P4P Global Learning Series

Impact Assessment Report: Tanzania

March 2014

WFP World Food Programme wfp.org

P4P Purchase for Progress

The Impact of P4P on SACCOs and Smallholder Farmers in Tanzania

March 2014

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ACRONYMS

AMCO	Agricultural Marketing Cooperative
DiD	Difference in Differences
FO	Farmers' Organization
ha	hectares
HH	Household
LRP	Local and Regional Procurement
mt	metric tonnes
NFRA	National Food Reserve Agency
P4P	Purchase for Progress
SACCO	Savings and Credit Cooperative
USD	United States Dollars
WFP	World Food Programme
WRS	Warehouse Receipt System

EXECUTIVE SUMMARY

The World Food Programme's (WFP) five-year Purchase for Progress (P4P) pilot initiative tests innovative approaches for linking some of the world's poorest farmers to formal commodity markets. If successful, P4P will transform smallholder low-income farmers from subsistence farming to business-oriented producers capable of delivering consistent surpluses to private sector buyers, government institutions, and international organizations. Remunerative participation in commodity markets should provide smallholder farmers the incentive and the means to invest in agricultural production thereby increasing their incomes and improving their wellbeing.

To accomplish this goal, WFP has committed about ten percent of its local and regional procurement (LRP) in 20 countries[1] to testing alternative approaches for procuring in a manner that more directly benefits smallholder low-income farmers. This commitment represents a substantial demand. In 2012, WFP purchased almost a half-million mt of food from the 20 pilot countries, transferring almost USD 204 million into the local economies.[2]

Each of the 20 P4P pilot countries developed its own strategy for engaging with smallholder farmers, taking into account the local environment, opportunities, and constraints. Building the capacities of smallholder farmers' organizations (FOs) to become active market participants is at the center of all the strategies and WFP buys directly from FOs in almost all pilot countries. When the opportunities existed, some countries integrated structured market platforms (commodity exchanges and warehouse receipt systems), small and medium traders, and food processors into the basic FO-centric model.

The P4P hypothesis describes a development progression that begins with building the capacities of FOs to aggregate commodities, add value (e.g., achieve WFP quality standards), and identify and sustainably access markets. To gain these capacities, FOs will necessarily need to engage their members; providing them with technical and financial services to support production and marketing, building trust and ownership, and promoting a business-oriented approach to farming. The progress individual countries are able to make along this progression will depend on the baseline capacities they find among FOs and smallholder farmers, the approach they take to capacity building, and characteristics of the enabling environment (e.g., partner support and policy).

P4P in Tanzania

Tanzania buys from Savings and Credit Cooperatives (SACCOs), SACCOs networks, and Agricultural Marketing Cooperatives (AMCOs) and works to link them to a nascent warehouse receipt system (WRS) to facilitate financing for SACCO members. However, SACCOs are prohibited from marketing and the few AMCOs that were functioning when implementation began lacked meaningful capacity. For example, few had marketing experience and most warehouses were dilapidated and unsuitable for commodity aggregation and storage. Nevertheless, these were the structures that were in place in Tanzania with which P4P could engage.

[1] Afghanistan, Burkina Faso, Democratic Republic of Congo, El Salvador, Ethiopia, Ghana, Guatemala, Honduras, Kenya, Liberia, Malawi, Mali, Mozambique, Nicaragua, Rwanda, Sierra Leone, South Sudan, Tanzania, Uganda, and Zambia.
[2] WPF. (2012). Food Procurement Annual Report 2012. Rome. Accessed at: http://documents.wfp.org/stellent/groups/public/documents/communications/wfp255336.pdf

The low baseline capacity in Tanzania necessitated a substantial investment of time and resources to develop even a minimal capacity among P4P-supported SACCOs and AMCOs. Furthermore, because it was working with organizations that are prohibited from marketing agricultural commodities, the program had to negotiate with government to begin operations. It also expended considerable effort supporting, operationally and on the policy side, an emerging WRS. The program has directly contributed to substantial capacity improvements for SACCOs and AMCOs by rehabilitating and equipping 23 warehouses, 10 of which are certified by the Tanzania Warehouse Licensing Board to operate WRS. It also invested substantially in an ambitious program to train SACCOs members and leaders in topics focused on production, institutional capacity building, agri-business management, quality control, gender issues, and WFP procurement. On the demand side, WFP has supported the SACCOs by purchasing over 9,000 mt of commodities from 27 P4P-supported SACCOs, AMCOs, and SACCOs networks.[3] All of these activates are part of the P4P "treatment" in Tanzania and therefore, not outcomes of P4P.

Assessing the Impact of P4P

Based on an M&E report covering the first half of the Tanzania pilot, P4P-supported SACCOs and farmers were unquestionably better off in 2011 than in 2009 by almost any objective measure. For example, the 25 P4P-supported SACCOs from which the country office collected data reported substantial increases in marketing capacity (percentage marketing and quantities sold to WFP and other buyers), the number of marketing and quality services provided to members, and use of market price information. A random sample of 321 farmer members of these SACCOs reported an average 60 percent increase in the quantity of maize produced, an increase in the likelihood of producing a maize surplus, an average 58 percent increase in the size of maize surpluses, and a 67 increase in annual household income, with the greatest percentage increase coming from crop production.

Trends in SACCO capacity and household production and welfare, however, do not constitute evidence that the observed changes are caused by participating in P4P. To credibly attribute changes to P4P it is necessary to compare these outcomes to those that *would have occurred had these same SACCOs and households not participated in P4P*. This report applies appropriate analytical techniques to the data to estimate the causal effects of P4P on key indicators of SACCO capacity and smallholder farmers' production and marketing of staple commodities and on their household income.

Data and Methods

The impact assessment analysis for SACCOs draws largely from survey data collected from 25 P4P-supported SACCOs and a matched set of 25 SACCOs that are not participating in P4P. The Tanzania country office collected data from all of these SACCOs annually throughout the pilot (2009-2013). The household analysis draws from surveys of random samples of farmer members of both P4P and non-SACCOs conducted at the baseline, midpoint, and final periods of the pilot (2009, 2011, and 2013). Accounting for attrition, the panel dataset contains observations for 321 P4P and 343 non-P4P households.

The SACCO and household impact analyses uses a difference-in-differences (DiD) approach to estimate the causal effects of participating in P4P on SACCO capacity and household production, marketing, and welfare indicators. Both analyses rely on comparing outcomes for P4P groups with those of non-P4P groups which represent the counterfactual of not having participated in P4P. To control for potential differences between

[3] WFP procurement records through December 2013.

the two groups, both models control for other factors that may have affected observed outcomes. Both analyses bolster the analytical results with visual inspection of the data to build a convincing case for causal effects.

Findings and Conclusions

SACCOs were not the ideal entry point for P4P because they focus on savings and credit and are legally prohibited from aggregating or marketing agricultural commodities. However, they were the only viable organizations WFP found that were supporting smallholder farmers in Tanzania. In spite of the legal difficulties, WFP targeted SACCOs while simultaneously building the capacities of parallel marketing organizations (AMCOs, networks, associations) to manage aggregation, warehouse management, and marketing on behalf of the SACCOs. Consequently, WFP began in Tanzania working with FOs that had limited to no marketing experience or capacity. In fact, none of the 25 P4P and 25 non-P4P SACCOs surveyed reported any experience selling maize in the two years prior to the 2009 baseline.

At the production level, Tanzania initially implemented P4P in eight regions[4] proximate to WFP operations and the surveyed SACCOs are all in these regions. Only two are in the major maize production areas (Manyara and Kigoma) while the remaining six are often in deficit.[5] Therefore, production capacity was also lower than the national average for many P4P households. Furthermore, the primary regions in which P4P operates suffered from drought in 2009 which probably depressed production in 2009 relative to other years.[6] Distances, poor transportation infrastructure, and poorly integrated markets also hamper the flow of food from surplus to deficit areas and the distribution of agricultural inputs.

These basic conditions define the "baseline" for achieving the anticipated results laid out in the results framework of Figure 4and Figure 5. The remainder of this section frames the conclusions in the context of the results framework. It presents results in the sequence in which they are likely to occur; SACCO capacity, household marketing, household production, and household welfare.

Impact of P4P on SACCO Capacity

Figure 4 summarizes anticipated results and facilitators of SACCO capacity and serves to frame the conclusions presented in this section.

Although the SACCOs selected to participate in P4P represented smallholder farmers, they were not marketing organizations. Consequently, they lacked the physical infrastructure (warehouses and equipment) necessary to manage aggregation and marketing. Even though 30 percent of P4P SACCOs reported having access to storage in the 2009 baseline survey, WFP's assessment found that these were largely dilapidated community-owned sheds unsuitable for effectively managing aggregation and quality.

The services P4P SACCOs reported providing their members also reflected SACCOs' limited capacities to support agricultural production, value addition, and marketing. In fact, in 2009, 60 percent of the P4P SACCOs reported providing no agricultural services to their members. Those that did provide services appear to have concentrated on supporting agricultural production (e.g., training and facilitating access to

[4] Kilimanjaro, Manyara, Arusha, Kigoma, Kagera, Dodoma, Singida, and Tabora.
[5] http://www.fao.org/fileadmin/templates/mafap/documents/technical_notes/URT/TANZANIA_Technical_Note_MAIZE_EN_Oct2013.pdf
[6] Tanzania P4P Story.

FIGURE 1: SUMMARY OF IMPACT OF P4P ON SACCO CAPACITY

Maize Marketing

	Indicators		Results attributable to P4P
Organizational capacity	Planning	↑	Significant positive impact on P4P SACCOs planning for production and marketing.
	Services	↑	Significant positive impact on P4P SACCOs provision of production, marketing, and quality services.
	Inputs	↑	Significant positive impact on P4P SACCOs facilitating members' access to inputs.
	Training	→	No significant impact on productivity training provided to members relative to non-P4P SACCOs
Marketing capacity outcomes	Sales	↑	Significant positive impact on total quantity of maize sold.
	Market diversity	↑	Significant positive impact on quantity sold to buyers other than WFP.
	Financing for members	↑	Significant positive impact on facilitating post-harvest financing for members.
	Prices	↑	Several sources of evidence suggest that by 2013, P4P households obtained higher average prices for maize than non-P4P households and that the margin was larger for households that sold through the SACCO.
Impacts	Sustainable access to value-added staples markets (increasing trajectory of quantities sold, especially to formal buyers; declining dependence on WFP market, established relationship with financial institutions, access to permanent storage facilities of at least 500 mt capacity)		

Facilitators		Changes attributable to P4P
Infrastructure	↑	Improved quality of warehouse facilities and access to equipment
Procurement	↑	Relatively consistent and sizable procurement
Supply-side support	↑	Increased supply-side support for infrastructure, production, marketing, and inputs relative to non-P4P SACCOs
Procurement	↑	Relatively consistent and sizable procurement
Access to credit	↑	Greater access to credit in 2013 relative to non-P4P SACCOs

Legend

↑ Statistically significant positive impact attributable to participating in P4P.
↓ Statistically significant negative impact attributable to participating in P4P.
→ No statistically significant impact associated with participating in P4P.

inputs), marketing (i.e., weighing and bagging, connecting farmers to buyers), and storage (i.e., warehousing and fumigation).[7]

At the time of the 2009 baseline, the development community was supporting P4P and non-P4P SACCOs but the assistance focused largely on organizational strengthening and management (i.e., record keeping, financial management, group management, and business planning). Ninety-six percent of surveyed SACCOs reported having received such assistance. Few SACCOs reported receiving other types of assistance although P4P SACCOs were significantly more likely than non-P4P SACCOs to have received assistance with agricultural production (48 percent versus 12 percent) and marketing (40 percent versus 8 percent).

In response to these limitations, WFP initially focused, with the help of partners, on strengthening marketing infrastructure and skills, and preparing SACCOs to sell to WFP. By the end of 2010, WFP had directly rehabilitated 23 warehouses, 10 of which were ultimately licensed with the Tanzania Warehouse Licensing Board to be used as WRS warehouses. To further build organizational capacity, WFP also provided (loaned) warehousing equipment (tarps, fumigation sheets, scales, stitching machines, generators, pallets, spears, moisture analyzers, first extinguishers, and milling machines) to 29 SACCOs and trained SACCOs in their use.

WFP and its partners also trained all P4P-supported SACCOs in agribusiness management; credit and finance; institutional capacity building; gender sensitivity; monitoring and evaluation; post-harvest handling, storage, and quality control; production and productivity; and WFP procurement procedures. As a consequence, the percentage of P4P SACCOs reporting receiving external assistance with production, marketing, inputs, and infrastructure increased by greater margins than among non-P4P SACCOs. To the extent that WFP did not provide this assistance directly, it reflects supply-side support catalyzed by WFP's commitment to buy from the SACCOs.

These direct investments and training put in place many of the facilitating factors necessary to support organizational capacity building. The other crucial facilitator is WFP's procurement stimulus. By the end of the pilot, WFP had registered 27 SACCOs and other organizations (AMCOs, networks, associations) as WFP suppliers and had purchased at least once from all of them. It had purchased in only one year from 7 (26 percent), in two years from 7 (26 percent), in three years from 10 (37 percent), and in four years from 3 (11 percent). On average, SACCOs that sold to WFP in any given year received contracts for 223 mt. WFP appears to have provided a reasonably consistent and sizable procurement stimulus in Tanzania.

These investments in the facilitators of organizational capacity quickly paid dividends in measurable indicators of SACCO capacity. Specifically:

- The availability of storage infrastructure and equipment coupled with training quickly led to large increases in the number of production, marketing, and quality services P4P SACCOs were able to provide to their members. P4P is responsible for an increase of 63 percentage points in the average percentage of quality services offered by P4P SACCOs, a 14 percentage point increase in production services, and a 54 percentage point increase in marketing services.
- The percentage of P4P SACCOs planning for production and marketing jumped from 48 percent to 92 percent between 2009 and 2013 compared to a change from 20 percent to 56 percent among non-

[7] SACCOs that reported supporting storage and marketing probably did so in conjunction with an AMCO or other marketing organization.

P4P SACCOs. A 10 point increase in the percentage of P4P SACCOs planning for production and marketing between 2011 and 2013 can be attributed to P4P.

- The percentage of P4P SACCOs able to facilitate members' access to inputs increased from 16 percent in 2009 to 96 percent in 2013. Relative to non-P4P SACCOs, a 24 percentage point increase is attributable to P4P.
- The percentage of P4P SACCOs providing production training to members increased from 12 percent in 2009 to 64 percent in 2013. However, non-P4P SACCOs experienced similar growth so this aspect of improved organizational capacity is not attributable to P4P.

The impact of P4P on sustainable market access for SACCOs is still an open question. One SACCOs network (Kaderes) has "graduated" from P4P and is now eligible to sell to WFP through its normal competitive tendering process. While the summary statistics suggest that the other P4P SACCOs increasingly engaged with staples markets, by 2013 only 24 percent (6 SACCOs) reported ever having sold to buyers other than WFP. The contracts WFP helped negotiate between 17 P4P SACCOs and the National Food Reserve Agency (NFRA) for 3,560 mt of maize (sales not reflected in the survey data) in 2013 will change this picture substantially.

The Tanzania P4P story and intervention details reveal several barriers SACCOs have faced building their marketing capacity. These include reliable access to warehouses and weak leadership and lack of member trust in leaders. Only 6 of the 25 surveyed SACCOs own their warehouses and the WFP country office has documented at least three instances where the warehouse used by a P4P SACCO was leased to other businesses.

Impact of P4P on Household Maize Marketing

The positive impacts of P4P on SACCO capacity established many of the facilitating conditions necessary to support household maize marketing. In particular, significant increases in quantities sold by P4P SACCOs, an expanded range of services offered by the SACCOs, and increasing market diversity should eventually influence household marketing choices, particularly the choice to sell through the SACCO (Figure 19).

Participating in P4P has significantly affected members' marketing behavior. Members of P4P-supported SACCOs were significantly more likely than members of non-P4P SACCOs to begin selling maize through the SACCO. In fact, between 2009 and 2013 the percentage of P4P SACCO members that reported ever selling maize through the SACCO increased significantly from 8 percent to 22 percent. Extrapolated to the entire reported membership of P4P-supported SACCOs, this implies that the total number of SACCO members selling through the SACCOs increased by 169 percent, from 1,001 in 2009 to 2,639 in 2013. This result reflects expanded market choices (households previously reported selling at the farm gate and in local markets) and increasing engagement with more diverse markets. It also indicates a level of trust in the SACCOs.

Prior to P4P, a majority of households reported selling at least part of their surplus maize at least four weeks after harvest. Between 2009 and 2013, the percentage fell for both P4P and non-P4P households. However, it fell by significantly more among P4P than non-P4P households – an unanticipated "impact" of P4P. The result is difficult to interpret; it is not correlated with selling through the SACCO or with the SACCO selling to WFP.

FIGURE 2: SUMMARY OF IMPACT OF P4P ON HOUSEHOLD MAIZE MARKETING

Maize Marketing						
	Indicators	**Results attributable to P4P**		**Facilitators**	**Changes attributable to P4P**	
Behavioral change	Selling through the SACCO	↑	P4P households were significantly more likely than non-P4P households to begin selling maize through the SACCO	Quantity sold by SACCO	↑	Significant increase in total quantity of maize sold relative to non-P4P SACCOs
				Quality and marketing services available from SACCO	↑	Significantly more P4P SACCOs providing production, marketing, and quality services relative to non-P4P SACCOs
	Selling more than 4 weeks after harvest	↓	By 2013, P4P households were significantly less likely than non-P4P households to report selling at least 4 weeks after harvest. Furthermore, those that sold at least 4 weeks after harvest reported selling a significantly smaller percentage of their surplus at that time.	Access to credit	→ ↑	P4P households were no more likely than non-P4P households to utilize credit for agricultural purposes. By 2013, P4P SACCOs were significantly more likely than non-P4P SACCOs to report providing post-harvest financing to members.
Household marketing outcomes	Prices	↑	Several sources of evidence suggest that by 2013, P4P households obtained higher average prices for maize than non-P4P households and that the margin was larger for households that sold through the SACCO.	Quantity sold SACCO	↑	Significant increase in total quantity of maize sold relative to non-P4P SACCOs
				Market diversity	↑	Significant increase in quantity sold to buyers other than WFP relative to non-P4P SACCOs

Legend

↑ Statistically significant positive impact attributable to participating in P4P.
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→ No statistically significant impact associated with participating in P4P.

An anticipated household level outcome is that members of P4P SACCOs will receive higher prices for their maize than members of non-P4P SACCOs, presumably because they sell through a SACCO with better marketing capacity and access to quality conscious buyers. This is a particularly important outcome since increased income from staple commodities is expected to drive increases in production and higher household incomes. Data on prices from the SACCO survey are very thin and data from the household survey very variable. However, both of these sources, triangulated with more reliable data from WFP procurement records,[8] suggest that P4P households obtained higher average prices for their maize than non-P4P households. Starting from a point of receiving statistically equivalent prices in 2009, by 2013, P4P households reported receiving an average of 8 percent more (USD 15/mt) for maize than non-P4P households and households that reported selling through the SACCO reported receiving an average of 24 percent more (USD 60/mt) than those who sold elsewhere. Neither of these differences, however, can be attributed to participation in P4P. This is not necessarily because P4P is not responsible for the change but could be that the data are too thin and variable to statistically attribute the change to P4P.

Impact of P4P on Household Maize Production

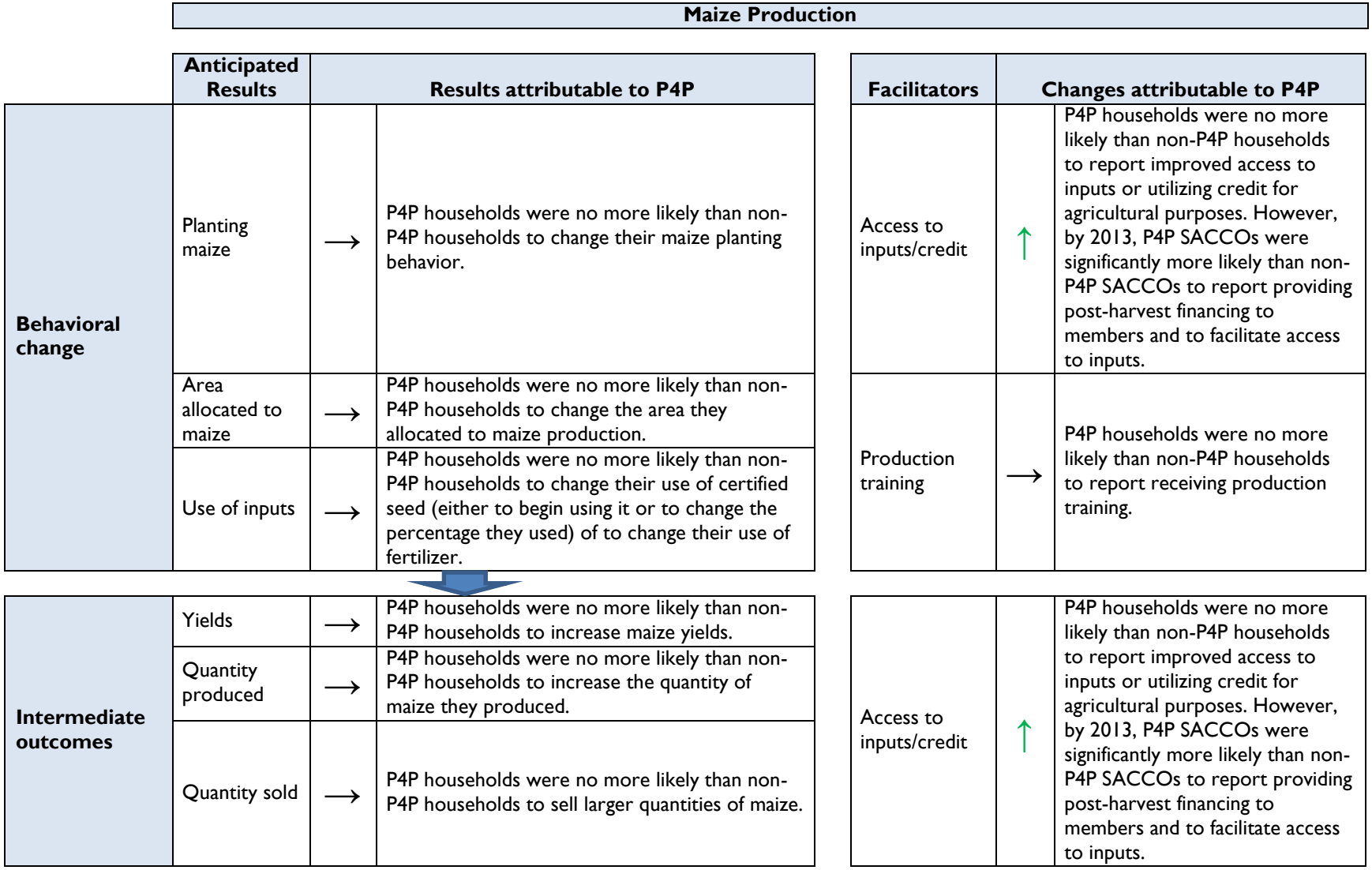
The P4P development hypothesis suggests that outcomes in household maize marketing lead to production outcomes. For example, higher prices obtained from selling maize through the SACCOs are expected to provide the incentive to invest in increasing maize production. In addition to the incentive provided by better access to markets, facilitating factors for maize production include access to inputs and credit to resolve financial constraints to investing in agriculture. P4P households were no more likely than non-P4P households to report improved access to inputs or utilizing credit for agricultural purposes. However, by 2013, P4P SACCOs were significantly more likely than non-P4P SACCOs to report providing post-harvest financing to members and to facilitate access to inputs. Specifically, between 2009 and 2013, the percentage of P4P SACCOs that reported providing financing to members between harvest and sale increased from 36 percent to 52 percent, with 24 percentage points attributable to participating in P4P. With respect to inputs, 16 percent of P4P SACCOs reported facilitating members' access to inputs in 2009. By 2013, 96 percent reported having helped members obtain inputs, an increase of 80 percentage points. The impact of participating in P4P was a 48 point increase in the percentage of P4P SACCOs facilitating access to inputs for members.

P4P households experienced some improvement in the factors facilitating maize production results and have changed their production behavior as a result. In particular:

- The percentage of P4P households planting maize increased from 83 percent to 94 percent between 2009 and 2013;
- The average area planted to maize increased by 0.20 ha (16 percent);
- The number of households using certified seed increased by 4 percentage points, from 29 percent to 33 percent, and the average share of maize seed households used that was certified increased by 5 percentage points, from 47 percent to 60 percent; and
- The number of households using fertilizer increased from 17 percent to 28 percent.

[8] Although the price data in the WFP procurement records are more reliable than the survey data, they may also reflect concessions made to facilitate sales from low-capacity FOs.

FIGURE 3: SUMMARY OF IMPACT OF P4P ON HOUSEHOLD MAIZE PRODUCTION



Legend

↑ Statistically significant positive impact attributable to participating in P4P.
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→ No statistically significant impact associated with participating in P4P.

These behavioral changes led to improved production results. Specifically:

- Average maize yields increased 75 percent, from 0.93 mt/ha to 1.63 mt/ha;[9]
- The average quantity of maize produced increased by 71 percent, from 1.08 mt to 1.85 mt; and
- The average quantity of maize sold increased by 96 percent, from 0.58 mt to 1.14 mt.

However, non-P4P households reported similar outcomes and the differences between P4P and non-P4P households were not statistically significant. These substantial changes in agricultural productivity cannot, therefore, be attributed to participating in P4P.

Impacts of P4P on Household Welfare

Ultimately, better access to markets and increased production should boost household welfare. However, the well-known difficulties in measuring income and the relatively small change anticipated make it likely that even if P4P "caused" a change in income, it would not be detected through the noise of reporting error (recall) and variability. The analysis therefore also considered alternative measures of changes in welfare where the prospects for detecting change were more promising. These included a summary measure of household assets (the household asset score), an indicator of food security (the food consumption score), the value of household livestock, and characteristics of the households housing (flooring, wall, and roofing materials). Which of these will respond first to changes in income will probably depend to some extent on characteristics of a particular household. For example, a food insecure household may spend additional income on food before investing in housing or livestock.

P4P households were better off in 2013 than in 2009 by almost any measure of welfare.

- Real incomes increased by 88 percent;
- The average household asset score increased by 7 percent;
- The real value of household livestock increased by 143 percent;
- The food consumption score increased by 7 percent; and
- The quality of the housing stock improved
    - Three percent of households replace thatch roofs with metal;
    - The percentage of households with dirt floors fell from 55 percent to 46 percent while the percentage with concrete floors increased from 43 percent to 51 percent; and
    - The percentage of households with mud or mud-brick walls fell from 83 percent to 71 percent with a corresponding increase in concrete walls.

However, non-P4P households experienced similar improvements and none of the changes observed with P4P households were significantly different from those experienced by non-P4P households.

[9] The yield estimates reflect averages over regions and seasons.

INTRODUCTION

The World Food Programme's (WFP) five-year Purchase for Progress (P4P) pilot initiative tests innovative approaches for linking some of the world's poorest farmers to formal commodity markets. If successful, P4P will transform smallholder low-income farmers from subsistence farming to business-oriented producers capable of delivering consistent surpluses to private sector buyers, government institutions, and international organizations. Remunerative participation in commodity markets should provide smallholder farmers the incentive and the means to invest in agricultural production thereby increasing their incomes and improving their wellbeing.

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Each of the 20 P4P pilot countries developed its own strategy for engaging with smallholder farmers, taking into account the local environment, opportunities, and constraints. Building the capacities of smallholder farmers' organizations (FOs) to be active market participants is at the center of all the strategies and WFP buys directly from FOs in almost all of the pilot countries. When the opportunities existed, some countries integrated structured market platforms (commodity exchanges and warehouse receipt systems), small and medium traders, and food processors into the basic FO-centric model.

The P4P hypothesis describes a development progression that begins with building the capacities of FOs to aggregate commodities, add value (e.g., achieve WFP quality standards), and identify and sustainably access markets. To gain these capacities, FOs will necessarily need to support and engage their farmer members; providing them with technical and financial services to support production and marketing, building trust and ownership, and promoting a business-oriented approach to farming. The progress individual countries are able to make along this progression will depend on the baseline capacities they find among FOs and smallholder farmers, the approach they take to capacity building, and characteristics of the enabling environment (e.g., partner support and policy).

The country's P4P Story[12] recounts that in Tanzania WFP found a weak FO structure that provided limited support to smallholder farmers. A large network of Savings and Credit Cooperatives (SACCOs) existed to provide financial services to members. The 56 percent of the 4,078 active SACCOs in rural areas probably largely supported smallholder farmers since a majority of rural residents are engaged in agriculture. However, the SACCOs were legally prohibited from aggregating commodities, managing warehouses, or marketing agricultural products. Agricultural Marketing Cooperatives (AMCOs) were responsible for marketing but most were not functioning and those that were had very low capacities. In this environment, the Tanzania program elected to work with rural SACCOs to increase production while concurrently working to build the marketing capacity of the AMCOs and other organizations that served the marketing needs of the SACCOs.

[10] Afghanistan, Burkina Faso, Democratic Republic of Congo, El Salvador, Ethiopia, Ghana, Guatemala, Honduras, Kenya, Liberia, Malawi, Mali, Mozambique, Nicaragua, Rwanda, Sierra Leone, South Sudan, Tanzania, Uganda, and Zambia.

[11] WPF. (2012). Food Procurement Annual Report 2012. Rome. Accessed at: http://documents.wfp.org/stellent/groups/public/documents/communications/wfp255336.pdf

[12] Each of the 20 pilot countries is in the process of documenting its experiences with P4P from design to implementation. These reports are available in various stages of completion from the P4P Coordination Unit in Rome.

In short, P4P started with very low capacity FOs[13] with limited experience supporting smallholder farmers' production, little formal marketing experience, and limited to no infrastructure to support production or marketing.

From this low base, WFP selected about 30[14] SACCOs, AMCOs, networks of SACCOs, and associations to participate in P4P. An initial assessment found many of the community warehouses in the 30 intervention areas unsuitable and inadequately equipped to support smallholder aggregation and marketing. Consequently WFP invested directly in rehabilitating and equipping community warehouses for use by SACCOs' members and AMCOs. The overall strategy aims to connect these warehouses to an emerging warehouse receipt system (WRS) that will "expand farmers' access to credit, provide greater marketing flexibility, and facilitate access to new markets."[15] To build the capacities of the SACCOs and AMCOs to benefit from these investments, WFP and its partners have trained SACCOs members and leaders in topics including production, institutional capacity building, agri-business management, quality control, gender issues, and WFP procurement. On the demand side, WFP has supported the SACCOs by purchasing 10,287 mt of maize (8,824 mt) and beans (1,463 mt) from 29 P4P-supported SACCOs, AMCOs, and SACCOs networks.[16]

P4P-supported SACCOs and farmers were substantially better off in 2013 than in 2009 by almost any objective measure. For example, of 25 P4P-supported SACCOs and a random sample of 321 of their member farmers from which the country office collected data:[17]

- The percentage of surveyed P4P SACCOs reporting any marketing experience increased from 0 percent in 2009 to 72 percent (18 organizations) in 2013. Total quantities sold increased from no sales in 2009 to 2,337 mt in 2013, 37 percent of which represents sales of high-quality commodities to WFP.
- The average percentage of selected production, marketing, and quality services P4P SACCOs provided to their members increased by an average of 49 percentage points between 2009 and 2013. WFP and its partners emphasized these services during training.[18]
- The percentage of P4P-supported households using fertilizer increased from 17 to 28 percent and the percentage using certified maize seed increased from 29 percent to 33 percent. Increased use of productivity-enhancing inputs mirrored a 75 percent increase in maize yields (from 0.93 mt/ha to 1.63 mt/ha) and a 71 percent increase in the average quantity of maize produced (from 1.08 mt to 1.85 mt).
- The percentage of P4P households producing a surplus of maize increased from 67 percent to 80 percent, the average size of the surplus increased from 0.85 mt to 1.43 mt, and the average quantity sold increased from 0.58 mt to 1.14 mt.
- Household income increased by 89 percent in real terms between 2009 and 2013. Other measures of household welfare also increased including a 143 percent increase in the value of household livestock.

Trends in SACCO capacity and household production and welfare, however, do not constitute evidence that the observed changes are attributable to P4P. To credibly attribute changes to P4P it is necessary to compare these outcomes to those that *would have occurred had the SACCOs and households not participated in P4P*. This is the major challenge of assessing impact; that analysts cannot simultaneously observe outcomes under P4P and those under the counterfactual of not participating in P4P. This report applies appropriate analytical

[13] Throughout this report, "FO" refers to a generic farmers' organization while "SACCO" refers to the specific FO structure in Tanzania.
[14] The number of P4P-supported organizations has varied slightly throughout the five-year pilot but has hovered in the neighborhood of 30 organizations.
[15] Tanzania P4P Story.
[16] WFP procurement records through May 2014.
[17] The results reported below are all statistically significant with p-values≤0.10.
[18] These results differ from those in the report due to a different interpretation of data on service provision.

techniques to the data to estimate the causal effects of P4P on key indicators of SACCO capacity and smallholder farmers' production and marketing of staple commodities and on indicators of household welfare.

To make a credible case for impact, it is first necessary to understand the details of what WFP did in Tanzania so anticipated outcomes are not confused with the P4P "treatment." For example, increased access to storage is an important anticipated outcome of participating in P4P and an indicator of FO capacity in the P4P logframe. In Tanzania, however, WFP invested directly in rehabilitating storage facilities. Increased access to storage in Tanzania is therefore part of the P4P treatment and not an outcome of P4P. Following sections that articulate a results framework and describe data and methods used in the impact assessment, this report describes in detail the elements of the P4P treatment in Tanzania.

Separate sections of the report then examine the evidence of causal effects of P4P participation on selected indicators of SACCO capacity and household production, marketing, and welfare theoretically linked to participating in P4P. The final section of the report summarizes conclusions with respect to the impacts of P4P in Tanzania.

RESULTS FRAMEWORK

The results framework articulated in this section illustrates the interdependent, and often sequential, nature of anticipated P4P results and provides a context within which to interpret the findings and frame the conclusions. It is relevant at this juncture as a framework for understanding the relevance of the findings and analysis presented in the remainder of the report.

P4P is a capacity building program set within a market development framework. WFP's primary entry point in most countries, including Tanzania, is farmers' organizations (FOs). The overarching rationale for WFP's involvement is the hypothesis that channeling a portion of the organization's local and regional procurement to a point in the supply chain that is closer to smallholder producers (usually FOs) can provide the market necessary to catalyze other development partner's efforts to build FOs' organizational and marketing capacities. FOs more capable of identifying markets, adding value, and reliably meeting market demands will improve households' marketing opportunities and outcomes. Improved access to markets for households will increase returns to agriculture, provide an incentive for investing in production, and ultimately, lead to improvements in household welfare.

This is an obviously simplistic summary of a much more complex and nuanced development hypothesis. For instance, it makes no mention of the myriad barriers FOs and smallholder farmers face pursuing these outcomes. It does, however, illustrate the sequential and interdependent aspects of the pathway through which P4P expects to produce results.

Figure 4 and Figure 5 illustrate the results framework for FOs and households, respectively. The vertical dimension of the figures illustrates the hypothesized progression of FO and household results, respectively. The second column of each figure (the second column of both the marketing and production components of Figure 5) lists the primary indicators at each level of result. For FOs, improved organizational capacity supports enhanced marketing capacity which ultimately leads to sustainable market access. For households, changing marketing behavior produces favorable market outcomes which then provide the incentive to change production behavior which increases production and, coupled with improved market access, improves

the welfare of the household. On the horizontal dimension, moving right to left, the "facilitators" acknowledge some of the fundamental conditions necessary to support achievement of the results.

There are several other important things to note about the results frameworks outlined in Figure 4 and Figure 5.

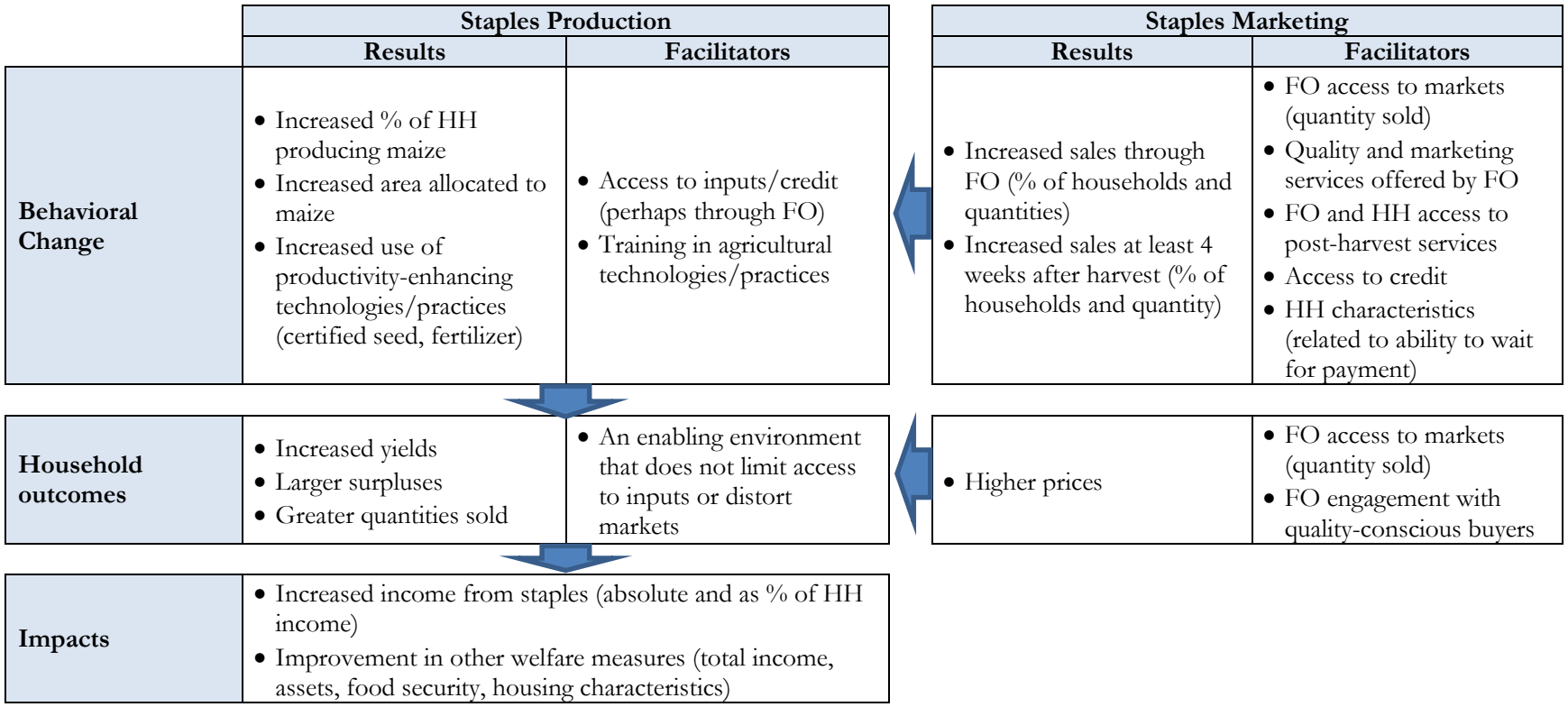
1. Household marketing and production results are not necessarily independent. For example, the development hypothesis posits that higher prices associated with selling through the FO (a household marketing outcome) will provide an incentive to invest in productivity-enhancing technologies and practices (a behavioral change in the production column). The interdependence of results therefore works horizontally and vertically in the household figure.
2. Results often depend on "facilitators", some of which fall within the remit of development partners' or governments.
3. Many FO results appear as facilitators in the household results framework. This implies that household results depend, in many cases, on FO results. The FO and household frameworks are therefore interdependent and household results may lag FO results. It is also possible that FO results may lag household results. For example, an FO may find it difficult to aggregate large quantities before achieving a level of trust with its members that will encourage them to sell through the FO.

The remainder of this section more fully articulates this framework, describes its components, and illustrates the interdependencies between anticipated results. It is organized around the four basic elements of FO capacity, household marketing, household production, and household welfare. Following a detailed description of the quantitative results, the conclusions section returns to the results framework articulated in this section to draw the quantitative and qualitative evidence together into a coherent story of the impact of P4P in Tanzania.

FIGURE 4: P4P RESULTS FRAMEWORK: FO CAPACITY

	Staples Marketing	
	Results	**Facilitators**
Organizational capacity	• Acquiring a business orientation • Planning for production and marketing • Increased services/training offered to members	• Access to post-harvest facilities and equipment • WFP procurement (catalyst) • Supply-side support (capacity building, infrastructure)
Marketing capacity outcomes	• Increased quantities aggregated and sold • Increased range of markets (including quality-conscious buyers) • Able to facilitate financing for members • Obtaining higher prices	• Creation of AMCOs • Consistent and sizeable WFP procurement • Trust of membership, transparency • Improved access to credit • FO engagement with quality-conscious buyers
Impacts	• Sustainable access to value-added staples markets (increasing trajectory of quantities sold, especially to formal buyers; declining dependence on WFP market, established relationship with financial institutions, access to permanent storage facilities of at least 500 mt capacity)	

FIGURE 5: P4P RESULTS FRAMEWORK: HOUSEHOLD MARKETING, PRODUCTION, AND WELFARE



FO Capacity

Organizational capacity refers to the capacity of the FO to operate effectively to support its farmer members' agricultural endeavors, particularly in production and marketing. It encompasses the human and physical capacity required to aggregate, add value, and market staple commodities. Initial FO capacities, as documented in country assessments, varied substantially across the P4P pilot countries. Some countries (e.g., Tanzania, DRC) found few viable FOs with which to engage. Others (e.g., Ethiopia, Mali, Mozambique) found well established FOs, some of which had substantial marketing capacity. The rate at which countries are able to progress through the results framework will depend to some extent on the baseline situation with respect to FO and farmer capacity and facilitating factors at both the FO and household levels. When the capacity of P4P-supported FOs was particularly low, which it was in many countries, WFP and its partners often had to start organizational capacity building by establishing basic facilitating conditions. Important among these are:

- **Management capacity:** Building the organizations' internal management capacity. Capable management promotes financial viability, efficiency, and sustainability. It also contributes to operational and financial transparency which may foster members' trust in the FO, an important factor supporting participation and reliable aggregation. To support building management capacity WFP and its partners often train FO leaders and members in topics such as bookkeeping, financial management, group dynamics, and other topics.
- **External assistance:** Marshalling the technical, financial, and material assistance necessary to improve FOs' commodity management and marketing skills and farmers' knowledge of, and access to, productivity-enhancing technologies and practices. Training, in topics such as warehouse management, procurement procedures, negotiation, and production contribute to building these skills. In some countries, WFP and its partners help FOs build relationships with service providers such as financial institutions and input suppliers to help resolve barriers to aggregation and production.
- **Post-harvest infrastructure and equipment:** Establishing the storage infrastructure necessary to support aggregation and quality management. Equipment to clean, dry, grade, weigh, and bag commodities and storage facilities capable of maintaining quality are essential material capacities for marketing. Many countries found it necessary to enhance the quality and size of FOs' storage facilities and provide the equipment required to properly store and market commodities.
- **WFP's procurement:** Finally, access to a market will help provide the incentives for FOs and farmers to invest the time and resources to build these capacities. The basic tenet of P4P is that WFP's commitment to buy from FOs for a period of time will provide this market. Thus, the consistency and size of WFP's procurement is important; it must be large and regular enough to stimulate the necessary investments.

Establishing these facilitating conditions should contribute to improving organizational capacity. Relevant indicators of improved FO organizational capacity include:

- **Planning for production and marketing**: Planning is an important discipline that encompasses developing marketing strategies and predicting quantities that will be available from members. It may also provide farmers with some expectation that a market exists and thus ease aggregation.
- **Providing services to members**: FOs exist to provide services to their members and the greater the range and number of beneficial services they can offer, the more relevant they will be to the needs of their members. In the context of P4P, services associated with production and marketing are particularly germane. The ability to provide some services is contingent on facilitating conditions. For example, to provide storage and quality management services, an FO must have access to a warehouse and equipment and training in commodity management.

- **Facilitating members' access to inputs**: Smallholder farmers' access to productivity-enhancing inputs may be constrained by limited access to input markets or by financial considerations. FOs have facilitated members' access to inputs in a number of ways including providing inputs on credit, serving as a conduit for subsidized inputs provided by government programs, or by buying inputs in bulk at lower prices than farmers could obtain on their own.
- **Providing production training to members**: Access to inputs is not sufficient in itself to increase production. Farmers must also know how to use inputs correctly. Facilitating access to training on the appropriate use of a full range of other productivity-enhancing technologies and practices is another important role for FOs and one that reflects their overall capacity to serve members' needs.

As FOs become better managed and gain access to the infrastructure, equipment, and knowledge necessary to support production and marketing, they should become more capable marketing organizations. As with organizational capacity, a number of factors will facilitate improvements in marketing capacity. These include:

- **WFP's procurement**: WFP's procurement plays a central role in the P4P development hypothesis. By providing an assured and forgiving market for quality, WFP expects to create a window for capacity building – especially the capacity to reach quality-conscious buyers. Access to an assured market will also create the incentive for FOs to make the investments of time, energy, and money to build their capacities.
- **Access to marketing credit**: Limited access to credit is a major barrier to FOs' ability to aggregate and become reliable market participants. Many smallholder farmers do not have the financial capacity to wait for payment when they sell their crops. They need immediate cash to meet household expenses and to invest in inputs for the next season. In this environment, FOs without the ability to pay members prior to receiving payment from a buyer have trouble competing with traders who usually pay cash at the farm gate. This situation often leads to side-selling, when a farmer who has committed to sell through the FO sells instead to a different buyer. Volatile prices can exacerbate the problem of side selling. In 2010, volatile commodity prices in many east African countries contributed to side-selling when farmers (and FOs and even large traders) that had committed to selling to WFP sold to other buyers as prices rose above the WFP contract price in the interval between signing a contract and delivering the commodity. Widespread side-selling can cause an FO to default on contracts. For FOs without sufficient internal capital, access to marketing credit can give them the ability to buy from farmers at the time they deposit commodities, eliminating the problem of side selling, and make them more reliable sellers. Many P4P countries have focused on building relationships between FOs and financial institutions to address this issue. And in many instances, financial institutions have agreed to accept a contract with WFP as collateral for a marketing loan.

Organizational capacity building coupled with establishing the facilitating conditions for more effective marketing should contribute to improved marketing capacity outcomes. Relevant indicators of marketing capacity in the P4P context include:

- **Quantity sold**: The total quantity an FO is able to aggregate and sell is an obvious indicator of marketing capacity. It reflects not only the FO's ability to find markets but also its ability to aggregate members' surpluses which, in turn, reflects the organizational capacity of the FO.
- **Quantity sold to buyers other than WFP**: WFP will not commit to buying from an FO indefinitely in a capacity building role. For results to be sustainable, FOs must develop the capacity to identify and sell to buyers other than WFP, and preferably to buyers who are willing to pay a premium for value addition (quantity, quality, or other commodity characteristics).
- **Facilitating post-harvest financing to members**: Access to credit, a facilitating factor, may give an FO the ability to provide post-harvest financing to members thus extending members' feasible marketing options and improving the reliability of aggregation. Using credit or other sources of

capital to buy from members prior to a sale is only one technique for facilitating post-harvest financing. Some countries, including Tanzania, have supported warehouse receipt systems which can give farmers access to a loan secured by deposited commodities. In other countries, e.g., Burkina Faso, FOs may provide inputs on credit and then compel members to sell a sufficient quantity of commodities through the FO to cover the loan.

- **Prices**: An FO's ability to offer competitive prices will be an important consideration in farmers' decisions to sell through the FO. The prices an FO is able to obtain reflect its ability to identify markets where it has a competitive advantage, negotiate effectively, and deliver reliably. Prices are not the only consideration however. Others include the timeliness of payment and valuable services farmers receive from FO membership (e.g., credit, inputs, and training). Nevertheless, prices are a relevant indicator of FO marketing capacity.

The ultimate objective of FO capacity building under P4P is to leave in place an FO that can add value to members' commodities (through aggregation, quality, or transformation/processing) and sustainably access markets that appropriately compensate the FO for commodity characteristics. It is too early to assess the sustainability of P4P results but positive change in organizational and marketing capacity indicators may point to the sustainability of results.

Household Marketing

To fully benefit from improved FO marketing capacity, farmers must elect to sell through the FO. A small handful of farmers (eight percent of P4P farmers in Tanzania) reported selling through the FO at the time of the 2009 baseline. To extend results to a wider range of members, farmers must change their marketing behavior and begin selling their surpluses through the FO. Farmers collectively channeling larger quantities through the FO will further build the organization's capacity, further enhancing overall results.

As in the FO marketing capacity results framework, several factors are likely to facilitate behavioral change. Many of these are FO marketing capacity outcomes reflecting the P4P development hypothesis that stronger FOs will support better marketing and production outcomes for farmers. Facilitators of household marketing include:

- **Services provided by the FO**: Services provided to members through the FO serve several purposes. From the perspective of household marketing behavior, FO's that provide services relevant to improving their member's production and marketing outcomes are likely to earn members' trust and loyalty and capture a larger share of their marketed surplus. From the FO perspective, members' trust and loyalty can further strengthen the FO and its ability to aggregate effectively and reliably.
- **Household access to credit**: Few smallholder farmers have access to credit. Tanzania is an exception with 64 percent of P4P households reporting utilizing credit in 2009. This may be a result of FOs in Tanzania being SACCOs that are in the business of providing credit. Access to credit enhances a household's flexibility in marketing choices. With access to credit, a household may be able to choose to sell to a buyer that does not pay cash on the spot or to hold commodities into the lean season when prices are typically higher. As mentioned among the FO marketing outcomes, FOs may play a role in facilitating households' access to credit. The efforts of WFP and its partners to build relationships with financial institutions and establish warehouse receipt systems may also contribute to improved access to credit.
- **Quantities sold by the FO**: For farmers to choose to sell through the FO, the FO must be able to offer a market. The quantity the FO is able to sell is thus a critical facilitating factor in households' decisions to sell through the FO.

Choosing to sell more through an FO that earns its members' support by providing valuable services and a reliable market should ultimately lead to improved marketing outcomes for farmers. In the P4P context these outcomes may include higher prices or lower marketing cost (and thus higher net returns to the farmer). The P4P monitoring and evaluation system did not collect detailed data on marketing costs. The relevant indicator of improved marketing outcomes at the household level is thus higher prices.

Household Production

Better marketing outcomes should provide farmers the incentive and the means to invest in increasing productivity. The path to higher productivity begins with behavioral change (i.e., choosing to produce maize, allocating more area to maize production, investing in productivity-enhancing inputs and technologies) supported by favorable facilitating conditions, many of which are outcomes of FO capacity building. Relevant facilitators include:

- **Access to inputs**: Farmers' access to productivity-enhancing inputs may be constrained by access to input dealers, high prices, limited availability, or lack of knowledge of their use or benefits. FOs, governments, the private sector, and agricultural development organizations may all play a role in improving access to inputs and P4P countries have worked with each of these actors.
- **Access to credit**: In the context of production, access to credit is important as a facilitator of investment in productivity. Without access to credit, capital-poor households may not be able to purchase inputs, increase the area of land they cultivate, or invest in other practices that improve productivity (e.g., hired labor, mechanization). Credit need not be in the form of cash; it may also encompass in-kind schemes that advance inputs, machinery, or tools against future payment in crops.
- **Access to training in agricultural production practices**: As important as access to productivity-enhancing technologies and practices is the knowledge of how to use them appropriately. For example, farmers in El Salvador reported that the knowledge of when to plant and how and when to apply fertilizers and pesticides was perhaps more important to increasing productivity than access to the inputs themselves. WFP and its P4P partners have often supported access to inputs and the training required to use them correctly.

With these facilitating factors in place, anticipated behavioral changes include:

- **Households choosing to produce maize:** Maize is a primary staple in many P4P countries and, consequently, most households produce maize. In Tanzania, for example, 83 percent of surveyed households reported producing maize in 2009. There may, therefore, be little scope for increasing the percentage of households that cultivate maize in some countries.
- **Area allocated to maize production**: Allocating more land to maize production, either by changing cropping patterns or increasing the overall area of land a household cultivates, may also affect the quantity of maize produced.
- **Use of productivity-enhancing technologies and practices**: Improved access to inputs, recognition of their value in increasing productivity, access to credit, and market-driven incentives should lead to increasing investment in productivity-enhancing inputs and practices.

All other things being equal, these behavioral changes should increase yields, quantities produced, and quantities sold, the key household production indicators.

Household Welfare

Producing and selling larger quantities at higher prices will ultimately affect household welfare. Welfare is a broad concept with dimensions including income, wealth, nutrition, food security, and physical security to

name a few. The P4P proposal identified income as the primary household welfare measure. Because of the anticipated difficulty measuring relatively small changes in income, however, the P4P logframe identified several alternate welfare indicators. These include the household asset score (a simple summary of household assets), the value of household livestock (an important store of wealth in many cultures), and the food consumption score (an indicator of food security).

DATA AND METHODS

The impact assessment is based on a quasi-experimental design that compares outcomes for two groups of SACCOs and households; one group that is participating in P4P and a similar group that is not. Survey data collected from these two groups at several points in time track changes in anticipated outcomes during the implementation of P4P. The Tanzania country office commissioned surveys of P4P and non-P4P SACCOs every year of the five-year pilot and surveys of smallholder farmer members of the surveyed SACCOs in 2009 (baseline), 2011 (mid-term), and 2013 (final). Furthermore, the surveys tracked a panel of SACCOs and households, i.e., the same set of SACCOs and households in each survey.[19] Table 1 documents the size of the household sample. The sample of SACCOs consisted of 25 P4P and 25 non-P4P SACCOs and the dataset includes observations from each SACCO in every year. The 2010 SACCO survey results had to be discarded because of poor quality data. Therefore, the SACCO analysis incorporates only four years of data.

It was not feasible to randomly assign SACCOs to P4P and non-P4P groups (the best way to obtain truly comparable groups) and the Tanzania country office matched them loosely on similarity of size, marketing experience, location, and organizational capacity. The household survey targeted a random sample of households from each selected SACCO. Household sample sizes were roughly proportional to the number of SACCO members.

The surveys collected data on a variety of SACCO capacity and household production, marketing, and welfare indicators. For SACCOs these included data on services provided to members, storage capacity, marketing activity, and credit utilization, among others. The household surveys collected data on household characteristics; production; production practices; marketing activity; credit utilization; and income from crops, livestock, and off-farm sources, among others. The data collection instruments are available from WFP.

TABLE 1: HOUSEHOLD SAMPLE

	2009 (baseline)	2011	2013
Entire sample			
P4P households	402	410	382
Non-P4P households	410	399	369
Panel			
P4P households	321	321	321
Non-P4P households	343	343	343

The panel represents the subset of households for which data exist in all three years and is smaller than the overall sample because of attrition.

[19] Due to attrition, the size of the household panel (households interviewed in all three surveys) is smaller than the overall sample.

Data Analysis Methods

Analysis of the SACCO and household data employs a difference-n-differences (DiD) approach to estimate the causal effects of P4P on selected SACCO and household outcomes. The DiD estimator defines the impact of a program on a particular anticipated outcome as the relative changes in the average outcome measure over time between a "treatment" group affected by the program and a "control" group that is not affected, or:

$$Impact = \left(\bar{Y}_{1t_1} - \bar{Y}_{1t_0}\right) - \left(\bar{Y}_{0t_1} - \bar{Y}_{0t_0}\right) \quad (1)$$

where $\bar{Y}$ indicates the group mean of outcome measure Y; the subscripts *0* and *1* refer to control and treatment groups, respectively, and the subscript *t* refers to time with the subscripts 0 and 1 on *t* referring to pre- and post- program time periods respectively.

The non-parametric DiD estimator in equation (1) is appropriate only if the treatment and control groups are statistically equivalent, that is that differences are due only to chance. Statistical equivalence implies that the DiD impact estimate derived from equation (1) is due only to the treatment and not to other factors. Random assignment of experimental units (e.g., FOs or households) to treatment and control groups is the best way to ensure probabilistic equivalence. Except for Ghana, it was not possible to randomly assign FOs, or by implication, households, to P4P and non-P4P groups. Therefore, the simple estimator of equation (1) is not appropriate for Tanzania.

A generalization of the DiD estimator in a regression framework is more appropriate for cases where treatment and control groups are not equivalent. When the two groups are not statistically equivalent, the analysis needs to control for the differences to obtain reliable estimates of causal effects. One useful feature of the DiD estimator is that it completely controls for time-invariant differences between the two groups leaving only time-variant differences as possible confounders. The regression equivalent of the DiD estimator is:

$$Y_{it} = \alpha + \beta D_{it_0} + \delta\tau + \gamma D_{it} + \theta X_{it} + \epsilon_{it} \quad (2)$$

where Y_{it} is the observed outcome for household *i* at time (survey) *t*, D_{it0} is a vector of indicators of whether household *i* is in the treatment group at time *t=0*, τ is a vector of indicators for each time period except *t=0*, D_{it} is an indicator of household *i* being in the treatment group for all $t \neq 0$, X_{it} is a set of control variables which may include interactions, and ε_{it} is the error term. The elements of the coefficient vector γ are the average impacts of the treatment on *Y* at time *t*.

With panel data the regression equation becomes:

$$Y_{it} - Y_{it-1} = \alpha + \delta\tau + \gamma D_{it} + \theta X_{it} + \epsilon_{it} \quad (3)$$

where parameters are the same as those defined for equation (2).

Because Tanzania purchased much more maize than beans, the technical review panel that WFP convenes annually to guide P4P recommended in 2013 that the quantitative analysis of impacts focus on maize. Consequently, the impact assessment analysis considers only maize.

Comparability of P4P and Non-P4P Groups

The reliability of the DiD estimates of impact in the case of non-equivalent groups depends in part on the extent of their similarities and differences. Therefore, prior to assessing the impacts of P4P on SACCO capacity and farmers' productivity and welfare, the analysis examines the differences between the two groups. The SACCO and household comparisons rely on tests of the statistical significance of observed baseline differences between the two groups for a large number of indicators.

Comparability of SACCOs

Side-by-side tests of differences in means and proportions of 27 SACCO characteristics served to assess the baseline comparability of P4P and non-P4P SACCOs. Statistically significant differences between the two groups were:

- P4P SACCOs were significantly **more likely** than non-P4P SACCOs to report having received external assistance to support agricultural production and marketing – 48 percent versus 12 percent for production assistance and 40 percent versus 8 percent for marketing assistance.
- P4P SACCOs were significantly **more likely** than non-P4P SACCOs to provide production and marketing services – 9 percent versus 2 percent for production services and 15 percent versus 4 percent for marketing services. This result may well be related to the differences in access to external assistance.
- P4P SACCOs were significantly **more likely** than non-P4P SACCOs to provide financing to their members between harvest and sale of commodities – 36 percent versus 8 percent.
- P4P SACCOs were significantly **more likely** than non-P4P SACCOs to plan for production and marketing – 48 percent versus 20 percent.
- P4P SACCOs were significantly **more likely** than non-P4P SACCOs to report access to storage – 30 percent versus 8 percent.
- P4P SACCOs were significantly **more likely** than non-P4P SACCOs to have sold under a contract – 12 percent (3 SACCOs) versus 0 percent. One of the three SACCOs that reported selling under contract is an AMCO (Wino) and the other two sell through a SACCOs network (Dunduliza).[20]

Table 17 in Annex A provides the full details of the tests for similarity between P4P and non-P4P SACCOs.

Comparability of Households

Side-by-side tests of differences in means and proportions of 75 baseline household characteristics found few significant differences. Statistically significant differences between the two groups were:

- The only statistically significant difference on the basis of household characteristics was that P4P households were significantly **less likely** than non-P4P households to be headed by a woman: 41 percent versus 49 percent.
- In terms of housing characteristics:
    - P4P households were significantly **less likely** than non-P4P households to have a concrete floor as opposed to dirt or wood – 56 percent versus 70 percent.
    - P4P households were significantly **less likely** than non-P4P households to have concrete brick walls as opposed to mud or mud brick – 84 percent versus 90 percent.
    - P4P households were significantly **less likely** than non-P4P households to have improved toilet facilities – 74 percent versus 82 percent.
- In terms of agricultural production:

[20] Tanzania P4P Story and intervention mapping data.

    - P4P households were slightly **more likely** than non-P4P households to cultivate maize – 95 percent versus 92 percent.
    - P4P households were significantly **more likely** than non-P4P households to report that their SACCO facilitated access to production inputs – 22 percent versus 15 percent.
    - P4P households were significantly **more likely** than non-P4P households to report producing a surplus of maize – 67 percent versus 60 percent.
- In terms of marketing activity:
    - P4P households were significantly **more likely** than non-P4P households to report selling maize through the SACCO – 13 percent versus 5 percent. They also reported selling a larger share of their surplus maize through the SACCO – 9 percent versus 3 percent.
    - Conversely, P4P households were significantly **less likely** than non-P4P households to report selling maize somewhere other than through the SACCO or at the farm gate – 82 percent versus 89 percent – and reported selling a smaller share of their surplus maize elsewhere – 74 percent versus 85 percent.
- P4P households were significantly **more likely** than non-P4P households to report obtaining a loan for a non-agricultural business – 23 percent versus 11 percent – and the average loan size was significantly larger – 242,738 shillings compared to 88,353 shillings.
- P4P households reported a significantly **higher** household asset score than non-P4P households – 9.00 compared to 8.68.
- P4P households reported spending significantly **more** than non-P4P households raising animals – 97,514 shillings compared to 60,489 shillings.
- P4P households reported spending significantly **more** than non-P4P annually on household items – 377,388 shillings compared to 321,224 shillings.

Table 18 in Annex A provides the full details of the tests for similarity between P4P and non-P4P households.

P4P IN TANZANIA

To determine the impact of the P4P "treatment" in Tanzania, it is necessary to know what the treatment was. The P4P development hypothesis implies that the treatment is merely WFP's commitment to buy from selected FOs. WFP's procurement would then catalyze the activities of other partners working to strengthen FOs and improve farmers' productivity. However, many P4P programs purposely selected FOs based in part on the presence of development partners working to build the capacities of the FOs. Furthermore, country programs often directly supported capacity building activities, e.g., conducted training, provided infrastructure and equipment. In Tanzania, in particular, the country office trained SACCOs and invested heavily in rehabilitating and equipping warehouses. In this context, participating in P4P implies a multi-faceted treatment that may vary across participating SACCOs.

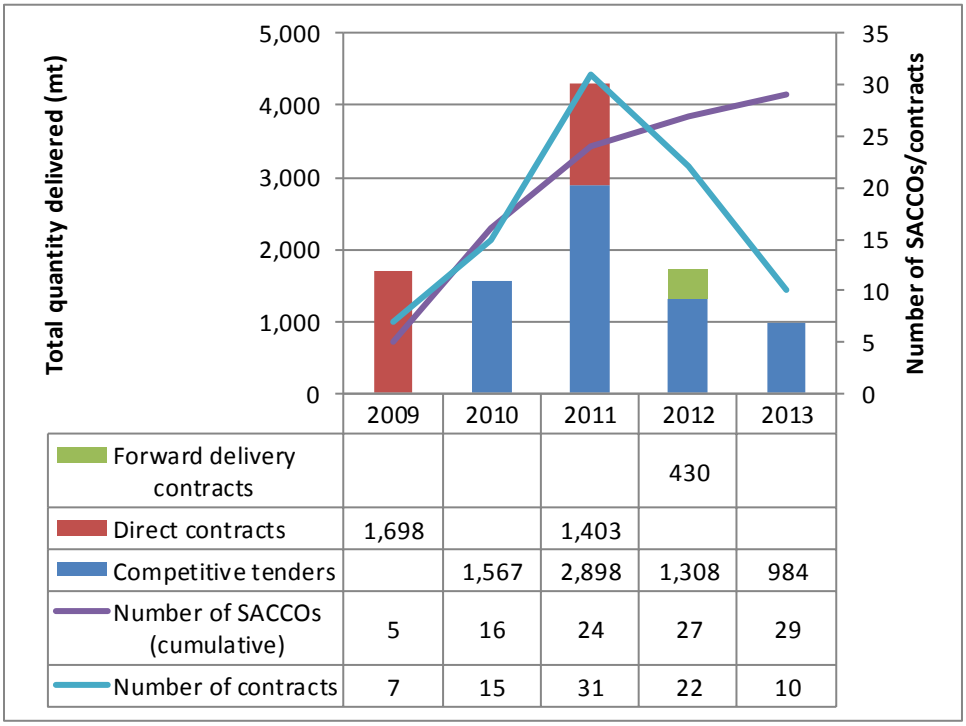
The remainder of this section documents characteristics of the P4P treatment for individual SACCOs in Tanzania in terms of WFP procurement, investments in infrastructure and equipment, and training. These data will define the dimensions and intensity of the P4P *treatment* applied to individual SACCOs and help identify the characteristics of the treatment that influenced particular outcomes. In the Tanzania context, the broad dimensions of the treatment are WFP procurement, investments (largely in infrastructure and equipment), and training. Because, in most cases, WFP's development partners were already working with participating FOs, coordinated their activities closely with WFP, and were often funded by WFP, the impact assessment considers their activities to be part of the P4P treatment rather than an outcome of the treatment.

WFP Procurement

The P4P development hypothesis implies that the size and consistency of procurement matters. WFP's commitment to purchase from a SACCO is expected to provide the SACCO the space to build capacity with a patient buyer. The stimulus should also be large enough to provide member farmers with the incentive to invest in increasing production. This implies a consistent level of procurement large enough to represent a meaningful sale volume for individual farmers.

Between P4P's inception in 2009 and May 2014, WFP purchased 1,463 mt of beans and 8,824 mt of maize from P4P SACCOs in Tanzania.[21] The quantities WFP procured varied throughout the course of the pilot, largely due to programmatic requirements external to the P4P program (Figure 6). WFP could determine the procurement modality; the number of SACCOs from which it purchased; the number of contracts awarded to each SACCO (excluding competitive tenders where WFP could not control the outcome); and by implication, the quantities contracted from each SACCO.[22]

FIGURE 6: WFP PROCUREMENT FROM P4P SACCOS BY YEAR AND MODALITY



	2009	2010	2011	2012	2013
Forward delivery contracts				430	
Direct contracts	1,698		1,403		
Competitive tenders		1,567	2,898	1,308	984
Number of SACCOs (cumulative)	5	16	24	27	29
Number of contracts	7	15	31	22	10

Source: WFP procurement records.

Figure 6 illustrates that, over the course of the five-year pilot WFP switched from relying exclusively on direct contracts to using only competitive tenders. By the end of the pilot, WFP had registered 29 SACCOs and other organizations (AMCOs, networks, associations) as WFP suppliers and contracted at least once from all of them. It had contracted in only one year from 6 (21 percent), in two years from 6 (21 percent), in three years from 11 (39 percent), and in four years from 5 (18 percent). Table 2 summarizes additional procurement details. These data suggest that WFP provided a reasonably consistent and meaningful procurement stimulus.

[21] Source: WFP procurement records. The most recent available data cover the period from inception (2009) to May 2014.
[22] With competitive tenders, the CO could control only the number of tenders it issued, and their size, but could not directly control the individual SACCOs that won tenders.

TABLE 2: PROCUREMENT DETAILS

	Maize	Beans	Total
Number of contracts	69	16	85
Average contract size (mt)	188	141	179
Number of contracts at least partially delivered	53	12	65
Average quantity delivered on contracts at least partially delivered (mt)	164	137	141
Average default rate (% defaulted)	35%	28%	34%

Table 24 and Table 20 in Annex B document quantities contracted by and delivered to WFP, respectively, by SACCO and year and clearly illustrates the characteristics of the procurement stimulus for individual SACCOs. Table 20 also documents a relatively high default rate (37 percent overall) which further emphasizes the low capacity of many SACCOs.

Investments in Infrastructure and Equipment

The Tanzania P4P program directly invested in improving warehousing capacity for P4P SACCOs. Chief among these investments was rehabilitating and constructing warehouses and furnishing them with scales, moisture analyzers, pallets, and other equipment necessary to aggregate, clean, store, and market high quality commodities.

During the 2009-2013 period, WFP provided the funding to construct 1 warehouse and to rehabilitate 20 others. In addition, it partially funded the rehabilitation of three warehouses and provided 8 rubhalls (temporary warehouses). According to data provided the by Tanzania country office,[23] all of the supported SACCOs had access to storage prior to P4P. These were most often community warehouses that were in poor condition and not owned by the SACCOs. In addition to rehabilitating many of the warehouses, WFP also helped SACCOs negotiate agreements with the communities to rent the facilities.[24]

Investments in warehouses do not appear to have changed access to storage (assuming that SACCOs could use community warehouses prior to P4P) or ownership status. However, it did substantially improve the quality of storage facilities and the overall capacity. Warehouse construction, rehabilitation, and providing temporary rubhalls increased the total storage capacity available to the 23 SACCOs from 7,500 mt to 8,500 mt and the average capacity from 300 to 340 mt.[25] Ten of the rehabilitated warehouses have met Tanzanian Warehouse Licensing Board criteria and are currently being registered as part of the Warehouse Receipt System. Only 6 of the SACCOs own the warehouses they use, 11 rent them, and 8 have other arrangements for using the warehouses.

WFP also directly provided (loaned) other equipment necessary to test, improve, and maintain commodity quality during storage; process grains; and prepare commodities for marketing. Table 3 summarizes WFP's investments in infrastructure and equipment during the P4P pilot.

Table 21 and Table 22 in Annex B document infrastructure and equipment investments for individual SACCOs.

[23] Tanzania intervention mapping data.
[24] Tanzania Follow-up Report. WFP/AERC. 2013.
[25] Tanzania intervention mapping data.

TABLE 3: INVESTMENTS IN INFRASTRUCTURE AND EQUIPMENT

Type of investment	Number of units	Number of SACCOs	Total value (USD)
Warehouse rehabilitation/construction	24	24	108,214
Rubhalls	8	6	154,760
Tarpaulins	28	26	62,496
Fumigation sheets	4	4	11,904
Weighing scales	27	26	27,567
Stitching machines	36	28	32,148
Generators	28	25	4,172
Pallets	1,040	23	41,600
Sampling Spears	19	19	38
Moisture analyzers	10	10	24,550
Fire extinguishers	22	21	15,12.5
Milling machines	1	1	2,633
Total value of investment			470,082

Sources: Tanzania intervention mapping data and investment schedules.

Training

Training is also an important element of capacity building for SACCOs and for farmers. WFP or its partners trained SACCOs and farmers in topics related to SACCO management, gender issues, post-harvest handling, production, and doing business with WFP. Partners provided training in agribusiness management, credit and finance, and production with no technical support from WFP. In all other topics, WFP played an active role in training.

WFP also either fully or partially funding all training activities. According to data provided by the Tanzania country office, WFP appears to have financially supported all of the training in 2009; topics included post-harvest handling and WFP procurement. In 2010, training expanded to cover all topics and partners played a large role in providing training and shared costs with WFP. Partners' large role in training continued in 2012 and 2013 but WFP appears to have covered all the costs.[26]

TABLE 4: SUMMARY OF TRAINING ACTIVITIES

Training topic	Number of FOs trained	Number of individuals trained	Trainer(s)	Funding
Agribusiness management	25	2,142	Partners	WFP & partners
Credit and finance	25	1,624	Partners	WFP & partners
Institutional capacity building	25	2,886	WFP & partners	WFP & partners
Gender	25	1,280	WFP & partners	WFP & partners
Monitoring and evaluation	25	1,962	WFP & partners	WFP & partners
Post harvest handling, storage, quality control	25	7,677	WFP & partners	WFP & partners
Production and productivity	25	9,111	Partners	WFP & partners
WFP procurement and payment procedures	25	4,258	WFP & partners	WFP & partners
Other	1	46	WFP & partners	WFP & partners

[26] Data from Tanzania CO intervention mapping exercise.

Source: Tanzania intervention mapping data.

Table 23 in Annex B documents training activities conducted with individual SACCOs.

IMPACT OF P4P ON SACCO CAPACITY

This section estimates changes in SACCO capacity that can be attributed to participating in P4P. The presentation is organized around the results framework of Figure 4, looking first at organizational capacity and then at intermediate outcomes. Each section presents evidence of changes in facilitating factors and links them to changes in anticipated results.

The analysis first compares trends in indicators between P4P and non-P4P SACCOs in a visual format that intuitively illustrates differential trends in outcomes. The visual presentation, however, does not control for other factors that may affect outcomes. Consequently, the second sub-section presents more rigorous DiD estimates of the impact of P4P on the indicators of SACCO capacity that control for differences between P4P and non-P4P SACCOs. The DiD analyses include variables to control for differences between P4P and non-P4P SACCOs. Table 5 summarizes the covariates used in the analysis of the impacts of P4P on SACCOs. **Error! Reference source not found.** in Annex **Error! Reference source not found.** describes e variables used in the analyses of SACCO impacts.

TABLE 5: COVARIATES USED IN ANALYSIS OF SACCO IMPACTS

Variable name	Variable description	Baseline values				
		P4P status	N	Mean	Median	Standard deviation
	Number of years since SACCO established	P4P	100	2.28	3.00	3.39
		Non-P4P	100	4.24	3.00	3.68
	Number of members at baseline	P4P	100	538	412	437
		Non-P4P	96	359	234	440
	Number of employees at baseline	P4P	100	8.32	9.00	1.72
		Non-P4P	100	8.48	9.00	1.71
	Indicator of receiving external assistance at baseline	P4P	100	0.96	1.00	0.20
		Non-P4P	100	0.96	1.00	0.20

Impact of P4P on Organizational Capacity

Organizational capacity refers to the human and physical capacity of an organization to effectively manage commodity aggregation, value addition, and marketing. WFP's procurement, its direct investments in rehabilitating and equipping warehouses, and the external assistance it brought to bear on the SACCOs significantly improved the facilitating conditions necessary to support improvements in organizational capacity. Indicators of organizational capacity relevant in the Tanzania context include services SACCOs are able to provide to members, including production training and access to inputs, and planning for production and marketing.

Visual Inspection

The results framework of Figure 4 suggests that access to post-harvest infrastructure, WFP's procurement, and other supply-side support are important factors facilitating improvements in organizational capacity. The intervention records provided by the Tanzania country office indicate that all P4P SACCOs received training in agribusiness management; credit and finance; institutional capacity building; gender; monitoring and evaluation; post-harvest handling; storage and quality control; production and productivity; and WFP procurement and payment procedures (Table 4). If they were effective, these trainings would have contributed directly to the SACCOs' capacities to provide many of the services. Furthermore, WFP's investments in warehouses and equipment directly built the capacities of 27 P4P SACCOs to provide quality and value addition services (Table 3). Participating in P4P has thus directly influenced SACCOs' ability to provide many of the services. The capacity to put knowledge into practice and use equipment is not necessarily part of the treatment although it may be driven, in part, by sales to WFP and the need to meet WFP's quantity and quality requirements.

WFP's commitment to provide a market for high quality commodities should have catalyzed supply-side support. Panels 1 and 2 of Figure 7 show changes in the types of external assistance SACCOs reported receiving over the course of the five-year pilot. Interestingly, almost all P4P and non-P4P SACCOs reported receiving external assistance in organizational strengthening and post-harvest management. At the time of the 2009 baseline, P4P SACCOs were significantly more likely than non-P4P SACCOs to have received external assistance only with production and marketing. All other baseline differences were not statistically significant.

Between 2009 and 2013, P4P SACCOs reported substantially greater growth than non-P4P SACCOs in the receipt of production, marketing, infrastructure, and input assistance. Some of this growth reflects WFP's direct investments in human and physical capacity but much of it is due to the activities of WFP's partners. In short, P4P appears to have catalyzed supply-side support to build important organizational capacities.

Finally, the consistency and size of WFP's procurement is also an important facilitating factor in building organizational capacity. The "WFP Procurement" section on page 15 summarizes WFP's procurement from P4P SACCOs and concludes that WFP provided a reasonably consistent and sizable procurement stimulus. Panel 3 of Figure 7 documents WFP's procurement during the P4P pilot.

The improved facilitating environment should have contributed to improved organizational capacity as measured a greater range of services offered to members, the ability to facilitate members' access to production inputs and provide production training to members, and greater use of planning for production and marketing.

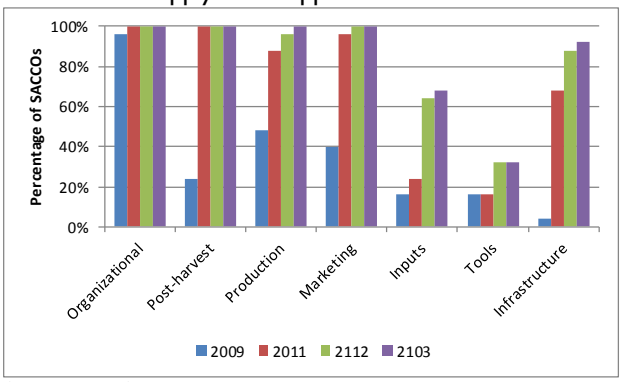
The FO survey asked whether SACCOs provided a range of 18 different services; too many to examine individually. The services fall into four categories; value addition, quality, production, and marketing.[27] The analysis aggregates the services into these four categories and defines the service capacity indicators as the percentage of the services within a category the SACCO provides. Panels 1 and 2 of Figure 8 illustrate trends in the average percentage of services offered by P4P and non-P4P SACCOs, respectively.

[27] The value addition category includes two services; small-scale food processing and milling. The quality category includes eight services; drying commodities, cleaning commodities, removing small/broken grains, removing discolored grains, use of storage facilities, use of cleaning facilities, use of drying equipment, and fumigation. Production includes five services; technical assistance in agricultural technologies and practices, supplying agricultural inputs, facilitating access to inputs, maize threshing/shelling, and draft power. Marketing includes the three services of transporting good to buyers/markets, weighing and bagging, and aggregating commodities for sale.

Figure 8 shows a substantial increase in the average percentage of quality and marketing services offered by P4P SACCOs with much smaller increases in production and value addition services. While non-P4P SACCOs exhibit some growth in each service category, it is nowhere near that of the P4P SACCOs.

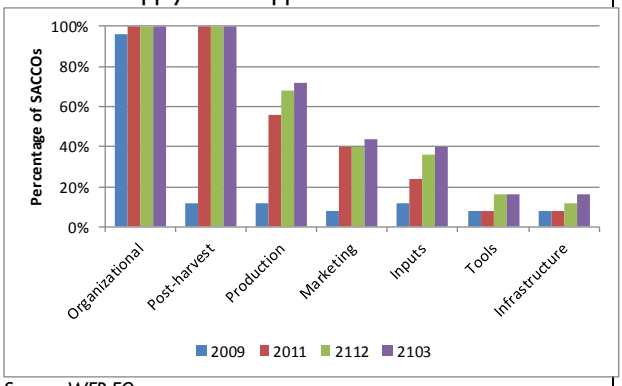
FIGURE 7: ORGANIZATIONAL CAPACITY FACILITATORS

Panel 1: Supply-Side Support to P4P SACCOs



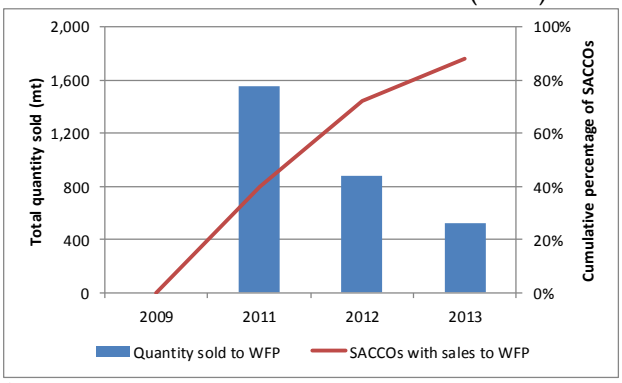
Source: WFP FO surveys.

Panel 2: Supply-Side Support to Non-P4P SACCOs



Source: WFP FO surveys.

Panel 3: WFP's Procurement Stimulus (Maize)



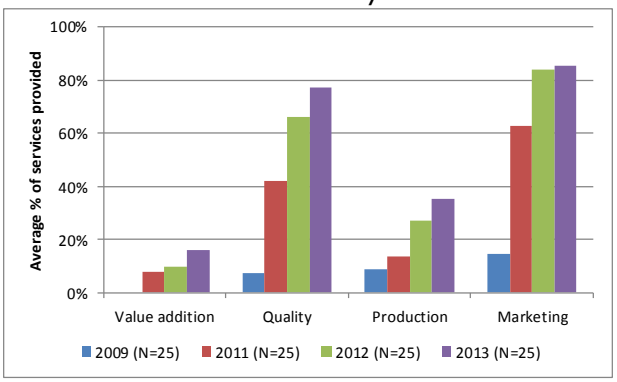
Source: WFP procurement records.

At the time of the baseline, P4P SACCOs offered a significantly greater percentage of production and marketing services than did non-P4P SACCOs (independent group t-test, $0.05>p<0.10$). Furthermore, growth in the percentage of quality and marketing services offered by P4P SACCOs (the two categories of services on which P4P focuses) significantly outstripped growth among non-P4P SACCOs in every time period (independent group t-test, $p <0.01$). Growth in production services was significantly greater among P4P than non-P4P SACCOs in 2012 and 2013.

The growth in the percentage of P4P SACCOs that reported facilitating access to inputs for members (either by providing them on credit or subsidizing their cost), providing production training, and planning for production and marketing also increased relative to non-P4P SACCOs suggesting that P4P had an impact on these indicators. All of these indicators are expressed in cumulative terms (i.e., once a SACCO reports having the capacity, it is assumed to have the capacity in all subsequent periods).

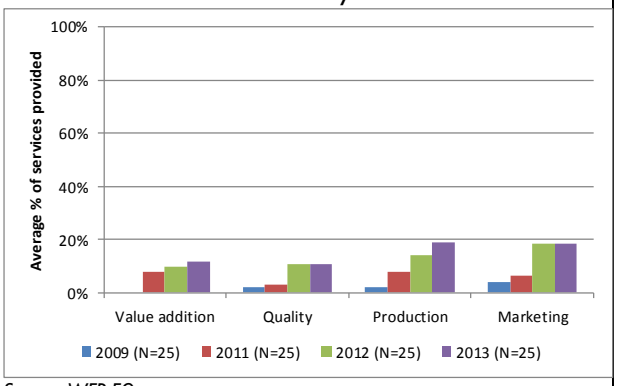
FIGURE 8: ORGANIZATIONAL CAPACITY INDICATORS

Panel 1: Services Provided by P4P SACCOs



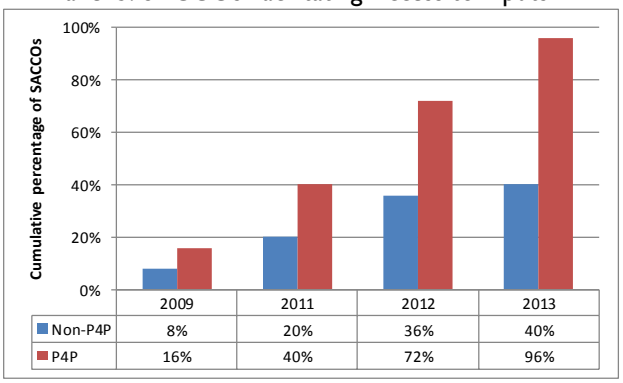
Source: WFP FO surveys.

Panel 2: Services Provided by Non-P4P SACCOs



Source: WFP FO surveys.

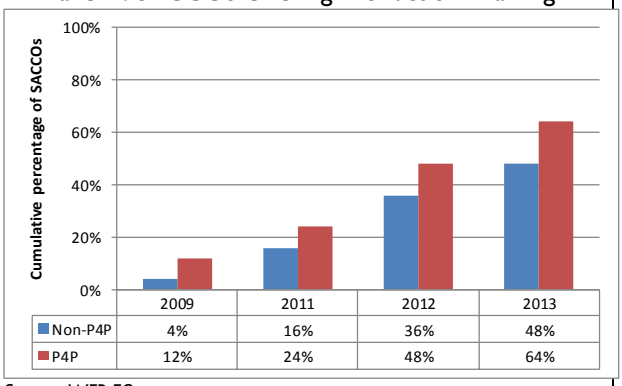
Panel 3: SACCOs Facilitating Access to Inputs



	2009	2011	2012	2013
Non-P4P	8%	20%	36%	40%
P4P	16%	40%	72%	96%

Source: WFP FO surveys.

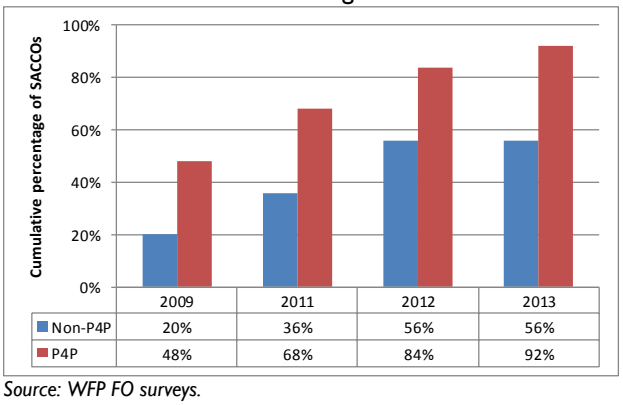
Panel 4: SACCOs Offering Production Training



	2009	2011	2012	2013
Non-P4P	4%	16%	36%	48%
P4P	12%	24%	48%	64%

Source: WFP FO surveys.

Panel 5: SACCOs Planning for Production and Marketing



	2009	2011	2012	2013
Non-P4P	20%	36%	56%	56%
P4P	48%	68%	84%	92%

Source: WFP FO surveys.

DiD Estimates of the Impact of P4P on Organizational Capacity

The visual inspection concluded that WFP had provided a reasonably consistent and sizeable procurement stimulus to P4P SACCOs while non-P4P SACCOs reported no sales. It also documented the substantial improvements in warehousing infrastructure and equipment directly attributable to WFP investments through

P4P. Finally, analysis of the data on external assistance provided to SACCOs found that P4P SACCOs access to assistance with infrastructure and inputs increased significantly relative to non-P4P SACCOs. The increase in assistance with infrastructure relates directly to WFP's investments in warehousing and is part of the P4P treatment. The increased assistance with inputs, however, is an outcome of participating in P4P. Thus, participating in P4P has directly improved the facilitating environment for SACCOs' organizational capacity outcomes.

Table 6 reports DiD estimates of the impact of participating in P4P on key organizational capacity indicators. The underlying data are from the panel of 25 P4P and 25 non-P4P SACCOs collected in 2009, 2011, 2012, and 2013. Estimated coefficients reflect the marginal impact of participating in P4P on the outcome of interest. A negative value does not necessarily mean that the value of the outcome declined, *it means it declined for P4P SACCOs relative to non-P4P SACCOs.*

TABLE 6: DID ESTIMATES OF THE IMPACT OF P4P ON SACCOS' ORGANIZATIONAL CAPACITY

Model	Impact (coefficient/p-value)				N	R^2
	2009-2011	2011-2012	2012-2013	2009-2013		
Percentage of value addition services provided (cumulative %)	0.0022 (0.9720)	0.0047 (0.8780)	0.0447 (0.2450)	0.0516 (0.4970)	147	0.0425
Percentage of quality services provided (cumulative %)	0.3631*** (0.0000)	0.1504* (0.1000)	0.1187*** (0.0050	0.6322*** (0.0000)	147	0.2558
Percentage of production services provided (cumulative %)	0.0154 (0.7540)	0.0637 (0.2050)	0.0570 (0.2880)	0.1361* (0.0740)	147	0.0491
Percentage of marketing services provided (cumulative %)	0.4416*** (0.0000)	0.0788 (0.3130)	0.0171 (0.5200)	0.5376**** (0.0000)	147	0.4075
Likelihood of facilitating access to inputs (cumulative %)	0.0935 (0.3620)	0.1318 (0.2950)	0.1768* (0.0800)	0.4020* (0.0620)	147	0.1181
Likelihood of providing production training (cumulative %)	0.0075 (0.9360)	0.0441 (0.7260)	0.0475 (0.6590)	0.0991 (0.5750)	147	0.0603
Likelihood of planning for production and marketing (%)	0.0242 (0.8910)	-0.1058 (0.5210)	0.3625** (0.0260)	0.2810 (0.1400)	147	0.1456

Numbers in parentheses are p-values.
** significant at p< 0.10*
*** significant at p< 0.05*
**** significant at p< 0.01*

The estimates in Table 6 show that participating in P4P significantly increased the average percentage of quality and marketing services provided by P4P SACCOs. Participating in P4P significantly increased the provision of quality services in each time period while the impact on marketing services was detectable as significant only when comparing the situation in 2009 to that in 2013. This result is consistent with expectations since WFP focused first on providing quality management infrastructure and equipment and training SACCOS in its use. All P4P SACCOs received this support within the first two years of the pilot. WFP's procurement, and thus SACCOs' direct engagement in marketing, evolved more slowly.

The training provided through P4P focused largely on marketing and quality so it is not surprising to see P4P SACCOs progressing more quickly towards acquiring these capacities than their non-P4P counterparts. In this context, changes in the provision of services could be viewed as part of the P4P treatment, i.e., direct outputs of participating in P4P. However, to the extent that sales to WFP and, importantly, others appear to coalesce the learning into actual service provision, it is an anticipated outcome of P4P as well.

P4P SACCOs were also significantly more likely than non-P4P SACCOs to begin facilitating members' access to inputs. As with marketing services, this impact did not emerge until the 2011-2013 time period.

Similarly, planning for production and marketing would be expected to move in tandem with marketing experience. The fact that it is a significant impact of P4P only in the final time period supports this interpretation.

Table 7 summarizes the statistically significant SACCO organizational capacity results.

TABLE 7: SUMMARY OF SACCO ORGANIZATIONAL CAPACITY RESULTS

Impact	Change relative to non-P4P SACCOs (percentage points)			
	2009-2011	2011-2012	2012-2013	2009-2013
Average percentage of eight quality services provided	36	15	12	63
Average percentage of three marketing services provided	44			54
Average percentage of five production services provided				14
Percentage of SACCOs facilitating members' access to inputs			18	40
Percentage of SACCOs planning for production and marketing			36	

Impact of P4P on SACCOs' Marketing Capacity

In Tanzania, WFP focused not only on building the capacities of P4P-supported SACCOs. It also had to build the capacities of organizations such as AMCOs, networks, and associations to act as marketing agents for the SACCOs which are legally prohibited from aggregating or selling agricultural commodities. A comparison of marketing capacities between P4P and non-P4P SACCOs therefore implicitly measures the combined impact of both levels of capacity building and the work WFP has done to make connections between SACCOs and marketing organizations. This section follows the format of the previous section by illustrating results in a visual format before presenting formal DiD estimates of impact.

Visual Inspection

Previous sections have already documented trends in WFP's procurement, a factor facilitating SACCO marketing outcomes. P4P and non-P4P both reported uneven trends in utilizing credit, another important facilitating factor (Figure 9). However, from 2011 onward, P4P SACCOs have seen more consistent growth in utilization of credit than non-P4P SACCOs and by 2013 P4P SACCOs appear to be much more likely than non-P4P SACCOs to have received loans.

Consistent with the development hypothesis, improvement in these facilitators appears to be associated with improvements in intermediate marketing outcomes. Panel 1 of Figure 10 shows substantial growth in total quantities sold, the number of SACCOs engaged in marketing, and the number of SACCOs selling to buyers other than WFP. It also shows a decreasing reliance on WFP as a market outlet, that is, the share of total quantity sold purchased by buyers other than WFP increases over time. Figure 10 does not show comparable sales figures for non-P4P SACCOs because none reported selling maize during the pilot period. P4P SACCOs also appear to have increased their capacity to facilitate financing to members by much greater margins than non-P4P SACCOs (Panel 2).

FIGURE 9: SACCOS' UTILIZATION OF CREDIT

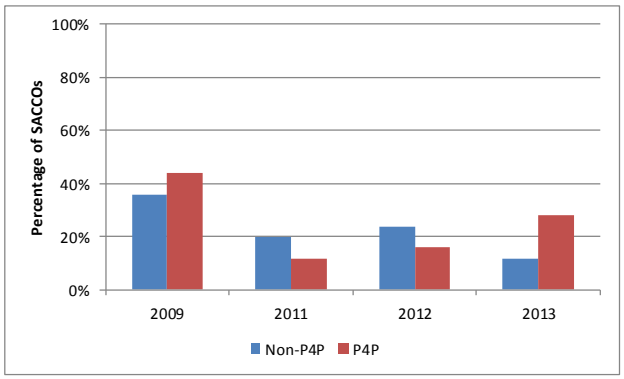
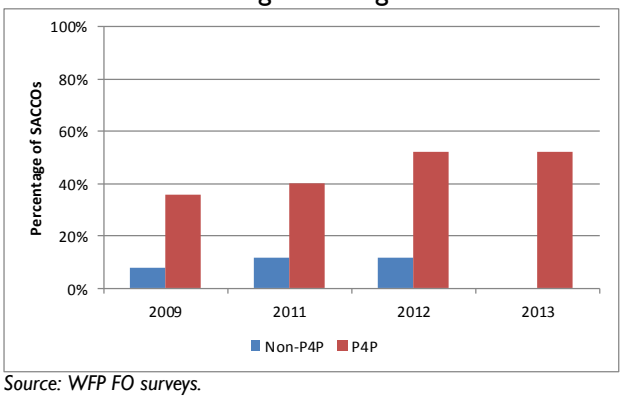


FIGURE 10: EVOLUTION OF SACCO MARKETING CAPACITY

Panel 1: P4P SACCOs' Marketing Activity

Source: WFP FO surveys.

Panel 2: Providing Financing to Members



Source: WFP FO surveys.

The data also suggest that P4P SACCOs sell more consistently than non-P4P SACCOs. The transition matrices of Figure 11 illustrate this dynamic. The percentage values in the table cells represent the percentage of cases where a SACCO moves from the row state in one period to the column state in the subsequent period. The numbers in parentheses are frequencies. Thus, 60 percent of P4P SACCOs that sold to buyers other than WFP in one period sold again in the immediately subsequent period. In the context of Tanzania's reliance on competitive tenders, this suggests that many P4P SACCOs developed the marketing capacity to consistently win competitive tenders. Forty percent of P4P SACCOs that did not sell to buyers other than WFP in one period did sell in the immediately subsequent period. The corresponding percentage among non-P4P SACCOs was 0 percent implying that sales to other buyers are one-off affairs.

The data also suggest that WFP provided a fairly consistent procurement stimulus. In 42 percent of cases when WFP bought from a SACCO, it did so again in the immediately subsequent period. And in 30 percent of cases when it did not buy from a particular SACCO, it purchased in the immediately subsequent period.

Visual inspection of the data also suggests that selling to WFP is weakly, if at all, associated with the capacity to sell to other buyers. Only half of the 18 SACCOS that sold to WFP ever reported sales to other buyers and only 2 sold to other buyers only after first selling to WFP.

FIGURE 11: CONSISTENCY OF MARKET ENGAGEMENT

Sales to other buyers: P4P

	Sales	No sales
Sales	60% (15)	40% (10)
No sales	40% (20)	60% (30)

Sales to other buyers: Non-P4P

	Sales	No sales
Sales	0% (0)	100% (3)
No sales	4% (3)	96% (69)

Sales to WFP: P4P

	Sales	No sales
Sales	42% (8)	58% (11)
No sales	30% (17)	70% (39)

Source: WFP FO surveys.
Note: The data in this figure reflect sales of maize and beans since non-P4P SACCOs reported no sales of maize.

SACCOs' ability to obtain prices that are higher than farmers can easily get on their own is another anticipated marketing outcome. All other things being equal, it is essential to a SACCO's ability to aggregate effectively and become a reliable supplier to buyers. The analysis draws on three primary sources for price information. In order of increasing reliability, it uses prices reported by respondents to the household survey, prices reported by respondents to the SACCOs survey, and prices obtained from WFP procurement records. Figure 12 illustrates differences in prices from several perspectives. Panel 1 shows the prices at which P4P SACCOs reported selling maize;[28] the price members received after the SACCO retained its share; the price WFP reported paying; and average annual maize prices obtain from the Food and Agriculture Organization's Global Information and Early Warning System.[29] Although the number of observations on sales by SACCOs is too small to support statistical tests, Panel 1 suggests several interesting conclusions:

- The average price SACCOs reported for sales to WFP matches almost exactly the (reliable) price data obtained from WFP procurement records.
- Prices associated with sales to WFP are higher than prices associated with sales to other buyers in 2011 and 2013. And even though SACCOs retain a larger share of revenue from sales to WFP, the share to farmers is larger than their share from sales to other buyers except in 2011. This suggests that, especially as SACCOs gained capacity, members of SACCOs that sold to WFP (P4P SACCOs) fared better than members of SACCOs that did not sell to WFP (non-P4P SACCOs).
- Prices are generally consistent with wholesale prices reported by FAO which also lends some credibility to the SACCO-reported data.

Panel 2 illustrates average prices reported by households by P4P status. Members of P4P SACCOs obtained significantly higher prices than members of non-P4P SACCOs in 2013. Panel 3 shows average prices reported by households separated by whether the household reported selling through the SACCO. The difference is statistically significant only in 2013. Taken together, the data presented in Figure 12 provide fairly compelling evidence that:

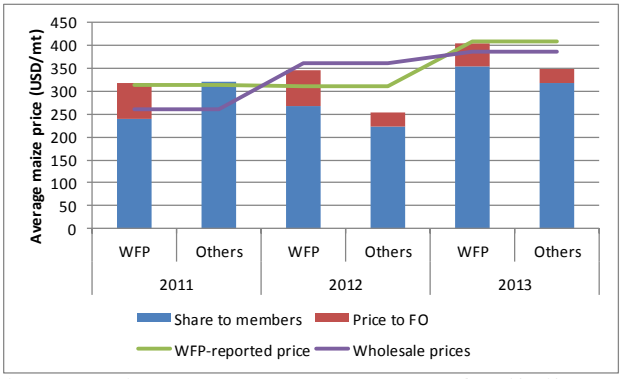
- SACCOs obtain higher prices selling to WFP than they do selling to other buyers.
- By 2013, P4P households were obtaining significantly higher prices than non-P4P households. Multiplying the USD 15/mt price differential between P4P and non-P4P households by the average quantity sold in 2013 (1.14 mt for P4P households and 1.16 mt for non-P4P households) suggests

[28] Non-P4P SACCOs reported no sales of maize.
[29] http://www.fao.org/giews/pricetool/

that P4P households earned, on average, about USD 17 more than non-P4P households from selling maize.

FIGURE 12: AVERAGE MAIZE PRICES

Panel 1: Average Maize Prices Reported by SACCOs



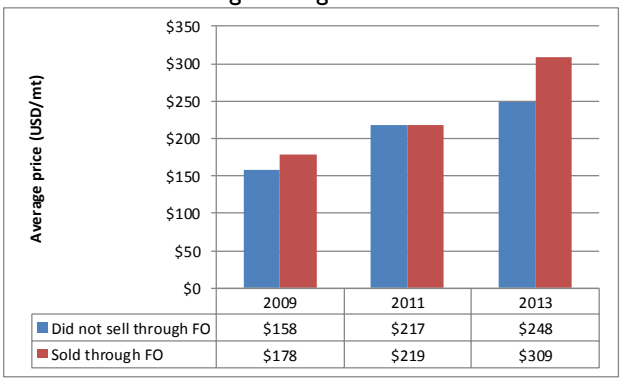
Source: WFP FO survey, WFP procurement records, and GIEWS(FAO).

Panel 2: Average Household Maize Prices by P4P Status

	2009	2011	2013
Non-P4P	$154	$216	$247
P4P	$159	$222	$262

Source: WFP household survey.

Panel 3: Average Household Maize Prices by Status of Selling Through the FO



	2009	2011	2013
Did not sell through FO	$158	$217	$248
Sold through FO	$178	$219	$309

Source: WFP household survey.

Table 8 presents DiD estimates of SACCO marketing outcomes. The estimates for the two indicators related to selling do not represent DiD estimates since comparisons with non-P4P SACCOs were not possible because they reported selling no maize. This implies that all marketing results for P4P SACCOs are entirely attributable to P4P. Reported results for SACCO marketing outcomes reflect the changes illustrated in Panel 1 of Figure 10. Statistically significant impacts on the likelihood of utilizing credit did not emerge until the period between 2012 and 2013 and P4P had no detectable impact on the likelihood that P4P SACCOs provided post-harvest financing to members.

TABLE 8: DID ESTIMATES OF THE IMPACT OF P4P ON SACCOS' MARKETING CAPACITY

Model	Impact (coefficient/p-value)				N	R^2
	2009-2011	2011-2012	2012-2013	2009-2013		
Likelihood of utilizing credit (%)	-0.1822 (0.2190)	0.0112 (0.9420)	0.2995** (0.0310)	0.1285 (0.4130)	147	0.0979
Likelihood of selling maize to buyers other than WFP (%)	0.0400	0.0800	0.1200	0.2400		
Average quantity of maize sold to buyers other than WFP (%)	27	25	121	172		
Likelihood of providing financing to members (%)	-0.0021 (0.9890)	0.1196 (0.3340)	0.1246 (0.3960)	0.2421* (0.0890)	147	0.0306

Numbers in parentheses are p-values.
** significant at p< 0.10*
*** significant at p< 0.05*
**** significant at p< 0.01*

Table 9 summarizes the statistically significant SACCO marketing capacity results.

TABLE 9: SUMMARY OF SACCO MARKETING CAPACITY RESULTS

Impact	Change relative to non-P4P SACCOs			
	2009-2011	2011-2012	2012-2013	2009-2013
Percentage of SACCOs utilizing credit (percentage points)			30	
Percentage of SACCOs selling to buyers other than WFP (percentage points)	4	8	12	24
Average quantity of maize sold to buyers other than WFP (mt)	27	25	121	172
Percentage of SACCOs providing financing to members (percentage points)				24

IMPACT OF P4P ON HOUSEHOLD PRODUCTION, MARKETING, AND WELFARE

The household analysis examines three broad categories of impacts aligned with the results framework of Figure 5; maize production, maize marketing, and household welfare. The sections on maize production and marketing present evidence of the impact of P4P on maize production and marketing "facilitators", behavioral change, and intermediate production and marketing outcomes. The household welfare section examines the combined effect of production and marketing on income and other measures of household wellbeing.

Each of the three main sections first presents the data in a graphical format that visually illustrates trends in the indicators over time for both P4P and non-P4P households and differences between the two groups. The analysis then presents DiD estimates derived from a regression model that incorporates covariates to control for factors other than participation in P4P that may influence the outcome measures differently for P4P and non-P4P households. Relevant covariates thus include factors that might be expected to differentially influence outcomes and which are exogenous to the treatment. Many of the candidate variables are not exogenous. For example, higher maize yields might indicate that a particular farmer is more likely to be using productivity-enhancing technologies or practices which are also anticipated outcomes of the treatment. For this reason, the regressions use baseline values for the selected covariates which are exogenous because they are measured prior to the treatment. Table 10 describes and summarizes baseline values for the covariates included in the analysis.

Not all of the covariates in Table 10 are expected to directly affect outcomes. For example, metal roofs are not likely to directly affect agricultural production. However, these covariates may well serve as proxies for unobservable factors that do influence production and P4P and non-P4P households reported significantly different values.

TABLE 10: COVARIATES IN HOUSEHOLD ANALYSIS

Variable name	Variable description	Baseline values				
		P4P status	N	Mean	Median	Standard deviation
Education	Indicator of HH head having at least a secondary education	Non-P4P	343	0.16	0.00	0.36
		P4P	321	0.14	0.00	0.35
Sex	Indicator of female HH head	Non-P4P	338	0.16	0.00	0.37
		P4P	315	0.15	0.00	0.35
Occupation	Indicator of HH head employed primarily in agriculture	Non-P4P	333	0.86	1.00	0.34
		P4P	312	0.89	1.00	0.31
Off-farm	Indicator of HH having income from off-farm source	Non-P4P	338	0.68	1.00	0.47
		P4P	317	0.69	1.00	0.46
Loans	Indicator of receiving loans for non-agricultural purposes	Non-P4P	343	0.26	0.00	0.44
		P4P	321	0.40	0.00	0.49
Leader	Indicator of HH member in FO leadership	Non-P4P	343	0.19	0.00	0.39
		P4P	321	0.15	0.00	0.35
Nfarming	Number of family members involved in farming	Non-P4P	343	2.52	2.00	1.44
		P4P	321	2.74	2.00	1.64
Labor	Indicator of employing hired labor in agriculture	Non-P4P	343	0.75	1.00	0.43
		P4P	321	0.76	1.00	0.43
Walls	Indicator of concrete or fired brick walls	Non-P4P	343	.090	1.00	.030
		P4P	321	0.83	1.00	0.37
Floor	Indicator of concrete floor	Non-P4P	343	0.70	1.00	0.46
		P4P	321	0.26	1.00	0.50
Toilet	Indicator of improved toilet facilities	Non-P4P	343	0.82	1.00	0.38
		P4P	321	0.74	1.00	0.44
Inputs	Indicator of FO facilitating access to inputs	Non-P4P	343	0.15	0.00	.036
		P4P	321	0.22	0.00	0.41
Surplus	Indicator of producing a surplus of maize	Non-P4P	322	0.60	1.00	0.49
		P4P	302	0.67	1.00	0.47
HHexp	Expenditures on household items	Non-P4P	343	321,224	237,256	315,659
		P4P	321	377,388	233,606	458,822

Location-specific characteristics such as weather, agricultural productivity, input availability, population, distance to urban centers, and transportation infrastructure might also influence agricultural production and marketing activity. To control for these factors, the covariate model included dummy variables for each of the ten regions containing surveyed SACCOs.[30] Table 11 summarizes selected characteristics of P4P operational regions extracted from the Tanzania P4P Story.[31]

[30] Factors relevant to production and marketing might be expected to vary within regions as well but, in the absence of readily accessible sub-national data, regional dummies strike a balance between more nuanced models using more granular location data and analytical tractability.
[31] Internal WFP document. Available from WFP.

TABLE 11: SELECTED CHARACTERISTICS OF P4P OPERATIONAL REGIONS

Region name	Number of P4P SACCOs/HH surveyed	Region characteristics
Kilimanjaro	2/18	Zone: Northern. P4P: Food-deficit. Proximate to WFP operations.
Manyara	4/43	Zone: Northern. P4P: Surplus-producing. Proximate to WFP operations. Limited production in 2009.
Arusha	2/8	Zone: Northern. P4P: Food-deficit. Proximate to WFP operations.
Kigoma	4/21	Zone: Lake. P4P: Surplus-producing. Proximate to WFP operations.
Kagera	4/81	Zone: Lake. P4P: Food-deficit. Proximate to WFP operations.
Dodoma	4/95	Zone: Central. P4P: Food-deficit. Proximate to WFP operations. Limited production in 2009.
Singida	2/12	Zone: Central. P4P: Food-deficit. Proximate to WFP operations. Limited production in 2009.
Rukwa	1/12	Zone: Southern Highlands. P4P: Surplus-producing. No WFP operations. Bumper crop in 2009.
Iringa	1/16	Zone: Southern Highlands. P4P: Surplus-producing. No WFP operations. Bumper crop in 2009.
Ruvuma	1/15	Zone: Southern Highlands. P4P: Surplus-producing. No WFP operations. Bumper crop in 2009. Targeted by AGRA for production assistance.

The P4P development hypothesis suggests that many of the anticipated household-level outcomes of P4P are contingent on selling through the SACCO. However, few surveyed households reported selling through the SACCOs. In fact, only 5 percent of non-P4P households and 22 percent of P4P households reported having sold through the SACCOs by 2013. In an attempt to isolate impacts for this group of households, a separate set of analyses estimated impacts for all household indicators using selling through the SACCOs as the treatment. Those analyses identified no significant impacts, perhaps because the numbers are very small, and the results are not reported here.

Impact of P4P on Household Maize Marketing

Following the outline of the results framework illustrated in Figure 5, this section first examines changes in the factors facilitating changes in household marketing behavior and then links them to observed changes in marketing decisions, i.e., the location and timing of sales. It then presents evidence of changes in facilitating factors for intermediate marketing outcomes and links them to observed changes in prices received for maize, the primary intermediate household marketing outcome.

Visual Inspection

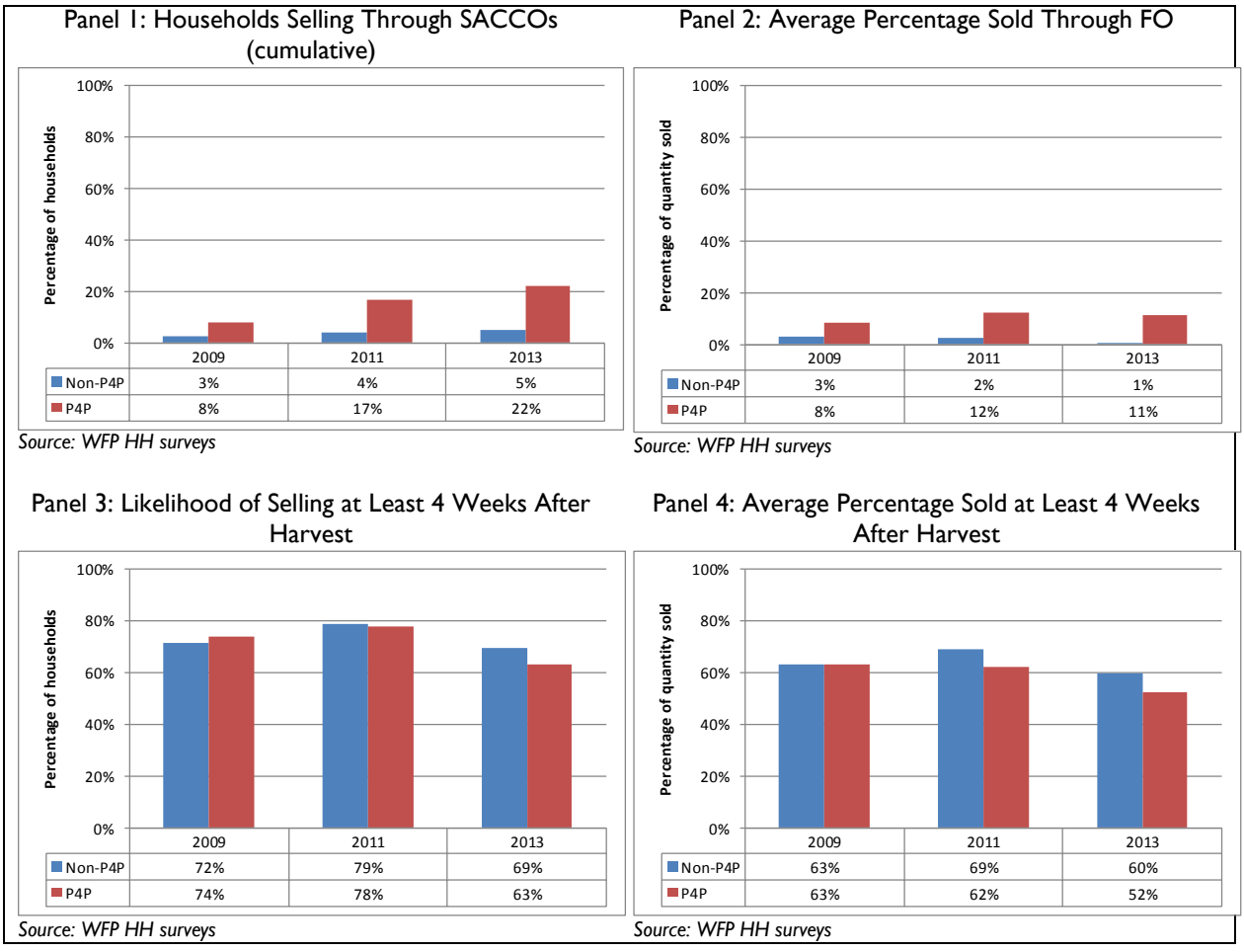
Visual inspection of the SACCO data suggest that P4P SACCOs increased the quantity of maize they sold relative to non-P4P SACCOs (Panel 1 of Figure 10); increased the percentage of production, marketing, and

quality services they provided to members relative to non-P4P SACCOs (Panels 1 and 2 of Figure 7), and were more likely than non-P4P SACCOs to provide post-harvest financing to members (Panel 3 of Figure 10). Thus P4P appears to have improved the conditions facilitating changes in household marketing choices, i.e., the location and timing of sales.

With respect to where households chose to sell their maize surpluses, P4P and non-P4P households appear to have followed different trends. Relatively few households in either group reported selling maize through the SACCO. However, the percentage of P4P households selling through the SACCO and the average percentage of their surplus they channeled through the SACCO increased over time compared to relative flat or declining trends among non-P4P households (Panels 1 and 2 of Figure 13). The differences between P4P and non-P4P households with respect to the percentage selling through the SACCO and the average percentage of marketed surplus sold through the SACCO were statistically significant in all three time periods.

Most P4P and non-P4P households reported selling at least maize four weeks or more after harvest (Panels 3 and 4 of Figure 13). Furthermore, they reported selling a majority of their surplus quantity four weeks or more after harvest. Differences between P4P and non-P4P households were not statistically significant in any time period for either indicator. P4P appears, therefore, to have encouraged more households to begin selling maize through the SACCO.

FIGURE 13: LOCATION AND TIMING OF MAIZE SALES



Households with a marketable surplus will generally find a way to sell the surplus. The percentage of households selling maize and the quantities sold are therefore more related to production than to marketing. Nevertheless, Figure 14 presents the household data on maize surpluses and sales as context for other marketing outcomes. With one exception, i.e., the decline in average quantities of maize sold by P4P households between 2011 and 2013, P4P and non-P4P households reported similar trends in these four marketing parameters. This decline corresponds to a drop in WFP procurement from 3,993 mt of maize from 19 SACCOs in 2011 to 984 mt from 6 SACCOs in 2013.[32]

FIGURE 14: MAIZE MARKETING PARAMETERS

DiD Estimates of the Impact of P4P on Household Maize Marketing

The facilitators of household maize marketing include the quantity of maize sold by the SACCO of which the household is a member (overall and to buyers other than WFP), the SACCO's provision of services, and the household's utilization of credit for agricultural purposes. The analysis of the impacts of P4P on SACCO's marketing capacity (Table 8) concluded that participating in P4P:

- Significantly increased the quantity of maize P4P SACCOs sold relative to non-P4P SACCOs (overall and to buyers other than WFP);
- Significantly increased the percentage of production, marketing, and quality services P4P SACCOs provided to their members relative to non-P4P SACCOs; and

[32] P4P procurement records.

- Significantly increased the percentage of P4P SACCOs that reported providing post-harvest financing to members relative to non-P4P SACCOs.

From the household perspective, the analysis reported in Table 14 concluded that P4P households were no more likely than non-P4P households to have utilized credit for agricultural purposes, even though a greater percentage of SACCOs reported providing post-harvest financing. Thus, participating in P4P appears to have significantly improved some aspects of the environment for facilitating household maize marketing.

The household-level behavioral changes and intermediate marketing outcomes attributable to participating in P4P have been modest. The DiD results reported in Table 12 show statistically significant impacts only for the likelihood of selling maize through the SACCO. In this instance, the percentage of P4P households that reported selling maize through the SACCO increased by 11 percentage points relative to non-P4P households.

TABLE 12: DID ESTIMATES OF THE IMPACT OF P4P ON HOUSEHOLD MAIZE MARKETING

Model	Impact (coefficient/p-value)			N	R^2
	2009-2011	2011-2013	2009-2013		
Likelihood of selling maize through the SACCO (cumulative % of households)	0.0648*** (0.0010)	0.0444** (0.0300)	0.1112*** (0.0000)	820	0.0767
Average percentage of marketed maize sold through the SACCO (%)	0.0499 (0.2760)	-0.0133 (0.7360)	0.0177 (0.6980)	432	0.0676
Likelihood of selling maize four weeks or more after harvest (%of households)	0.0272 (0.7640)	-0.0023 (0.9770)	-0.1414 (0.1460)	432	0.1044
Average percentage of marketed maize sold four weeks or more after harvest (%)	-0.0213 (0.8150)	0.0172 (0.8270)	-0.1297 (0.1470)	432	0.1207
Average maize prices to farmers (USD/mt)	18,805 (0.3900)	8,534 (0.7000)	-7,509 (0.7710)	438	0.1644

Numbers in parentheses are p-values.
* significant at p< 0.10
** significant at p< 0.05
*** significant at p< 0.01

Table 13 summarizes the statistically significant household marketing results.

TABLE 13: SUMMARY OF HOUSEHOLD MARKETING RESULTS

Impact	Change relative to non-P4P SACCOs			
	2009-2011	2011-2012	2012-2013	2009-2013
Percentage of SACCOs utilizing credit (percentage points)			30	
Percentage of SACCOs selling to buyers other than WFP (percentage points)	4	8	12	24
Average quantity of maize sold to buyers other than WFP (mt)	27	25	121	172
Percentage of SACCOs providing financing to members (percentage points)				24

Impact of P4P on Household Maize Production

Maize is the primary staple crop in Tanzania. Across the three WFP household surveys, between 83 percent (2009) and 94 percent (2013) of P4P households reported cultivating maize. The factors that are likely to affect the average quantity of maize produced by households that cultivate maize include the land area allocated to maize production and maize yields (which may be affected by the use of productivity-enhancing technologies and practices such as certified seed or fertilizer). Weather is also likely to strongly influence maize production. In the absence of accessible subnational rainfall data, the regional dummy variables control, to some extent, for weather-related factors that influence production.

A country-specific parameter that is likely to affect the quantity produced is average cereal yields. Average yields capture external factors such as weather that can influence yields. The World Bank reported average cereal yields for Tanzania of 1,110 kg/ha in 2009 and 1,379 kg/ha in 2011.[33] Data from 2013 were not available but FAO, data on which the World Bank bases its estimates, forecast an average yield of 1,310 kg/ha for 2013.[34]

Visual Inspection

The results framework presented in Figure 5 defines a number of "facilitators" that might be expected to influence household production results. These include access to productivity-enhancing inputs and training and access to credit. Figure 15 illustrates changes in these facilitators over time for P4P and non-P4P households. Panels one through four present the household perspective while Panels five and six reflect results from the surveys of SACCOs.

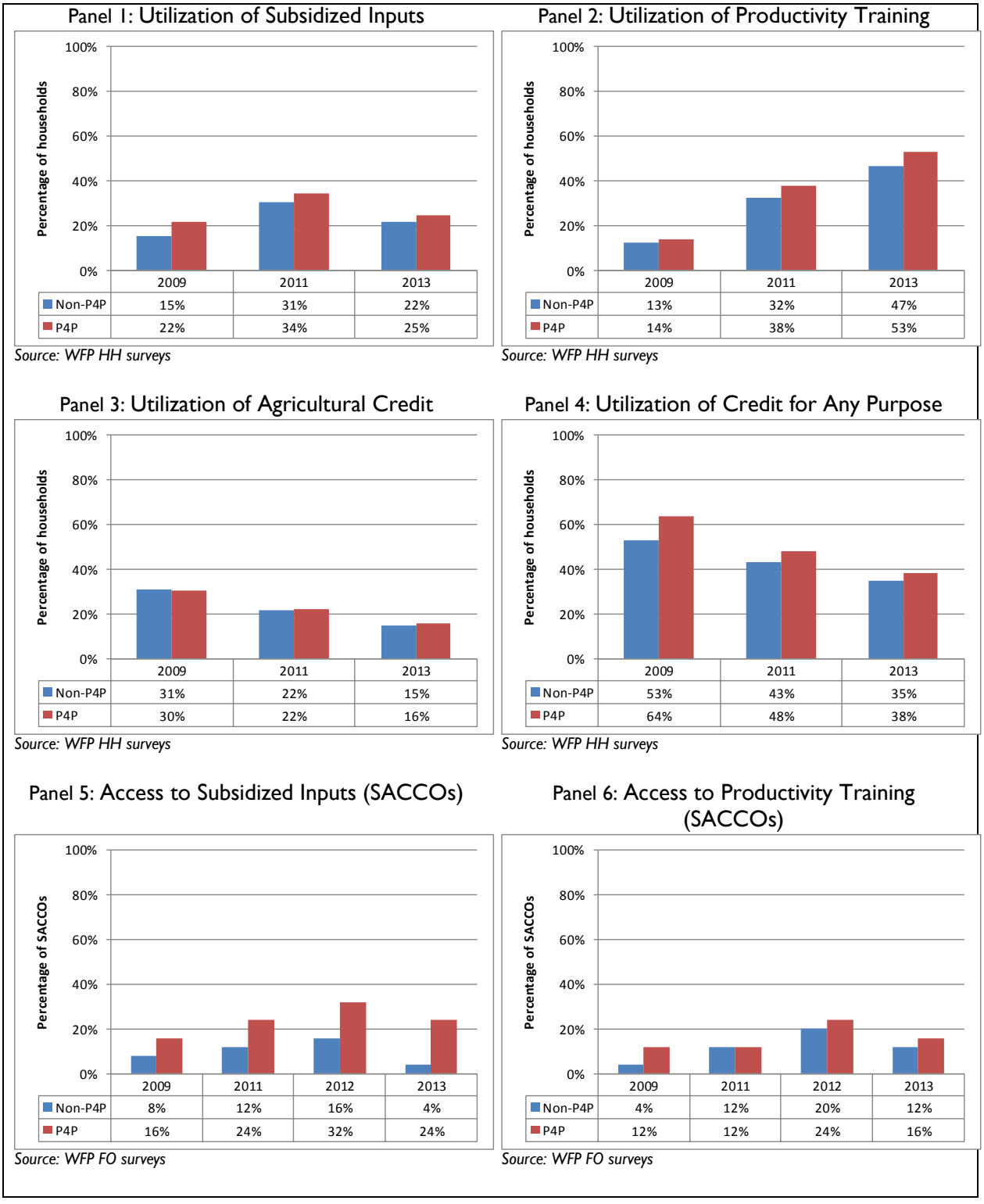
Households reported similar values and trends in the four primary production facilitators. In fact, the only statistically significant differences were:

- A significantly higher percentage of P4P than non-P4P households reported receiving free or subsidized inputs in 2009.
- A significantly higher percentage of P4P than non-P4P households reported utilizing credit for any purpose in 2009.
- A significantly higher percentage of P4P than non-P4P households reported participating in productivity training in 2013.

In summary, it appears that P4P and non-P4P households experienced similar trends in most production-facilitating factors with the possible exception of access to inputs and productivity training.

[33] Accessed at http://data.worldbank.org/indicator/AG.YLD.CREL.KG
[34] Accessed at http://www.fao.org/giews/countrybrief/country.jsp?code=TZA

FIGURE 15: MAIZE PRODUCTION FACILITATORS

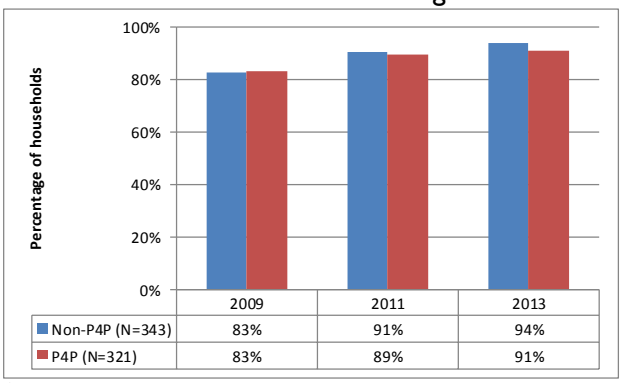


Improvement in the facilitating conditions should influence maize production. Figure 16 illustrates trends in household maize production parameters and differences between P4P and non-P4P households. At least on

visual inspection, P4P and non-P4P households reported very similar experiences with all of the indicators. They started at about the same point and reported similar changes in direction and magnitude over time. Based solely on visual inspection, there appear to be few obvious differences between P4P and non-P4P households in the evolution of maize production or the P4P-related factors that might explain production. Simple statistical tests confirm the visual inspection. P4P and non-P4P households were statistically similar (i.e., the differences were not statistically significant) in any of the three time periods.

FIGURE 16: MAIZE PRODUCTION PARAMETERS

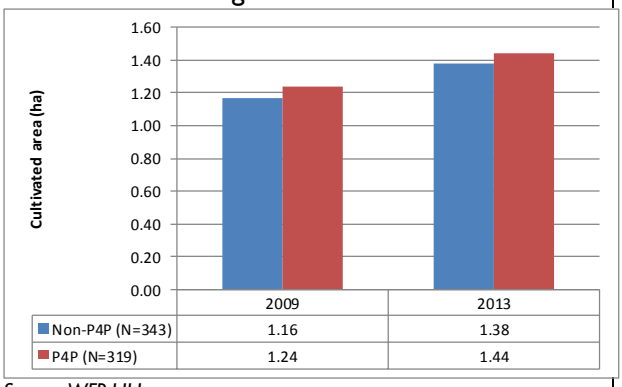
Panel 1: Households Cultivating Maize



	2009	2011	2013
Non-P4P (N=343)	83%	91%	94%
P4P (N=321)	83%	89%	91%

Source: WFP HH surveys

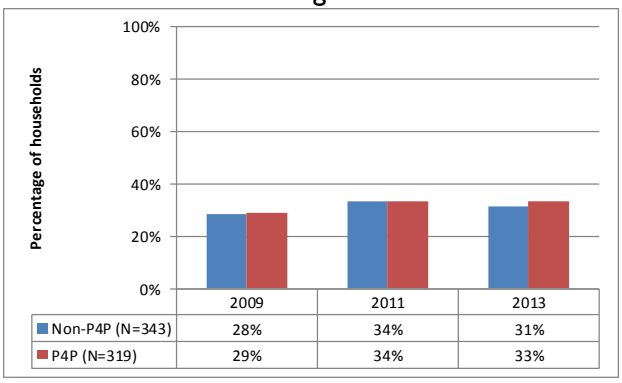
Panel 2: Average Area Planted to Maize



	2009	2013
Non-P4P (N=343)	1.16	1.38
P4P (N=319)	1.24	1.44

Source: WFP HH surveys
Area measures for 2011 are inconsistent with other periods

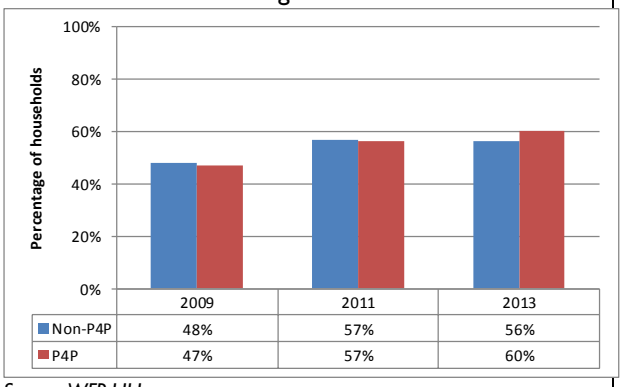
Panel 3: Households Using Certified Maize Seed



	2009	2011	2013
Non-P4P (N=343)	28%	34%	31%
P4P (N=319)	29%	34%	33%

Source: WFP HH surveys

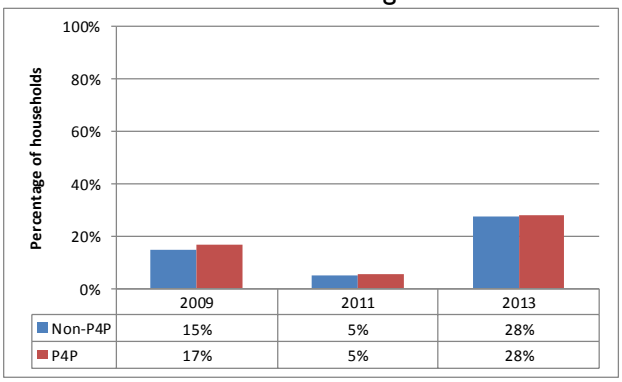
Panel 4: Percentage of Seed Certified



	2009	2011	2013
Non-P4P	48%	57%	56%
P4P	47%	57%	60%

Source: WFP HH surveys

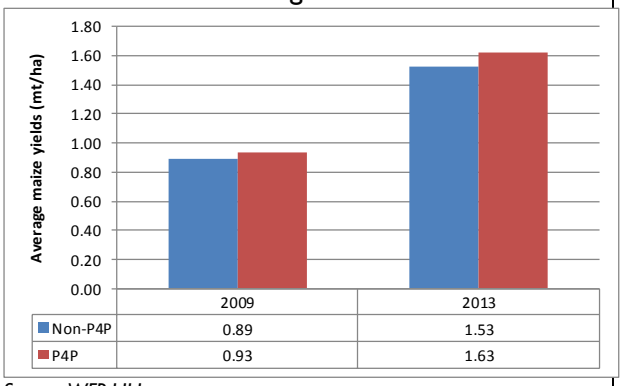
Panel 5: Households Using Fertilizer



	2009	2011	2013
Non-P4P	15%	5%	28%
P4P	17%	5%	28%

Source: WFP HH surveys

Panel 6: Average Maize Yields

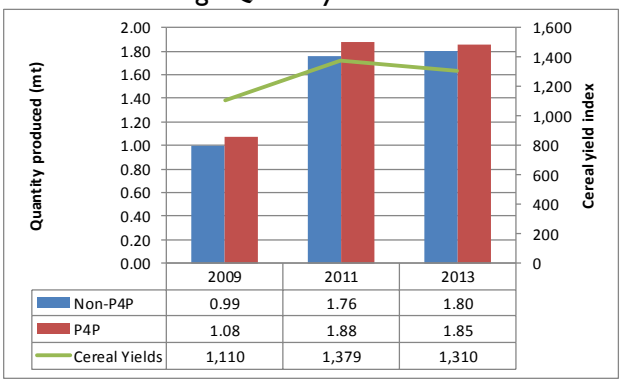


	2009	2013
Non-P4P	0.89	1.53
P4P	0.93	1.63

Source: WFP HH surveys

2011 data are not useable because inconsistent area measurements produced inconsistent imputed yields

Panel 7: Average Quantity of Maize Produced



Source: WFP HH surveys

DiD Estimates of the Impact of P4P on Maize Production

Visual inspection of the data suggests that P4P had little impact on the quantity of maize households produced or on the factors that may have affected maize production. Table 14 presents DiD estimates of the impact of participating in P4P on the maize production facilitators measured at the household level, i.e. utilization of inputs, training, and credit.

TABLE 14: DID ESTIMATES OF THE IMPACT OF P4P ON MAIZE PRODUCTION FACILITATORS

Model	Impact (coefficient/p-value)			N	R^2
	2009-2011	2011-2013	2009-2013		
Utilization of subsidized inputs (%) – all households	-0.0306 (0.1120)	-0.0210 (0.4860)	-0.0442 (0.3130)	1,163	0.1221
Utilization of productivity training (%) – all households	0.0620 (0.1780)	-0.0487 (0.3020)	0.0178 (0.6980)	1,163	0.0793
Utilization of agricultural credit (%) – all households	0.0438 (0.3170)	-0.0149 (0.7400)	0.0234 (0.6160)	1,163	0.0278
Utilization of credit for any purpose (%) – all households	-0.0581 (0.2030)	-0.0329 (0.4830)	-0.0849* (0.0860)	1,163	0.2422

Numbers in parentheses are p-values.
* significant at p< 0.10
** significant at p< 0.05
*** significant at p< 0.01

With the exception of utilizing credit for any purpose, P4P households fared no better than non-P4P households in terms of changes in maize production facilitators. However the decline between 2009 and 2013 in utilizing general credit was significantly greater among P4P than non-P4P households.

The estimates presented in Table 6 reported results for two other household marketing facilitators, access to production inputs and production training through the SACCO. The analysis concluded that participation in P4P significantly increased the percentage of SACCOs facilitating access to inputs for members. However, it had no discernable effect on the percentage of SACCOs that provided production training.

Table 15 summarizes DiD estimates of the impact of P4P on household maize production and associated production parameters.

TABLE 15: DID ESTIMATES OF THE IMPACT OF P4P ON HOUSEHOLD MAIZE PRODUCTION

Model	Impact (coefficient/p-value)			N	R^2
	2009-2011	2011-2013	2009-2013		
Likelihood of cultivating maize (%) – all households	-0.0107 (0.7450)	0.0108 (0.7500)	0.0155 (0.6410)	1,163	0.1422
Average area planted to maize (ha) – cultivating households	2011 data are inconsistent		-0.0125 (0.9530)	564	0.1695
Likelihood of using certified maize seed (%) – cultivating households	-0.0099 (0.8090)	-0.0029 (0.9440)	0.0154 (0.7240)	1,162	0.0323
Average percentage of maize seed that was certified (%) – certified seed using households	-0.0339 (0.6310)	0.0274 (0.7100)	0.0007 (0.9930)	561	0.0191
Likelihood of using fertilizer (%) – cultivating households	-0.0089 (0.7710)	-0.0124 (0.6930)	-0.0301 (0.4060)	1,162	0.3489
Average maize yield (mt/ha) – producing households	2011 data are inconsistent		0.0193 (0.8550)	508	0.1211
Average quantity of maize produced (mt) – producing households	0.0840 (0.7390)	-0.0537 (0.8360)	-0.0111 (0.9650)	1,162	0.0756

Numbers in parentheses are p-values.
* significant at p< 0.10
** significant at p< 0.05
*** significant at p< 0.01

Relevant findings from the DiD analysis include:

- P4P had no discernable impact on the quantity of maize produced or on the factors that may have affected maize production.
- Geographic location (represented by regional dummy variables in the covariate model) had a significant effect on changes in maize production and all of the production parameters. This is not surprising since region may reflect weather. However, it is somewhat surprising that the regional dummy variables seem to be most important in explaining variation in input use.
- The remaining variables had a limited and inconsistent influence on results.

Impact of P4P on Household Welfare

Welfare is a broad concept with dimensions including income, wealth, nutrition, food security, and physical security to name a few. The P4P proposal identified income as the primary household welfare measure. Because of the anticipated difficulty measuring small changes in income, however, the P4P logframe identified several alternate welfare indicators. These include the household asset score (a simple summary of household assets), the value of household livestock (an important store of wealth in many cultures), and the food consumption score (an indicator of food security). The analysis of the impacts of P4P on household welfare examines each of these indicators to provide a well-rounded picture of welfare change.

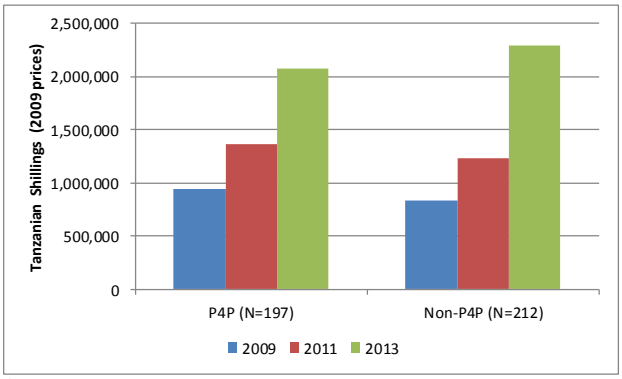
Visual Inspection

As with previous sections, the inquiry begins with illustrations of changes in income and welfare measures (Figure 17). On all four measures P4P and non-P4P households appear to have had largely similar experiences. Real income has increased steadily for both groups (Panel 1) and the share of total income

attributable to crops, livestock, and off-farm sources appears to have evolved in a similar manner (Panel 2). Panels 3 and 4 illustrate similar patterns of change in asset scores, real livestock value, and the food consumption score (Panels 3-5).

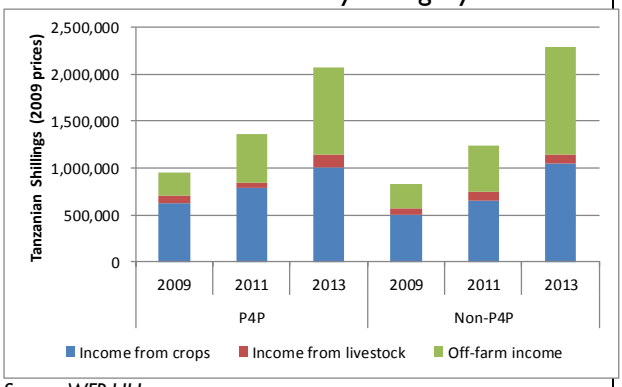
FIGURE 17: HOUSEHOLD WELFARE INDICATORS

Panel 1: Household Income



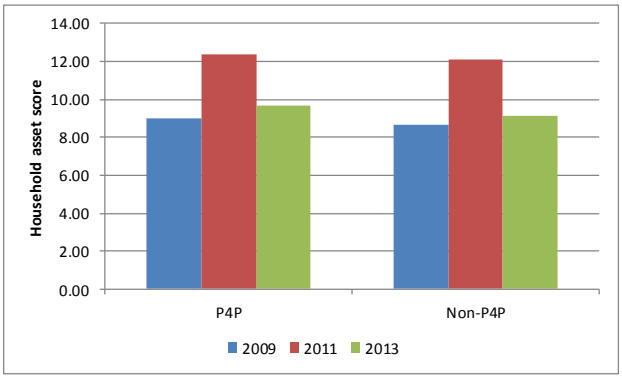
Source: WFP HH surveys

Panel 2: Income by Category



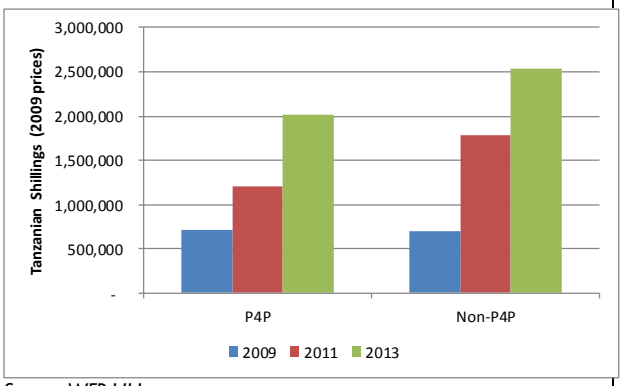
Source: WFP HH surveys

Panel 3: Household Asset Score



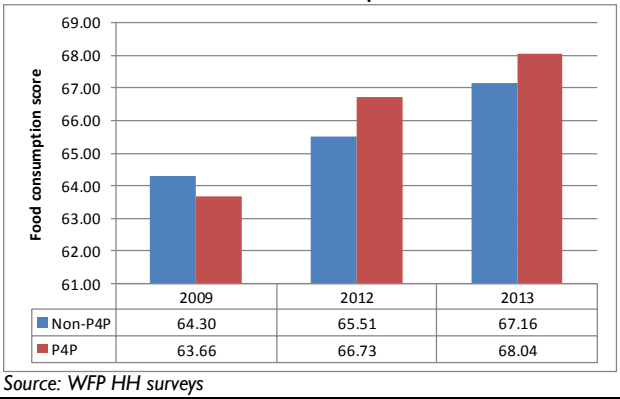
Source: WFP HH surveys

Panel 4: Livestock Value



Source: WFP HH surveys

Panel 5: Food Consumption Score



	2009	2012	2013
Non-P4P	64.30	65.51	67.16
P4P	63.66	66.73	68.04

Source: WFP HH surveys

The only statistically significant difference between P4P and non-P4P households was in the household asset score. P4P households had slightly (but significantly) higher scores than non-P4P households in 2009 and in 2013.

DiD Estimates of the Impact of P4P on Household Welfare

Table 16 reports DiD estimates of the impact of P4P on four household welfare indicators.

TABLE 16: DID ESTIMATES OF THE IMPACT OF P4P ON HOUSEHOLD MAIZE MARKETING

Model	Impact (coefficient/p-value)			N	Adjusted R^2
	2009-2011	2011-2013	2009-2013		
Household income (2009 Tanzanian Shillings)					
Non-parametric model	-45,396 (0.7970)	58,411 (0.7450)	-147,507 (0.4340)	1,328	0.0002
Covariate model	-4,601 (0.9800)	-223,681 (0.2370)	-260,894 (0.2030)	1,163	0.1459
Household asset score					
Non-parametric model	-0.0570 (0.7180)	0.2420 (0.1260)	0.1968 (0.2460)	1,326	0.7041
Covariate model	-0.0002 (0.9990)	0.2532 (0.1470)	0.1590 (0.3930)	1,162	0.7162
Value of livestock (2009 Tanzanian Shillings)					
Non-parametric model	-335,984 (0.2010)	-143,045 (0.5860)	-479,030 (0.1350)	1,234	-0.0002
Covariate model	-234,267 (0.4430)	-194,778 (0.5350)	-453,546 (0.2410)	1,082	0.0048
Food consumption score					
Non-parametric model	1.8690 (0.3040)	-0.3414 (0.8490)	1.5273 (0.4040)	1,327	-0.0003
Covariate model	1.4520 (0.4540)	-0.4133 (0.8360)	2.4713 (0.2200)	1,163	0.0489

Numbers in parentheses are p-values.
* significant at p< 0.10
** significant at p< 0.05
*** significant at p< 0.01

CONCLUSIONS

SACCOs were not the ideal entry point for P4P because they focus on savings and credit and are legally prohibited from aggregating or marketing agricultural commodities. However, they were the only viable organizations WFP found that were supporting smallholder farmers in Tanzania. In spite of the legal difficulties, WFP targeted SACCOs while simultaneously building the capacities of parallel marketing organizations (AMCOs, networks, associations) to manage aggregation, warehouse management, and marketing on behalf of the SACCOs. Consequently, WFP began in Tanzania working with FOs that had limited to no marketing experience or capacity. In fact, none of the 25 P4P and 25 non-P4P SACCOs surveyed reported any experience selling maize in the two years prior to the 2009 baseline.

At the production level, Tanzania initially implemented P4P in eight regions[35] proximate to WFP operations and the surveyed SACCOs are all in these regions. Only two are in the major maize production areas (Manyara and Kigoma) while the remaining six are often in deficit.[36] Therefore, production capacity was also

[35] Kilimanjaro, Manyara, Arusha, Kigoma, Kagera, Dodoma, Singida, and Tabora.
[36] http://www.fao.org/fileadmin/templates/mafap/documents/technical_notes/URT/TANZANIA_Technical_Note_MAIZE_EN_Oct2013.pdf

lower than the national average for many P4P households. Furthermore, the primary regions in which P4P operates suffered from drought in 2009 which probably depressed production in 2009 relative to other years.[37] Distances, poor transportation infrastructure, and poorly integrated markets also hamper the flow of food from surplus to deficit areas and the distribution of agricultural inputs.

These basic conditions define the "baseline" for achieving the anticipated results laid out in the results framework of Figure 4and Figure 5. The remainder of this section frames the conclusions in the context of the results framework. It presents results in the sequence in which they are likely to occur; SACCO capacity, household marketing, household production, and household welfare.

Impact of P4P on SACCO Capacity

Figure 4 summarizes anticipated results and facilitators of SACCO capacity and serves to frame the conclusions presented in this section.

Although the SACCOs selected to participate in P4P represented smallholder farmers, they were not marketing organizations. Consequently, they lacked the physical infrastructure (warehouses and equipment) necessary to manage aggregation and marketing. Even though 30 percent of P4P SACCOs reported having access to storage in the 2009 baseline survey, WFP's assessment found that these were largely dilapidated community-owned sheds unsuitable for effectively managing aggregation and quality.

The services P4P SACCOs reported providing their members also reflected SACCOs' limited capacities to support agricultural production, value addition, and marketing. In fact, in 2009, 60 percent of the P4P SACCOs reported providing no agricultural services to their members. Those that did provide services appear to have concentrated on supporting agricultural production (e.g., training and facilitating access to inputs), marketing (i.e., weighing and bagging, connecting farmers to buyers), and storage (i.e., warehousing and fumigation).[38]

At the time of the 2009 baseline, the development community was supporting P4P and non-P4P SACCOs but the assistance focused largely on organizational strengthening and management (i.e., record keeping,

[37] Tanzania P4P Story.
[38] SACCOs that reported supporting storage and marketing probably did so in conjunction with an AMCO or other marketing organization.

FIGURE 18: SUMMARY OF IMPACT OF P4P ON SACCO CAPACITY

Maize Marketing

	Indicators	Results attributable to P4P		Facilitators	Changes attributable to P4P
Organizational capacity	Planning	↑	Significant positive impact on P4P SACCOs planning for production and marketing.	Infrastructure	↑ Improved quality of warehouse facilities and access to equipment
	Services	↑	Significant positive impact on P4P SACCOs provision of production, marketing, and quality services.	rocurement	↑ Relatively consistent and sizable procurement
	Inputs	↑	Significant positive impact on P4P SACCOs facilitating members' access to inputs.	Supply-side support	↑ Increased supply-side support for infrastructure, production, marketing, and inputs relative to non-P4P SACCOs
	Training	→	No significant impact on productivity training provided to members relative to non-P4P SACCOs		
Marketing capacity outcomes	Sales	↑	Significant positive impact on total quantity of maize sold.	Procurement	↑ Relatively consistent and sizable procurement
	Market diversity	↑	Significant positive impact on quantity sold to buyers other than WFP.		
	Financing for members	↑	Significant positive impact on facilitating post-harvest financing for members.	Access to credit	↑ Greater access to credit in 2013 relative to non-P4P SACCOs
	Prices	↑	Several sources of evidence suggest that by 2013, P4P households obtained higher average prices for maize than non-P4P households and that the margin was larger for households that sold through the SACCO.		
Impacts	Sustainable access to value-added staples markets (increasing trajectory of quantities sold, especially to formal buyers; declining dependence on WFP market, established relationship with financial institutions, access to permanent storage facilities of at least 500 mt capacity)				

Legend

↑ Statistically significant positive impact attributable to participating in P4P.
↓ Statistically significant negative impact attributable to participating in P4P.
→ No statistically significant impact associated with participating in P4P.

financial management, group management, and business planning). Ninety-six percent of surveyed SACCOs reported having received such assistance. Few SACCOs reported receiving other types of assistance although P4P SACCOs were significantly more likely than non-P4P SACCOs to have received assistance with agricultural production (48 percent versus 12 percent) and marketing (40 percent versus 8 percent).

In response to these limitations, WFP initially focused, with the help of partners, on strengthening marketing infrastructure and skills, and preparing SACCOs to sell to WFP. By the end of 2010, WFP had directly rehabilitated 23 warehouses, 10 of which were ultimately licensed with the Tanzania Warehouse Licensing Board to be used as WRS warehouses. To further build organizational capacity, WFP also provided (loaned) warehousing equipment (tarps, fumigation sheets, scales, stitching machines, generators, pallets, spears, moisture analyzers, first extinguishers, and milling machines) to 29 SACCOs and trained SACCOs in their use.

WFP and its partners also trained all P4P-supported SACCOs in agribusiness management; credit and finance; institutional capacity building; gender sensitivity; monitoring and evaluation; post-harvest handling, storage, and quality control; production and productivity; and WFP procurement procedures. As a consequence, the percentage of P4P SACCOs reporting receiving external assistance with production, marketing, inputs, and infrastructure increased by greater margins than among non-P4P SACCOs. To the extent that WFP did not provide this assistance directly, it reflects supply-side support catalyzed by WFP's commitment to buy from the SACCOs.

These direct investments and training put in place many of the facilitating factors necessary to support organizational capacity building. The other crucial facilitator is WFP's procurement stimulus. By the end of the pilot, WFP had registered 27 SACCOs and other organizations (AMCOs, networks, associations) as WFP suppliers and had purchased at least once from all of them. It had purchased in only one year from 7 (26 percent), in two years from 7 (26 percent), in three years from 10 (37 percent), and in four years from 3 (11 percent). On average, SACCOs that sold to WFP in any given year received contracts for 223 mt. WFP appears to have provided a reasonably consistent and sizable procurement stimulus in Tanzania.

These investments in the facilitators of organizational capacity quickly paid dividends in measurable indicators of SACCO capacity. Specifically:

- The availability of storage infrastructure and equipment coupled with training quickly led to large increases in the number of production, marketing, and quality services P4P SACCOs were able to provide to their members. P4P is responsible for an increase of 63 percentage points in the average percentage of quality services offered by P4P SACCOs, a 14 percentage point increase in production services, and a 54 percentage point increase in marketing services.
- The percentage of P4P SACCOs planning for production and marketing jumped from 48 percent to 92 percent between 2009 and 2013 compared to a change from 20 percent to 56 percent among non-P4P SACCOs. A 10 point increase in the percentage of P4P SACCOs planning for production and marketing between 2011 and 2013 can be attributed to P4P.
- The percentage of P4P SACCOs able to facilitate members' access to inputs increased from 16 percent in 2009 to 96 percent in 2013. Relative to non-P4P SACCOs, a 24 percentage point increase is attributable to P4P.

- The percentage of P4P SACCOs providing production training to members increased from 12 percent in 2009 to 64 percent in 2013. However, non-P4P SACCOs experienced similar growth so this aspect of improved organizational capacity is not attributable to P4P.

The impact of P4P on sustainable market access for SACCOs is still an open question. One SACCOs network (Kaderes) has "graduated" from P4P and is now eligible to sell to WFP through its normal competitive tendering process. While the summary statistics suggest that the other P4P SACCOs increasingly engaged with staples markets, by 2013 only 24 percent (6 SACCOs) reported ever having sold to buyers other than WFP. The contracts WFP helped negotiate between 17 P4P SACCOs and the National Food Reserve Agency (NFRA) for 3,560 mt of maize (sales not reflected in the survey data) in 2013 will change this picture substantially.

The Tanzania P4P story and intervention details reveal several barriers SACCOs have faced building their marketing capacity. These include reliable access to warehouses and weak leadership and lack of member trust in leaders. Only 6 of the 25 surveyed SACCOs own their warehouses and the WFP country office has documented at least three instances where the warehouse used by a P4P SACCO was leased to other businesses.

Impact of P4P on Household Maize Marketing

The positive impacts of P4P on SACCO capacity established many of the facilitating conditions necessary to support household maize marketing. In particular, significant increases in quantities sold by P4P SACCOs, an expanded range of services offered by the SACCOs, and increasing market diversity should eventually influence household marketing choices, particularly the choice to sell through the SACCO (Figure 19).

Participating in P4P has significantly affected members' marketing behavior. Members of P4P-supported SACCOs were significantly more likely than members of non-P4P SACCOs to begin selling maize through the SACCO. In fact, between 2009 and 2013 the percentage of P4P SACCO members that reported ever selling maize through the SACCO increased significantly from 8 percent to 22 percent. Extrapolated to the entire reported membership of P4P-supported SACCOs, this implies that the total number of SACCO members selling through the SACCOs increased by 169 percent, from 1,001 in 2009 to 2,639 in 2013. This result reflects expanded market choices (households previously reported selling at the farm gate and in local markets) and increasing engagement with more diverse markets. It also indicates a level of trust in the SACCOs.

Prior to P4P, a majority of households reported selling at least part of their surplus maize at least four weeks after harvest. Between 2009 and 2013, the percentage fell for both P4P and non-P4P households. However, it fell by significantly more among P4P than non-P4P households – an unanticipated "impact" of P4P. The result is difficult to interpret; it is not correlated with selling through the SACCO or with the SACCO selling to WFP.

An anticipated household level outcome is that members of P4P SACCOs will receive higher prices for their maize than members of non-P4P SACCOs, presumably because they sell through a SACCO with better marketing capacity and access to quality conscious buyers. This is a particularly important outcome since increased income from staple commodities is expected to drive increases in production and higher household incomes. Data on prices from the SACCO survey are very thin and data from the household survey very variable. However, both of these

FIGURE 19: SUMMARY OF IMPACT OF P4P ON HOUSEHOLD MAIZE MARKETING

Maize Marketing						
	Indicators	**Results attributable to P4P**		**Facilitators**	**Changes attributable to P4P**	
Behavioral change	Selling through the SACCO	↑	P4P households were significantly more likely than non-P4P households to begin selling maize through the SACCO	Quantity sold by SACCO	↑	Significant increase in total quantity of maize sold relative to non-P4P SACCOs
				Quality and marketing services available from SACCO	↑	Significantly more P4P SACCOs providing production, marketing, and quality services relative to non-P4P SACCOs
	Selling more than 4 weeks after harvest	↓	By 2013, P4P households were significantly less likely than non-P4P households to report selling at least 4 weeks after harvest. Furthermore, those that sold at least 4 weeks after harvest reported selling a significantly smaller percentage of their surplus at that time.	Access to credit	→ ↑	P4P households were no more likely than non-P4P households to utilize credit for agricultural purposes. By 2013, P4P SACCOs were significantly more likely than non-P4P SACCOs to report providing post-harvest financing to members.
Household marketing outcomes	Prices	↑	Several sources of evidence suggest that by 2013, P4P households obtained higher average prices for maize than non-P4P households and that the margin was larger for households that sold through the SACCO.	Quantity sold SACCO	↑	Significant increase in total quantity of maize sold relative to non-P4P SACCOs
				Market diversity	↑	Significant increase in quantity sold to buyers other than WFP relative to non-P4P SACCOs

Legend

↑ Statistically significant positive impact attributable to participating in P4P.
↓ Statistically significant negative impact attributable to participating in P4P.
→ No statistically significant impact associated with participating in P4P.

sources, triangulated with more reliable data from WFP procurement records,[39] suggest that P4P households obtained higher average prices for their maize than non-P4P households. Starting from a point of receiving statistically equivalent prices in 2009, by 2013, P4P households reported receiving an average of 8 percent more (USD 15/mt) for maize than non-P4P households and households that reported selling through the SACCO reported receiving an average of 24 percent more (USD 60/mt) than those who sold elsewhere. Neither of these differences, however, can be attributed to participation in P4P. This is not necessarily because P4P is not responsible for the change but could be that the data are too thin and variable to statistically attribute the change to P4P.

Impact of P4P on Household Maize Production

The P4P development hypothesis suggests that outcomes in household maize marketing lead to production outcomes. For example, higher prices obtained from selling maize through the SACCOs are expected to provide the incentive to invest in increasing maize production. In addition to the incentive provided by better access to markets, facilitating factors for maize production include access to inputs and credit to resolve financial constraints to investing in agriculture. P4P households were no more likely than non-P4P households to report improved access to inputs or utilizing credit for agricultural purposes. However, by 2013, P4P SACCOs were significantly more likely than non-P4P SACCOs to report providing post-harvest financing to members and to facilitate access to inputs. Specifically, between 2009 and 2013, the percentage of P4P SACCOs that reported providing financing to members between harvest and sale increased from 36 percent to 52 percent, with 24 percentage points attributable to participating in P4P. With respect to inputs, 16 percent of P4P SACCOs reported facilitating members' access to inputs in 2009. By 2013, 96 percent reported having helped members obtain inputs, an increase of 80 percentage points. The impact of participating in P4P was a 48 point increase in the percentage of P4P SACCOs facilitating access to inputs for members.

P4P households experienced some improvement in the factors facilitating maize production results and have changed their production behavior as a result. In particular:

- The percentage of P4P households planting maize increased from 83 percent to 94 percent between 2009 and 2013;
- The average area planted to maize increased by 0.20 ha (16 percent);
- The number of households using certified seed increased by 4 percentage points, from 29 percent to 33 percent, and the average share of maize seed households used that was certified increased by 5 percentage points, from 47 percent to 60 percent; and
- The number of households using fertilizer increased from 17 percent to 28 percent.

These behavioral changes led to improved production results. Specifically:

- Average maize yields increased 75 percent, from 0.93 mt/ha to 1.63 mt/ha;[40]
- The average quantity of maize produced increased by 71 percent, from 1.08 mt to 1.85 mt; and
- The average quantity of maize sold increased by 96 percent, from 0.58 mt to 1.14 mt.

[39] Although the price data in the WFP procurement records are more reliable than the survey data, they may also reflect concessions made to facilitate sales from low-capacity FOs.
[40] The yield estimates reflect averages over regions and seasons.

However, non-P4P households reported similar outcomes and the differences between P4P and non-P4P households were not statistically significant. These substantial changes in agricultural productivity cannot, therefore, be attributed to participating in P4P.

FIGURE 20: SUMMARY OF IMPACT OF P4P ON HOUSEHOLD MAIZE PRODUCTION

Maize Production						
	Anticipated Results	**Results attributable to P4P**		**Facilitators**	**Changes attributable to P4P**	
Behavioral change	Planting maize	→	P4P households were no more likely than non-P4P households to change their maize planting behavior.	Access to inputs/credit	↑	P4P households were no more likely than non-P4P households to report improved access to inputs or utilizing credit for agricultural purposes. However, by 2013, P4P SACCOs were significantly more likely than non-P4P SACCOs to report providing post-harvest financing to members and to facilitate access to inputs.
	Area allocated to maize	→	P4P households were no more likely than non-P4P households to change the area they allocated to maize production.	Production training	→	P4P households were no more likely than non-P4P households to report receiving production training.
	Use of inputs	→	P4P households were no more likely than non-P4P households to change their use of certified seed (either to begin using it or to change the percentage they used) of to change their use of fertilizer.			
Intermediate outcomes	Yields	→	P4P households were no more likely than non-P4P households to increase maize yields.	Access to inputs/credit	↑	P4P households were no more likely than non-P4P households to report improved access to inputs or utilizing credit for agricultural purposes. However, by 2013, P4P SACCOs were significantly more likely than non-P4P SACCOs to report providing post-harvest financing to members and to facilitate access to inputs.
	Quantity produced	→	P4P households were no more likely than non-P4P households to increase the quantity of maize they produced.			
	Quantity sold	→	P4P households were no more likely than non-P4P households to sell larger quantities of maize.			

Legend

↑ Statistically significant positive impact attributable to participating in P4P.
↓ Statistically significant negative impact attributable to participating in P4P.
→ No statistically significant impact associated with participating in P4P.

Impacts of P4P on Household Welfare

Ultimately, better access to markets and increased production should boost household welfare. However, the well-known difficulties in measuring income and the relatively small change anticipated make it likely that even if P4P "caused" a change in income, it would not be detected through the noise of reporting error (recall) and variability. The analysis therefore also considered alternative measures of changes in welfare where the prospects for detecting change were more promising. These included a summary measure of household assets (the household asset score), an indicator of food security (the food consumption score), the value of household livestock, and characteristics of the households housing (flooring, wall, and roofing materials). Which of these will respond first to changes in income will probably depend to some extent on characteristics of a particular household. For example, a food insecure household may spend additional income on food before investing in housing or livestock.

P4P households were better off in 2013 than in 2009 by almost any measure of welfare.

- Real incomes increased by 88 percent;
- The average household asset score increased by 7 percent;
- The real value of household livestock increased by 143 percent;
- The food consumption score increased by 7 percent; and
- The quality of the housing stock improved
    - Three percent of households replace thatch roofs with metal;
    - The percentage of households with dirt floors fell from 55 percent to 46 percent while the percentage with concrete floors increased from 43 percent to 51 percent; and
    - The percentage of households with mud or mud-brick walls fell from 83 percent to 71 percent with a corresponding increase in concrete walls.

However, non-P4P households experienced similar improvements which rendered none of these changes attributable to participating in P4P.

ANNEXES

Annex A: Comparison of P4P and Non-P4P SACCOs and Households

TABLE 17: BASELINE DIFFERENCES BETWEEN P4P AND NON-P4P SACCOS

SACCO characteristic	P4P	Non-P4P	p-value of difference
Indicator of receiving credit in past two years	0.00	0.60	0.0000
Indicator of receiving production assistance	0.48	0.12	0.0055
Indicator of receiving marketing assistance	0.40	0.08	0.0081
Indicator of providing financing to members	0.36	0.08	0.0169
Indicator of planning for production and marketing	0.48	0.20	0.0366
Indicator of access to storage	0.30	0.08	0.0467
Indicator of experience with contract sales	0.12	0.00	0.0740
Number of members	538.00	359.00	0.1688
Indicator of providing marketing services	0.15	0.04	0.1948
Indicator of providing any services	0.36	0.20	0.2077
Maximum quantity of maize ever sold in one sale (mt)	453.00	0.00	0.2240
Indicator of receiving post harvest assistance	0.24	0.12	0.2695
Indicator of lowest level FO	0.04	0.00	0.3124
Indicator of using price information	0.04	0.00	0.3124
Indicator of providing production services	0.09	0.02	0.3250
Indicator of receiving assistance for tools	0.16	0.08	0.3481
Indicator of providing quality services	0.08	0.02	0.3606
Indicator of mid-level FO	0.40	0.28	0.3705
Percentages smallholder farmer members	0.77	0.59	0.3737
Indicator of receiving assistance for infrastructure	0.04	0.08	0.5515
Indicator of receiving assistance for inputs	0.16	0.12	0.6836
Number of full-time employees	8.32	8.48	0.7468
Percentage of female members	0.59	0.57	0.8574
Number of years since formation	4.28	4.24	0.9688
Indicator of receiving loans	0.84	0.84	1.0000
Indicator of receiving organizational assistance	0.96	0.96	1.0000
Indicator of receiving any assistance	0.96	0.96	1.0000

TABLE 18: BASELINE DIFFERENCES BETWEEN P4P AND NON-P4P HOUSEHOLDS

SACCO characteristic	P4P	Non-P4P	p-value of difference
Number of individuals in household	6.41	6.36	0.7986
Indicator of using certified maize seed	0.29	0.28	0.8440
Indicator of using certified seed on crops other than maize	0.15	0.13	0.4289
Indicator of using certified seed on any crop	0.34	0.34	0.9031
Area of land owned (ha)	2.57	2.19	0.1408
Area allocated to maize (ha)	1.24	1.16	0.2223
Area allocated to crops other than maize (ha)	2.09	2.27	0.3489
Total cultivated area (ha)	3.33	3.43	0.6399
Average maize yield (mt/ha)	0.93	0.89	0.6030
Average quantity of maize harvested (mt)	1.07	0.99	0.4928
Average quantity of crops other than maize harvested (mt)	1.88	1.65	0.3382
Average quantity of all crops harvested (mt)	2.95	2.64	0.2435
Quantity of maize sold (mt)	0.50	0.43	0.3472
Quantity of crops other than maize sold (mt)	1.06	1.77	0.2518
Quantity of all crops sold (mt)	1.56	2.20	0.3190
Size of maize surplus (mt)	0.82	0.75	0.5143
Average percentage of maize sold within 4 weeks of harvest (%)	0.38	0.37	0.8158
Average percentage of maize sold 4 weeks after harvest (%)	0.62	0.63	0.8158
Average quantity of maize sold within 4 weeks of harvest (mt)	0.21	0.26	0.4086
Average quantity of maize sold 4 weeks after harvest (mt)	0.69	0.63	0.6873
Average percentage of maize sold through FO (%)	0.09	0.03	0.0347
Average percentage of maize sold elsewhere (%)	0.74	0.85	0.0159
Average percentage of maize sold at the farm gate (%)	0.17	0.12	0.1848
Average quantity of maize sold through FO (mt)	0.06	0.05	0.9146
Average quantity of maize sold elsewhere (mt)	0.08	0.07	0.8754
Average quantity of maize sold at the farm gate (mt)	0.77	0.77	0.9808
Value of loans received for agricultural purposes (2009 Tanzanian Shillings)	77,483	65,255	0.4767
Value of loans received for non-agricultural business (2009 Tanzanian Shillings)	242,738	88,353	0.0341
Value of loans received for any purpose (2009 Tanzanian Shillings)	377,797	244,135	0.1066
Average food consumption score	63.66	64.30	0.6808
Average food consumption rank	2.92	2.92	0.7630
Average household asset score	9.00	8.68	0.0481
Value of livestock assets (2009 Tanzanian Shillings)	612,859	494,325	0.3319
Average annual household income (2009 Tanzanian Shillings)	1,077,216	922,194	0.1149
Average annual income from farming (2009 Tanzanian Shillings)	704,853	584,865	0.1443

SACCO characteristic	P4P	Non-P4P	p-value of difference
Average annual off-farm income (2009 Tanzanian Shillings)	372,362	337,329	0.4831
Net value of crops produced (2009 Tanzanian Shillings)	585,057	519,680	0.3457
Net value of crops consumed (2009 Tanzanian Shillings)	380,475	342,469	0.5112
Net value of crops sold (2009 Tanzanian Shillings)	215,981	195,030	0.5552
Net value of staples sold (2009 Tanzanian Shillings)	75,550	57,019	0.2135
Net income from livestock (2009 Tanzanian Shillings)	119,797	65,184	0.1729
Income from livestock sales (2009 Tanzanian Shillings)	27,017	24,948	0.8646
Value of livestock consumed (2009 Tanzanian Shillings)	11,712	4,177	0.2291
Income from livestock products and services (2009 Tanzanian Shillings)	81,067	36,059	0.1793
Annual cost of keeping livestock (2009 Tanzanian Shillings)	97,514	60,489	0.0943
Percentage of household income from off-farm sources	6.51	0.58	0.3166
Annual expenditure (2009 Tanzanian Shillings)	2,874,319	2,705,956	0.6621
Annual expenditure on household items (2009 Tanzanian Shillings)	377,388	321,224	0.0651
Annual expenditure on food (2009 Tanzanian Shillings)	875,980	852,665	0.6476
Annual expenditure on other items (2009 Tanzanian Shillings)	1,561,736	1,506,668	0.8807
Annual expenditure on rent (2009 Tanzanian Shillings)	59,215	25,399	0.1310
Annual crop production expenses (2009 Tanzanian Shillings)	207,569	261,920	0.1222
Indicator of female household head	0.41	0.49	0.0509
Indicator of metal roof on house	0.13	0.17	0.1063
Indicator of concrete floor in house	0.56	0.70	0.0002
Indicator of concrete or fired brick walls on house	0.84	0.90	0.0082
Indicator of improved toilet facilities in house	0.74	0.83	0.0088
Indicator of household access to improved water source	0.59	0.62	0.3137
Indicator of using fertilizer	0.17	0.15	0.4905
Indicator of access to inputs on credit or subsidized	0.22	0.15	0.0352
Indicator of irrigating maize	0.03	0.02	0.2514
Indicator of planting maize	0.95	0.92	0.0988
Indicator of planting crops other than maize	0.84	0.88	0.1441
Indicator of producing a surplus of maize	0.67	0.60	0.0493
Indicator of selling maize within 4 weeks of harvest	0.50	0.52	0.7550
Indicator of selling maize 4 weeks after harvest	0.72	0.72	0.9161
Indicator of selling maize through the SACCO	0.13	0.05	0.0160
Indicator of selling maize at the farm gate	0.25	0.19	0.2366
Indicator of selling maize elsewhere	0.82	0.89	0.1021
Indicator of receiving loans for agriculture	0.30	0.31	0.8480
Indicator of receiving loans for non-agricultural business	0.23	0.11	0.0000
Indicator of receiving loans for any purpose	0.64	0.53	0.0062

SACCO characteristic	P4P	Non-P4P	p-value of difference
Indicator of obtaining crop price information through SACCO	0.17	0.12	0.1128
Indicator of using crop price information	0.96	0.98	0.2063
Indicator of finding price information from SACCO useful	0.13	0.11	0.4915

Annex B: P4P Treatment Details

TABLE 19: QUANTITIES CONTRACTED BY WFP BY SACCO AND YEAR

Organization type	FO name	Quantity contracted (mt)					Years w/ contracts	Average contract size (mt)
		2009	2010	2011	2012	2013		
SACCO	Mkombozi Soko kuu Saccos		227	379	300	250	4	289
SACCO	Kwamtoro Saccos		100	110	60	120	4	97
SACCO	Ibumila Saccos	300		128	96	148	4	168
Network	KADERES PEASANTS DEVELOPMENT	150	374	112	Graduated		3	212
SACCO	Kandaga Saccos	50	70	30			3	50
SACCO	Gallapo Saccos			277	60	100	3	146
SACCO	Usomama Saccos		200	454	456		3	370
Network	DUNDULIZA COMPANY LTD	200		267	570		3	345
SACCO	Laela Saccos	1,350		200	196		3	582
SACCO	NKWERWA TALANTA SACCOS LTD		36	150	482		3	223
SACCO	UMOJA WA SACCOS ZA WAKULIMA KILIMANJARO		280	280	243		3	268
SACCO	Mbulumbulu KKKT Saccos		200	200	60		3	153
Association	CEREAL GROWERS ORGANISATION OF KONGWA			285	157	220	3	220
SACCO	Jipemoyo Saccos			300	60		2	180
SACCO	Didihama Saccos		400		60		2	230
SACCO	Mkombozi Mrijo Saccos		50	400			2	225
SACCO	Mahhahhha Saccos				60	100	2	80
SACCO	Jikuzeni Kware				107	133	2	120
SACCO	Kituntu Saccos				220	329	2	275
AMCO	Wino Saccos		200	397			2	299
SACCO	Kibaigwa Saccos			120			1	120
SACCO	Umoja Saccos			200			1	200
SACCO	Meqbami Saccos		200				1	200
SACCO	UPENDO SACCOS LIMITED			502			1	502
SACCO	Muhangu Saccos				60		1	60
SACCO	Jitegemee Saccos			50			1	50
SACCO	Kiosa Saccos					165	1	165
Totals		2,050	2,337	4,840	3,246	1,564		216

Source: WFP procurement records through May 2014.
Note: Shaded cells represent years in which an FO was not participating in P4P.
a. Kaderes became a regular (i..e., non-P4P) supplier to WFP starting in 2012.

TABLE 20: QUANTITIES RECEIVED BY WFP BY SACCO AND YEAR

Organization type	FO name	Quantity contracted (mt)					Total default quantity	Average default rate
		2009	2010	2011	2012	2013		
SACCO	Kwamtoro Saccos		100	110	60	120	0	0%
SACCO	Ibumila Saccos	300		128	96	148	0	0%
Network	KADERES PEASANTS DEVELOPMENT	150	374	112	Graduated		0	0%
SACCO	Kandaga Saccos	0	0	0			150	100%
SACCO	Gallapo Saccos			0	60	100	277	44%
SACCO	Usomama Saccos		200	334	246		330	24%
Network	DUNDULIZA COMPANY LTD	129		267	194		447	43%
SACCO	Laela Saccos	1,119		200	24		404	23%
SACCO	NKWERWA TALANTA SACCOS LTD		36	150	212		270	40%
SACCO	UMOJA WA SACCOS ZA WAKULIMA KILIMANJARO		280	280	137		106	12%
SACCO	Mbulumbulu KKKT Saccos		200	67.8	7.5		185	40%
Association	CEREAL GROWERS ORGANISATION OF KONGWA			285	60	220	97	11%
SACCO	Jipemoyo Saccos			200	32		128	59%
SACCO	Didihama Saccos		100		0		360	78%
SACCO	Mkombozi Mrijo Saccos		277	378	300	0	650	40%
SACCO	Mahhahhha Saccos				60	100	0	48%
SACCO	Jikuzeni Kware				0	133	106	39%
SACCO	Kituntu Saccos				220	164	165	30%
AMCO	Wino Saccos		0	201			396	66%
SACCO	Kibaigwa Saccos			120			0	65%
SACCO	Umoja Saccos			60			140	70%
SACCO	Meqbami Saccos		0				200	100%
SACCO	UPENDO SACCOS LIMITED			211			291	58%
SACCO	Muhangu Saccos				30		30	11%
SACCO	Jitegemee Saccos			27			23	23%
SACCO	Kiosa Saccos					0	0	0%
Totals		1,698	1,567	4,300	1,738	984		37%

Source: WFP procurement records through May 2014.
Note: Shaded cells represent years in which an FO was not participating in P4P.
a. Kaderes became a regular (i..e., non-P4P) supplier to WFP starting in 2012.

TABLE 21: INVESTMENTS IN WAREHOUSE REHABILITATION AND CONSTRUCTION (2009-2010)

FO Name	Rehab/const (2009-2010)			Terms of use	Capacity by year (mt)				
	Rehab/ Const	Capacity (mt)	WFP funding		2009	2010	2011	2012	2013
Jikuzeni Kware	Rehab	150	Full	Own	100	100	100	500	500
Jitegemee Saccos	Rehab	300	Full	Own	400	400	400	400	400
Usomama Saccos	Rehab	300	Full	Rent	300	300	300	700	700
Gallapo Saccos	Rehab	300	Full	Rent	300	300	300	300	300
Meqbami Saccos	Rehab	300	Full	Rent	300	300	300	300	300
Didihama Saccos	Rehab	300	Full	Own	300	300	300	300	300
Mbulumbulu KKKT Sacc	Rehab	300	Full	Rent	300	300	300	300	300
Mahhahhha Saccos	Rehab	300	Full	Own	300	300	300	300	300
Upendo	Rehab	300							
Rusesa Saccos	Rehab	300	Full	Other	300	300	300	300	300
Umoja Saccos	Rehab	300	Full	Rent	300	300	300	300	300
Wanyamu Saccos	Const	300	Full	Rent	300	300	300	300	300
Kiosa Saccos	Rehab	500	Partial	Other	300	300	300	300	300
Kaisho Saccos	Rehab	500	Partial	Other	300	300	300	300	300
Kituntu Saccos	Rehab	500	Partial	Other	300	300	300	300	300
Kibaigwa Saccos	Rehab	450	Full	Rent	200	200	200	200	200
Mkombozi Soko kuu Sa	Rehab	400	Full	Other	400	400	400	400	400
Mkombozi Mrijo Sacco	Rehab	300	Full	Other	300	300	300	300	300
Kwamtoro Saccos	Rehab	300	Full	Rent	300	300	300	300	300
Jipemoyo Saccos	Rehab	150	Full	Rent	200	200	200	200	200
Muhangu Saccos	Rehab	150	Full	Own	100	100	100	100	300
Ibumila Saccos	Rehab	300	Full	Rent	300	300	300	300	300
Laela Saccos	Rehab	400	Full	Rent	400	400	400	400	400
Wino Saccos	Rehab	1,000	Full	Own	1,000	1,000	1,000	1,000	1,000

Source: Tanzania CO intervention mapping data.

TABLE 22: INVESTMENTS IN EQUIPMENT

FO Name	Number of units of equipment distributed									
	Tarps	Fumigation sheets	Scales	Stitching machines	Generators	Pallets	Spears	Moisture analyzers	Fire exting.	Milling machines
Jikuzeni Kware	1	0	1	1	1	30	1	0	1	0
Jitegemee Saccos	1	0	1	1	1	30	1	1	1	0
Usomama Saccos	1	0	1	1	1	30	1	0	1	0
Gallapo Saccos	1	0	1	1	1	30	1	0	1	0
Meqbami Saccos	1	0	1	1	1	30	1	0	1	0
Didihama Saccos	1	0	1	1	1	30	1	0	1	0
Mbulumbulu KKKT Saccos	1	0	1	1	0	30	1	0	1	0
Mahhahhha Saccos	1	0	1	1	1	30	1	0	1	0
Kandaga Saccos	0	0	0	0	0	0	0	0	0	0
Upendo	0	1	1	2	1	45	0	0	1	1
Rusesa Saccos	1	0	1	1	1	44	0	0	1	0
Umoja Saccos	1	0	1	1	1	44	0	0	1	0
Wanyamu Saccos	1	0	1	1	0	45	0	0	1	0
Nyakisasa	0	0	0	0	0	0	0	0	0	0
Kumubuga	0	0	0	0	0	0	0	0	0	0
Chakanya Saccos	1	0	1	1	1	35	1	0	0	0
Kiosa Saccos	1	0	1	1	1	60	1	1	1	0
Kaisho Saccos	1	0	1	1	1	61	1	0	1	0
Kituntu Saccos	1	0	1	2	2	36	1	1	1	0
Kibaigwa Saccos	0	0	0	0	0	30	1	0	0	0
Cereal Growers Assoc.	1	1	1	2	1	0	0	0	0	0
Mkombozi Soko kuu Saccos	1	0	1	1	1	30	1	1	1	0
Mkombozi Mrijo Sacco	1	0	1	1	1	30	1	0	0	0
Kwamtoro Saccos	1	0	1	1	1	30	1	1	2	0
Jipemoyo Saccos	1	0	1	1	1	30	1	1	1	0
Muhangu Saccos	1	0	1	1	1	30	1	1	0	0
Mwongozo	0	0	0	0	0	0	0	0	0	0
Tujikomboe	0	0	0	0	0	0	0	0	0	0
Ibumila Saccos	1	0	1	1	1	0	0	1	1	0
Laela Saccos	1	0	0	1	0	0	0	0	1	0
Wino Saccos	1	0	0	1	1	0	0	0	1	0

FO Name	Number of units of equipment distributed									
	Tarps	Fumigation sheets	Scales	Stitching machines	Generators	Pallets	Spears	Moisture analyzers	Fire exting.	Milling machines
KADERES	1	1	1	4	1	250	1	1	0	0
Nkwerwa Talanta	0	0	2	2	2	0	0	0	0	0
USAWA	3	1	1	2	2	0	0	1	0	0
Number of FOs	26	4	26	28	25	23	19	10	6	21
Number of units	28	4	27	36	28	1,040	19	10	8	22
Total investment (USD)	62,496	11,904	27,567	32,148	4,172	41,600	38	24,550	154,760	1,513

Source: Tanzania CO investment schedule.

TABLE 23: NUMBER OF INDIVIDUALS TRAINED BY FO AND TOPIC

FO Name	Agribusiness mgmt	Credit	Institutional capacity building	Gender	M&E	Post-harvest handling	Production	WFP procurement	Other
Jikuzeni Kware	138	70	236	56	108	118	371	333	0
Jitegemee Saccos	132	68	232	56	106	116	365	320	0
Usomama Saccos	135	68	241	52	108	119	370	323	0
Gallapo Saccos	135	68	241	52	108	119	370	323	0
Meqbami Saccos	117	65	235	51	96	101	359	295	0
Didihama Saccos	127	64	231	51	100	111	362	309	0
Mbulumbulu KKKT Saccos	132	64	230	50	102	112	365	322	0
Mahhahhha Saccos	132	64	230	50	102	106	365	316	0
Jipemoyo Saccos	86	86	68	50	104	941	900	127	0
Muhangu Saccos	77	77	97	41	97	1,009	963	123	0
Kibaigwa Saccos	87	87	79	61	87	932	891	128	0
Kwamtoro Saccos	100	100	66	50	100	1,004	958	146	0
Mkombozi Soko kuu Saccos	111	111	79	63	111	1,017	969	167	0
Mkombozi Mrijo Sacco	87	87	75	51	87	963	957	117	0
Wanyamu Saccos	51	50	51	51	51	76	51	76	0
Kiosa Saccos	46	46	46	46	46	85	46	85	46
Kaisho Saccos	51	51	51	51	51	96	51	96	0
Chakanya Saccos	44	44	44	44	44	65	44	65	0
Rusesa Saccos	50	50	50	50	50	81	50	81	0
Umoja Saccos	51	51	51	51	51	77	51	77	0
Kituntu Saccos	51	51	51	51	51	92	51	92	0
Kandaga Saccos	52	52	52	52	52	75	52	75	0
Wino Saccos	50	50	50	50	50	95	50	95	0
Laela Saccos	50	50	50	50	50	88	50	88	0
Ibumila Saccos	50	50	50	50	50	79	50	79	0
Number of individuals[a]	**2,142**	**1,624**	**2,886**	**1,280**	**1,962**	**7,677**	**9,111**	**4,258**	**46**
Number of FOs	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**1**

Source: Tanzania CO intervention mapping data.

a. Counts of the number of individuals trained probably include substantial double, or more, counting since individuals may have attended several trainings but training records did not identify individuals.

TABLE 24: WFP PROCUREMENT BY MODALITY

Contract year	Procurement modality									Total (all modalities)		
	Competitive tenders			Direct contracts			Forward contracts					
	Beans	Maize	Total	Beans	Maize	Total	Beans	Maize	Total	Beans	Maize	Total
2009	0	0	0	150	1,548	1,698	0	0	0	150	1,548	**1,698**
2010	410	1,157	1,567	0	0	0	0	0	0	410	1,157	**1,567**
2011	76	2,822	2,898	232	1,170	1,403	0	0	0	308	3,993	**4,300**
2012	432	877	1,308	0	0	0	0	430	430	432	1,306	**1,738**
2013	164	820	984	0	0	0	0	0	0	164	820	**984**
Total	**1,081**	**5,676**	**6,757**	**382**	**2,718**	**3,100**	**0**	**430**	**430**	**1,463**	**8,824**	**10,287**

Source: WFP procurement records.

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