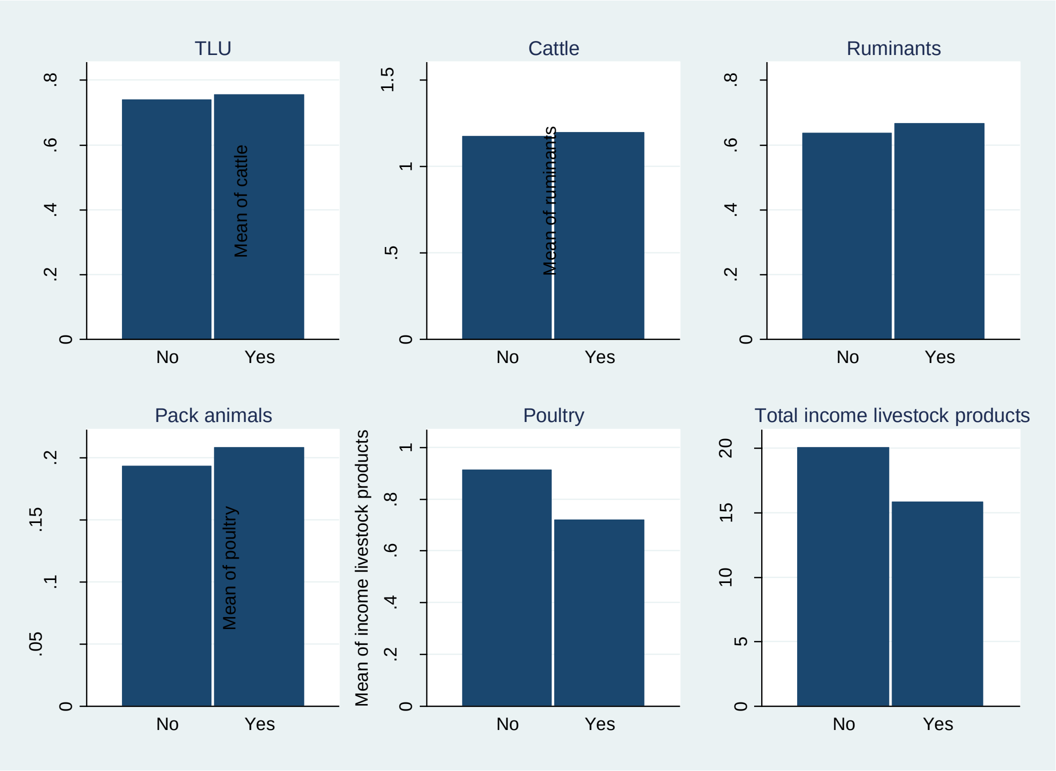
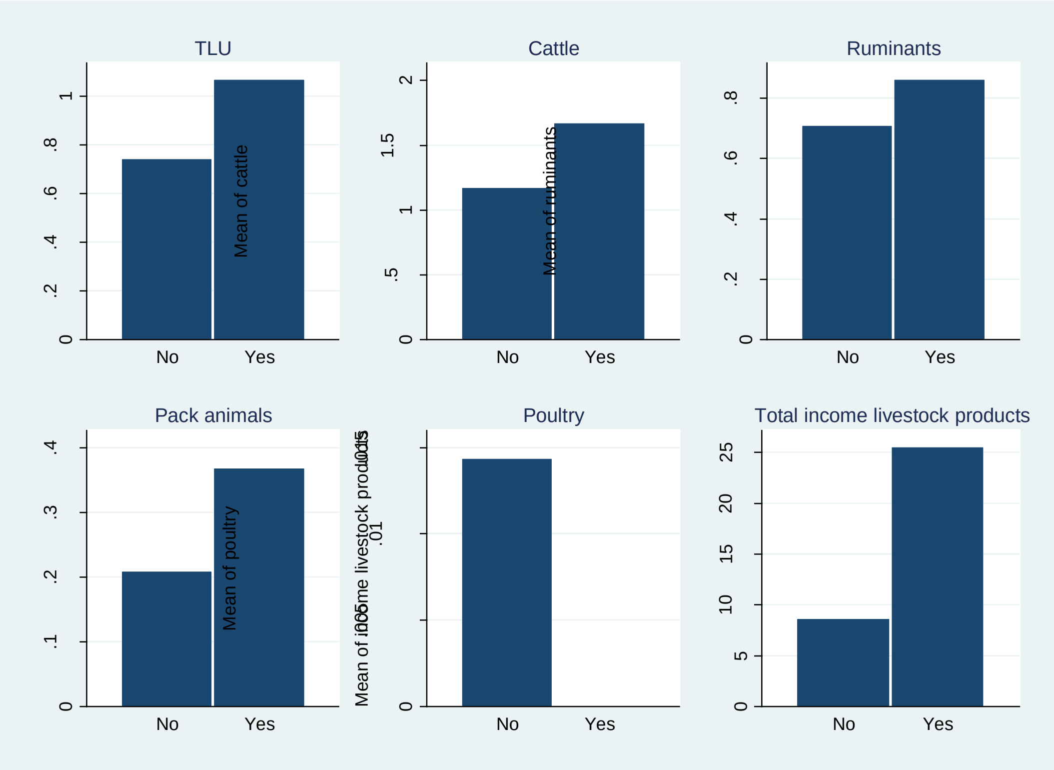


Figure 11: **Livestock and access to extension services, SNNP1 sample**



Overall, households that have access to extension services seem to be slightly more productive than households that do not have contacts with DAs, although several nuances characterize these results. Furthermore, services seem to be more effective in the SNNP2 sample than in SNNP1. Probably we can attribute this difference to the specific characteristics of the SNNP1 sample, being composed of households that are more labour constrained because of the presence of PLW.

Non-farm businesses

Small non-farm enterprises are an important part of rural livelihoods. Cash transfers potentially affect non-farm enterprises by removing liquidity constraints that prevent families from starting or maintaining small businesses. In both SNNP1 and SNNP2 samples, a minor proportion of households run a non-farm business (four and three percent, respectively).[16] In both samples, households in the control groups C1 and C2 are more engaged in non-farm business activities than households in the treatment group (Table 18). On average, the main non-farm business has been in operation for seven and a half months during the preceding 12 months, in both samples (not reported in the table). Engagement in non-farm business activities is well balanced across all three treatment arms in the SNNP1 sample. In the SNNP2 sample, households in the joint treatment group (T) are less involved in business activities compared to the pure control group (C1) and to the PSNP-only clients that make up the second control group (C2).

[16] These figures are comparable with the rural sample in the Hintalo-Wajirat *woreda*, observed for the impact evaluation of the SCTPP in Tigray, while in Abi Adi, an urban *woreda*, this share was significantly higher.

Table 18: Non-farm business activities in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
any business	0.04	0.03	0.05	0.05	-0.02	-0.02	0.15
	(0.00)	(0.00)	(0.00)	(0.00)	(0.07)	(0.12)	
SNNP2							
any business	0.03	0.01	0.04	0.06	-0.02	-0.04	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Paid labour and transfers

In this section we show summary statistics for paid labour and private transfers, such as remittances or other kinds of transfers. Paid labour is considered both for the adult members of the household and for children aged under 15. Table 19 shows statistics for the supply of paid labour by adult household members in the agricultural and non-agricultural sectors, by sample and treatment arm. In the SNNP1 sample, almost four percent of the households have at least one adult member who works for pay in the non-agricultural sector and 12 percent have an adult member who is employed for pay in the agricultural sector. In this sample, the households that did have at least one adult member in paid employment dedicated around nine months to paid non-agricultural labour and around 11 months to agricultural labour over the previous 12 months. In the SNNP2 sample, households seem slightly less involved in agricultural (nine percent) and non-agricultural (two percent) paid labour, probably because they include PDS clients who are labour constrained and are logically less involved in paid labour. In this sample, the households with at least one adult member in paid employment dedicated around seven months to paid non-agricultural labour and around eight months to agricultural labour over the previous 12 months. Agricultural paid labour supply is generally unevenly distributed across the three treatment arms. Households in the treated group are more involved in paid labour compared to both control groups, as indicated by the pairwise tests. These estimates are corroborated by the findings of the baseline report for the evaluation of Tigray's SCTPP, according to which almost ten percent of the households had at least one member working outside of the household for cash or in-kind payment (Berhane et al., 2015).

Table 19: Adult paid labour in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
non-ag paid labour (y/n)	0.04	0.05	0.03	0.03	0.02	0.02	0.12
	(0.00)	(0.00)	(0.00)	(0.00)	(0.14)	(0.04)	
ag paid labour (y/n)	0.12	0.15	0.08	0.14	0.08	0.01	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.85)	
SNNP2							
non-ag paid labour (y/n)	0.02	0.02	0.03	0.01	-0.00	0.02	0.19
	(0.00)	(0.00)	(0.00)	(0.29)	(0.98)	(0.09)	
ag paid labour (y/n)	0.09	0.08	0.07	0.11	0.01	-0.03	0.36
	(0.00)	(0.00)	(0.00)	(0.00)	(0.61)	(0.30)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Child work in agriculture represents an enormous economic and social cost for children, their families and society as it can negatively affect their health and personal development or interfere with their education.[17] Table 20 shows summary statistics for the share of households that have at least one child engaged in some paid agricultural or non-agricultural labour. Generally, children are not involved in paid non-agricultural labour in either sample. Almost two percent of the households declare to engage one or more children in paid agricultural work, regardless of the sample. Paid agricultural child work is unevenly distributed across treatment arms, because of a higher involvement of children in the PSNP-only control group in both samples. In the sample for the evaluation of Tigray's SCTPP, the share of households that employed children in paid labour or in their own businesses (five percent) appears higher than in our sample. However, the variable in the SCTPP data includes also the time spent in the household's own business.

[17] Due to missing information in the survey instruments, descriptive statistics on children's engagement in work-related activities refer to the broader definition of child work and not to the specific internationally recognized definition of child labour.

Table 20: Paid child work in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
non-ag	0.00	0.00	0.00	0.00	-0.00	0.00	0.99
	(0.05)	(0.29)	(0.29)	(0.53)	(1.00)	(0.90)	
ag	0.02	0.01	0.01	0.04	0.01	-0.02	0.00
	(0.00)	(0.00)	(0.05)	(0.00)	(0.12)	(0.02)	
SNNP2							
non-ag	0.00	0.01	0.00	0.00	0.00	0.01	0.69
	(0.09)	(0.16)	(0.53)	(.)	(0.54)	(0.41)	
ag	0.02	0.01	0.01	0.04	-0.00	-0.04	0.00
	(0.00)	(0.05)	(0.08)	(0.00)	(0.98)	(0.00)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

By providing a stable source of liquidity, programmes like IN-SCT and PSNP can influence the share of households making or receiving informal private transfers. Table 21 shows summary statistics for the share of households that gave or received transfers during the previous 12 months in the SNNP1 and SNNP2 samples. In the former, the share of households that received any transfers is four percent and those that gave transfers to others make up two percent. In the SNNP2 sample, a higher share of households either gave or received transfers. The probability of giving a private transfer is unevenly distributed in the three treatment arms. The first control group in both samples generally gives out more transfers compared to the treatment and the second control groups. These figures are in the same order of magnitude of those contained in the baseline report for the evaluation of Tigray's SCTPP. In Hintalo, in fact, almost five percent of the households had received an informal transfer in the preceding 12 months.

Table 21: Transfers in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
HH received transfer	0.04	0.05	0.04	0.04	0.01	0.01	0.72
	(0.00)	(0.00)	(0.00)	(0.00)	(0.54)	(0.25)	
HH gave transfer	0.02	0.02	0.03	0.02	-0.02	0.00	0.06
	(0.00)	(0.00)	(0.00)	(0.01)	(0.06)	(0.97)	
SNNP2							
HH received transfer	0.06	0.06	0.08	0.06	-0.02	-0.00	0.80
	(0.00)	(0.00)	(0.00)	(0.00)	(0.52)	(1.00)	
HH gave transfer	0.03	0.01	0.05	0.03	-0.04	-0.02	0.00
	(0.00)	(0.03)	(0.00)	(0.01)	(0.00)	(0.05)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

4. Production choices and nutrition

In this section, we analyse the relationship at baseline between farmers' production choices and their nutritional outcomes. The illustration of this cross-sectionl relationship before the IN-SCT programme is implemented provides an overview of how these two dimensions are associated with each other. Once follow-up data are collected, we will be able to analyse the impacts of the programme on the nutrition-related aspects of both production and consumption decisions. A programme such as the IN-SCT can be considered nutrition-sensitive as it aims to contribute to improved nutrition outcomes by addressing some of the underlying determinants of nutrition – access to safe and nutritious food, adequate care, and a healthy and hygienic environment. Each of these determinants is influenced, in turn, by lower-level outcomes such as on-farm availability, diversity and safety of food, food availability in markets, income, women's empowerment, nutrition knowledge and norms, and natural resource management and practices. The IN-SCT programme has a pure social protection component provided by the cash transfer, which is complemented with several nutrition-sensitive interventions. Nutrition-sensitive social protection programmes, like the IN-SCT, seek to reach the nutritionally vulnerable, to incorporate explicit nutrition objectives and indicators and to promote strategies that enable households to access healthy and sustainable diets as well as healthcare. The basic idea behind this multisectoral approach is that accelerated progress towards improving maternal and child nutrition can be better achieved by supporting nutrition-sensitive interventions and programmes that tackle the root causes of malnutrition, namely poverty and social inequality (Ruel and Alderman, 2013).[18] [19]

Given that all activities under the IN-SCT are nutrition sensitive the programme is expected to have a direct impact on the consumption phase by improving care practices and health through promoting knowledge about nutrition and access to health services. The pure social protection component can have both a direct impact on nutrition outcomes, as the cash transfer increases income which may then be spent to consume more or higher quality food, as well as an indirect impact if the cash transfer is either spent to improve sanitation infrastructure within the clients' dwellings, or put to productive use by increasing on-farm availability and diversity of production and income (FAO, 2015a). Investing the transfer in agricultural activities aims at guaranteeing access to food via production rather than through purchases. This does not translate automatically into better nutrition, since nutrition-sensitive agriculture also requires actions to address all phases of the food systems chain: input quality, production, post-harvest handling, processing, retailing and consumption.

[18] Bhutta et al. (2010) calculate that scaling up ten of the most effective proven interventions would reduce stunting by only 20 percent.

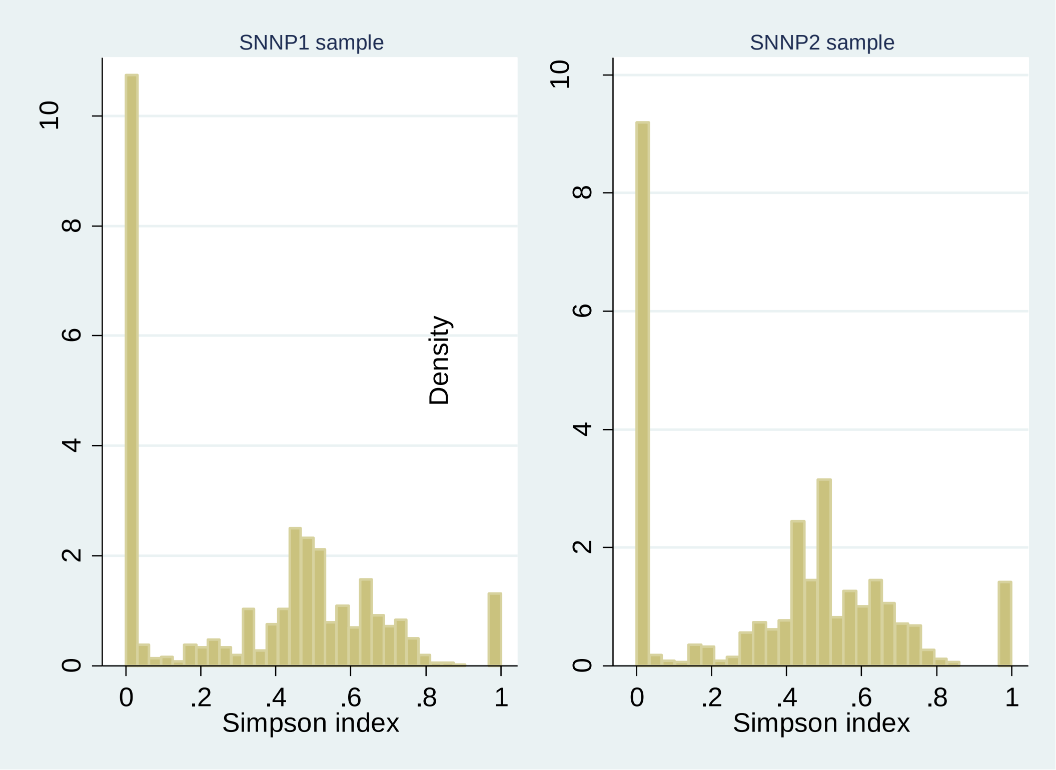
[19] As the number and complexity of social protection programmes globally have grown over the past twenty years, so too has interest in making them work better for nutrition. Related initiatives by many governments and development partners are underway around the world. See FAO (2015) for a review of existing nutrition-sensitive social protection measures.

Crop diversification

We start by looking at whether the current farm production is suitable to sustaining a nutritious diet. The precondition for good nutrition is that a diversity of foods is available and affordable for all individuals at all times. On the other hand, excessive intensification, which often results in monocultures, risks simplifying diets and worsening nutrition in producer communities (FAO, 2017). Diversified crop production and home gardening can help increase direct access to micronutrients, proteins and nutrient-dense varieties of vegetables, which might otherwise be expensive or difficult to acquire, particularly for poor people. We use two indicators to measure the current level of diversity of foods produced on farms: the number of crop species cultivated by the farm-household over the last 12 months and the Simpson index based on the quantities produced of each crop. The first indicator has a straightforward interpretation as the larger the number of crops produced by the farm, the higher the food diversity potentially available to the farm. The second indicator is computed for each household using the quantities produced for each crop. The index ranges between 0 and 1. The index reaches the lower bound when the farmer produces only one crop, while it is equal to the maximum when the farmer harvests the same quantity for several crops. The Simpson index is computed $as\ S = 1 - \sum_{i=1}^{R} p_i$, where p_i is the share of the quantity of crop *i* on the total quantity produced of all crops by the single farmer (FAO, 2016).

Figure 12 shows the distribution of the Simpson Index for the SNNP1 and SNNP2 samples. Crop production in the SNNP1 sample seems less diversified than in the SNNP2 sample. In fact, the share of households that are completely undiversified (Simpson index = 0) is larger compared to SNNP2, while the share of households that have maximum crop diversification is lower. The Simpson index is a general index of diversity, which takes into account both the quantity produced of each crop as well as the number of crops. As a result, a farmer who produces the same quantity of two different crops will be less diversified than a farmer who harvests the same quantity from three different crops. Apart from the Simpson index, we analyse the number of crops grown, which gives a more concrete idea of the availabity of foods produced on-farm.

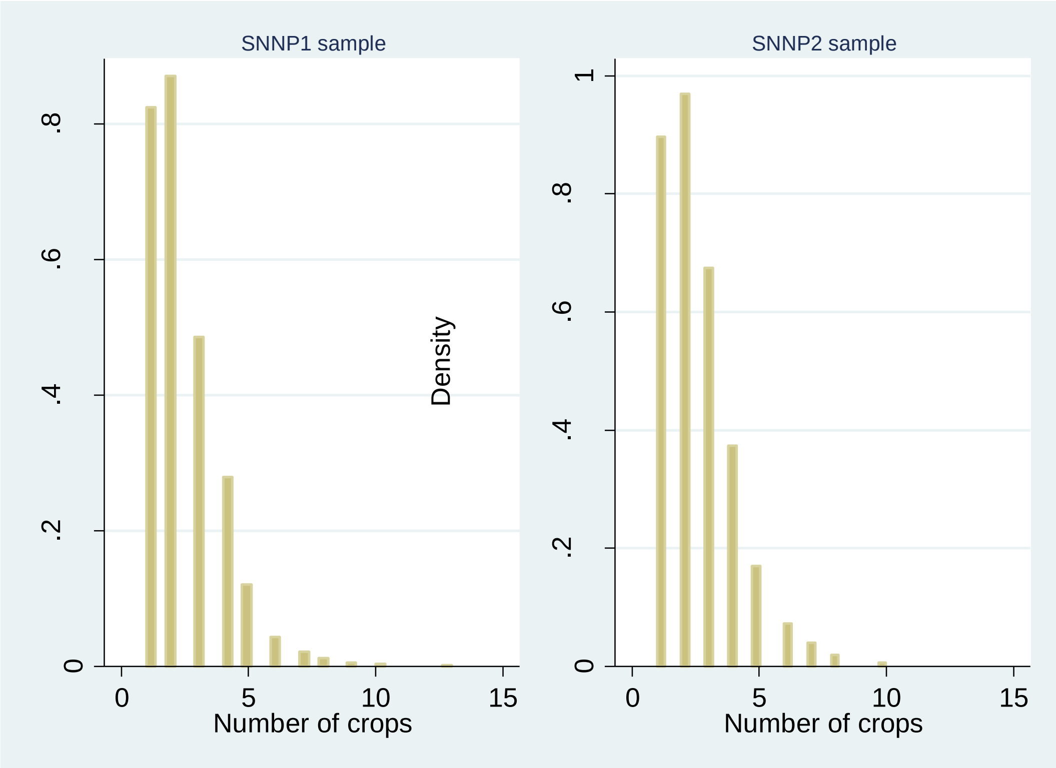
Figure 12: **Distribution of Simpson index, by sample**



Note: Our elaboration from raw data.

Overall, farmers grow between two and three crops on average in both samples. As shown in Figure 13, we notice that the distribution in the SNNP2 sample is more skewed to the right compared to that in SNNP1, indicating a higher concentration of households at small numbers of crops grown. The same message comes across from looking at the cumulative distribution of the number of crops. It is clear, in fact, that almost 90 percent of the sample grows less than five crops. Based on all these elements, it seems reasonable to conclude that farmers are scarsely diversified in terms of both harvested quantities and number of crops.

Figure 13: Distribution of the number of crops, by sample



Note: Our elaboration from raw data.

Table 22: Diversification in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
Simpson	0.35	0.37	0.38	0.29	-0.01	0.08	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.77)	(0.00)	
no. of crops	2.38	2.38	2.72	1.96	-0.34	0.43	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
SNNP2							
Simpson	0.37	0.39	0.39	0.28	-0.00	0.11	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(0.00)	
no. of crops	2.53	2.57	2.81	2.04	-0.24	0.53	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

In Table 22 we show summary statistics for the two indicators of diversification. Overall, the households show a low degree of crop diversification. On average, farmers in both samples produce slightly more than two crops. In light of the results in section 0, we can assume that one of these two crops is most likely maize. While the overwhelming majority does not seem to grow a suitable basket of crops to support a nutritious diet, almost one-quarter of the farmers produce more than five crops.

Crop diversification is never distributed evenly across the three treatment arms, for either of the indicators and in either sample. The underlying reason relates to a higher degree of crop diversification in the joint PSNP and IN-SCT treatment arm (T) as compared to the PSNP-only arm (C2). Just like crop production, livestock ownership can contribute to dietary diversity and nutritional outcomes through home consumption and income generation (FAO, 2015). This sector of farm production provides the largest contribution to the production and consumption of animal source foods such as meat, organ meat, eggs and dairy products. The inclusion of animal source foods in the diet is an important source of protein or micronutrients. As seen in the previous sections, livestock holdings are low in the sample. Each household owns on average just around one cattle and less than one unit of poultry and of small ruminants. The typical livestock by-products are also produced only by a tiny share of households. For example, only around five percent of the sample produces any milk. Therefore, home consumption of livestock and livestock by-products falls way short of meeting the nutritional needs of a typical household with six members (Devereux et al., 2016b). As long as the sales of crops, livestock and livestock-products do not translate into reduced home consumption, they can support nutrition by increasing income and consumption of market goods. In the section dedicated to crop production and use we saw that only one-fifth of the households sell any crop, which almost always is teff. Moreover, sales revenues from livestock by-products are marginal. Therefore, the contribution of sales of farm produce to income and nutrition appears limited.

Productive capacity and nutrition

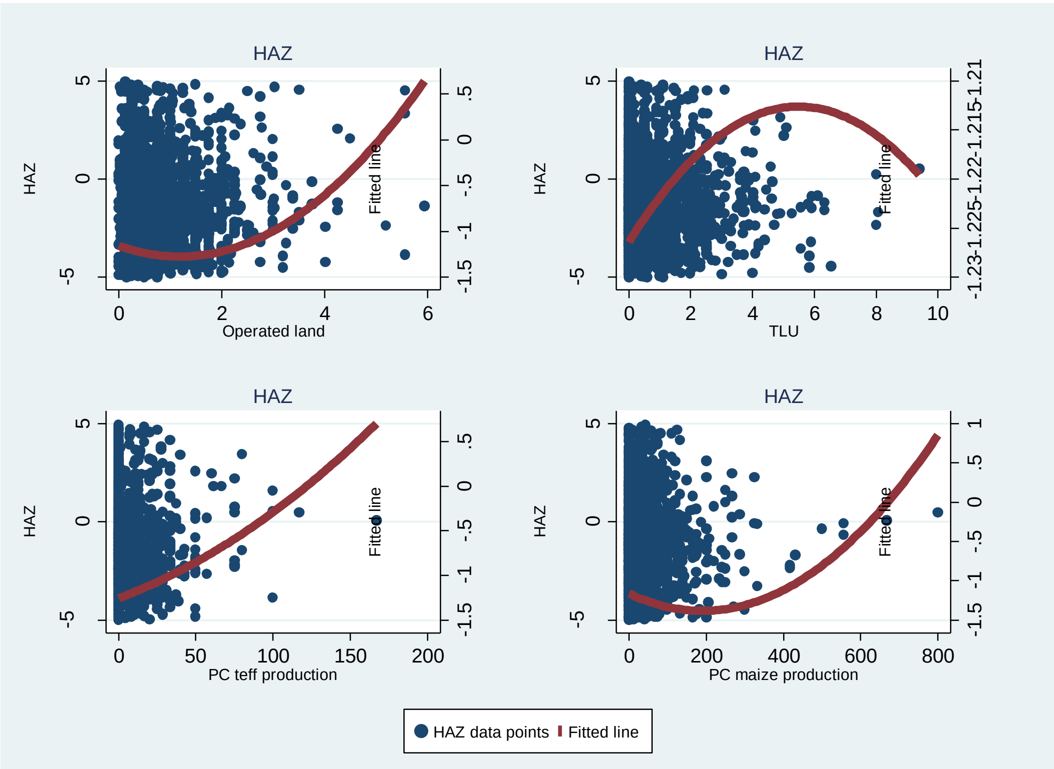
We now look at the relationship between productive capacity of the farm-household and indicators of nutrition. Given the different populations, and consequently the different objectives of the evaluaton, the survey instruments have been shaped differently and we thus report alternative indicators for the two samples.

Because of the focus on PLW and children below 23 months of age, for the SNNP1 sample the data collected included children's measurements on height and weight. Therefore, for this sample, we look at the relationship between child anthropometric indicators and livelihoods. We focus on the height for age Z score (HAZ) and the weight for age Z score (WAZ).[20] As for the livelihoods dimension, we first look at measures of productive capital, such as the size of operated land and the number of TLUs, and at per capita production of maize and teff, which are among the most widespread crops. Figure 14 shows that the relationship between HAZ and livelihood indicators is generally nonlinear and non-monotonically increasing. For example, HAZ does not seem to be affected by the size of operated land for households that lie below the average land holding size (2 ha). For those that operate farms above the average size (> 2 ha), larger farm sizes appear to be associated with children of greater height for a given age. For households that own up to five TLUs, children's height for a given age seems to increase with the herd size. HAZ and TLUs are invertly correlated for herd sizes above five. On average, increasing the herd by one extra animal is associated with an increase of 0.8 cm in children's height. HAZ has clearly an increasing relationship with per capita teff production since this is

[20] According to the WHO methodology, the formula for calculating the Z-score is: Z-score = (observed value - median value of the reference population) / standard deviation value of reference population.

a staple food across the country. Per capita maize production shows an increasing pattern that is similar to the one seen for land size. This may result from the fact that both maize production and operated land are indicators of farm size. Being a staple crop, teff production is more dirctely related to child anthropometry, while operating land and maize production affect child anthropometry in an indirect way; most likely, through the income. For below average farm-households HAZ seems to decrease with farm size. The relationship becomes incremental for households that operate farms larger than the average size.

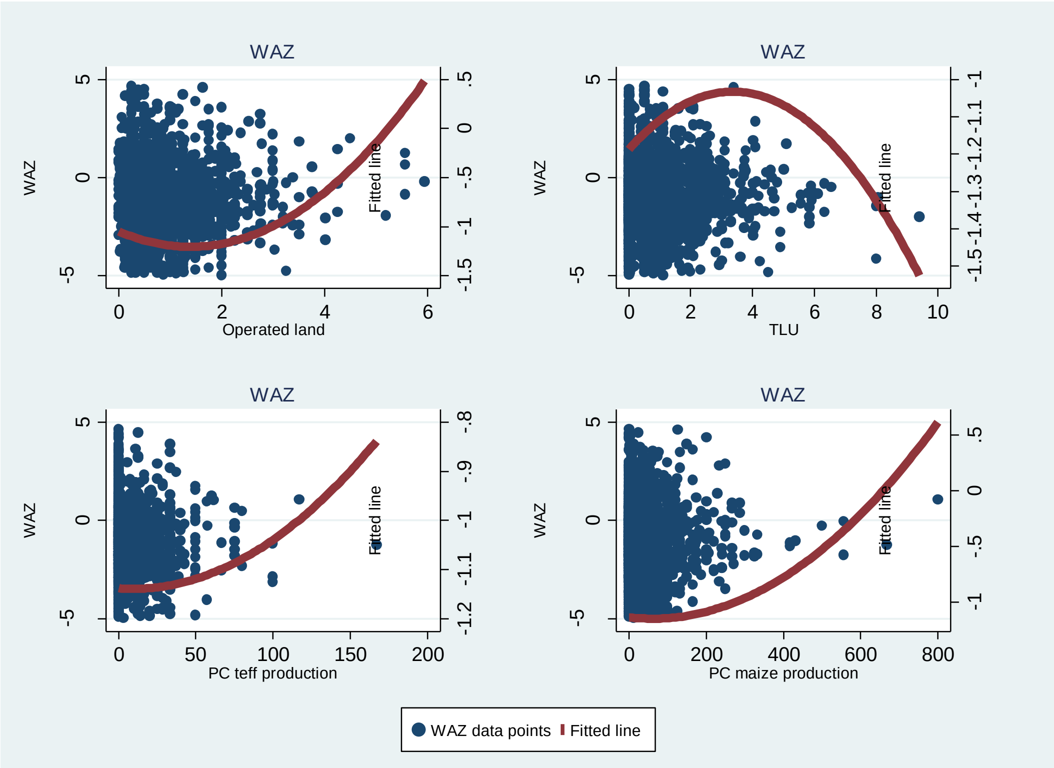
Figure 14: Height for age Z-score and livelishoods, SNNP1 sample



Note: Our elaboration from raw data.

Figure 15 repeats the analysis for the weight for height Z score (WAZ). Here, too, some of the relationships are not monotonically increasing. The size of operated land, for instance, has a similar influence on children's weight to that observed for HAZ. In particular, weight decreases with land area for households that operate farms below 2 ha. For larger farm-households, increasing the area of cultivated land is associated with higher children's body weights. Children's weight increases also with livestock holding, especially beyond the average herd size (0.74 TLUs). In this case the relationship is more strongly positive and, on average, one extra TLU in herd size translates into a quarter kilogram increase in children's body weight. For herd sizes above a threshold of 4 TLUs, increasing the number of animals is associated with a reduction in children's body weight. Finally, the relationship between per capita teff and maize production and weight is again monotonically increasing. Both teff and maize may have an immediate direct impact on children's body weight, since they are consumed routinely and represent a dominant portion of their diet.

Figure 15: **Weight for age Z-score and livelishoods, SNNP1 sample**



Note: our elaboration from raw data.

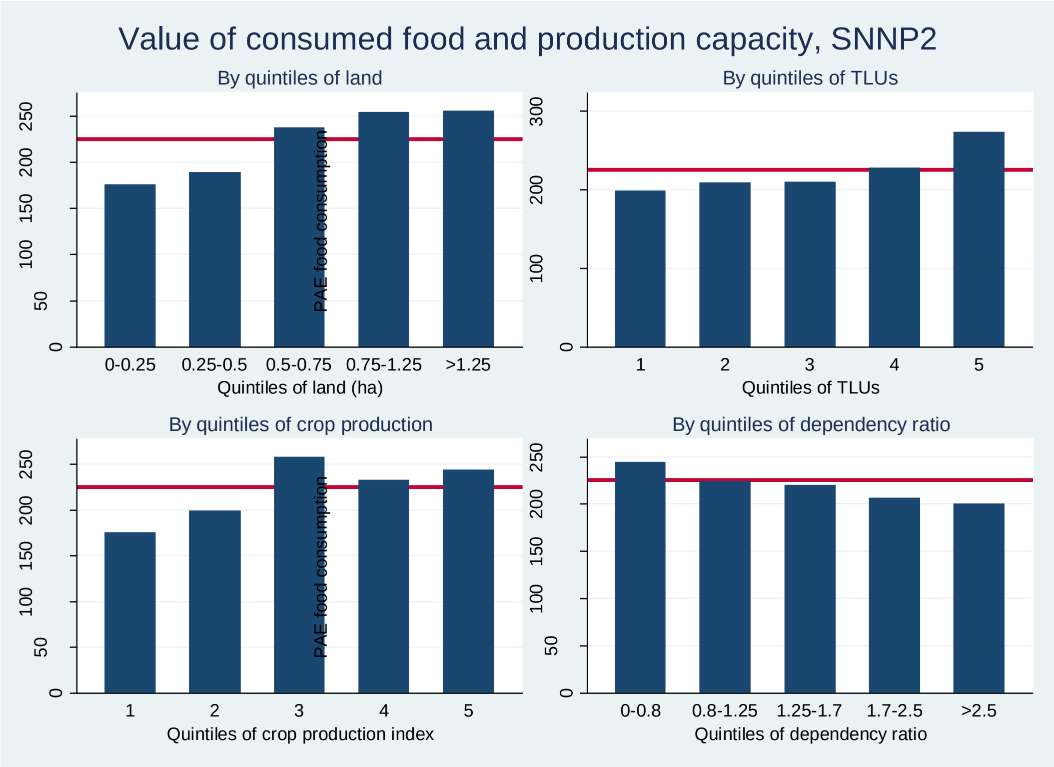
For the SNNP2 sample, anthropometric measurements have not been collected. As a proxy for nutrition, we look at food consumption at home, measured through the per adult equivalent monetary value of the food consumed at home in the 30 days before the survey and by the Household Dietary Diveristy Score (HDDS). Productive capacity is proxied by four indicators: area of operated land, number of TLUs owned by the household, an index of the overall crop production and the dependency ratio.[21] Figure 16 shows the relationship between the value of food consumed per adult equivalent on the *y* axis and the four indicators of productive capacity on the *x* axis. In each of the four graphs we have added Ethiopia's food poverty line for adults in red.[22] The first graph shows the average value of food consumed per adult equivalent in each of the five groups of households defined by the quintiles of operated land. There is a clear increasing relationship whereby households with greater land endowments have higher consumption. Moreover, only households with more than half a hectare of land manage to reach a level of food consumption above the food poverty line. We find a similar pattern for livestock ownership, with households that own more TLUs consuming more food. The estimated relationship shows that increasing the herd size by one TLU leads to an increase in the value of food consumed per adult equivalent of 20.8 birr or, in relative terms, of 9.4 percent. However, only the top 20 percent of the TLU distribution, or those with more than 1.5 TLUs, consumes an amount above the food poverty line. For crop production we built a composite index with

[21] The index of overall crop production is constructed through Principal Component Analysis (PCA), a dimensionality reduction method which aggregates in one index the variability from a set of variables.

[22] The food poverty line in Ethopia was 1 985 birr/adult/year in 2011, providing the minimum caloric requirement of 2 200 kilocalories per adult. This threshold was devided by 12 and inflated to reflect food price inflation between 2011 and the year of the survey (2016) (WFP, 2014).

the quantities harvested of all crops. The third graph shows a positive correlation between the value of food consumed and the quantity of crops produced. Households at the bottom 40 percent of the crop production distribution are unable to consume above the food poverty line. The last graph in Figure 16 shows a decreasing relationship between food consumption and the dependency ratio, defined as the ratio between the number of children and elderly and the number of active household members. Households with higher labour capacity and lower dependency ratios seem to consume more. However, the average dependency ratio in the SNNP2 sample is lower than the critical level of 3, above which a household is generally classified as labour constrained. Only those with less than 0.8 dependents per active member have a value of consumption per adult equivalent above the food poverty line.

Figure 16: **Food consumed and production capacity, SNNP2 sample**



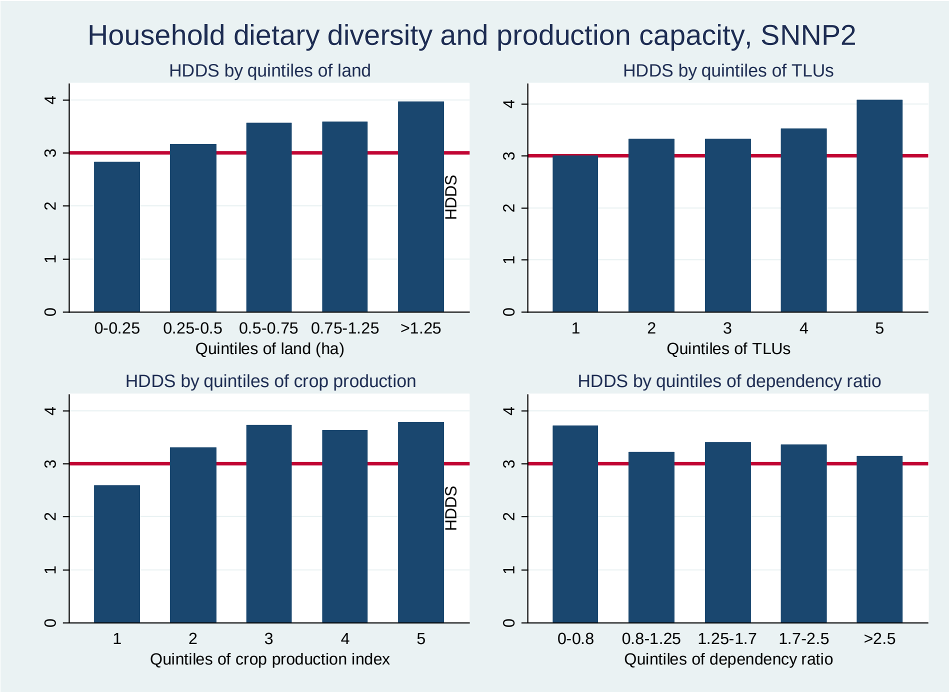
Note: PAE = per adult equivalent; ha=hectares; TLU = tropical livestock units. Our elaboration from raw data.

In Figure 17 we show a similar analysis by using the Household Dietary Diversity Score (HDDS) as the outcome of interest. There are no established cut-off points that indicate adequate or inadequate dietary diversity for the HDDS. IFPRI proposes to use a threshold of 4.5 (Coates et al., 2006). The FAO indication is to use the sample mean or the median or other location parameters of the HDDS distribution, depending on the context (FAO, 2011). Given the range of the HDDS in our sample, and following other studies (Kennedy et al., 2010), we set the cut off at 3, which is represented by the horizontal red line in each sub-graph of Figure 17. The first three graphs show an increasing relationship between dietary diversity and productive capacity. Households that operate more land, own more livestock and produce larger quantities of crops enjoy a more diversified diet. However, households that lie at the bottom 20 percent of land distribution, TLU and crop production do not reach the critical level of 3 and can be considered to have an inadequate diet.

Comparing the findings from the first three graphs of Figure 16 to the corresponding graphs in Figure 17, we notice that households in the second quintile of the distribution reach the minimum level of dietary diversity despite being below the food poverty line. This may appear contradictory, but there are possible reasons for this result: 1) we may have set an arbitrarily low cut-off point for the HDDS; and 2) monetary consumption/poverty and dietary diversity/undernourishment are two different, though interrelated, concepts, for which results can diverge. However, the two analyses agree for the households at the bottom 20 percent of the productive capacity distribution: these households reach neither the food poverty line nor the minimum level of dietary diversity. The last graph in Figure 17 shows a non-monotonically decreasing relationship between dietary diversity and the dependency ratio and a weak influence of labour capacity on the chances of the household to consume adequately diversified food.

Although far from having a causal interpretation, these descriptive findings may have implications for the targeting of nutrition-sensitive and productive interventions. They clearly indicate that further efforts should be made to lift those at the bottom 20 percent of the productive capacity distribution out of food poverty and poor nutrition.

Figure 171: Household dietary diversity and production capacity, SNNP2 sample



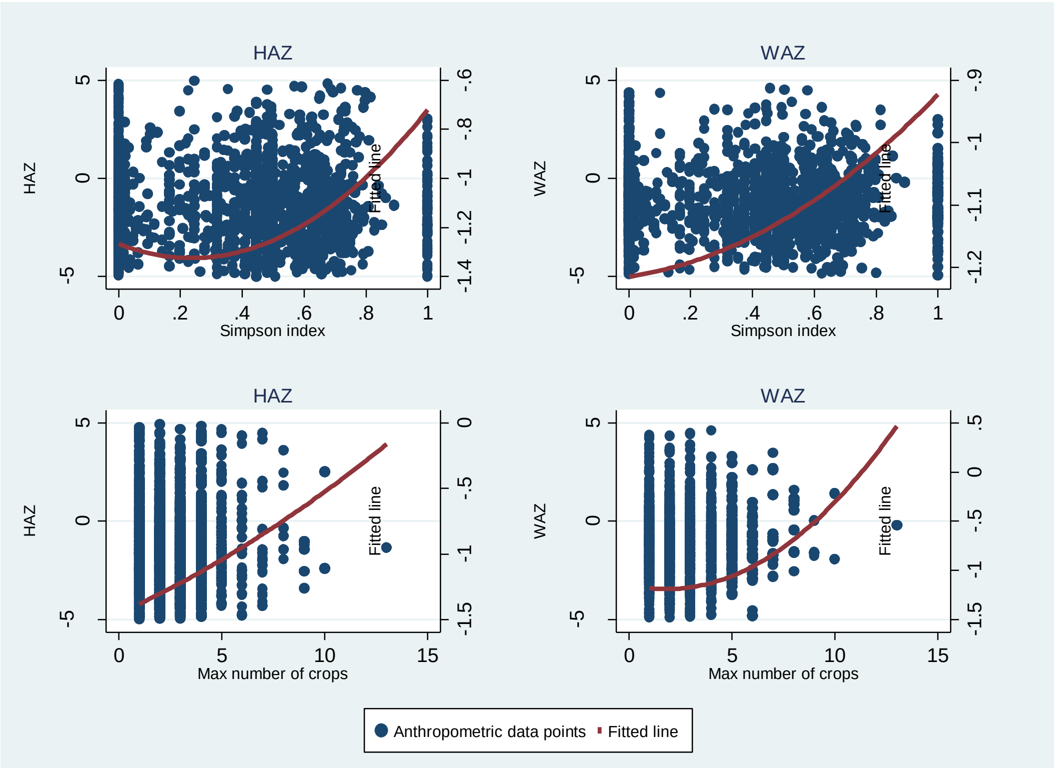
Note: HDDS = household dietary diversity score; ha=hectares; TLU = tropical livestock units. Our elaboration from raw data.

Crop diversification and nutrition

Crop diversification also plays an important role in providing the household with sufficient and adequate food. For the SNNP1 sample, we look at the relationship between child anthropometric indicators and diversification measures. We use the Simpson index based on harvested quantities and the number of crops grown by the farmer as proxies for crop diversification. The top left and top right graphs in Figure 18 illustrate the influence of the

Simpson index on the HAZ and WAZ, respectively. The positive effects of diversification on height kick in slightly above the average level of diversification of harvested quantities. On the other hand, the relationship between weight and the Simpson index seems monotonically increasing. The graphs in the lower panel of Figure 18 show the relationship between the number of cultivated crops and children's heights and weights. The results mirror what we observed for the Simpson indexes of diversification. In particular, adding one crop to the production basket leads to an average increase in children's height of five cm and to an increase in children's body weight of 1.25 kg.

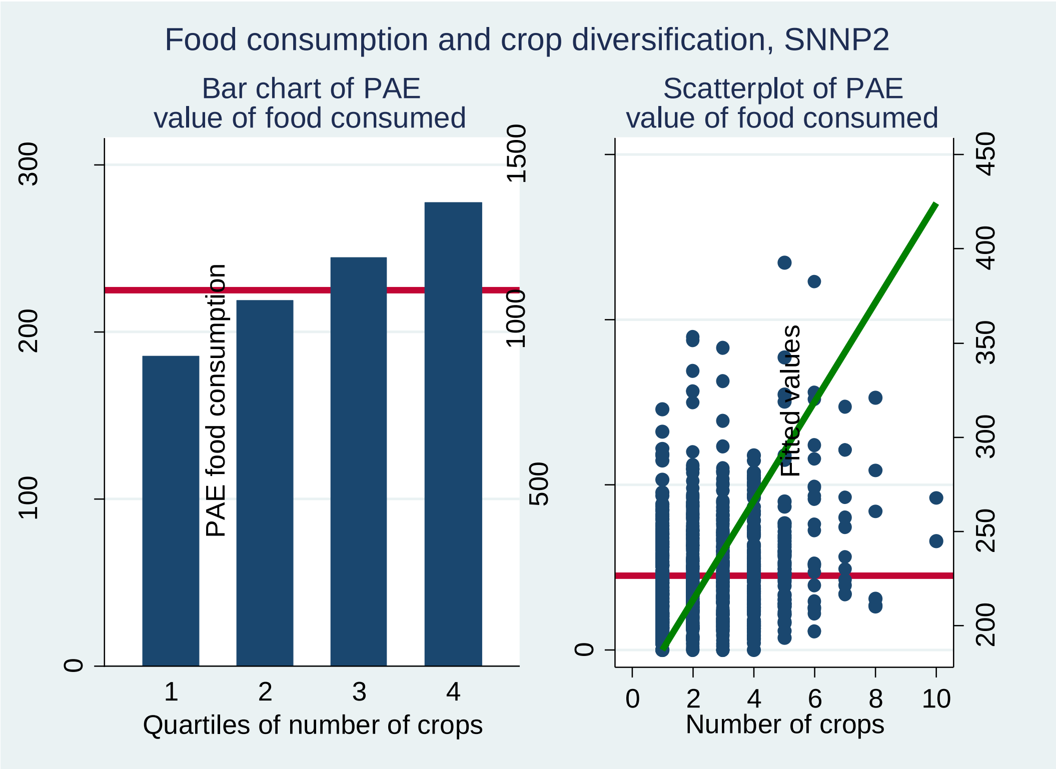
Figure 18: **Child anthropometrics and livelishoods, SNNP1 sample**



Note: Our elaboration from raw data.

For the SNNP2 sample, graphs in Figure 19 illustrate the relationship between the value of per adult equivalent food consumption and the number of crops grown. The bar chart shows that more diversified farmers consume more food at home. Households lying at the bottom 50 percent of the distribution, which grow less than three crops, fail to achieve the food poverty line, on average. The increasing relationship is even clearer in the scatterplot where we have added the regression line that interpolates the cloud of data points. The estimated relationship shows that adding one crop to the output basket increases the per adult equivalent value of consumed food of the average household by 26 birr, or by 12 percent.

Figure 19: **Food consumption and crop diversification, SNNP2 sample**

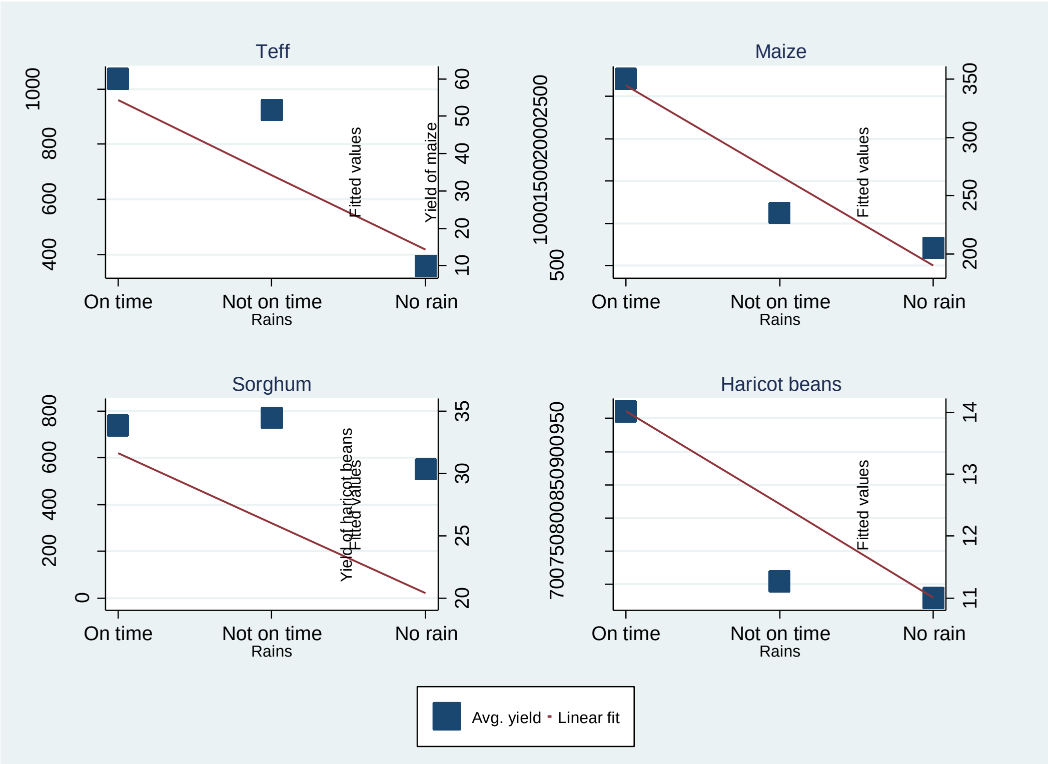


Note: PAE = per adult equivalent. Our elaboration from raw data.

Crop and garden production and access to water

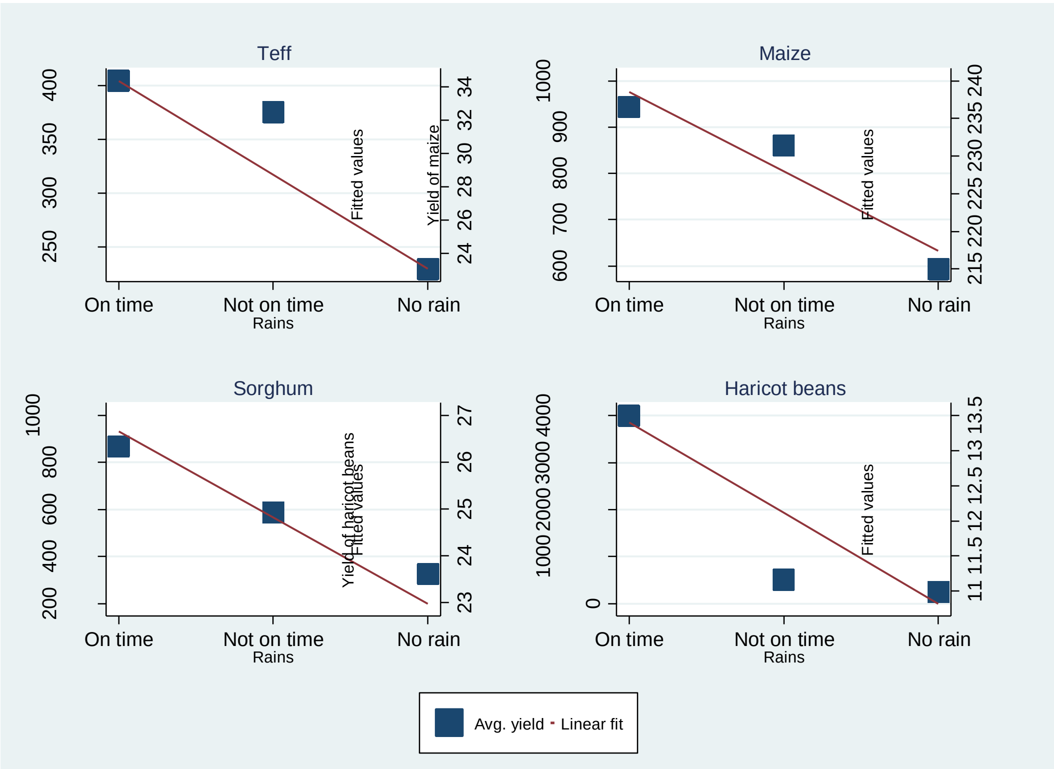
Rainfed agriculture is the primary source of food production globally. Almost all land in sub-Saharan Africa (93 percent), three-quarters of cropland in Latin America, two-thirds of cropland in the Middle East and North Africa region is rainfed. On average, rainfed agriculture productivity (tonnes/ha) is globally less than half of that of irrigated agriculture (FAO, 2002). Figure 20 and Figure 21 illustrate the relationship between selected crop yields and rainfall timeliness and abundance. The horizontal axis shows three categories in decreasing order of desirability which group households into those who experienced timely rainfalls, those who experienced rainfalls that were either too early or too late and those who did not benefit from rainfalls at all. Figure 20 shows that in the SNNP1 sample, for farm households that benefited from timely rainfalls the yields are higher than for those that experienced untimely rainfalls, regardless of the crop. For maize and beans, the timeliness of the rainfalls seems to have a sizeable impact on yields, while it affects teff and sorghum yields to a lesser extent. Lack of rainfalls, on the other hand, causes a drastic reduction in yelds across all crops. Figure 21**Figure** shows a similar pattern for the SNNP2 sample.

Figure 20: **Crop production and rainfall timeliness, SNNP1 sample**



Note: Our elaboration from raw data.

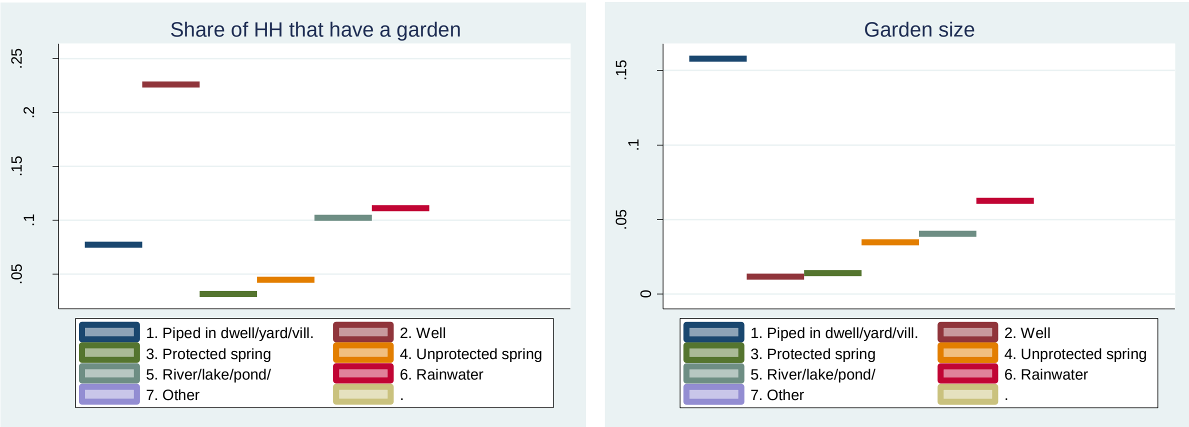
Figure 21: **Crop production and rainfall timeliness, SNNP2 sample**



Note: Our elaboration from raw data.

Access to water is a vital aspect of food security and nutrition, yet recognition of the links between water and food production are often overlooked. Water of appropriate quality and quantity is essential for drinking and sanitation and for hygiene processes, for food production and preparation. In many local contexts, domestic water use includes subsistence gardening and livestock, crucial for ensuring food security. In Kenya and Senegal, 71 to 75 percent of households use domestic water supplies for productive activities including food gardening, while 54 to 61 percent use piped water for these productive activities (Hall et al., 2013). Figure 22 shows the relationship between homestead gardening and the main source of drinking water (horizontal axis). The share of households that have a garden is higher among those that use the well as their main source of drinking water. Almost one in every five households that uses a well as the main source of drinking water has a home garden. However, the size of the garden in this category is very small on average. Among housheolds that have access to piped drinking water, be it located in the dwelling,the yard or in the village, the share of those who cultivate is lower, but those who do cultivate gardens have larger ones. As one moves along the horizontal axis the source of drinking water worsens and the average size of the gardens increases.

Figure 22: Home gardening and access to water, SNNP1 sample



Note: Our elaboration from raw data.

Women's empowerment and nutrition outcomes

Women's empowerment[23] is one of the fundamental channels through which any programme influences nutrition by improving care practices and, through these, the diet and health of households. Women can play a central role in improving nutrition since, compared to men, the resources and income that women control have positive impacts on nutrition because they are more likely to be directed towards food, education, health and care, especially of children (Thomas et al., 1990; Quisumbing and La Brière, 2000). In the food and agriculture sector, women's empowerment should lead to equal participation of women and men as decision-makers and to equal access to productive resources (FAO, 2017). In particular, indicators of women's empowerment may focus on different aspects of control over resources and opportunities: income, time/labour, assets, knowledge and decision-making. Gender equity is one of the principles guiding PSNP implementation. In order to enhance women's equal

[23] Women's empowerment refers to improving the social, economic, political and legal strength of women, so that they gain power and control over their own lives.

participation and increase their benefit, the fourth phase of PSNP more systematically addresses gender-related concerns, particularly in the areas of nutrition, household asset management, and community cohesion.

Although it is important to measure the aspects most likely to be affected by a given intervention, we are limited by our data which only allow for the measurement of access and control over farmland. In particular, we look at the share of households in which at least one plot is registered in the name of the spouse (Reg_spouse) or is managed by the spouse (Gro_spouse). Some differences emerge in terms of plot management by the household head and the spouse (Table 23). We restrict the analysis to the male-headed households for which we know the spouse is a woman. In three percent of the households in the SNNP1 sample, there is at least one plot registered in the name of the wife. In the remaining part of the sample, plots are registered mainly in the name of the household head or in the name of both head and spouse. In a similar share of households (five percent) there is at least one plot for which the wife is in charge of deciding on what to grow in the plot. In the SNNP2 sample, the share of households with at least one plot registered in the name of, or managed by, the wife is very close to the corresponding share in the SNNP1 sample. In the SNNP1 sample, these two gender-related variables are unequally distributed across treatment arms, because of the low share of such households in the PSNP-only control group (C2) relative to the joint treatment arm (T). In the SNNP2 sample, these characteristics appear well balanced across groups. Overall, wives' exclusive access and management of farmland is quite low in the sample.

Table 23: Land control by spouses in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
Reg_spouse	0.03	0.04	0.04	0.01	0.00	0.04	0.00
	(0.00)	(0.00)	(0.00)	(0.13)	(0.96)	(0.00)	
Gro_spouse	0.05	0.07	0.06	0.03	0.01	0.03	0.06
	(0.00)	(0.00)	(0.00)	(0.00)	(0.39)	(0.02)	
SNNP2							
Reg_spouse	0.02	0.02	0.02	0.01	0.01	0.02	0.49
	(0.00)	(0.00)	(0.04)	(0.40)	(0.75)	(0.17)	
Gro_spouse	0.04	0.04	0.05	0.03	-0.02	0.01	0.31
	(0.00)	(0.00)	(0.00)	(0.02)	(0.18)	(0.85)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms. Reg_spouse: plot is registered in the name of the spouse. Gro_spouse plot is managed by the spouse.

Another indicator of women's involvement in the economic activities of the farm-household is their access to credit as shown in Table 24. We also look at women access to production and consumption loans in the SNNP1 and SNNP2 samples. The share of women who have managed to access a loan for productive purposes is around two percent in both the SNNP1 and SNNP2 samples. Compared to the corresponding figures discussed earlier in this report, men who obtain productive loans greatly outnumber women who manage to do so (eight percent vs two percent). Access to consumption loans is slightly easier for women, but these are less telling about women's engagement in economic activities since they mostly refer to purchases on credit at local shops. Access to both types of loans is spread equally accross the three groups.

Table 24: Access to credit by women in the SNNP1 and SNNP2 samples

	All	T	C1	C2	T vs C1	T vs C2	T vs C1 vs C2
SNNP1							
Prod loans	0.02	0.02	0.03	0.01	-0.01	0.01	0.09
	(0.00)	(0.00)	(0.00)	(0.12)	(0.80)	(0.18)	
Cons loans	0.05	0.06	0.04	0.04	0.02	0.03	0.16
	(0.00)	(0.00)	(0.00)	(0.00)	(0.23)	(0.10)	
SNNP2							
Prod loans	0.02	0.03	0.03	0.00	-0.00	0.02	0.52
	(0.00)	(0.00)	(0.01)	(0.85)	(1.00)	(0.19)	
Cons loans	0.04	0.06	0.03	0.02	0.02	0.04	0.21
	(0.00)	(0.00)	(0.00)	(0.17)	(0.28)	(0.04)	

Note: Column 1 shows the overall sample mean, columns 2–4 show group means, while columns 5–6 show the difference in sample means between treatment arms. For columns 1–6, p-values of the corresponding null hypothesis are shown in parentheses. The last column shows the p-value of an ANOVA F-test for the equality of sample means across all three arms.

Finally, we look at how food consumption and dietary diversity differ between households where spouses take decisions on what to grow on some of the plots and households where the head takes such decisions for all plots. Results are shown in Table 25. Households with mixed productive decision-making show clearly higher values of food consumed per adult equivalent and of HDD score, although only the latter difference is statistically significant. This finding fosters the idea that women's involvement in decisions concerning the economic life of the farm-household and, more generally, their empowerment is crucial for improving the household's food security status.

Table 25: Food consumption and diet diversity: gender aspects, SNNP2

	Head decides	Spouse decides	Diff
Value food consumed (PAE)	219.54	235.27	15.73
	(45.36)	(13.27)	(0.77)
HDDS	3.36	4.00	0.64***
	(68.31)	(20.52)	(3.10)

Note: Columns 1–2 show sample means by group, while coulumn 3 shows the group differneces. Standard errors in parentheses.

5. Conclusions

The Improved Nutrition through Integrated Basic Social Services with Social Cash Transfer (IN-SCT) is a three-year-pilot programme implemented by the Government of Ethiopia and represents an integral part of the 4th phase of the Productive Safety Net Programme (PSNP4). The IN-SCT programme expands the PSNP4 by offering an integrated package of multisectoral nutrition services and aims to enhance access to social services through co-responsibilities for PSNP clients under both Permanent and Temporary Direct Support.

In this baseline report, we provide a snapshot of the rural livelihoods and show the existing linkages between production choices, nutrition and consumption behaviour in one of the two regions selected for the IN-SCT impact evaluation, the Southern Nations, Nationalities, and Peoples' Region. We describe summary statistics for key selected variables and a comparison of the treatment and comparison groups from the baseline survey implemented by the the International Food Policy Research Institute in partnership with the Institute of Development Studies at the University of Sussex and Cornell University. This impact evaluation is characterized by a three-arm design for two separate samples, stratified along two dimensions: demographically and by beneficiary status. The first sample (SNNP1) is made up of households with pregnant and lactating women and/or with children of 6-23 months of age, classified as either IN-SCT clients with temporary cash support, PSNP clients under temporary cash transfer not benefitting from the additional serices provided by IN-SCT and, finally, non–clients of neither IN-SCT nor PSNP. Instead, the second sample (SNNP2) comprises households with at least one child under five years of age and grouped depending on their participation into either IN-SCT and permanent direct support, or Public Works and cash transfer, or non-clients of any programme. The complexity of this design reflects the elaborate architecture of the IN-SCT programme and represents a positive contribution to the literature which seeks to analyse the impacts of combined programmes and policies. In fact, this evaluation aims to disentangle the impacts of different components, either in isolation or jointly. A recent literature review on agricultural and social protection interventions confirms the relative scarcity of this type of analysis (Veras et al., 2017), which allows to identify possible synergies between programmes (social protection and nutrition, in this report).

Our findings show that, for some outcomes of interest, households in the SNNP2 sample are comparatively more worse off than households in the SNNP1 sample. They cultivate less land, produce smaller amounts of crops and especially main staples like cereals, they are less engaged in wage labour market and less likely to have a non-farm business. These differences, although not large in absolute terms, are not surprising, considering that the SNNP2 sample is mostly comprised of labour-constrained households. Further, when comparing the three treatment arms in each of our samples, we observe that variables are often unevenly distributed across arms. This imbalance was expected, given the lack of a randomization process. This circumstance implies the need to properly control for these baseline differences when estimating the impacts of the programme, be it with a Propensity Score Matching (PSM) or a Difference-in-Difference approach. Most often, the pure control group, comprised of households that are participating in neither the PSNP nor the IN-SCT, stands out as faring worse than both the treatment group (households benefiting from both the PSNP and the IN-SCT) and our second control group, which includes households that only receive support from PSNP, but not the complementary interventions offered in the IN-SCT pilot.

The simple descriptive statistics included in this report show that overall, and irrespective of the treatment arm, the vulnerable rural households included in the survey have low levels of endowments, limited access to credit or markets, limited crop diversification, low productivity and involvement in non-farm activities. At first glance, it would seem very hard for these households to break out of the poverty trap and achieve food security. let alone self-sufficiency. This, in fact, is corroborated by the findings from Section 0, showing that the more land households operate, the more livestock that they own and crops they produce, the more diversified their diet is. There is a clear gradient here, and those at the bottom of the distribution (especially the two lowest quintiles) have insufficient productive resources to protect them from shocks, ensure an adequate diet and enable them to build pathways out of poverty.

These results are useful to generate hypotheses on the expected impacts of the IN-SCT programme and likely impact pathways which can later be formally tested once follow-up data are collected. For subsistence agriculture households, limited crop diversification is likely to translate into limited dietary diversity. Homestead gardening would represent a possible low-cost source of diverse vitamin-rich food, but in the studied areas only a minor share of farmers cultivate a garden. Similarly, limited production of livestock by-products such as milk, eggs and meat, unavoidably converts into limited consumption of food of animal origin, which is a source of protein. Not only quality, but also quantity, of food produced represents a concern in the studied areas, as a result of poor access to water for irrigation: only ten percent of farmers cultivating a garden rely on water piped in the dwelling or in the yard, while crop yields are highly dependent on the timeliness of rainfalls.

Findings from the analysis of anthropometric data reveal a complex nonlinear and non-monotonically increasing relationship between livelihood indicators and measures such as weight-for-age and height-for-age. This confirms existing evidence that while productive capacity is an important determinant of food availability, and hence of nutritional status, other factors such as access to water, sanitation and personal hygiene practices, among others, are likely to play an important complementary role in the reduction of stunting and wasting (Masset et al., 2012; Ruel and Alderman, 2013). Therefore, the consistent implementation of the nutrition-sensitive interventions and compliance of beneficiary households represent one of the keys to success for the IN-SCT pilot in enhancing nutrional outcomes, as shown also by the baseline analysis conducted by IFPRI (Devereux et al., 2016b).

The statistical analysis shows that IN-SCT households have partial access to extension services, which can be further improved, given its potential to improve productivity and efficiency of agriculture. This seems to be especially relevant for livestock production: while 70 percent of farmers own any type of livestock, only 10 percent of them have had any contact with a Development Agent. Furthermore, a minor share of the farmers is engaged in the production and sale of livestock by-products. The combined reading of these figures suggests that in the population of interest for this study, livestock ownership represents mostly a form of savings and collateral rather than a source of food production or income generation. This points out to the relevant role of the Development Agents in the IN-SCT implementation, which needs to be strengthened in order for the households to achieve the goals of raising productivity for their own consumption and generating sustainable sources of income.

Although nothing can be said about the impacts of the IN-SCT programme until follow-up data are collected, the binary T-C1 comparisons throughout the report may reflect the effects of PSNP that had been operating for some time before baseline data collection in the areas covered by this survey. From this cross-sectional comparison a few observations seem to be in place. Despite the great efforts spent to improve the PSNP and achieve greater synergies between social protection and nutrition, challenges remain to be met: 1) in the short term, efforts should be made to concentrate on those at the bottom 20 or 40 percent of the distribution to prevent the most vulnerable households falling even more behind; and 2) in the medium-long term, strengthening of food and security nutrition outcomes will not be sustained in the absence of other strong complementary interventions on the agricultural side, aimed at facilitating access to credit and markets (rural finance, roads and value chains), diversifying and increasing productivity (agricultural tools and inputs, crop diversification and irrigation infrastructures) and improving diets directly (home gardening). The activities implemented by Concern clearly represent only a first step in this direction.

In terms of future knowledge and evidence generation, the design of the IN-SCT evaluation allows for a disentangling and understanding of the multiplicative/additive effects of agricultural, nutrition and social protection interventions, thus representing a key contribution to the development economics literature. The richness of the survey instruments allows for a better exploration of the linkages between nutritional outcomes and agriculture, of how development programmes such as the IN-SCT pilot can have a direct and an indirect impact to food consumption and nutrition, and how these impacts are shaped by mediating factors, especially women’s contribution to decision-making and supply of services.

References

Asfaw, S., Pickmans, R., Alfani, F. & Davis, B. 2016. *Productive impact of Ethiopia's Social Cash Transfer Pilot Programme.* PtoP report. Rome, FAO. 69 pp. (also available at http://www.fao.org/3/a-i5166e.pdf).

Berhane, G. , Hoddinott, J., Kumar, N. & Taffesse, A.S. 2011. *The impact of Ethiopia's Productive Safety Nets and Household Asset Building Programme: 2006-2010.* Washington, DC, International Food Policy Research Institute. 106 pp. (also available at https://www.ids.ac.uk/files/dmfile/Impact_Report_FINAL_JAN2012.pdf).

Behrane, G., Devereux, S., Hoddinott, S., Hoel, J., Roelen, K., Abay, K., Kimmel, M., Ledlie, N. & Woldu, T. 2015. *Evaluation of the Social Cash Transfer Pilot Programme, Tigray Region, Ethiopia: Endline Report*. UNICEF. 209 pp. (also avialable at https://www.unicef.org/evaldatabase/files/UNICEF_Tigray_Endline_Report_FINAL_Ethiopia_2015-051.pdf).

Bhutta, Z.A., Das, J.K., Rizvi, A., Gaffey, M.F., Walker, N., Horton, S., Webb, P., Lartey, A. & Black, R.E. 2013. Evidence-based interventions for improvement of maternal and child nutrition: What can be done and at what cost? *The Lancet*,382(9890):452–77.

Christoplos, I. 2010. *Mobilizing the potential of rural and agricultural extension.* Rome, FAO & N GFRAS . 64 pp. (also available at http://www.fao.org/docrep/012/i1444e/i1444e.pdf.

Coates, J., Swindale A. & Bilinsky P. 2006. *Household Food Insecurity Access Scale (HFIAS) for measurement of household food access: Indicator guide (v. 2).* Washington, D.C.: Food and Nutrition Technical Assistance, Academy for Educational Development.

Daidone, S., Davis, B., Dewbre, J., Miguelez, B., Niang. O. & Pellerano, L. 2017. Linking agriculture and social protection for food security: The case of Lesotho. *Global Food Security*, 12: 146-154. Amsterdam, Elsevier. (also available at https://ac.els-cdn.com/S2211912416300517/1-s2.0-S2211912416300517-main.pdf?_tid=22255d14-0378-11e8-b715-00000aacb360&acdnat=1517067694_e6b93e3fb1884c0bb002ce4ce579f1db)

Daidone, S., Davis, B., Handa, S. & Winters, P. 2017. *The household and individual-level economic impacts of cash transfer programmes in sub-Saharan Africa. Synthesis Report.* PtoP project Report. Rome, FAO. 66 pp. (also available at http://www.fao.org/3/a-i6826e.pdf).

Devereux, S., Gilligan, D., Hirvonnen, K., Hoddinott, J., Roelen, K. & Taffesse, A. (2016a). *Impact Evaluation of the UNICEF Social Cash Transfer Pilot Programme in Oromia and SNNP Regions, Ethiopia. Inception Report*. UK; Ethiopia.

Devereux, S; Gilligan, D.; Hoddinott, J.; Jilani, A.; Kebede, D.; Ledlie, N.; Roelen, K. & Taffesse, A. (2016b). *Impact Evaluation of the UNICEF Social Cash Transfer Pilot Programme In Oromia and SNNP Regions, Ethiopia. Baseline Survey Report.*UK; Etiopia.

FAO. 2011. *Guidelines for measuring household and individual dietary diversity.* Rome. 60 pp. (also available at http://www.fao.org/docrep/014/i1983e/i1983e00.pdf).

FAO. 2002. *The State of World Fisheries and Aquaculture. Fisheries Department*. Rome.150 pp. (also available at http://www.fao.org/3/a-y7300e.pdf).

FAO. 2015. *Nutrition and social protection*. Rome . 36 pp. (also available at http://docs.scalingupnutrition.org/wp-content/uploads/2015/09/Nutrition-and-Social-Protection.pdf).

FAO. 2015. *Designing nutrition-sensitive agriculture investments.* Rome. 49 pp. (also avialable at http://www.fao.org/3/a-i5107e.pdf).

FAO. 2016. *Compendium of indicators for nutrition-sensitive agriculture.* Rome.

FAO. 2017. *Nutrition-sensitive agriculture and food systems in practice. Options for intervention.* Rome. 82 pp. (also available at http://www.fao.org/3/a-i6983e.pdf).

Hall, R., Van Koppen, B. & van Houweling, E. 2013. The human right to water: the importance of domestic and productive water rights. *Science Engineering Ethics*, 20 (4): 849–866. Springer, Netherlands. (also available at https://link.springer.com/content/pdf/10.1007%2Fs11948-013-9499-3.pdf).

Hoddinott, J., Headey, D. & Dereje, M. 2015. Cows, missing milk markets, and nutrition in rural Ethiopia. *The Journal of Development Studies*, 51(8): 958-975.

Kennedy G., Berardo A., Papavero C., Horjus P., Ballard T., Dop M. C., Delbaere J., & Brouwer I. 2009. Proxy measures of household food consumption for food security assessment and surveillance: comparison of the household dietary diversity and food consumption scores. *Public Health Nutrition*: 13(12), 2010–2018 (also available at doi:10.1017/S136898001000145X).

Masset, E.; Haddad, L.; Cornelius, A. & Isaza-Castro, J. 2012. Effectiveness of agricultural interventions that aim to improve nutritional status of children: a systematic review, *British Medical Journal*, 344: d8222. (also available at https://doi.org/10.1136/bmj.d8222).

McDonald, J., H. 2008. Handbook of biological statistics. Sparky House Publishing Baltimore, Maryland. 296 pp.

Ministry of Agriculture of Ethiopia. 2014. *Productive Safety Net Programme Phase IV Programme Implementation Manual.* Addis Ababa.

Quisumbing, A.R. & de La Brière, B. 2000. Women's assets and intrahousehold allocation in rural Bangladesh: Testing measures of bargaining power. IFPRI, FCND Discussion Paper 86. Washington DC. 63 pp. (also available at http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/125454/).

Ruel, M.T. & Alderman, H. 2013. Nutrition-sensitive interventions and programmes: How can they help to accelerate progress in improving maternal and child nutrition? *The Lancet*: 382(9891), 536-551

Schubert, B. 2015. *Design and logical framework of the Social Cash Transfer Pilot Programme in Oromia and SNNPR implemented by MoLSA/BoLSAs as part of the Productive Safety Net Programme, Phase 4.* Report coomissioned by UNICEF.

Thomas, D., Strauss, J., & Henriques, M.H. 1990. Child survival, height for age and household characteristics in Brazil. *Journal of Development Economics* 33, 197–234.

Triki T. &Faye I. 2013. *Financial inclusion in Africa*. African Development Bank. Tunis, AfBD. 146 pp. (also available at https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Financial_Inclusion_in_Africa.pdf).

Veras Soares, F., Knowles, M., Daidone, S. & Tirivayi, N. 2017. *Combined effects and synergies between agricultural and social protection interventions: What is the evidence so far?* Rome. FAO. 143 pp. (also available at http://www.fao.org/3/a-i6589e.pdf).

World Bank. 2010. *Lessons learned from Ethiopia's Productive Safety Net Programme 2005–2009.* Washington, DC. 168 pp. (also available at http://siteresources.worldbank.org/SAFETYNETSANDTRANSFERS/Resources/EthiopiaPSNPLessonsLearnedLite.pdf)**WFP & (CSA) Ethiopia**. 2014. *Ethiopia. Comprehensive Food Security and Vulnerability Analysis (CFSVA).* A joint publication between the Ethiopia Central Statistical Agency and the World Food Programme. 107 pp. (this report and a summary report are available at http://www.csa.gov.et and http://www.wfp.org/food-security/).

Food and Agriculture Organization of the United Nations (FAO)

Viale delle Terme di Caracalla

00153 Rome, Italy

FAO, together with its partners, is generating evidence on the impacts of coordinated agricultural and social protection interventions and is using this to provide related policy, programming and capacity development support to governments and other actors.

http://www.fao.org/social-protection/en/

ISBN 978-92-5-130398-6

9 789251 303986

I8773EN/1/04.18