



The impacts of the El Niño-induced drought on seed security in Southern Africa: implications for humanitarian response and food security

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Executive summary

As part of a strategy to address the effects of the recent El Niño and its impact on the agriculture sector, the Food and Agriculture Organization of the United Nations (FAO) undertook a seed and other agricultural inputs assessment in Madagascar, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe, with funding support from the United States Agency for International Development (USAID). South Africa was also assessed even if it was not one of the focus countries, to determine the potential of seed and other input (e.g. fertilizer) exports to other countries in the region. The assessment was conducted by International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in collaboration with Southern African Development Community (SADC) Seed Centre, Governments, Non-governmental Organizations (Catholic Relief Services(CRS) and OXFAM)), National Agricultural Marketing Council of South Africa (NAMAC), the Feed the Future Seed Trade Project and private sector actors. The objectives of the assessment were (i) to assess current seed security situation in drought affected areas to understand constraints and opportunities for intervention (ii) to guide short and long-term field programming and (iii) to build the capacity of national stakeholders to mainstream seed security assessments in national processes.

The assessment was undertaken in two phases: Phase I focused on establishing national-level seed supply and demand information of the focus countries; and Phase II concentrated on ascertaining the capacity of drought-affected farming households and communities to timely access seed. This report presents the consolidated findings of the seed security assessment which was undertaken by ICRISAT in collaboration with FAO, Ministry of Agriculture, CRS, Oxfam and other NGOs.

Phase 1 information was sourced from country presentations at a workshop attended by 46 participants, representing Governments, USAID, the SADC Seed Centre, United Nations agencies, NGOs, academia, private sector actors (e.g. seed trader and fertilizer associations) and other development partners, preliminary findings from the Feed the Future Southern Africa Seed Trade Project, the Seed Supply and Demand Study and findings of FAO scoping missions in Malawi, Mozambique, Zambia and Zimbabwe.

The Phase II survey was conducted in 6 countries of Southern Africa namely Madagascar, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe in September and October 2016. The assessment consisted of quantitative and qualitative surveys. For the quantitative survey, a total of 2543 smallholder farmers were interviewed in the six countries. Qualitative interviews were also conducted in the study districts in each country. Key informants, local market traders, focus groups, seed growers, NGO programme officers and agro dealers were interviewed.

The assessment looked at all the aspects of seed security, which are availability, access, varietal suitability and quality. A summary of findings on these aspects is presented below:

Seed availability and access

According to Phase 1 survey results, Zambia has enough seed to meet national demand and are also available for export. The countries with the most significant gaps in the availability of seed in the formal market were Madagascar and Mozambique. While farmers generally noted they would rely on the informal market, the shortage of seed in the formal market is likely to negatively affect the capacity of governments and development partners to quickly and effectively respond to the crisis at scale through provision of certified quality seed and other agricultural inputs. This challenge will be further compounded by the fact that most countries have not adopted the Southern African Development Community (SADC) Harmonized Seed Regulatory System policy which is meant to facilitate the movement of seed between countries.

There is a general shortage of small grains and legume seed on formal markets across all focus countries, an aspect which needs to be given attention if the efforts to promote crop diversification through agricultural interventions are to be realized.

Results from household surveys show that informal seed systems (own stock and local markets) and formal (agro-dealers) were dominant seed sources used by smallholder farmers in 2015/16 season. Overall, over a third of all seeds across all crops were obtained from own stock, indicating that this source, quantitatively, is the most important of the six sources mentioned by farmers. About a fifth of all seeds in Madagascar, Malawi and Zimbabwe and a third in Mozambique were obtained from local markets. Seed from social networks was dominant and contributing to about a fifth of the seed sown in Zimbabwe and Malawi and this highlights the presence of farmer to farmer exchange of seeds. Agro-dealers, proved to be significant sources of seed for smallholder farmers, across the countries. In Swaziland, 44% of the seeds sown in 2015/16 were obtained from agrodealers.

In the coming 2016/17 season, maize seed is likely to be obtained from agrodealers, own stock and local markets. Sorghum, pearl millet and legume seed will be primarily sourced from the informal seed sector. Overall, results suggest the need to strengthening both informal and formal seed systems for seed security. Agrodealers should be strengthened to continue stocking and supply certified seeds. There is need to enhance the development and marketing of certified small grains and legumes in Southern Africa. At the same time local landraces with good agronomic traits should be maintained and promoted.

There is need for active participation of both the public and private sector to ensure that good quality seed is available and accessible for the 2016/17 season. Indications show a potential seed shortages - especially for maize, sorghum, groundnuts and cowpeas in 2016/17 season. This is likely to affect the poorer farmers more, and hence a need for looking at options on how to assist such vulnerable communities in seed access.

Variety introductions and suitability

Over a third (30%) of farmers, had accessed to some new varieties within the previous 5 years. In terms of crop profiles, maize comprised 67% of all the 1063 new variety cases, and this is expected considering that maize is a staple crop in Southern Africa. The major

outlets providing the new varieties within the sample countries were agrodealers, government, local markets and NGO/FAO.

Seed quality

With regards to germination, households indicated that across all crops seed germination in 2015/16 was good. The seeds from both formal and informal seed systems were reported to be clean by the majority of households. Furthermore, the majority of seeds planted for all crops was perceived to be of good quality based on physical characteristics.

Recommendations

The study results show an indication of significant decline in seed access in the coming 2016/17 season. In order to sustain production areas, particularly for the poorer farmers, seed relief programs are encouraged for the 2016/17 season. Therefore, relief organizations need to properly target the poor in their seed interventions

Informal seed systems play a key role in availing seeds to farmers in Southern Africa. Given this key role following considerations have to be put in place:

- Promote seed delivery mechanisms that enhance farmers' exchange of local landraces, including the implementation of seed fairs. Such seed fairs should be held to enable the exchange of local adaptable materials, and local agro-dealers should be encouraged to participate and sell certified seeds.
- There is need to enhance the informal seed sector to bring it to a level where it can be a major source of seed for emergency interventions, this will guarantee seed quality.
- Efforts to promote viable agro-input markets should also ensure that successful local markets are identified and trained to enable them to graduate into agrodealers.
- Considering that the informal seed system is the main source of seed in Southern Africa, extension training should be provided to farmers from informal seed systems on participatory variety selection, good quality seed selection, grading and post-harvest management, including storage. This will ensure access to good quality seeds that are clean, disease-free, have no impurities and are not damaged.

Local production of small grains and legumes seed should be promoted using methods and approaches that grow and strengthen - local seed entrepreneurship. This can be supported through field demonstrations, field days and information campaigns. For nutrition and resilience building, seed interventions should stimulate and promote crop diversification by including not only maize – the staple crop in Southern Africa –, but also bean, cowpea, groundnut and sorghum seed. Legumes are soil-enhancing, and an important source of protein. Sorghum and millet should be prioritized in semi-arid areas for climate resilience.

1. BACKGROUND

Southern Africa is currently in the grip of an intense drought that has expanded and strengthened since the earliest stages of the 2015/16 agricultural season, driven by one of the strongest El Niño events of the last 35 years. As result of the current situation, it is estimated that more than 41 million people in the region are considered food insecure, of which 22 million will require emergency assistance. Lesotho, Malawi, Swaziland and Zimbabwe have declared national drought emergencies and South Africa has declared the same in eight of its nine provinces. On the other hand, Madagascar, Malawi, Mozambique and Tanzania experienced floods, and cyclones are forecast for Madagascar and Mozambique.

Food security and seed security are linked but not the same. Households may have enough seed to plant but lack sufficient food to eat. Conversely, a household may have adequate food but lack access to appropriate seed for planting. Despite these clear differences, determinations of seed security have been largely based, implicitly or explicitly, on food-security linked assessments.

In most parts of Southern Africa, farmers have faced two consecutive years of below average rainfall. The El Nino drought which resulted in a poor 2015/16 agricultural season, compounded by a poor 2014/2015 season, has had a cumulative eroding effect on the production capacities of farmers in the 2016/17 agricultural season. Appropriate and good quality seeds are often in short supply following consecutive drought years compounded by economic crisis and dysfunctional input markets. However, the impact of the 2015/16 El Nino drought on availability and access to good quality seed is unknown. Understanding this is of policy relevance and ensures that government, donors, NGOs and private sector can plan and ensure a secure seed system. It is for this reason that FAO undertook an assessments to ascertain the capacity of drought affected vulnerable communities and households to timely access appropriate seeds given the eroding impact of the El Nino drought on farmers. Access to seed and other agricultural inputs by vulnerable households in Southern Africa is anchored on a mixture of both formal and informal transactions. The transactions may either be money centred or could be through a barter system where produce from the farm or any other items are exchanged for seed.

This report outlines details of the seed and agricultural input assessment in six countries in Southern Africa. The study results are crucial for guiding governments and humanitarian actors in Southern Africa in order to assist them make informed emergency response actions.

2. OBJECTIVES

The objectives of the seed assessment were:

- To quantify availability, access and quality of seed and agricultural inputs available for 2016/17 agricultural season so as to determine whether there is short-term

insecurity of the seed system, long-term insecurity or both after the 2015/16 drought

- To review problems related to seed insecurity, such as low availability of seed, lack of farmer access to seed, or poor seed quality and the underlying causes
- To ascertain the capacity of drought affected vulnerable communities and households to timely access appropriate seeds and other farming inputs from existing formal and informal seed/ farming inputs mechanisms
- To recommend appropriate action plan needed to counteract acute seed insecurity or, in the case of chronic, longer-term insecurity to define a set of counter-measures
- To provide comprehensive information on which humanitarian and development actors can implement immediate and medium-term action plans.

3. METHODOLOGY

The assessment employed qualitative and quantitative data collection techniques. The quantitative and qualitative survey tools were adapted, refined and customized to country context during the survey training and pretesting. The assessment was guided by the FAO Practitioners Guide for Seed security Assessments was undertaken by FAO in partnership with International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Southern African Development Community (SADC) Seed Centre, Governments, Non-governmental Organizations (CRS and OXFAM), the USAID funded Feed the Future project and the private sector actors. With the objective of determining the effects of the El Niño-induced drought on seed security in the six focus countries, the assessment entailed two phases: Phase I gauged the availability of seed on the formal market, while Phase II involved interviews with farming households and key stakeholders in the affected areas so as to ascertain the capacity of drought-affected farming households and communities to timely access seed and other agricultural inputs. The assessment was conducted in September and October 2016. Details of the quantitative and qualitative surveys is discussed below:

3.1. Quantitative survey

The survey was conducted in six countries namely Madagascar, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe. In each, country, four districts that had the highest proportions of food insecure households were selected and in each district, four wards were randomly selected from the pools of wards with high food insecurity. In each ward, 2 villages were selected randomly. Twelve households were then randomly selected and interviewed. The sampling approach yielded a total sample of 2543 households (Table 1).

Table 1. Households interviewed in each country

Country	Sample
Madagascar	100
Malawi	605
Mozambique	381
Swaziland	387
Zambia	384
Zimbabwe	386
Total	2543

Details of the survey district by country are shown in Appendix. The quantitative survey used a household survey questionnaire (see Appendix). The household survey questionnaire collected information on demographic and livelihood characteristics; crop production, seed sources and acquisition, seed types and quality, seed aid, new variety acquisitions, food consumption, livestock and other household assets. Well trained enumerators were responsible for administering the household questionnaire and supervised by experienced ICRISAT, CRS and Oxfam, FAO and Ministry of Agriculture supervisors.

3.2. Qualitative survey

The qualitative assessment was implemented in the same districts and wards in tandem with the household surveys. The qualitative survey was led by a Technical Officer from either FAO or Ministry of Agriculture. This was in line with one of the objectives of the assessment which was to develop capacity and national level to undertake future assessments. The detailed qualitative survey sample by country is shown in Appendix 2. The Technical Officer led a team of research assistants who conducted interviews with the following groups/individuals:

Key informant interview (KII): Sixty eight key informants were interviewed using a standard KII interview guide which focuses on understanding the general agricultural context; the activities of agrodealers and seed production activities; access to seed policy and other relevant agricultural documents; disasters and impact on seed security; and insight into food and nutrition security from an expert point of views. The key informants included; a) Ministry of agriculture staff at district agricultural offices and headquarters, b) Officers from Non-Governmental Organization at districts and c) private seed and agricultural input companies.

Focus group discussions (FGDs): In each selected district, 2 FGDs were held with a group of men and women separately. In total 56 FGS (28 male and 28 female) were done. The gender differentiation was meant to enable women to participate actively without male dominance. The FGSs provided information on farming and seed security of the community.

Seed grower's interviews – Twenty eight individual or group seed growers were interviewed using a semi-structured questionnaire to establish the nature of the group, understand their seed production activities, challenges; and investment plan.

Agro-dealer's interviews – A total of 52 agro-input dealers were interviewed. The interview with agro-input dealers collected information on their current seed and agricultural input stock, seed prices, seed demand and supply.

Local market survey (LMS): Forty nine local market traders were interviewed using a structured LMS questionnaire in the four districts. The LMS focused on those who normally sell inputs to farmers. It also looked on the demand and supply of the various seed types, prices, seed storage and handling.

Seed Aid Actors interviews: A total of 24 seed aid actors were interviewed using a structured questionnaire. These included NGO programme staff and the interviews collected data on the number and type of beneficiaries, quantities seeds and varieties distributed and their sources as well as mode of distribution.

3.3. Limitations

On constraints and limitations, the assessment was not immune to the general weaknesses arising from recall errors and biases. In addition the sampling for the survey was purposive targeting food insecure areas therefore findings may not be representative of the entire seed system in the focus countries. Though, the survey was conducted a little bit late, the preliminary findings were presented to national stakeholders in November and early December when the seed interventions were still at the initial stages to influence programming.

4. RESULTS

4.1. Demographic and farm characteristics

The descriptive statistics for demographic and farm characteristics differentiated by country are shown in Table 2. Seventy one percent of the interviewed households are male-headed households. Most of the smallholder farmers attained primary education. Thirty three percent of interviewed households across the study countries had access to credit, either from formal sources or informal sources. The survey results show that about half of the household across all countries were categorized as food insecure, an indication that households lack diversification in their diets.

Table 2. Summary statistics of household and farm characteristics

Variable	Descriptions	All sample	Madagascar	Malawi	Mozambique	Swaziland	Zambia	Zimbabwe
Age	Age of the household head (years)	48.13	46.38	45.36	45.38	57.13	47.43	48.67
Gender	0 if female; 1 if male	0.71	0.83	0.68	0.62	0.67	0.79	0.73
Education	Primary education and above	0.80	0.76	0.85	0.61	0.75	0.93	0.87
Marital status	0 if widowed/divorced; 1 if married	0.71	0.82	0.75	0.59	0.58	0.77	0.73
Experience	Farming experience (years)	22.15	23.91	20.83	16.92	32.39	17.41	21.37
Size	Household size (number)	6.51	5.75	5.73	6.21	8.40	7.02	6.44
Full time	Full time labour (number)	2.82	2.93	2.15	2.54	3.51	3.66	2.53
Part time	Part time labour (number)	1.82	1.37	1.83	1.22	2.80	1.41	2.26
Credit	Can access credit (1=yes, 0=No)	0.33	0.28	0.31	0.44	0.49	0.27	0.21
Food poor	Poor and borderline (1=yes)	0.45	0.32	0.56	0.77	0.23	0.16	0.61
<i>Number of observations</i>		<i>2543</i>	<i>400</i>	<i>605</i>	<i>381</i>	<i>387</i>	<i>384</i>	<i>386</i>

4.2. Crop production

Maize, sorghum, groundnuts, cowpeas and beans were the dominant crops grown in most of the study countries. Figure 2 show the crop production levels for the 2015/16 season by country. These are also the main crops grown in each country. Mean harvest for maize were low and below 355kg in all the countries (except Zambia which had 1650kg – not shown). Survey evidence show that the El Niño resulted in poor harvest across all the crops in all the countries. This will severely constrained quantities of seed from informal seed systems. Furthermore, given that groundnuts and cowpeas are the dominant legume across all the countries, encouraging their production is crucial for nutrition as they supply proteins. Results from qualitative studies suggest that there is a generally, shift in the cropping pattern in favour of drought tolerant crop varieties in most countries. Investing in initiatives that improves the availability of drought tolerant seed may assist in lessening the challenges associated with ensuring seed security among smallholders.

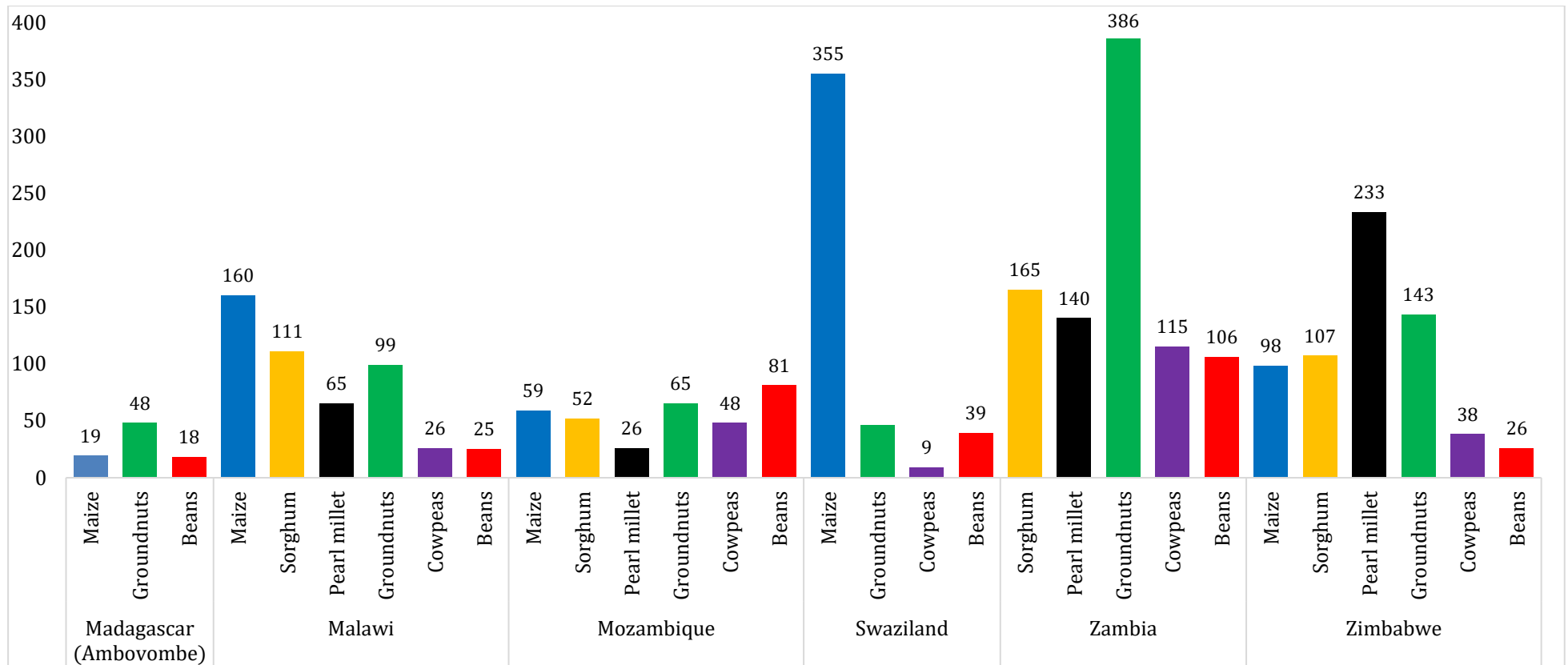


Figure 1. Mean crop production for 2015/16 season (kg)

4.3. Income and livelihoods strategies

Across all countries except Swaziland, crop and livestock sales is the dominant income and livelihood strategy (Figure 2). Cumulatively, crop and livestock sales and on farm labour supply account for over half of the income sources in each country suggesting that smallholder farmers depend heavily on agricultural activities for sustenance. Heavy reliance on agricultural activities exposes farmers to acute challenges in the event of poor cropping season. Qualitative studies indicate that there have been two successive poor cropping seasons. In Swaziland, salaries and pension is the main livelihood strategy. Petty trading is also dominant across all the countries.

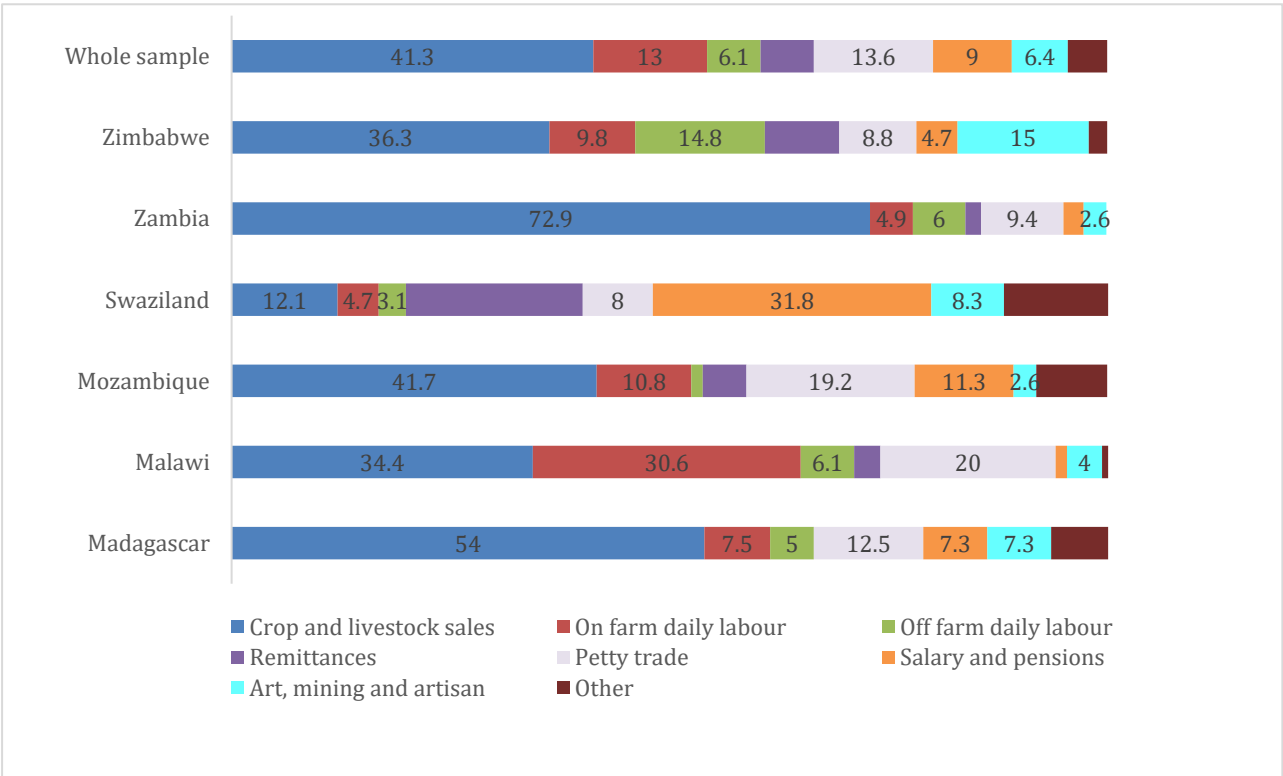


Figure 2. Proportion of smallholder farmers relying on income and livelihood strategy

4.4. Food availability and access at household level

The survey assessed household food access and availability at the time of the survey. The assessment determined household food security by asking households the number days they consumed certain types of foods over the last seven days. A food consumption score, which is a proxy indicator of household food security based on the weighted frequency (number of days in a week) of the intake of eight different food groups, was then calculated. Based on this indicator, southern Madagascar, Malawi and Mozambique have the greatest proportion of food insecure households, while Zambia had the least, less than 1 percent. Figure 3 provides more information on the food consumption scores calculated for the six countries. Although it is generally acknowledged that seed security and food security are linked but not the same, the survey found out that in general greater proportions of food insecure households reported that they will not be able to access enough seed for the 2016/17 season.

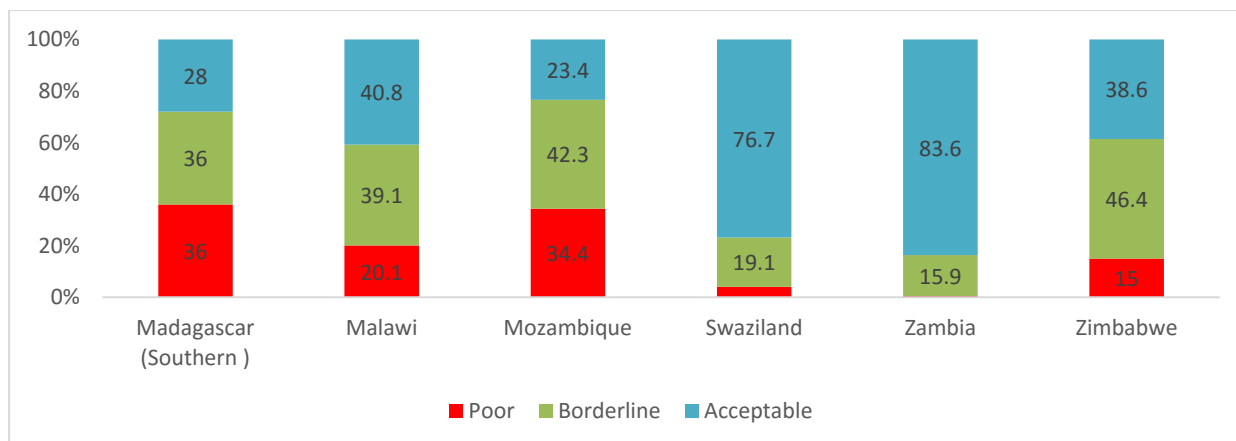


Figure.3: Household food security at national level by food consumption score

4.5. Seed security

The results of Phase II are organized around a set of questions covering important parameters crucial to understanding seed security: seed availability, accessibility and quality. The questions included which channels farmers will use to access seed, how seed will be acquired in 2016/17 (and farmers' access to new crop varieties). In order to put the prospective sources of seed in context, farmers were asked about the sources of seed for the 2015/16 cropping season, household food security situation and the quality of seed used in the previous season. The approach follows guidelines set by McGuire and Sperling (2016).

4.5.1. Which seed channels did farmers use?

Across crops

In the household survey questionnaire, farmers provided details on all the sources used to obtain seed, with their exact amounts, for all the crops planted during the 2015/16 cropping season. Table 3 presents the volumes provided by each source, across all crops differentiated by country. Overall, over a third of all seeds across all crops were obtained from own stock, indicating that this source, quantitatively, is the most important of the six sources mentioned by farmers. About a fifth of all seeds in Madagascar, Malawi and Zimbabwe and a third in Mozambique were obtained from local markets.

Seed from social networks was dominant and contributing to about a fifth of the seed sown in Zimbabwe and Malawi and this highlights the presence of farmer to farmer exchange of seeds. Coomes et al. (2015) notes that seed from social networks or farmer seed networks refer to the transfer of seed (and other vegetative material such as cuttings, pseudo stems or tubers) from domesticated or undomesticated plants through farmer-to-farmer swapping, gifting, bartering, or purchase and this occurs outside of the commercial seed sector and formal regulation. Social networks and own stock are classified as 'informal seed systems' which supply landraces and local seed varieties to smallholder farmers. The primary importance of social networks in Zimbabwe and Malawi challenges two misconceptions: first, the notion that farmer seed networks are

inefficient for seed dissemination and, second, that farmer seed networks are weakening and disappearing (Coomes et al. 2015). Simply, overall data show that the own stock is a dominant and important seed source.

Agro-dealers, proved to be significant sources of seed for smallholder farmers, across the countries. Agrodealers belong to 'formal seed systems' which convey improved, certified seed to farmers. In Swaziland, 44% of the seeds sown in 2015/16 were obtained from agrodealers. Community seed banks and seed aid, proved to be an insignificant source of seed for smallholder farmers, across the countries, with the exception of Malawi, supplying less than 3% of seed used respectively.

Table 3. The sources supplying seed in 2015/16 season, as a percentage of total seed supplied in each country

Seed source	Madagascar	Malawi	Mozambique	Swaziland	Zambia	Zimbabwe
Own stock	63.9	36.2	54.4	35.5	85.3	44.1
Local market	19.6	17.3	27.8	13.8	2.6	17.8
Social network	13.7	18	6.7	3.9	2.8	22.8
Agro-dealer	1.9	19.7	8.7	43.7	6.8	10.9
Community seed bank	0.2	2.2	0.4	2.7	1.3	0.0
Seed aid	0.7	6.6	2.0	0.5	1.0	4.4
Total %	100.0	100.0	100.0	100.0	100.0	100.0
Total kg	96472	20048	20675	19672	107289	11997

Within crop category

Table 4 shows the sources of seed by crop category. Maize is an important food and cash crop in Southern Africa (McGuire and Sperling 2016). Agro-dealers, own stock and local markets were the important seed sources for maize providing 36%, 29.2 % and 23 % of the maize seeds sown by smallholder farmers in all six countries, respectively. Own stock is the major source of sorghum, pearl millet, groundnuts, cowpeas and beans in the study countries. Eighty seven and 96 % of groundnuts and cowpeas seeds were sourced from own stock respectively. Social networks and local markets provided 30 % and 25 % of the bean seeds sown by farmers in 2015/16. McGuire and Sperling (2016) found similar results that local market was important sources of legume seeds. Overall, results show that maize is predominantly sourced from formal seed markets while small grains and legumes are obtained from informal seed systems in the six countries. The policy implication is that there is need for strengthening an integrated seed system for seed security in Southern Africa. Furthermore, there is need for strengthening input markets to stock and supply good quality small grain and legume seeds.

Table 4. Sources of seed for 2015/16 season, by crop cluster, across all countries

Crop	Seed source: 2015/16 (%)						Total-all sources (kg)
	Own stock	Local market	Social network	Agro-dealer	Community seed bank	Seed aid	
Maize	29.2	22.7	4.9	35.9	3.5	3.8	53559
Sorghum	45.9	16	22.6	7.3	7.3	1.7	4304
Pearl millet	57	10	25	4.4	2.3	1.3	3221
Groundnuts	86.7	7.5	4.2	1.0	0.1	0.6	58975
Cowpeas	96.3	2.1	0.6	0.40	0.1	0.5	42892
Beans	33.5	25.1	30.2	10.3	0.7	0.3	3687

4.5.2. Which seed types were planted?

Figure 4 shows the proportion of maize seed types (% of total quantity) planted by smallholder farmers in 2015/16 season. Certified seeds consist of hybrids and open pollinated seeds that have formally been certified. Recycled is the retained grain from previous harvest that were selected as seed. Local seeds refers to local landraces. The majority (over 72 %) of the maize seed planted in Swaziland, Zambia and Zimbabwe was certified. Twenty two percent and 9 % of the maize seed used in Mozambique and Madagascar respectively was certified. In these two countries the bulk of maize seed used was obtained from local markets. Policy strategies that promote the development and marketing of certified maize seed in Mozambique and Madagascar are crucial.

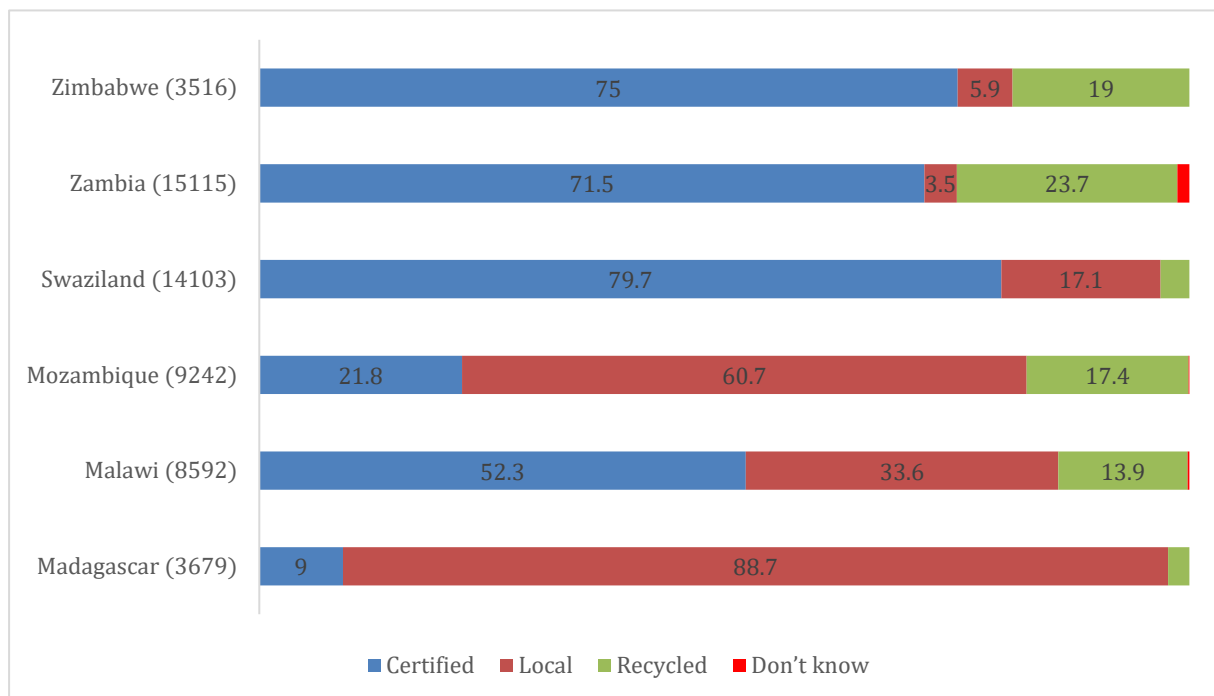


Figure 4. Maize seed type planted by farmers in 2015/16 by country

Note: % of kg and total kg are shown in parenthesis.

Figure 5 shows the proportion of groundnut seed types (% of total quantity) planted in 2015/16 season. The bulk of groundnuts planted in Madagascar, Mozambique and Zimbabwe are local landraces. In Zambia, about 98 % of the total seed planted was recycled. Recycled seed have not been tested for purity and in most cases, performs relatively poor compared to improved and certified seed varieties. Our results show that the majority of groundnut seeds planted were sourced from informal seed systems. Research and development of certified groundnuts seeds should be scaled up, coupled with good agricultural practices that reduce aflatoxin contamination in Southern Africa.

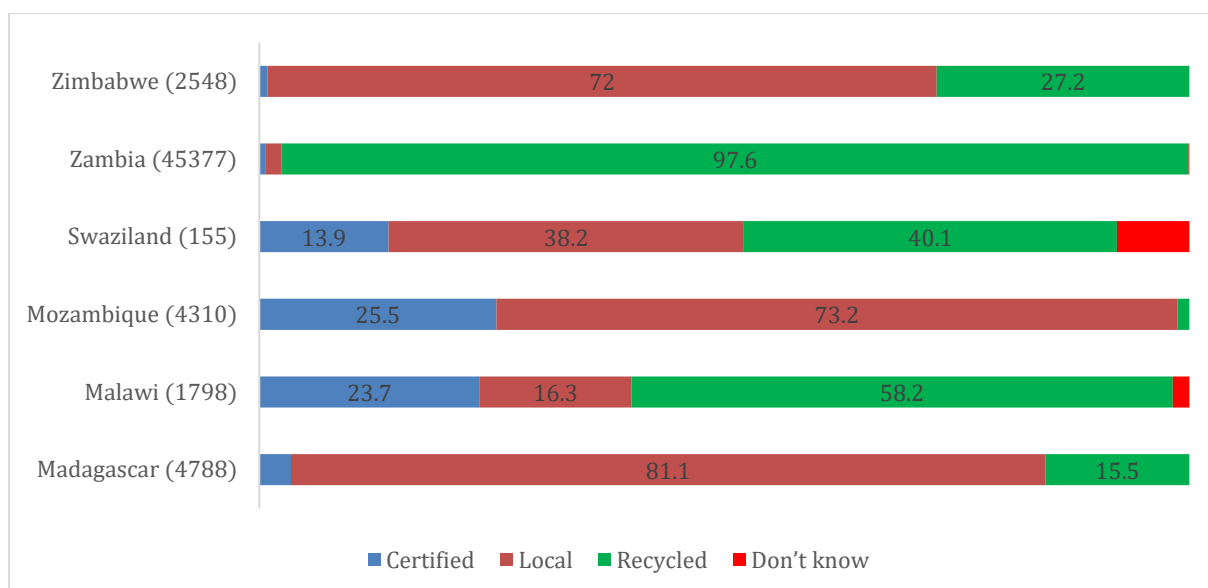


Figure 5. Groundnut seed type planted by farmers in 2015/16 by country

Note: % of kg and total kg are shown in parenthesis.

Figure 6 shows the proportion of cowpeas seed types (% of total quantity) planted in 2015/16 season. The bulk of cowpeas planted in Malawi and Zimbabwe was certified whereas for Mozambique the local landraces were dominant. In Zambia and Swaziland, over 84 % of the total cowpeas seed planted was recycled. In most countries, except Malawi, the majority of cowpeas seeds planted were sourced from informal seed systems. Research and development of certified cowpeas seeds needs to be promoted in Southern Africa.

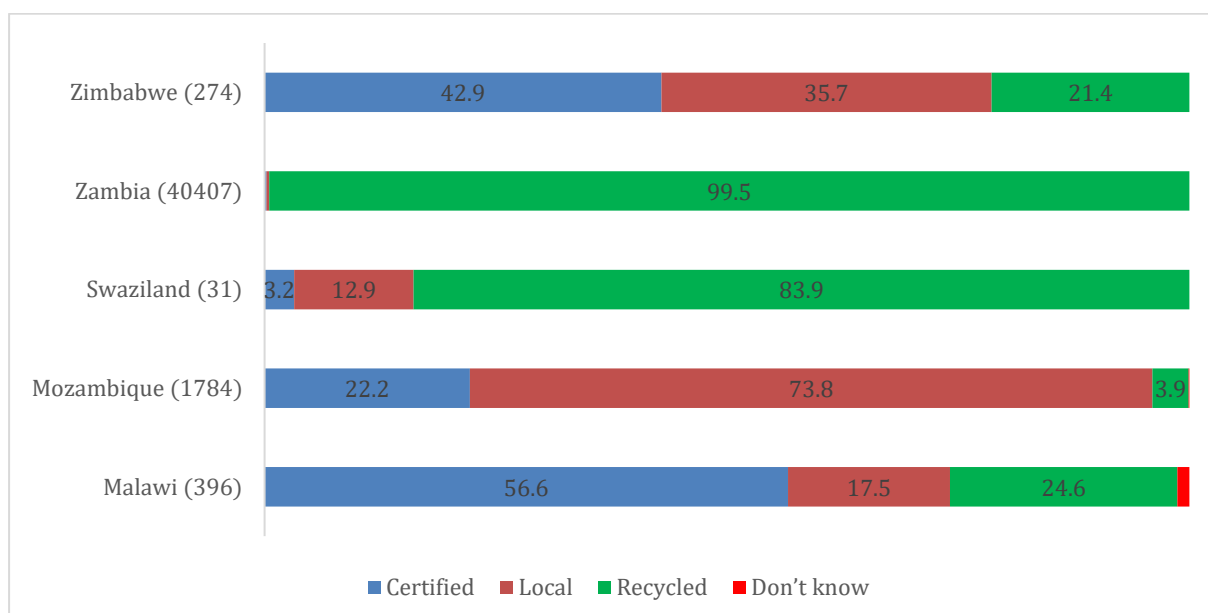


Figure 6. Cowpeas seed type planted by farmers in 2015/16 by country

Note: % of kg and total kg are shown in parenthesis.

4.5.3. Which seed types were obtained from various sources?

The majority of the certified seed was obtained from agro-dealers and seed aid (Figure 7). For example, of the 24603kg seed sourced from agrodealers, 86 % was certified seeds. These results show that certified seeds were channelled through formal seed systems. Therefore seed interventions for certified seeds should use formal seed systems. As expected the local and recycled seeds were sourced from informal seed system - own stock, local market and social networks. Local markets supplied a mixture of certified and local landraces. Programs that aim to expand agrodealers network should target, train and upgrade potential local markets into agrodealers so that they stock and supply certified seeds to smallholder farmers. Local seed may also need to be incorporated in the community seed bank for biodiversity protection and also accessibility. Local varieties are better known for their adaptability and ability to produce fairly good yields without using fertilizer. The fact that most recycled seed is coming from own stock and community seed banks means that farmers can be taught on the best methods of producing own seed and preserving it.

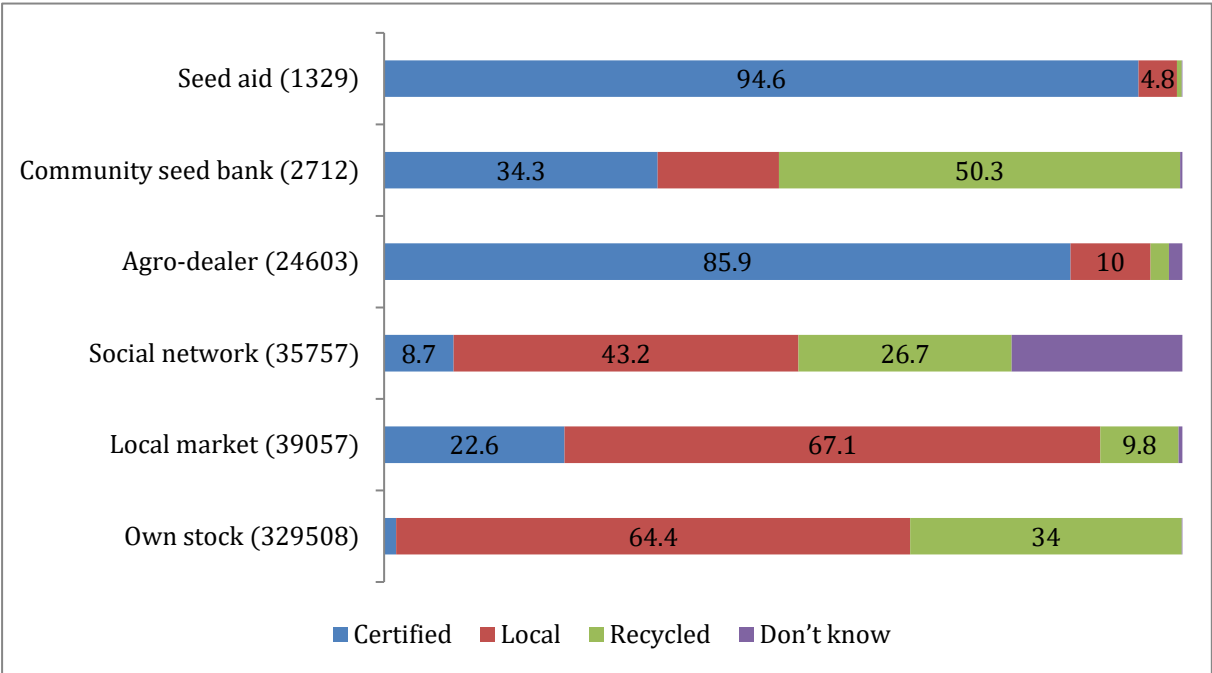


Figure 7. Seed types sown by source for all crops in 2015/16 season across all countries
 Note: % of kg and total kg are shown in parenthesis.

4.5.4. How seed was acquired, location and timeliness

With regards to methods of acquiring seeds, results show that more than half of maize seeds were bought using cash (Figure 8). For the other crops the bulk of the seeds were acquired free and this could be from own saved seed, seed aid or gifts from social networks. These results show that farmers are willing to pay for maize seeds relative to other crops in Southern Africa. Seed delivery mechanisms that encourage farmers to contribute to the purchase of seeds should be encouraged and free seed should be only confined to the most vulnerable populations only. The use of credit for agricultural input

use is not pronounced. This suggest acute challenges faced in providing credit to smallholder farmers. Usually offering credit to smallholder farmers who practice subsistence farming is risky and often not sustainable as they rarely participate in the market. Beans consists of a mixture of cash and free acquisition.

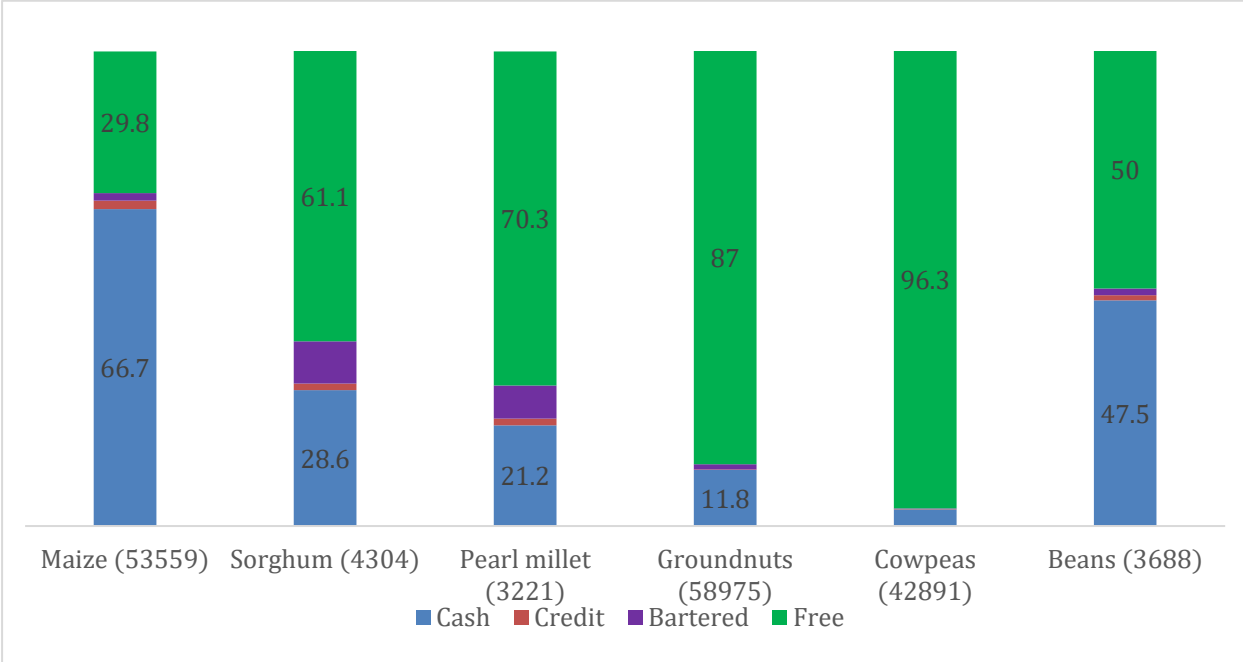


Figure 8. Seed acquisition methods used for selected crops in 2015/16 season across all countries
 Note: % of kg and total kg are shown in parenthesis.

Location where seed was obtained

The majority of seed planted for all crops were obtained within the Enumeration Planning Area (EPA) or ward in which farmers reside (Figure 9). This implies that seed were sourced from nearby sources and this reduces transaction costs. About 37% and 13% of the seed for maize and beans were collected within the district. The qualitative studies also revealed that many farming households get seed from within their wards and districts. Most agro-dealers in Southern Africa have a number of outlets where they sell their seed from. These outlets (though sometimes temporary) help reduce distances travelled by farmers in search of seeds. However, during the interviews, it was highlighted that these some of the seeds from these outlets may be of poor quality due to poor storage conditions and lack of regulatory mechanisms. Nevertheless, these channels still act as immediate seed sources and should not be ignored as they are a key component of the local seed system.

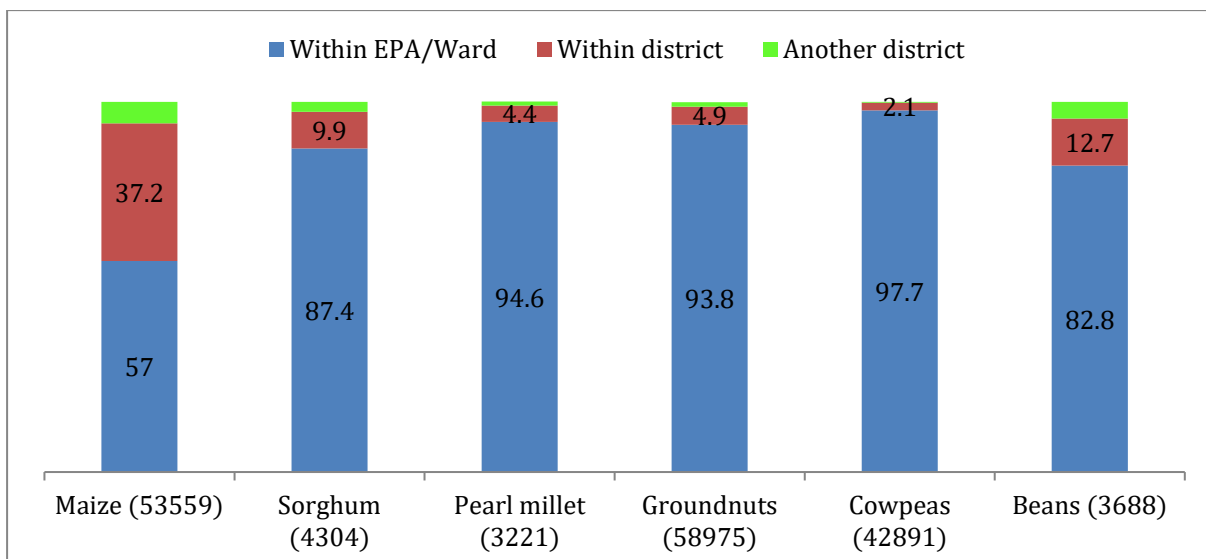


Figure 9. Location where seed was obtained by crop in 2015/16 season across all countries

Note: % of kg and total kg are shown in parenthesis.

4.5.5. When did you acquire the seeds?

We asked smallholder farmers on the timeliness of obtaining seeds during the 2015/16 season. Most seeds were acquired before the start of the season for all crops except cowpeas (Figure 10). For cowpeas, about 94 % of the seeds were obtained mid-season possibly because cowpeas is an early maturing crop. Overall, results suggest that farmers acquired their seeds in time for planting. Timely seed and input acquisition is crucial for timely planting with early rains.

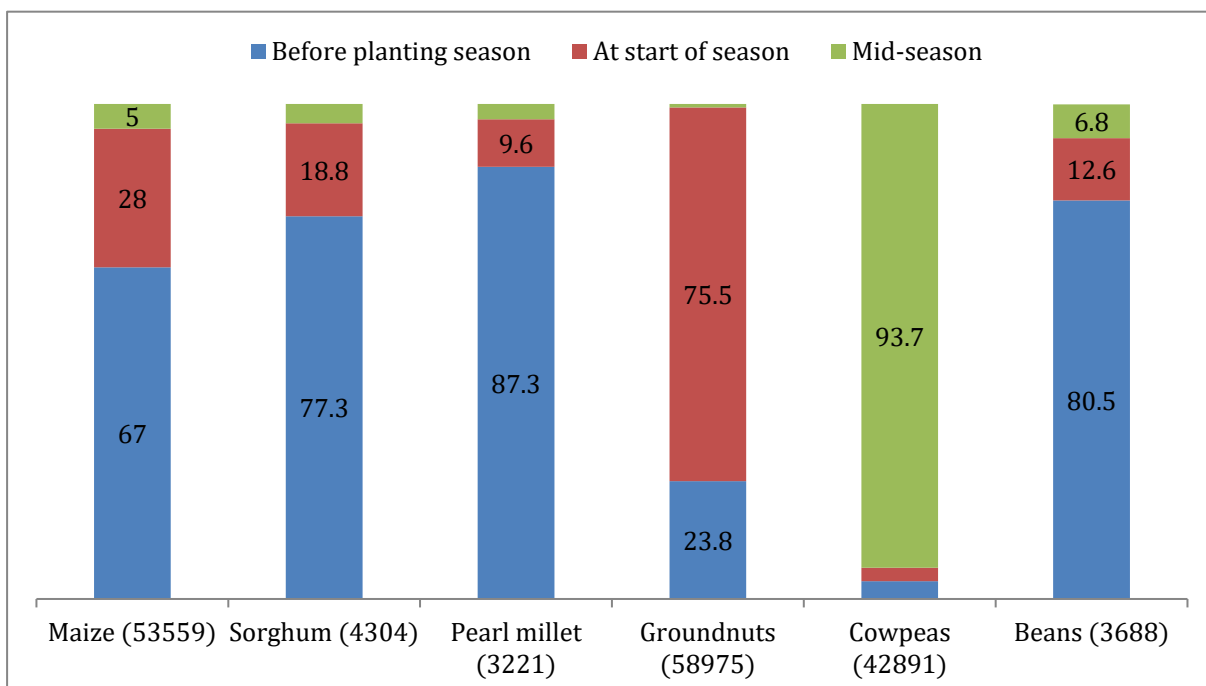


Figure 10. Timeliness of obtaining seeds by crop in 2015/16 season across all countries

Note: % of kg and total kg are shown in parenthesis.

4.5.6. Seed quality

Quality of seed by crop

Table 5 shows farmers perceptions on the quality of seed planted based on physical characteristics. Results show that across all crops, of the majority of seed planted were clean or fairly clean. Seven percent of the sorghum seed planted was deemed unclean. Unclean seed, usually have poor germination and emergency rate and this reduces plant populations and subsequently production levels.

Table 5. Farmer's perceptions on quality of seeds by crop in 2015/16 season across all countries

Crop	Quality of seeds: 2015/16 (% of kg)			Total (kg)
	Clean (no impurities and damage)	Fairly clean (some impurities and no damage)	Not clean (some impurities and damage)	
Maize	79.7	18.9	1.4	53559
Sorghum	74.7	17.9	7.4	4304
Pearl millet	75.3	19.9	4.7	3221
Groundnuts	18.2	81.4	0.4	58975
Cowpeas	3.7	96.2	0.1	42891
Beans	72.9	25.5	1.6	3688

Quality of seed by source

The source of the seed is also important in determining quality of the seed (Table 6). Results show that all sources provided relatively clean seed. As expected formal seed systems provided relatively more clean seed compared to informal seed systems. About a third of seed from own stock and local markets were fairly clean. Almost five percent of the seed from own stock was not clean. This may negatively reduce seed germination and emergence. Extension should emphasize on good agricultural practices in seed production, quality control in informal seed systems (selection and grading of good quality seeds) and post-harvest management.

Table 6. Quality of seeds by source for all crops across all countries

Seed source	Quality of seeds: 2015/16 (% of kg)			Total (kg)
	Clean (no impurities and damage)	Fairly clean (some impurities and no damage)	Not clean (some impurities and damage)	
Own stock	61.5	33.6	4.8	329508
Local market	64.6	32.1	3.3	39057
Social network	82.2	16.8	1.0	35757
Agro-dealer	86.9	12.1	1.0	24603
Community seed bank	88.5	11.5	0.0	2713

Perception of germination by crop

Figure 11 shows farmers perceptions on the emergency of the crop. This gives a rough indication of how the seed performed. It should be noted that there are many biophysical factors that affect germination and emergency. Crops requires a fine tilth, adequate moisture, appropriate planting depth and good seed soil contact for good germination and emergence. If these conditions are not met, there will be poor germination. Results show that across all crops, over 55% of the seed planted had good emergence. Cases of poor emergence was mostly confined to below 15% of the seeds planted across all crops.

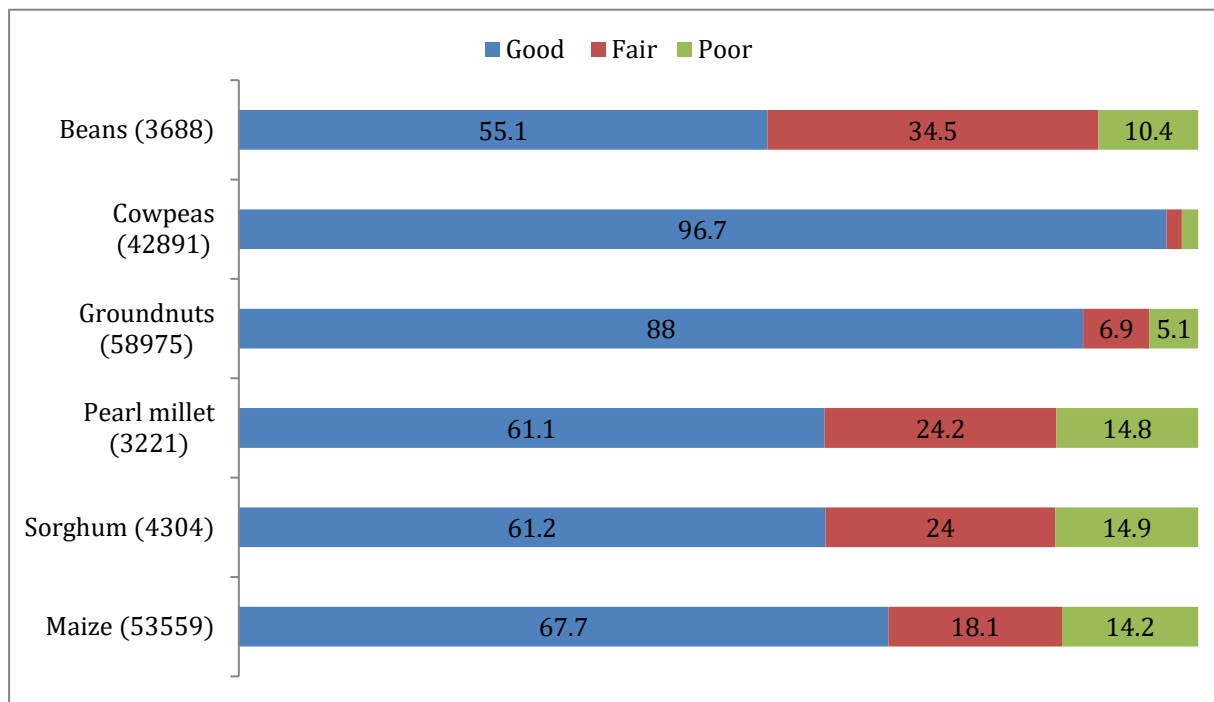


Figure 11. Farmer perceptions of seed emergency by crop across all countries

Note: % of kg and total kg are shown in parenthesis.

4.6. How farmers accessed new varieties

New variety introductions are viewed as an economical way to strengthen seed systems and security and increase production (McGuire and Sperling 2016). In the survey, we asked smallholder farmers whether they accessed new varieties and details on the sources and methods of acquisition. Table 7 shows that overall, across countries, about a third of farmers, 30% had accessed some new variety within the previous 5 years, though we were not able to differentiate whether these were hybrids or open pollinated varieties. In Malawi, Swaziland, Zambia and Zimbabwe, over 34% of smallholder farmers obtained new varieties in the past 5 years. It should be noted that food insecure districts were selected and these usually have a high concentration of government and NGO seed interventions which might bias results. Madagascar and Mozambique had the

lowest proportions of households receiving new varieties. There is need for strengthening programs that facilitate the development and marketing of appropriate new varieties in Madagascar and Mozambique. In terms of crop profiles, maize comprised 66.7% of all the 1063 new variety cases, while 6.5% were from sorghum and 3.8% were for groundnuts. The results on maize dominance in new variety introductions is expected considering that maize is the staple crop for Southern Africa.

New varieties were accessed through multiple channels. The major outlets providing the new materials within the study countries were government, NGO/FAO, agro-dealers and local markets. Government and NGO/FAO were the major sources of new varieties in Malawi and Zimbabwe whereas agrodealers were the chief sources in Swaziland and Zambia. In Zimbabwe, 21% of the new varieties were obtained from social networks. Overall, these results highlight that new varieties flow through both the formal and informal seed systems. It is therefore important to strengthen the integrated seed system. Results show that smallholder farmers purchased new varieties from agro-dealers while government and NGOs largely delivered via free vouchers and direct distributions. Agro-dealers are usually an important source of improved and certified seeds. Furthermore, government and NGO programs also promote improved seeds and planting materials of good quality. Where seed fairs were being implemented these also distributed local landraces adapted to the local conditions.

Table 7. Farmers who obtained a new variety in the previous 5 years and the sources of provision

Seed source	Country (%)						All countries	
	Madagascar	Malawi	Mozambique	Swaziland	Zambia	Zimbabwe	%	N
Social network (neighbour/friends/relative)	3.6	9.8	7.7	14.9	6.0	21.0	11.3	120
Local market	2.4	13.8	42.3	23.3	21.2	6.8	18.8	200
Agro-dealer	17.9	18.9	6.2	57.8	37.5	11.1	28.4	302
Community based seed groups	10.7	1.6	5.4	1.2	2.2	1.9	2.8	30
Government	3.6	30.3	17.7	0.8	19.0	35.2	18.5	197
NGO/FAO	23.8	24.0	20.0	0.0	14.1	23.5	16.1	171
Contract seed growers	2.4	0.8	0.8	0.0	0.0	0.6	0.6	6
Others	35.7	0.8	0.0	2.0	0.0	0.0	3.5	37
ALL Sources	100.0	100.0	100.0	100.0	100.0	100.0	100.0	1063
TOTAL new varieties	84	254	130	249	184	162		1063
Households receiving new variety (count)	56	210	59	158	141	138		762
No. Households in sample	400	605	379	387	384	386		2541
Households receiving new variety (% of sample)	14	34.7	15.6	40.8	36.7	35.8	30	

4.7. Use of other agricultural inputs

Figure 12 shows the proportion of households which applied herbicides, inorganic and organic fertilizer to crops in the 2015/16 season. Use of inorganic fertilizer was pronounced in Swaziland (74% of the households), Malawi (72 %), and Zambia (65 %) an indication that the majority of farmers in these countries were engaged in high input production systems. The low proportions of household using inorganic fertilizer in Zimbabwe may be associated with high input costs whereas for Madagascar poorly development input markets may be driving low fertilizer use. Mozambique is lagging behind in fertilizer usage compared to the other countries.

Mozambique uses the least fertilizer in Southern Africa with an average of 25 tonnes per year (IFDC 2012). Fertilizer use in Mozambique is only 4 kg/ha, which is below the African average of 8 kg/ha and far below the Abuja target of 50kg/ha (Cavane and Donovan 2011; Benson, Cunguara, and Moguees 2012; IFDC 2012). The design of new strategies to stimulate agricultural productivity in Mozambique should incorporate the promotion of fertilizer access and use since it is one of the significant determinants of agricultural productivity. The promotion should be targeted at high potential areas where there is sufficient rainfall. In dry areas it should be applied where irrigation is available. There is need for training farmers on fertilizer types, management and handling. Farmer extension training can be done through demonstration plots located at strategic sites for maximum impact. There is need for promotion of market oriented crop production as farmers see value in fertilizing crops that have a market. The government should develop policy incentives that encourage competition in fertilizer manufacturing and distribution as well as strengthen private companies and agro-dealers to increase fertilizer supply.

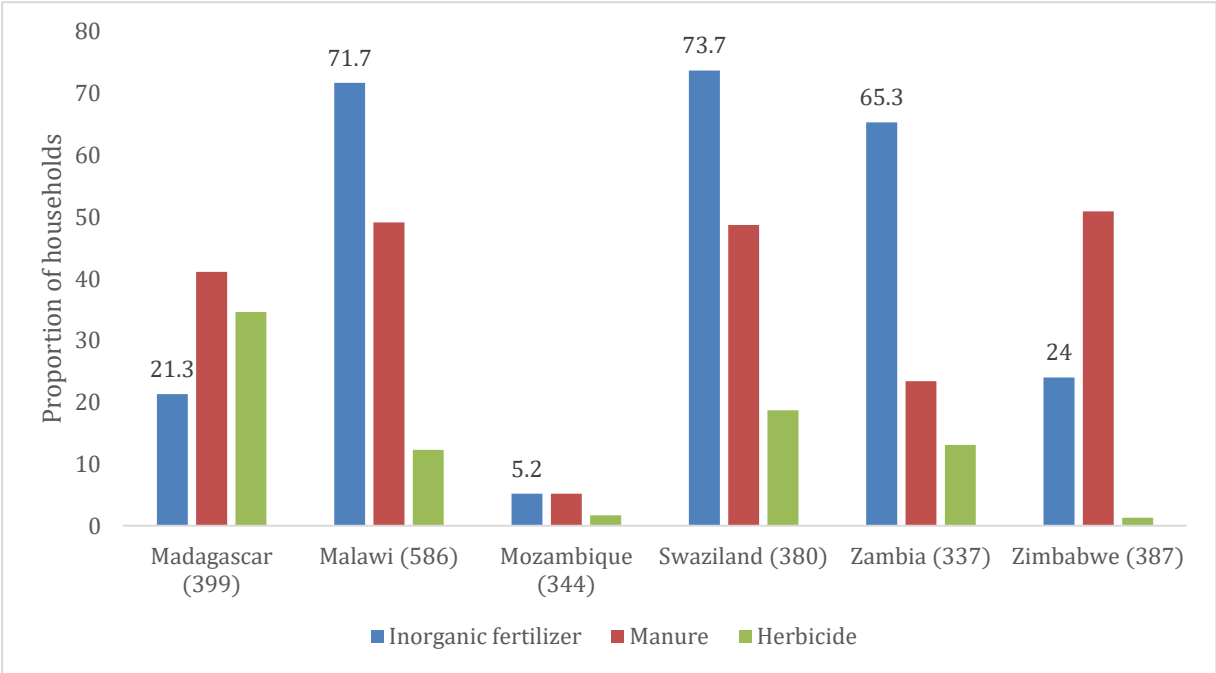


Figure 12. Proportion of households using other agricultural inputs in 2015/16 season

Note: sample size in parenthesis.

4.8. Future Seed Security Plans -2016/17 Season

In this section, we discuss the seed availability from various sources and smallholder farmers seed security plans for the coming 2016/17 season.

4.8.1. Seed availability from various sources

The macro-level study of seed availability in the formal market conducted during Phase I of the assessment revealed significant gaps in seed supply and demand in drought-affected countries (Table 8). The difference between seed which is available in the formal sector and requirements based on five year average of area planted to various crops was defined as the gap in seed availability.

According to Phase 1 survey results, Zambia has enough seed to meet national demand and are also available for export. The countries with the most significant gaps in the availability of seed in the formal market were Madagascar and Mozambique. While farmers generally noted they would rely on the informal market, the shortage of seed in the formal market is likely to negatively affect the capacity of governments and development partners to quickly and effectively respond to the crisis at scale through provision of certified quality seed and other agricultural inputs. This challenge will be further compounded by the fact most countries have not adopted the Southern African Development Community (SADC) Harmonized Seed Regulatory System policy which is meant to facilitate the movement of seed between countries.

There is a general shortage of small grains and legume seed on the formal market across all focus countries, an aspect which need to be given attention if the efforts to be promote crop diversification through agricultural interventions are to be realized.

Table 8. Seed availability vs requirements in study countries for the 2016/17 season (tonnes)

Crop		Madagascar	Malawi	Mozambique	Swaziland	Zambia	Zimbabwe
Maize	Availability	250	17130	1330	750	77885	44152
	Requirements*	10000	32935	9245	1057	27465	37500
	Gap	-9750	-15805	-7915	-307	50420	6652
Sorghum	Availability	0	----	2	0	478	1300
	Requirements	15	----	2850	12	233	2500
	Gap	-15	----	-2848	-12	245	-1200
Pearl millet	Availability	1	----	----	----	----	120
	Requirements	5	----	----	----	----	2900
	Gap	-4	----	----	----	----	-2780
Groundnuts	Availability	15	2106	78	----	751	110
	Requirements	5000	29599	1387	----	17836	2500
	Gap	-4985	-27493	-1309	----	-17085	-2390
Cowpeas	Availability	----	325	84	5	----	310
	Requirements	----	1287	1849	3	----	4000
	Gap	----	-962	-1765	2	----	-3690
Beans	Availability	1500	2365	1	3	325	1075
	Requirements	7200	27267	1156	120	266	5000
	Gap	-5700	-24902	-1155	-117	59	-3925

*Requirements are based on five-year averages of area planted. ---- Data not available.

Source: FAO Seed Security Regional Workshop.

4.8.2. Which seed channels will farmers use in 2016/17?

Across crops

Smallholder farmers provided details on all the sources planned to obtain seed, with their estimated amounts, for all the crops to be planted during the 2016/17 cropping season. The volumes provided by each source, across all crops differentiated by country are shown in Table 9. Farmers plan to obtain most of their seed from own stock, local markets and agro- dealers in most countries. These results suggest the need for promoting an integrated seed system. In Madagascar own stock and local markets will contribute 58 % and 31 % of the seeds to be planted across all crops, indicating that these sources, quantitatively, will be the most important. Agrodealer networks are not well developed in Madagascar.

In Malawi, Swaziland and Zambia, agrodealers will be an important source accounting for over a fifth of the seed requirements. The fact that farmers intend to obtain a significant portion of seed from agro-dealers suggest that farmers will access improved and certified seeds. According to farmers, community seed banks and seed aid, will supply less than 10 % of seed to be used in each country.

Table 9. Seed sources farmers intend to use in 2016/17 season

Seed source	Madagascar	Malawi	Mozambique	Swaziland	Zambia	Zimbabwe
Own stock	58.1	28.2	38.8	19.4	41.4	42.4
Local market	30.7	21.0	38.9	22.0	16.4	18.2
Social network	6.5	15.4	4.9	15.5	11.1	23.2
Agro-dealer	3.8	28.9	14.8	40.1	26.2	13.5
Community seed bank	0.0	1.8	0.1	2.5	1.3	0.7
Seed aid	0.8	4.7	2.2	0.5	3.5	1.1
Don't know	-	-	0.4	-	-	0.8
Total %	100	100	100	100	100	100
Total kg	58503	22916	26883	11958	29882	

Note: Figures are % of total seed to be sourced in each country

Within crop category

Table 10 shows the planned sources of seed by crop category across all the countries. Farmers intend to source over a third of their maize seed from agrodealers and local markets each. Own stock will provide about a fifth of the maize seed requirements. These results show that both the formal and informal seed systems should continue to be strengthened to supply maize to smallholder farmers.

Farmers expect to source the bulk of their sorghum, pearl millet, groundnuts and bean seeds from own stock. For example significant amounts of seeds for pearl millet and groundnuts (58% and 48% respectively) to be sown by smallholder farmers will be sourced from own stock. These results support the fact that informal seed systems are an important sources of legume and small grain seeds (McGuire and Sperling 2016). For groundnut and cowpeas, the percentages for own stock for 2016/17 season were quite low compared to last season and thus can be partly attributed to poor harvest because of El Niño which subsequently lowered own stock reserves. The results for own stock for sorghum and pearl millet are comparable and stable in the two seasons. From a policy perspective, these results highlight the need to strengthen both formal and informal seed systems to ensure adequate supply of maize, small grains and legumes.

Table 10. Seed sources, farmers intend to use for 2016/17 season (% of kg)

Crop	Seed source: 2016/17 (% of quantity)							Total-all sources (kg)
	Own stock	Local market	Social network	Agro-dealer	Community seed bank	Seed aid	Don't know	
Maize	21.3	32.5	5.0	37.0	0.8	3.2	0.2	51674
Sorghum	46.4	20.0	20.0	7.4	2.0	3.1	1.0	5872
Pearl millet	58.2	19.5	16.8	3.6	0.9	0.5	0.4	4269
Groundnut	48.2	27.5	15.2	6.3	0.7	2.0	0.1	23407
Cowpeas	32.6	36.0	11.8	15.8	0.6	3.1	0.2	3872
Beans	46.1	25.3	19.4	7.6	1.1	0.4		4848

4.8.3. Which seed types will farmers plant?

Figure 13 shows the proportion of maize seed types (% of total quantity) to be planted by smallholder farmers in 2016/17 season. The majority (over 68 %) of the maize seed to be planted in Malawi, Swaziland, Zambia and Zimbabwe will be certified. Fourteen percent and 9% of the maize seed to be planted in Mozambique and Madagascar respectively will be certified. In these two countries the bulk of maize seed to be used will be obtained from local markets. Research, development and marketing of certified maize seed in Mozambique and Madagascar needs to be promoted.

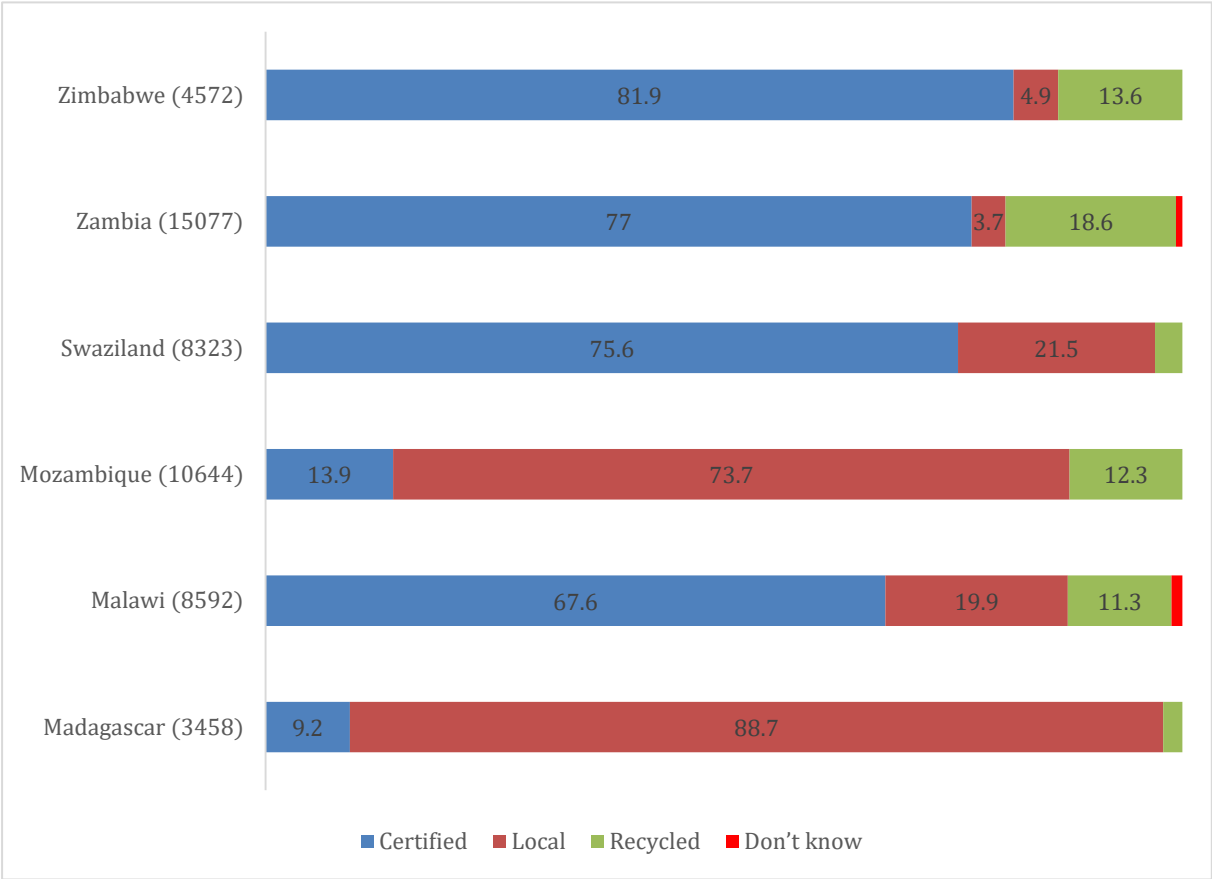


Figure 13. Maize seed type to be planted in 2016/17 by country

Note: % of kg and total kg are shown in parenthesis.

Figure 14 shows the proportion of groundnut seed types (% of total quantity) to be planted in 2016/17 season. The bulk of groundnuts to be planted in Madagascar, Mozambique and Zimbabwe will be local landraces. In these three countries the use of certified groundnuts seeds is minimal. In Zambia, about 68 % of the total seed to be planted is recycled. Recycled seed have not been tested for purity and in most cases, performs relatively poor compared to improved and certified seed varieties. Malawi has the highest proportion of certified groundnuts seed. Malawi has a robust groundnut breeding and marketing program and is also supplying certified seeds to other countries such as Zimbabwe and Zambia. Our results show that the majority of groundnut seeds to

be planted in most countries will be sourced from informal seed systems. Research, development and marketing of certified groundnuts seeds should be scaled up in Southern Africa.

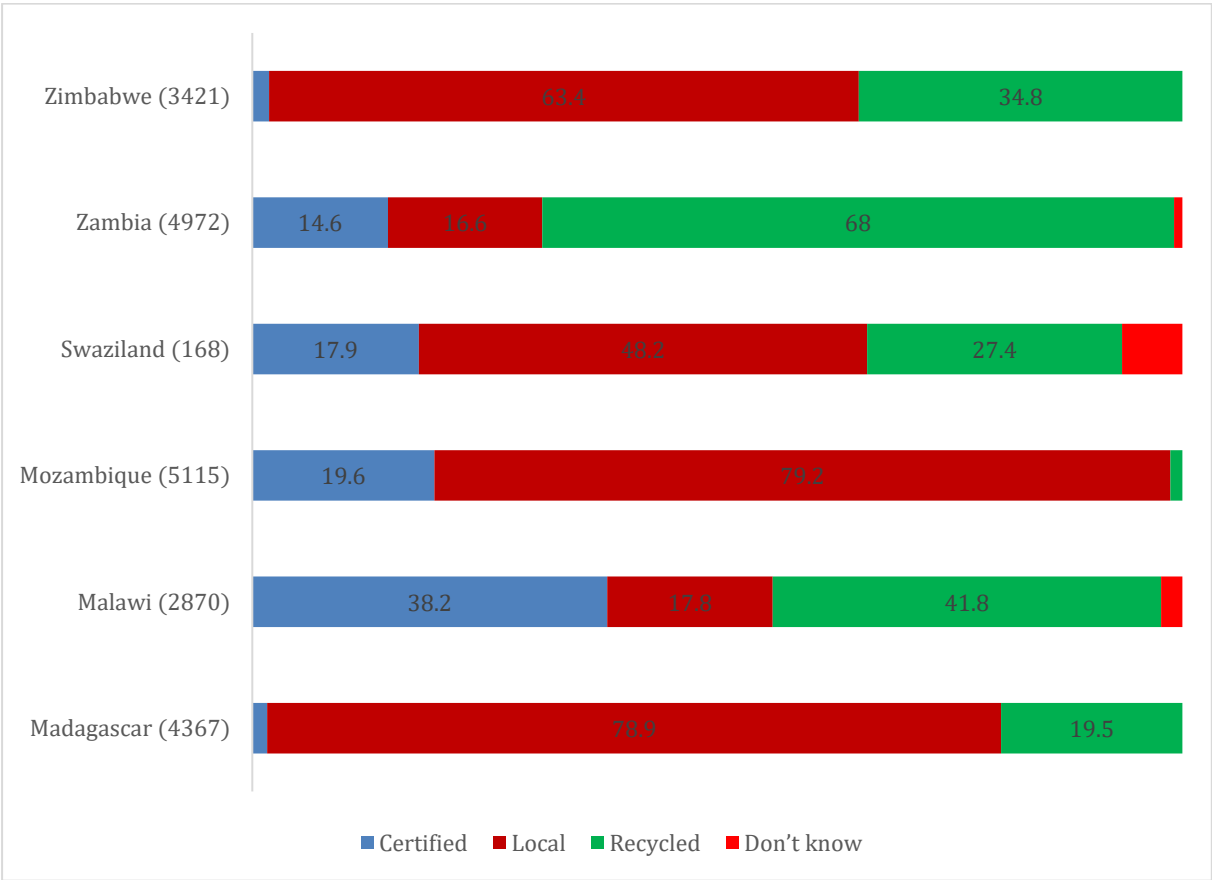


Figure 14. Groundnut seed type to be planted in 2016/17 by country

Note: % of kg and total kg are shown in parenthesis.

Figure 15 shows the proportion of cowpeas seed types to be planted in 2016/17 season. The bulk of cowpeas to be planted in Mozambique and Swaziland will be local landraces whereas for Zambia, Zimbabwe and Malawi there will be heavy reliance on recycled seeds. About a third and a fifth of the cowpeas seeds to be planted in Malawi and Zambia respectively will be certified. In all countries, results show that the majority of cowpeas seeds to be planted will be sourced from informal seed systems. Research, development and marketing of certified cowpeas seeds needs to be promoted in Southern Africa.

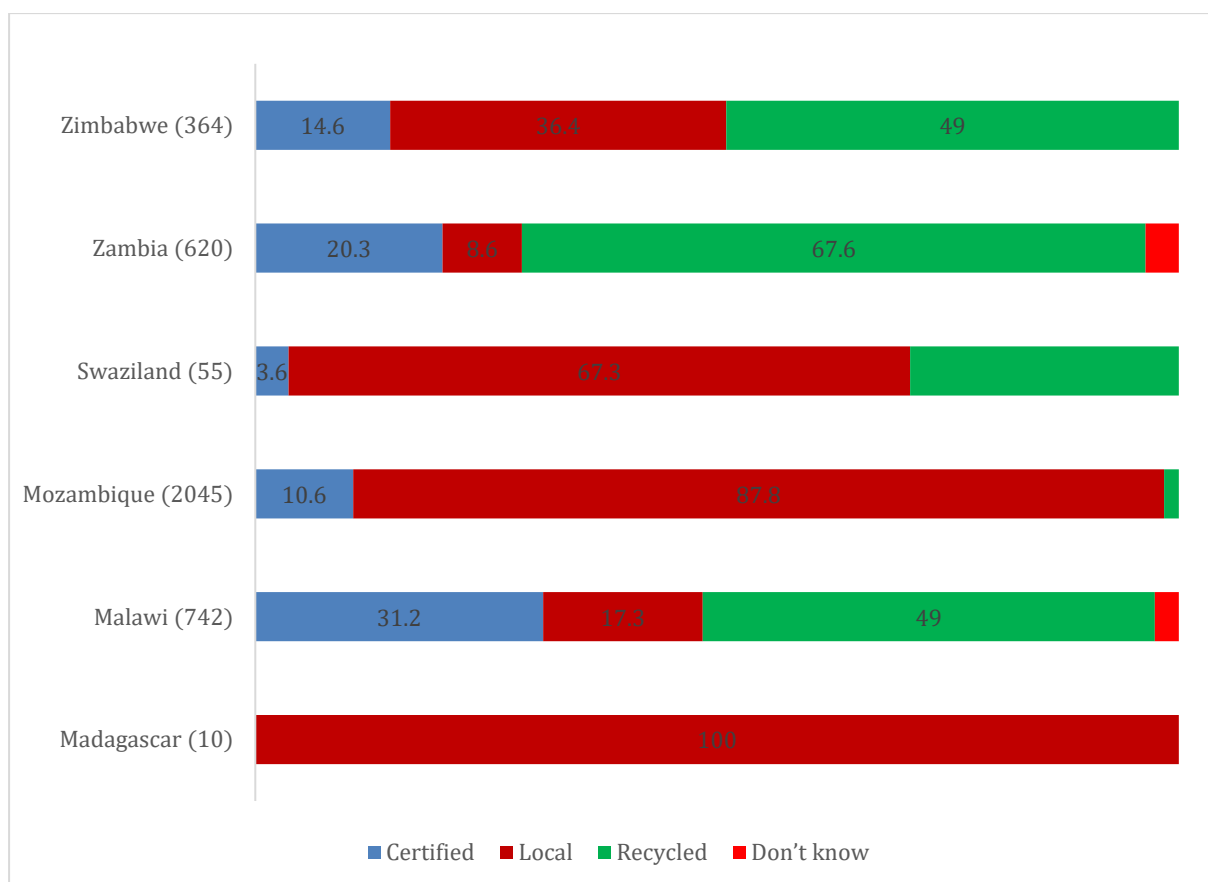


Figure 15. Cowpeas seed type to be planted in 2016/17 by country

Note: % of kg and total kg are shown in parenthesis.

How will the seeds be acquired?

To further investigate the methods of seed acquisition, farmers were asked how they expect to acquire the various seeds for different crops. The bulk of the maize, groundnuts, cowpeas and bean seeds will be acquired through cash (Table 11). These results shows that farmer indeed invest in input acquisition. Free seed acquisition will be common for small grains – sorghum and pearl millet and these will mainly be from own stock.

Table 11. Seed acquisition methods to be used by crop in 2016/17 season across all countries

Crop	How acquired: 2016/17 (% of quantity)					Total (kg)
	Cash	Credit	Bartered	Free	Don't know	
Maize	74.5	1.8	3.4	17.3	3.0	50666
Sorghum	36.6	1.2	10.9	49.5	1.9	5872
Pearl millet	25.8	0.8	9.2	62.5	1.8	4264
Groundnuts	49.9	1.0	9.8	31.8	7.5	20912
Cowpeas	64.3	3.1	4.5	21.0	7.2	3835
Beans	50.8	0.3	2.7	46.0	0.2	4847

4.8.4. Will there be enough seed for planting in 2016/17 season?

An important question which farmers were asked is whether there will be enough seed for planting in 2016/17 season (Table 12). This question helped in understanding farmer's perception on the availability of seed. In Ambovombe, Madagascar results show that farmers perceived that there will not be enough seed to plant on 57 %, 55% and 51% of the planned area for maize, pigeon peas and beans respectively. These results show that there are high concerns that seed will not be enough by farmers in Ambovombe and this is expected considering that Ambovombe is located in the drier regions relative to other districts. In Malawi, farmers reported that they will not have enough seed to plant 54%, 41% and 38% of the area they were planning to put under groundnuts, maize and sorghum respectively. If one is to prioritize crops, these will be groundnuts, maize and sorghum.

For Mozambique, farmers reported that they would not have enough seed for 56, 79 and 71 percent of areas to be planted with maize, sorghum and groundnuts respectively. For the four major crops in Swaziland, seed shortages are confined to range from 9.3 percent to 21 percent. Seed shortages are expected to be more acute for maize. This has an implication on food security given that maize is a staple crop. Farmers in Zimbabwe, reported that they will not have enough seed to plant 50 %, 47.2% and 44.9 % percent of the areas they were planning to plant for cowpeas, groundnut and bambaranuts respectively. On above 90% of all crop areas to be planted in Zambia, farmers reported that they will have enough seed. Generally, these results show that there were concerns among farmers in all the countries, except Zambia that seed would not be enough. Two successive drought crises in 2014/15 and 2015/16 reduced crop harvest thereby affecting seed stocks from informal sources. If good quality seeds are not available this may reduce areas to be planted by smallholder farmers.

Table 12. Will there be enough seeds for selected crops in 2016/17 season

Country	Crop	% of crop area		Total area to be planted (hectares)
		Yes	No	
Madagascar (Ambovombe)	Maize	42.8	57.2	103
	Groundnuts	86.6	11.4	17.3
	Pigeon pea	45.0	55.0	283
	Beans	49.1	50.9	8.4
Malawi	Maize	59.5	40.5	419
	Sorghum	62.2	37.8	65
	Groundnut	45.8	54.2	106
	Pigeon pea	78.7	21.3	100
	Cowpeas	72.8	27.2	34.1
	Beans	66.0	34.0	27
Mozambique	Maize	42.1	55.9	467
	Sorghum	20.4	78.6	141
	Pearl millet	8.0	92.0	141
	Groundnuts	29.4	70.5	236
	Cowpeas	42.8	57.0	324
Swaziland	Maize	79.0	21.0	742
	Groundnuts	87.1	12.9	18
	Cowpeas	90.7	9.3	22
	Beans	85.7	14.3	4
Zambia	Maize	98.3	1.6	8171
	Sorghum	93.9	6.1	32
	Groundnuts	98.9	1.1	942
	Pearl millet	94.2	5.8	17
	Cowpeas	99.7	0.3	1057
	Sunflower	96.4	3.6	82
Zimbabwe	Maize	65.0	35.0	272
	Sorghum	63.9	29.4	255
	Pearl millet	59.7	34.5	369
	Finger millet	58.2	31.6	28
	Groundnut	44.7	47.2	98
	Bambaranuts	44.9	46.7	60
	Cowpeas	40.5	50.0	32

4.8.5. Who will use specific seed sources?

Own stock, agro-dealers and local markets emerge as the most important seed sources that farmers will use in 2016/17 season in most of the countries. This raises important policy questions of which factors affect farmers use of own stock, agro-dealers and local markets. Do other factors such as crop, variety type, food poverty and location affect farmers' choice? Probit regression was used to analyse how country, crop, household characteristics and food poverty affect the likelihood of own stock, agro dealer and local market use. The dependent variables are use of own stock, agro-dealers and local markets to supply seed, with independent variables being age and gender of household

head, household size, area planted, modern variety and crop. Table 13 shows the marginal effects of key variables on farmers' use of own stock, agro-dealers and local markets

Table 13. Probability that a farmer will access seed from specific channel in 2016/17

	Own stock		Agro dealer		Local market	
	Marginal effect	Std. err.	Marginal effect	Std. err.	Marginal effect	Std. err.
Head age (years)	-0.004**	0.002	0.020***	0.006	0.002	0.002
Head age squared	0.000***	0.000	-0.000***	0.000	-0.000	0.000
Head gender (1=male)	0.038	0.056	0.198***	0.060	-0.200***	0.051
Marital status (1=married)	-0.025	0.057	-0.021	0.062	0.026	0.053
Head education (Primary and above)	0.364***	0.052	-0.039	0.059	-0.261***	0.047
Farming experience (years)	-0.001	0.002	0.003	0.002	-0.003*	0.002
Household size	-0.013*	0.007	-0.001	0.008	0.034***	0.007
Part time labour (number)	-0.027**	0.011	-0.002	0.013	-0.011	0.011
Full time labour (number)	0.010	0.011	0.017	0.013	-0.018	0.011
Credit access (1=yes)	-0.000	0.040	-0.025	0.045	-0.024	0.038
Modern variety (1=yes)	-1.218***	0.048	1.268***	0.048	0.254***	0.042
Maize	-0.227***	0.048	0.450***	0.049	0.039	0.044
Sorghum	0.064	0.071	-0.336***	0.095	-0.110	0.074
Groundnut	-0.221***	0.056	0.003	0.071	0.165***	0.055
Food poverty (1=yes)	-0.368***	0.040	0.074	0.046	0.101***	0.038
Madagascar	0.215***	0.061	-0.100	0.092	0.550***	0.065
Malawi	-0.319***	0.062	0.507***	0.073	0.182***	0.060
Mozambique	-0.177***	0.068	0.627***	0.087	0.748***	0.068
Swaziland	-0.261***	0.101	0.572***	0.094	0.114	0.086
Zambia	0.161**	0.068	0.159*	0.085	-0.037	0.072
Observations	6611		6611		6611	
Pseudo R-squared	0.206		0.286		0.06	

Probit regression on plot level data. Marginal effects (d) for discrete change of dummy variable from 0 to 1. *, **, *** Statistically significant at the 10%, 5%, and 1% level, respectively.

Zimbabwe was used as the referent for country dummies. The marginal effect of gender of the household head shows that male farmers are more likely to use agrodealers and less likely to use local markets. Farmers were likely to get modern varieties from the agro-dealers and local markets and this is because new varieties usually flow through the formal systems. As expected, maize will more likely to be sourced from formal seed systems (agro dealers). Maize is the staple crop in Southern Africa and farmers are more likely to invest money in the purchase of certified maize which is mainly sold by agro-dealers. The food poor households are less likely to rely on own stock but rather they will rely on local markets for seed sources. Farmers own stock were negatively affected last season Elnino drought. Farmers in Madagascar will rely heavily on own stock and local markets, while in Malawi, Mozambique and Swaziland farmers will procure their seeds from agro dealers and local markets.

5. CONCLUSION AND RECOMMENDATIONS

Conclusions

The seed system in Southern Africa consists of both formal and informal systems. The informal sector consists of farmer own saved seed and seed from social networks and local markets. The formal seed subsector is dominated by agro-dealers, seed aid from government and NGOs. Generally, both the macro level and the household level results indicate that there will be seed shortages in 2016/17 season for the region.. The macro level gives an overview of the formal market subsector yet the household study gives insights of both the formal and informal market. The household survey revealed that significant amounts of seeds are sourced from the informal market therefore the macro level gap is partially reduced by informal sources. The major crops produced by farmers are maize, sorghum, groundnuts, beans, cowpeas and pigeon peas.

For the 2016/17 cropping season, there is strong indication that farmers intend to obtain nearly 70% of their seed from the informal market (local market, own stock and social networks). This is with exception for Madagascar which has a predominant informal seed sector for all seed types. Informal market supplies most of the legumes crops and small grains. Where maize is the staple crop, the seed tends to be obtained increasingly more from the formal sector. Farmers also are willing to pay more for the certified improved seed supplied through agro-dealers and other formal sources. These formal markets need an incentive to trade on legumes and small grains. The incentive can come from increased demand if awareness of improved varieties is ramped up in Southern Africa.

Comparing the planned seed sources with previous year's actual sources, there were fewer households planning to rely on social networks and their own production, and increased dependence on local markets and agro-dealers. This can be an indication that households' grain stocks were low owing to poor harvest that was caused by El Niño induced drought, and farmers opting for the formal market for seed. Phase 1 and Phase 2 components of the study highlight the need to establish effective demand for seed from the formal sector in order to properly provide early warning information and also accurately inform interventions. Seed interventions should include a mixture of cereals and legumes in their packages for promoting crop diversification, nutrition and resilience.

Seed availability

According to Phase 1 survey results, Zambia has enough seed to meet national demand and are also available for export. The countries with the most significant gaps in the availability of seed in the formal market were Madagascar and Mozambique. While farmers generally noted they would rely on the informal market, the shortage of seed in the formal market is likely to negatively affect the capacity of governments and development partners to quickly and effectively respond to the crisis at scale through provision of certified quality seed and other agricultural inputs. This challenge will be further compounded by the fact most countries have not adopted the Southern African Development Community (SADC) Harmonized Seed Regulatory System policy which is meant to facilitate the movement of seed between countries.

There is a general shortage of small grains and legume seed on the formal market across all focus countries, an aspect which needs to be given attention if the efforts to be promote crop diversification through agricultural interventions are to be realized.

Results from household surveys show that informal seed systems (own stock and local markets) and formal (agro-dealers) were dominant seed sources used by smallholder farmers in 2015/16 season. Overall, over a third of all seeds across all crops were obtained from own stock, indicating that this source, quantitatively, is the most important of the six sources mentioned by farmers. About a fifth of all seeds in Madagascar, Malawi and Zimbabwe and a third in Mozambique were obtained from local markets. Seed from social networks was dominant and contributing to about a fifth of the seed sown in Zimbabwe and Malawi and this highlights the presence of farmer to farmer exchange of seeds. Agro-dealers, proved to be significant sources of seed for smallholder farmers, across the countries. In Swaziland, 44% of the seeds sown in 2015/16 were obtained from agrodealers.

In the coming 2016/17 season, maize seed is likely to be obtained from agrodealers, own stock and local markets. Sorghum, pearl millet and legume seed will be primarily sourced from the informal seed sector. Overall, results suggest the need to strengthening both informal and formal seed systems for seed security. Agrodealers should be strengthened to continue stocking and supply certified seeds. There is need to enhance the development and marketing of certified small grains and legumes in Southern Africa. At the same time local landraces with good agronomic traits should be maintained and promoted.

There is need for active participation of both the public and private sector to ensure that good quality seed is available and accessible for the 2016/17 season. Indications show a potential seed shortages - especially for maize, sorghum, groundnuts and cowpeas in 2016/17 season. This is likely to affect more the poorer farmers, and calling for a need to ensure that such households have access to appropriate seed, and of good quality.

Accessibility

Results from the qualitative surveys revealed that most farmers primarily depend on subsistence farming and do not have the purchasing power to afford quality seed. Conversations with key informants suggest that the seed prices were likely to remain high, making it difficult for poorer farmers to purchase the improved seed. On the positive side, regardless of source, most farmers obtained seed before planting and they sourced the seed within the wards in which they reside.

Variety introductions and suitability

Over a third (30 %) of farmers, had accessed some new variety within the previous 5 years. In terms of crop profiles, maize comprised 67% of all the 1063 new variety cases, and this is expected considering that maize is a staple crop in Southern Africa. New varieties are expected to help in improving productivity and seed security. Limited access to new varieties suggest stagnation of seed systems. The major outlets providing the new varieties within the sample countries were agrodealers, government, local markets and

NGO/FAO. Overall, these results highlight that new varieties flow through both the formal and informal seed systems. It is therefore important to strengthen the integrated seed system. Promotion of new varieties need to focus on both legume and cereal crops to improve on diversity.

Seed quality

With regards to germination, households indicated that across all crops seed germination in 2015/16 was good. Furthermore, the majority of seeds planted for all crops was perceived to be of good quality based on physical characteristics. The seeds from both formal and informal seed systems were reported to be clean by the majority of households.

Recommendations

The study results show an indication of significant decline in seed access for the coming 2016/17 season. In order to sustain production areas, particularly for the poorer farmers, seed relief programs are encouraged for the 2016/17 season. Therefore, relief organizations need to properly target the poor in their seed interventions

Informal seed systems play a key role in availing seeds to farmers in Southern Africa. Given this key role following considerations have to be put in place:

- Promote seed delivery mechanisms that enhance farmers' exchange of local landraces, including the implementation of seed fairs. Such seed fairs should be held to enable the exchange of local adaptable materials, and local agro-dealers should be encouraged to participate and sell certified seeds.
- There is need to enhance the informal seed sector to bring it to a level where it can be a major source of seed for emergency interventions, this will guarantee seed quality. It is encouraged to revisit the seed fairs approach to relief seed provisions.
- Efforts to promote viable agro-input markets should also ensure that successful local markets are identified and trained to enable them to graduate into agrodealers trading in improved seed.
- Considering that the informal seed system is the main source of seed in Southern Africa, extension training should be provided to farmers from informal seed systems on participatory variety selection, good quality seed selection, grading and post-harvest management, including storage. This will ensure access to good quality seeds that are clean, disease-free, have no impurities and are not damaged.

Local production of small grains and legumes seed should be promoted using methods and approaches that grow and strengthen - local seed entrepreneurship. This can be supported through field demonstrations, field days and information campaigns. For nutrition and resilience building, seed interventions should stimulate and promote crop diversification by including not only maize – the staple crop in Southern Africa –, but also bean, cowpea, groundnut and sorghum seed. Legumes are soil-enhancing, and an

important source of protein. Sorghum and millet should be prioritized in semi-arid areas for climate resilience.

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Appendix

Appendix 1. Households interviewed in each district by country

Country	District	Sample
Madagascar	Ambovombe	100
	Mananjary	100
	Bealanana	100
	Antsirabe 11	100
Malawi	Blantyre rural	99
	Salima	100
	Chikwawa	103
	Ntcheu	100
	Mulanje	101
	Neno	46
	Mwanza	56
Mozambique	Mabalane	93
	Magude	98
	Mabote	92
	Changara	98
Swaziland	Hhohho	97
	Lubombo	97
	Manzini	96
	Shiselweni	97
	Chibombo	96
Zambia	Nyimba	96
	Kalomo	96
	Sesheke	96
	Mudzi	96
Zimbabwe	Binga	98
	Buhera	96
	Mwenezi	96
	Total	2543

Appendix 2. Qualitative survey sample by country

Country		Sample
Madagascar	Key informant interviews	16
	Focus Group Discussion	16
	Seed growers	5
	Agrodealers	9
	Local market survey	0
	Seed aid actors	6
Malawi	Key informant interviews	12
	Focus Group Discussion	8
	Seed growers	8
	Agrodealers	12
	Local market survey	12
	Seed aid actors	3
Mozambique	Key informant interviews	9
	Focus Group Discussion	8
	Seed growers	6
	Agrodealers	4
	Local market survey	8
	Seed aid actors	4
Swaziland	Key informant interviews	6
	Focus Group Discussion	8
	Seed growers	1
	Agrodealers	4
	Local market survey	14
	Seed aid actors	4
Zambia	Key informant interviews	13
	Focus Group Discussion	8
	Seed growers	-
	Agrodealers	11
	Local market survey	3
	Seed aid actors	4
Zimbabwe	Key informant interviews	12
	Focus Group Discussion	8
	Seed growers	8
	Agrodealers	12
	Local market survey	12
	Seed aid actors	3

Respondent Code	Country	District	EPA/Ward/Block	Village	Household no.	

Appendix 3. Household questionnaire

FAO/ICRISAT
Seed and Fertilizer Security Assessment: Household Survey

We are a group of researchers working for the United Nations' FAO and partners. We want to understand how your seed and agricultural system works. The answers we get will be shared with organizations working on seed and agricultural input for any improvement required for their action. Respondents should understand that participation in this survey, and the answers provided, will not influence whether this household receives assistance of any sort in the future. All data are kept confidential. Thank you for agreeing to this interview.

Section 1: Details

- 1.1 Name of Enumerator: _____
- 1.2 Date of interview: _____
- 1.3 Country: _____
- 1.4 Province/Region: _____
- 1.5 District: _____
- 1.6 EPA/Ward/Block: _____
- 1.7 TA: _____
- 1.8 Group Village: _____
- 1.9 Village: _____

Section 2: Respondent Information

- 2.1 Name of respondent: _____
- 2.2 Age: _____ (years)
- 2.3 Gender (Sex): Male (1) Female (2)
- 2.4 Relationship: Household head (1) Spouse (2) Son/daughter (3) Others (4)
- 2.5 Highest Education No formal (1) Primary school (2) Secondary (3) Tertiary (4)

Respondent Code	Country	District	EPA/Ward/Block	Village	Household no.	

2.6. Area cultivated last season (Nov 2015 – May 2016) _____ Acres Hectares m³

Respondent Code	Country	District	EPA/Ward/Block	Village	Household no.	

Section 3: Household Demographic Characteristics

3.1 Let us review information concerning the head of household

Gender (1=male, 2=female)

Age in years

Marital status (1=single, 2=married (monogamous), 3= married (polygamous) 4=divorced, 5=widowed)

Employment status (1= Formally Employed 2= Self Employed (off -farm) 3=Farmer 4=Other specify)

Level of education (1=primary, 2=secondary, 3= Tertiary, 4= none)

In which year did you or this household start farming in this area?

Residential status of household head on farm (1=Resident, 2=Non-resident*) Resident if staying for at least three months out of a total of 12 months a year

3.2 Household size and composition: How many people live in this household in the past 12 months?

Please note that "living" is defined as someone who stays here at least for three months in a year, "Full-time farm work" is when someone provides labor to the farm all the time and "part time farm work" is when one is engaged in other activities like school or off farm work - only provides labor to the farm some of the time. (Provide the numbers under each category including respondent)

Age group (years)	Members living in household including hired labor and relatives		Work fulltime on the farm		Work part-time on the farm	
	Male	Female	Male	Female	Male	Female
Infants (0-5)						
Children (6-17)						
Youths (18 - 35)						
Mature (36-59)						
Elderly (60+)						

Respondent Code	Country	District	EPA/Ward/Block	Village	Household no.	

Section 4: Crop Production/ Seed System Profile

4.1 What main crops did you plant in the last (2015/16) rainy season? – *For groundnuts harvest use unshelled*

Crop (see codes below)	Main use of crop 1= Food 2= Income 3= Fodder	Area planted		Quantity of seed/planting material planted		Quantity of fertilizer applied		Applied manure applied 1=Yes 2=No	If yes what type of manure 1=compost 2=animal 3=others (specify)	Applied herbicide 1=Yes 2=No	Quantity harvested		How do you rate the harvest <i>1=Good; 2=Fair; 3=Poor</i>
		Size	Unit <i>1=acre 2=ha 3= m²</i>	Amt	Unit	Amt	Unit				Amt	Unit	
Crop codes 1=Maize 2=Sorghum 3= Pearl. Millet 4=Tobacco 5=Groundnut		6=Cowpea 7=Cotton 8=Soybeans 9= Beans 10=Finger millet		11=Sesame 12=Rice 13=Sunflower 14=Cassava 15=Irish Potato		16=Bambara nuts 17=Pigeon peas 18=Green grams 19=Sweet potato 20=Cocoyams		21=Yams 22=Banana 23=Local vegetables 24=Exotic vegetables 25=Other (SPECIFY)					
Unit of Quantities 1=kg, 2=50kg bag, 3=20lt Btk, 4=5lt Bkt, 5= 90kg bag, 6=tonne 7= bale, 8=Small (250ml) cup, 9=Large (500ml) cup, 10=Scotch Cart, 11=Wheelbarrow, 12=200lt Drum, 13= Bundle, 14=Suckers, 15=grams, 16 =Other specify													

Respondent Code	Country	District	EPA/Ward/Block	Village	Household no.	

4.2 From the crops planted in the last (2015/16) rainy season - mentioned above in 4.1: main sources of the seed/planting material?

Repeat row for same crop and different source. Social network refers to friends, relative and other farmers. If farmer don't know put DK.

Crop (see codes below)	Major variety planted - in terms of area planted (Write name)	Seed/planting material type 1=Hybird 2=OPV 3=Local 4=Recycled	Seed/planting material source 1=Own 2=Local market 3=Social network 4=Agro input dealer 5=Community seed bank 6=Seed aid	Place seed/planting material collected from 1=Within EPA/ Ward 2=Within district 3=Another district	How did you acquire the seed/planting material 1=Cash 2=Credit 3=Bartered 4=Free (gift)	At what time was the seed/planting available 1=Before the planting season; 2= At start of the season; 3=Mid-season; 4= Towards the end of season	Was the seed/planting material enough for your requirements <i>1=Yes</i> <i>2=No</i>	Quantity of seed/planting material planted		Quality of seed/planting material 1= clean (no impurities, no damage); 2= fairly clean (some impurities, no damage); 3=not clean (Some impurities & damage)	How was the germination rate? 1=Good 2=Fair 3=Poor
								Amt	Unit		
Crop codes 1=Maize 2=Sorghum 3= Pearl. Millet 4=Tobacco 5=Groundnut		6=Cowpea 7=Cotton 8=Soybeans 9= Beans 10=Finger millet		11=Sesame 12=Rice 13=Sunflower 14=Cassava 15=Irish Potato		16=Bambara nuts 17=Pigeon peas 18=Green grams 19=Sweet potato 20=Cocoyams		21=Yams 22=Banana 23=Local vegetables 24=Exotic vegetables 25=Other (SPECIFY)			
Unit of Quantities 1=kg, 2=50kg bag 3=20lt Btk, 4=5lt Bkt 5= 90kg bag, 6=tonne 7= bale 8=Small (250ml) cup, 9=Large (500ml) cup, 10=Scotch Cart, 11=Wheelbarrow,12=200lt Drum, 13= Bundle, 14=Suckers, 15=grams, 16 =Other specify											

Respondent Code	Country	District	EPA/Ward/Block	Village	Household no.	

4.3 Overall, if you consider the following seed/planting material sources; own production, local market, social network and agro-input dealers etc, was there enough seed available for your main food crop _____ (name crop) during last season

Yes (1) (*skip to section 5*) No (2)

4.4 If no to 4.3 what are the reasons

A) _____

b) _____

Section 5: Access to New Varieties

5.1. In the last 5 years, have you ever purchased, obtained or received a new crop variety? Yes (1)

No (2) *go to Section 6*

5.2. If yes, specify source, crop, variety name, and if you are still sowing the variety

Crop (see codes on page before)	Variety name	Source (codes 3-10)	How acquired (codes B-J)	When (year)	Are you still growing the same variety 1=Yes, 2=No

Sources of seed: CODES 3= friends/neighbors/relatives 4= local market 5= agro-input dealer 6= community-based seed groups	7= government 8= NGO /FAO 9= contract growers 10= other (specify)	How acquired :CODES B= exchange/barter C= gift (friend/neighbor/relatives) D= Cash purchase/buy E= vouchers/coupons (free) F= vouchers/coupons (with farmer contributed)	G= direct seed distribution H= seed loan I= food aid J= money credit K= other (specify)
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Respondent Code	Country	District	EPA/Ward/Block	Village	Household no.	

Section 6: Seed and Planting Materials for Next (2016/17) Rainy Season

6.1. Which crops do you plan to plant in the coming (2016/17) rainy season and where do you plan to get the seed and planting material from (source)

Repeat row for same crop and different source. Social network refers to friends, relative and other farmers. If farmer don't know put DK.

Crop (see codes below)	Major variety you plan to plant (Write name)	Variety same as last season 1=Yes 2=No 3=Did not plant last year	Reason for maintaining or changing variety change (see codes below)	Seed /planting material type 1=Hybrid 2=OPV 3=Local 4=Recycled	Seed /planting material source 1=Own 2=Local market 3=Social network 4=Agro input dealer 5=Community seed bank 6=Seed aid	How will you acquire the seed /planting material 1=Cash 2=Credit 3=Bartered 4=Free (gift)	Will there be enough seed /planting material from this source 1=Yes 2=No	Area you plan to plant		Quantity of seed /planting material you plan to plant		At what time will the seed /planting material be available 1=Before the planting season; 2= at start of the season; 3=mid-season; 4= towards the end of season	Place where seed /planting material will be collected from 1=Within EPA/Ward 2=Within district 3=Another district
								Size	Unit 1=a 2=ha 3=m ²	Amt	Unit		

Respondent Code	Country	District	EPA/Ward/Block	Village	Household no.	

Crop codes 1=Maize 2=Sorghum 3= Pearl. Millet 4=Tobacco 5=Groundnut	6=Cowpea 7=Cotton 8=Soybeans 9= Beans 10=Finger millet	11=Sesame 12=Rice 13=Sunflower 14=Cassava 15=Irish Potato	16=Bambara nuts 17=Pigeon peas 18=Green grams 19=Sweet potato 20=Cocoyams	21=Yams 22=Banana 23=Local vegetables 24=Exotic vegetables 25=Other (SPECIFY)									
Unit of Quantities 1=kg, 2=50kg bag 3=20lt Btk, 4=5lt Bkt 5= 90kg bag, 6=tonne 7= bale 8=Small (250ml) cup, 9=Large (500ml) cup, 10=Scotch Cart, 11=Wheelbarrow,12=200lt Drum, 13= Bundle, 14= Suckers, 15=grams, 16 =Other specify													
Reasons for maintaining or changing variety 1 = Lack of seed from same source; 2 = More seeds available from this source; 3 = Lack of resistance to pest; 4 = Good resistance to pests;				5= Good performance of seeds; 6= Bad performance of seeds; 7=Received free seed; 8=Increase in seed prices;				9=Decrease in seed prices; 10= Lack of resistance to diseases; 11=Good resistance to diseases; 12= Lost seeds during storage 13=Others, specify).....					

6.2 Overall, if you consider the all the sources for example; own production, local market, social network and agro-input dealers, will there be enough seed/planting material available for your main food crop _____(name crop) in the next season

Yes (1) No (2)

Respondent Code	Country	District	EPA/Ward/Block	Village	Household no.	

Section 7: Seed Aid

Note to the enumerators: All those who indicated seed aid as their source of seed (Section 4, 5 and 6) already have information for last and current season- Just transfer the information from these Sections. Others who have not indicated seed aid as source of seed in Section 4, 5 and 6 could still provide information on seed aid in the previous years (below the current year).

- 7.1 Have you ever received seed aid in the last five years? Yes (1) No (2) *If no go to Section 8*
- 7.2 If yes, how many times have you receives seed aid in the last five years? _____
- 7.3 How did you access the seeds? *(Multiple choice possible)*
 Direct distribution Seed fairs and voucher; Voucher/FISP
 Others (specify) _____
- 7.4. On which terms have you been given the seed aid? *(Multiple choice possible)*
 Free Cost sharing Seed Recovery
 Others (specify) _____
- 7.5. Which organizations provided the seed *(Mention the organizations / institutions names)?*
1: _____ 2: _____
3: _____ 4: _____
- 7.6 Were you consulted in identifying the crop and variety given to you?
 No, never consulted (1); Yes, but did not get what I/we asked for (2); Yes, and given my choice (3)
- 7.7 Did you ever receive a variety totally new to you? Yes (1) No (2) *if No go to 7.10*
- 7.8 Were you provided information you needed on the new variety? Yes (1) No (2)
- 7.9. Overall, what is your level of satisfaction with the new variety that you were provided?
 Very satisfied =1; Satisfied (2); Not satisfied (3); Very unsatisfied (4)
- 7.10. Any comment about the seed aid in the area?

Respondent Code	Country	District	EPA/Ward/Block	Village	Household no.	

Section 8: Livestock and Asset Ownership

8. What is the size of your livestock and household assets do you own?

8.1. Livestock owned		8.2. Assets owned	
Livestock class	Current numbers	Type of assets	Current numbers
1=Oxen (Including Bulls)		1=Plough	
2=Cows		2=Ox/Scotch Cart	
3=Calves		3=Cultivator	
4=Goats		4=Harrow	
5=Sheep		5=Tractor	
6=Donkeys		6=Wheelbarrow	
7=Chickens		7=Bicycle	
8=Guinea Fowls		8=Television	
9= Duck		9=Radio	
10=Pig		10=Cell phones	
11=Rabbit		11=Motorcycle	
12= Others (SPECIFY)		12=Knapsack sprayer	
		13=Car	
		14=Treadle pump	
		15=Solar panel	
		16=Solar lamp	
		17=Other (<i>Specify</i>)	

Respondent Code	Country	District	EPA/Ward/Block	Village	Household no.	

8.2 What were the main sources of income for your household in the past 12 months? *First list and then rank three important.*

Source of income

Rank in order of importance (*first three important*)

- 1=Crop sale
- 2=Livestock and livestock product sale
- 3=Fishing
- 4=Hunting and gathering
- 5=On-farm daily labour
- 6=Non-on farm daily labour/semi -skilled
- 7=Remittances
- 8=Sale of charcoal/wood
- 9=Petty trade
- 10=Salary
- 11=Pension
- 12=Art and craft
- 13=Mining
- 14=Quarry
- 15=Local artisan (Builder, Carpenter, Tailoring)
- 16=Others (specify)

Respondent Code	Country	District	EPA/Ward/Block	Village	Household no.	

Section 9: Food Availability and Access at Household Level

9.1. For how many days (0-7) of the last 7 days have you eaten the following food groups?

Food group	Days (0-7)	Food group	Days (0-7)
1. Cereals	6. Milk/ milk products
2. Roots and tuber	7. Fruits
3. Pulses / legumes	8. Sugar / sweet
4. Vegetables	9. Oil / ghee / fat
5. Meat / fish / eggs		

Section 10: Credit Access

10.1. Are you able to access credit from any source [Consider informal and formal sources] _____ 1 = Yes, 2 = No.

*Thank the respondent for all the information s/he has provided.
Record any questions below that the respondent might have*