Assessment of the Effectiveness of Maize Seed Assistance to Vulnerable Farm Households in Zimbabwe

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CIMMYT

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The International Maize and Wheat Improvement Center, known by its Spanish acronym, CIMMYT® (www.cimmyt.org), is an international, not-for-profit research and training organization that, together with partners in over 100 developing countries, works to increase food security, improve the productivity and profitability of farming systems, and sustain natural resources in the developing world. The center's outputs and services include improved maize and wheat varieties and cropping systems, the conservation of maize and wheat genetic resources, and capacity building. CIMMYT belongs to and is funded by the Consultative Group on International Agricultural Research (CGIAR) (www.cgiar.org), and also receives support from national governments, foundations, development banks, and other public and private agencies.

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Abstract: The publication describes outcomes of a study to assess the effectiveness of a large-scale crop seed relief effort in Zimbabwe during 2003-07. Aims of the effort, which was supported by the British Department for International Development (DfID) and coordinated by the Food and Agricultural Organization (FAO) regional office in Harare, included broader diffusion of open-pollinated maize varieties (OPVs), as opposed to hybrids. Based on the findings of the study, the authors recommend that, to increase benefits to vulnerable groups, participants in such efforts should effectively disseminate information on selecting and recycling seed, supported by training and field demonstrations, and should target relatively well-endowed farmers initially. Recommendations also included promotion of OPVs by commercial seed companies and developing a simple, farmer-friendly system for naming varieties.

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Executive summary

Introduction

The British Department for International Development (DfID) implemented a protracted relief program (PRP) to help vulnerable households in Zimbabwe improve their food security and livelihoods. One of five components of the PRP was the distribution of seed of major food crops (maize, sorghum, cowpeas, pearl millet and groundnuts) to vulnerable farm households in selected districts through non-governmental organizations (NGOs) and coordinated by the Food and Agricultural Organization (FAO) regional office in Harare. Over 25,000 households in the Makoni, Hurungwe, Shurugwe, Chivi, Seke, and Gwanda districts in the Manicaland, Mashonaland West, Midlands, Masvingo, Mashonaland East, and Matebeleland South provinces, respectively, benefited from the relief seed between 2003/04 and 2006/07 crop seasons.

The proportion of maize OPVs versus hybrids distributed increased from 54% when the program started to 95% in the third year for two main reasons. Firstly, OPVs seed are relatively cheap and out-perform hybrids when cultivated under marginal conditions without complementary inputs such as fertilizer. Secondly, because the yield reduction effect of recycled OPVs is far lower than for hybrids, farmers could recycle the seeds. The objective of this study was to assess the effectiveness of the seed distribution component of the PRP. Specifically the study investigated whether or not NGOs advised beneficiaries to select, store and re-use maize OPV seed; assessed the retention of relief OPV maize seed within target farming communities; based on the findings, reported on lessons learned; and recommended ways to improve seed assistance programs. Using structured questionnaires, data were collected from 100 households in each of the six districts listed above, 70% beneficiaries and the remaining 30% non-beneficiaries. Three questionnaires were rejected during analysis on the basis of incomplete information.

Profile of a typical farm household

There are no significant differences in the typologies of households between beneficiaries and non-beneficiaries of the PRP. The average household size is 6.5 members with comparative distribution within age groups across the six districts. Of the 597 households interviewed, 213 are headed by females, 86% of whom are widowed compared to only 6% of their male counterparts. Cultivated farm size averages 1.7 ha, over 60% of which is planted to maize OPVs and hybrids. About half of the farmers recycle OPV and hybrid maize. Most farmers think OPV seeds are relatively cheaper than hybrids but agreed that the former are hardly available on the local markets. Two-thirds think that OPVs are inferior to hybrids in terms of yield, resistance to field and storage pests as well as tolerance to low soil fertility or drought.

Unlike wheelbarrows, productive assets such as pairs of bullock (or donkeys), bicycles and harrows are less popular among farmers. The proportions of farmers owning ox-ploughs is about twice that owning bullocks and donkeys put together because some farmers reportedly disposed of their draft animals for cash to meet immediate household needs or could not maintain them when economic conditions became very difficult.

Maize seed distributed to beneficiaries

Of the 417 beneficiaries interviewed, 26% received maize seed in 2003/04, 52% in 2004/05 and 76% 2005/06. The average quantity of seeds distributed varied from 5 to 16 kg per beneficiary depending on year and location. Over the three years, between 50 and 70% of the beneficiaries thought the seeds were always delivered on time for planting. The dominant OPVs distributed were ZM421, ZM423, ZM523 and ZM521, while among hybrids, SC 530, SC513, SC501, SC413, SC405, SC403, and SC401 dominated. More than 50% of the beneficiaries in the first year indicated that given cash and seed availability[1] on the market, they will be willing to purchase similar varieties suggesting that farmers like the varieties distributed. The proportion, however, declined over time with the shift from hybrids to OPVs.

Effectiveness of maize seed assistance to vulnerable households

The effectiveness of the relief seed distribution was assessed by analyzing the flow of information from NGOs to beneficiary households on maize seed types distributed, the need to select, store and re-use OPV maize seed in subsequent years, and how much OPV maize seed distributed is being retained in the selected communities. Results from the survey suggest that less than half of the first-year beneficiaries were informed of the type of seeds to be provided. The proportion (and hence number of beneficiaries) increased to a little more than 60% by the third year. Information on what an OPV is was limited to the fact that it is a maize variety that can be recycled. In general, the proportion of beneficiaries informed to select seeds increased from 55% the first year to 62% in the third. Over the three-year period, 25% received such information more than once, and 75% only once. In terms of carrying out field demonstrations to teach farmers how to select or store seed, less than 50% of them benefited in the three consecutive years.

Notwithstanding the fact that the varieties seemed to meet the preferences of most beneficiaries in terms of performance in the field and food qualities, less than 50% of them actually selected seed. Females appear more willing to select compared with males. Similarly, recycling is more common among the relatively richer households than the very poor. Results from regression analysis show that the probability that a farmer initially without any experience with recycling OPV maize seed would recycle will increase by 24% with just a year's experience provided the seed meets his/her preferences. The strategies used by different NGOs appear to have differential impacts on beneficiaries' selection behavior.

Lessons learned from maize seed relief to vulnerable households

The survey results clearly show that, over the three-year period of the PRP, less than 10% of the beneficiaries ever participated in deciding on the type of maize seeds to be distributed. The program emphasized OPV seed distribution that would allow farmers to recycle but it is for the same reason that seed companies are reluctant to produce and market such seeds. The results, however, suggest that both OPVs and hybrids are recycled.
The proportion of beneficiaries informed to select, store, and re-use OPV seed by participating NGOs increased from 55% the first year to 62% by the third, much greater that the proportion

[1] The unavailability of similar varieties on the local markets was of concern to more than 80% of beneficiaries.

taught how to select. Aggregated over the years, the flow of seed selection information was gender insensitive. Each year, fewer than half of beneficiaries informed to select actually did so, although females appear more aggressive in selecting seed. If seed selection information is complemented by teaching farmers how to select, the proportion of those selecting increases. Factors observed to be important in driving seed selection include information on the need to select, past experience with seed selection, and if the variety meets the preferences of the beneficiary. In addition, some NGOs appear more effective than others in convincing their beneficiaries to select seeds.

Concluding remarks

Based on the findings of the study, the following recommendations are made to improve seed assistance to vulnerable groups in Zimbabwe to ensure greater spillover effects.

- Experience with OPV maize seed recycling is important in influencing farmers' recycling decisions. Ways to extend similar interventions for a few more years should be explored. In this way, many more farmers would have experienced handling OPV maize seed and hence be recycling seed, ensuring greater spillover effects within the communities.
- Given that the relatively "well-endowed" farmers are more willing to recycle OPV seed, targeting them can potentially ensure large-scale spillovers.
- NGOs should endeavor to ensure that all beneficiaries be provided with seed selection information. They should follow up the information with field-level training/demonstration of seed selection practices during the crop growth period. This could help foster greater adoption of selection than simply providing information.
- Seed selection information should emphasize the need to select only OPV maize, since farmers are inclined to select any type of variety.
- Participating NGOs should share their seed selection information strategies so that less successful ones can learn from those able to ensure that large proportions of their beneficiaries select seed.
- Beneficiaries should be given the opportunity to select the varieties they want, because the probability of recycling is higher if a variety meets their preferences.
- Seed companies should promote OPVs: farmers recycle both OPVs and hybrids but, if given a choice, they will purchase fresh seed every year, thereby creating an OPV market.
- A simple varietal naming system should be developed to help farmers remember the names of the varieties they receive and to distinguish between hybrids and OPVs.

Introduction

The recent economic downturn in Zimbabwe severely impoverished many households. As a result, the majority of them could no longer afford essential commodities. Farmers found prices of farm inputs (such as fertilizer and seed) beyond their means thereby making them vulnerable to food insecurity and their livelihoods threatened. To help vulnerable households improve their food security and livelihoods, the British Department for International Development (DfID) implemented the protracted relief program (PRP) for 3 years (2003/04-2006/07). One of the five components of the PRP was the distribution of seed of major food crops (maize, sorghum, cowpeas, pearl millet and groundnuts) to vulnerable farm households in selected districts through non-governmental organizations (NGOs) coordinated by the Food and Agricultural Organization (FAO) regional office in Harare (Annex 1).

Seed of both hybrid and open pollinated varieties (OPVs) of maize, the dominant crop produced and consumed in the country[2], constituted a major part of the program. The proportion of OPVs versus hybrids increased from 54% in 2003/04 when the PRP started to 87% in 2004/05 and 95% in 2005/06 for two main reasons. Firstly, most of the vulnerable farm households grow maize in marginal areas under sub-optimal conditions and lack money to purchase complementary inputs recommended for optimal performance of hybrids. Moreover, hybrid seed costs over 20% more than that of OPVs, implying a reduced assistance per household and thereby the opportunity to reach more households without increasing funding. Secondly, for lack of cash to purchase seed, most farmers "recycle" seed—that is, they save grain from the harvest and sow it as seed the following year. In that regard, OPV maize offers the best choice: the yield reduction from recycling freshly purchased seed the following season is only 5%, compared with 30% for hybrids[3]. What the PRP hoped to achieve was that, at the end of the program, farmers would sustainably source their seed, with spill-over effects in the communities. This was ultimately going to depend on several factors, including committed farmers and NGOs who would inform them how to select, store, and re-use seed of OPVs rather than hybrids, which were once the predominant type of maize grown in Zimbabwe.

To date, over 25,000 beneficiaries in six districts have received OPV maize seed, but it was not know if they had indeed begun to recycle it. The objective of this study was to assess the effectiveness of the PRP in this regard, specifically:

- Investigate whether or not NGOs advised beneficiaries to select, store and re-use maize OPV seed distributed to them.
- Assess the retention of relief OPV maize seed within target farming communities.
- Report on lessons learned and recommend ways to improve seed assistance programs.

While providing a deeper analysis of the overall impact of such assistance programs, the study was expected to generate insights that would improve the effectiveness of the distribution of relief seed among vulnerable farm households in Zimbabwe.

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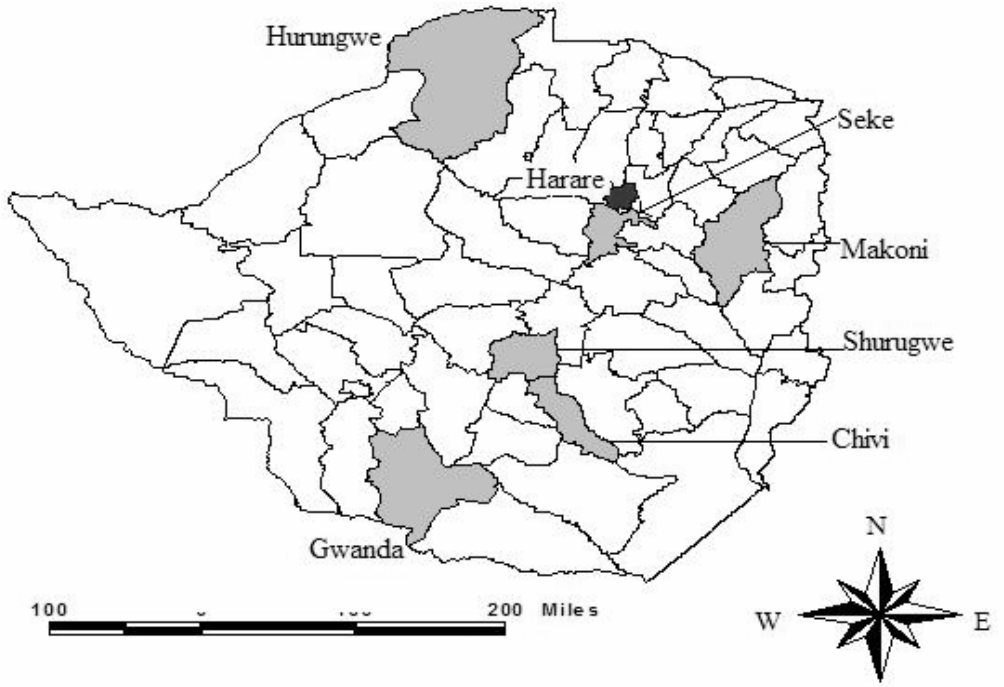
2 Byerlee, D. and C. Eicher, eds. 1997. Africa's Emerging Maize Revolution. Lynne Rienner, Boulder, Co. Food Composition Tables, 1987. Technical Center for Agriculture and Rural Cooperation, Wageningen Agricultural University, Netherlands.

3 Pixley, K., Banziger, M., 2002. Open pollinated maize varieties: A backward step or valuable option for farmers. International Maize and Wheat Improvement Center (CIMMYT), Harare , Zimbabwe.

Sampling and data collection

This study was a collaborative effort between the FAO regional office in Harare, Zimbabwe and the International Maize and Wheat Improvement Center (CIMMYT) in Harare, Zimbabwe. FAO provided financial and some technical support to CIMMYT to implement the study. The selection of survey locations was influenced by the PRP related activities coordinated by the former. In the past three years, the FAO coordinated the distribution of relief seed to selected beneficiaries in the Manicaland, Mashonaland West, Midlands, Masvingo, Mashonaland East, and Matebeleland South provinces of Zimbabwe. The field work therefore concentrated on the Makoni, Hurungwe, Shurugwe, Chivi, Seke, and Gwanda districts in the above-named provinces, respectively (Map 1). Farm households were sampled from all the wards that participated in the relief seed distribution over the last three years. In each district, 70% of the sampled households were beneficiaries and the remaining 30% non-beneficiaries. From the FAO records (Annex 1), 16 NGOs distributed 420 tons of maize OPV seed to 25,232 farm households in 11 wards in the Makoni (5,020), Hurungwe (6,642), Shurugwe (1,881), Chivi (3,538), Seke (2,544) and Gwanda (5,607) districts during the 2004/05 and 2005/06 cropping seasons.



Map 1: Map of Zimbabwe showing survey districts

In each district, the councilor or local authority representative provided the list of households in the selected areas, which was used as the sampling frame. Seed relief beneficiary households were identified by participating NGOs. For a representative sample of beneficiary households, the number of farm households selected from each ward and per participating NGO was proportional to the number of beneficiaries in the ward assisted by the NGO (See Annex 1 column 6).

Characterization of farm households

Demographic characteristics of households

The descriptive statistics of selected farm households presented in Table 1 suggest that the average household size is 6.5, with comparative distribution of members within age groups across the six districts. Over 50% of the households have members ranging from 4 to 8 (Table 2). Within that family size range, female headed households appear to have more members than their male counterparts. The reverse is true for household sizes larger than 8 members.

Table 1: Descriptive statistics of survey districts in Zimbabwe

	District					
Variable	Makoni (n=100)	Hurungwe (n=100)	Shurugwe (n=100)	Chivi (n=99)	Seke (n=99)	Gwanda (n=99)
Household size (number)						
Total members[1]	6.2 (2.9)	6.5 (2.6)	5.8 (2.9)	6.9 (3.1)	6.1 (2.4)	7.8 (3.2)
Above 50 years	0.9 (0.9)	1.0 (0.8)	0.8 (0.8)	0.9 (0.9)	0.8 (0.8)	0.9 (0.8)
Males (16-50 years)	1.5 (1.1)	1.5 (1.1)	1.4 (1.2)	1.6 (1.3)	1.4 (1.1)	1.6 (1.4)
Female (16-50 years)	1.4 (1.3)	1.6 (1.2)	1.5 (1.5)	1.6 (1.4)	1.6 (1.1)	1.9 (1.3)
Males (9-15 years)	0.6 (0.8)	0.6 (0.8)	0.6 (0.8)	0.8 (1.0)	0.7 (0.9)	1.0 (1.1)
Females (9-15 years)	0.6 (0.9)	0.6 (0.8)	0.6 (0.7)	0.7 (0.9)	0.6 (0.8)	0.9 (1.2)
Children under 8 years	1.2 (1.2)	1.2 (1.2)	0.9 (1.1)	1.2 (1.2)	1.0 (1.1)	1.6 (1.5)
Age of HH head (years)[2]	50 (15)	54 (18)	55 (17)	51 (16)	50(14)	53(13)
Female HH heads (%)	30	45	31	37	32	38
Marital status of HH head (%)						
Single	0	3	1	0	0	2
Married	74	51	57	61	66	62
Divorced	3	1	6	2	2	2
Widowed	23	45	36	37	32	34
Widowed by gender (%)						
Females	70	91	87	92	91	84
Males	3	2	13	5	4	3
Educational level of HH head (%)						
Illiterate	3	24	8	8	0	3
Primary	56	49	42	56	54	47
Secondary	41	26	46	36	46	48
Post secondary	0	1	4	0	0	1
Association membership (%) 72		26	66	71	75	34

Note: [1]In parentheses are the standard deviations; [2]HH = household

Table 2: Distribution of family size by province and gender

District	Gender of household head	Family size range (number of members)					
		<2.1	2.1 - 4	4.1 - 6	6.1 - 8	8.1 - 10	>10
Makoni	Female (n=30)	3	23	43	13	3	13
	Male (n=70)	4	29	29	21	14	3
Hurungwe	Female (n=45)	4	20	47	20	4	4
	Male (n=55)	2	16	25	33	15	9
Shurugwe	Female (n=31)	10	16	42	13	13	6
	Male (n=69)	14	25	23	25	7	6
Chivi	Female (n=37)	8	24	19	27	8	14
	Male (n=62)	0	21	31	18	19	11
Seke	Female (n=32)	6	28	41	16	3	6
	Male (n=67)	1	24	34	19	16	4
Gwanda	Female (n=38)	0	8	45	24	8	16
	Male (n=61)	2	5	26	30	18	20

Each household is headed by the most elderly person aged about 52 years, 36% of whom are females. Of the 213 female household heads interviewed, 86% of them are widowed compared to 6% of their male counterparts. Whereas in Seke all the household heads have some formal education up to standard six, 24% of those in Hurungwe are illiterate (Table 1). The highest educational level attained by about 4% of household heads in Shurugwe is post secondary. About half of all the farmers interviewed belong to at least a farmers' association.

Household access to productive assets

Table 3 indicates that farm households are endowed with varying levels of different assets. Farm sizes range from 1.4 ha in Seke to about 3 ha in Gwanda. The majority of households in all but Seke district own between 1 and 3 hectares with few female headed households owning above 3 ha (Table 4). In Seke, the high population pressure on farm land limits the maximum farm size to only 2 ha for more than 80% of them.

Maize is the dominant food crop in all districts (Annex 2). It occupies more than half of the cultivated land in all districts except Chivi (Table 3 and Figure 1). Farmers also keep livestock, predominantly fowls, as a risk management strategy (Table 3). In times of crop failure, which sometimes leads to loss of seed stock, livestock are sold to purchase grain for home consumption and seed for planting.

Productive assets such as pairs of bullock (or donkeys as draft animals), bicycles and harrows are less popular among farmers than wheelbarrows, which appear common across the districts. Whereas more than half of the farmers in Shurugwe own scotch carts, the opposite is true for those in the other districts. The proportion of farmers owning ox-ploughs is about twice that owning bullocks and donkeys put together, apparently because some farmers reportedly disposed of their draft animals (but not the ploughs) for cash to meet immediate household needs or because they could not maintain them when economic conditions became very difficult for them.

Table 3: Access to productive assets

	Makoni (n=100)	Hurungwe (n=100)	Shurugwe (n=100)	Chivi (n=99)	Seke (n=99)	Gwanda (n=99)
Farm land ownership						
Total farm (ha)	2.0 (1.1)	3.5 (2.5)	2.8 (2.6)	3.4 (2.6)	1.4 (0.8)	2.9 (1.5)
Cultivated farm (ha)	1.4 (0.8)	2.1 (1.6)	1.5 (1.1)	2.4 (1.8)	0.9 (0.4)	1.9 (1.1)
Maize area (%)	60	76	64	44	66	69
Livestock numbers						
Cattle	2.0 (3.5)	1.1 (2.1)	3.3 (5.5)	2.6 (3.3)	1.0 (2.1)	2.4 (3.4)
Small ruminants	1.9 (2.6)	2.1 (3.0)	1.3 (1.7)	2.7 (4.1)	0.7 (1.0)	4.4 (3.7)
Fowls	8.2 (7.5)	6.9 (6.8)	9.2 10.1)	8.5 (6.8)	5.5 (6.9)	8.1 (5.9)
Ownership of at least one …						
Pair bullock	39	27	43	43	18	42
Donkey	0	4	7	43	1	57
Scotch cart	34	27	55	36	20	48
Bicycle	34	20	21	21	14	30
Radio set	33	37	31	22	27	39
Wheel barrow	60	38	69	43	35	68
Ox-plough	62	69	61	69	37	85
Harrow	11	14	34	20	12	22

Note: [1]In parentheses are standard deviations

Table 4: Distribution of farm size by district and gender

District	Gender of HH head	Farm size range (ha)					
		< 1.01	1.01 - 2.0	2.01 - 3.0	3.01 - 4.0	4.01 - 5.0	>5.0
Makoni	Female (n=30)	20	40	27	3	7	3
	Male (n=70)	33	37	23	4	1	1
Hurungwe	Female (n=45)	9	36	29	13	9	4
	Male (n=55)	2	27	29	15	5	22
Shurugwe	Female (n=31)	6	55	26	3	3	6
	Male (n=69)	20	32	26	10	3	9
Chivi	Female (n=37)	14	30	24	14	5	14
	Male (n=62)	8	27	31	6	10	18
Seke	Female (n=32)	66	28	3	3	0	0
	Male (n=67)	46	43	7	1	1	0
Gwanda	Female (n=38)	13	24	39	13	5	5
	Male (n=61)	7	26	39	16	5	7

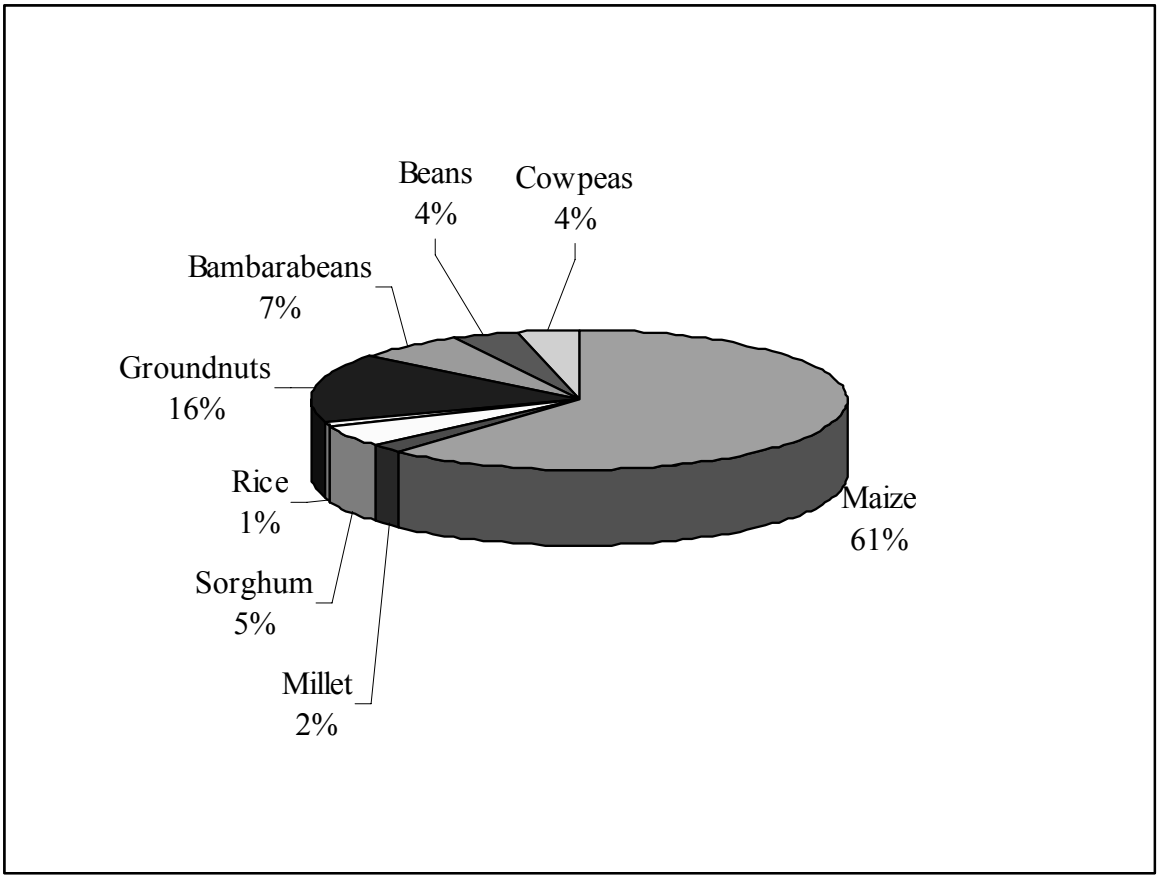


Figure 1: Distribution of cropped land to crops at provincial level in Zimbabwe

Wealth indices

Households are endowed with varying levels of different assets, as noted earlier, each of which could potentially contribute to their wealth statuses. In Zimbabwe as in most developing countries, smallholder farmers are usually cash-strapped and have limited access to credit for varied reasons and therefore have to rely on their productive assets to chart a route out of poverty. To be able to assess how the wealth levels of households influenced farmers' access to technology and in particular information on relief seed selection and re-use, it was important to generate composite wealth indices using the farmers' assets. Such an approach will also give an indication of whether the distribution of seed actually targeted the very poor in the communities. In other words, the process could indirectly serve to validate the targeting processes adopted by the NGOs.

From the whole sample, an estimated 55% of the households are poorly endowed with a mean index of -0.79. The well-endowed, on the other hand, have a mean index of 0.92. Figure 3 shows that at the district level, the proportion of households within the well-endowed category in Shurungwe appear larger than in all other districts because of the smaller probability of getting a household below the sample mean of zero (42%) compared with all others, especially Seke (over 70%).

Using the mean index values for the poorly-endowed and well-endowed households as lower and upper cut-off points, respectively, Figure 4 shows the probability distribution of households in three categories: below the lower cut-off point of -0.72, between the lower and upper cut-off points of 0.92 and above the upper cut-off point. Clearly, the Seke district has over 50% of its households below the poorly-endowed mean compared with all other districts. This means that if a development program aims to improve the livelihoods of the very vulnerable groups in the society, Seke district should take priority over the others.

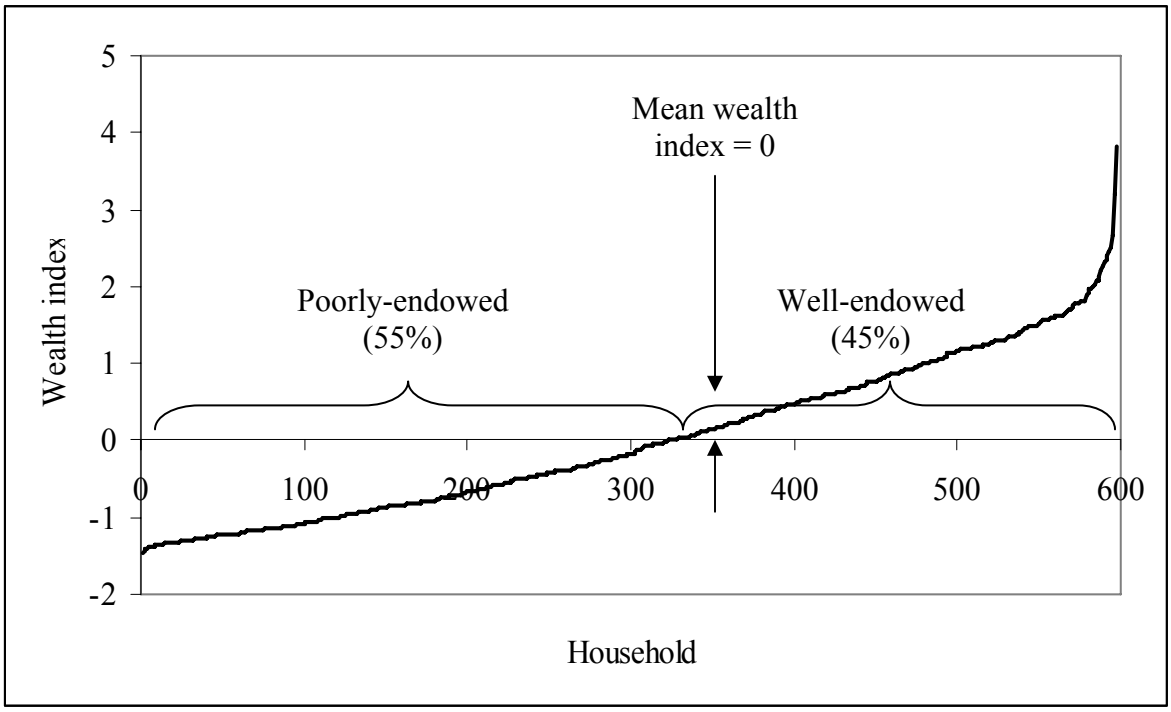


Figure 2: Distribution of households according to wealth groups

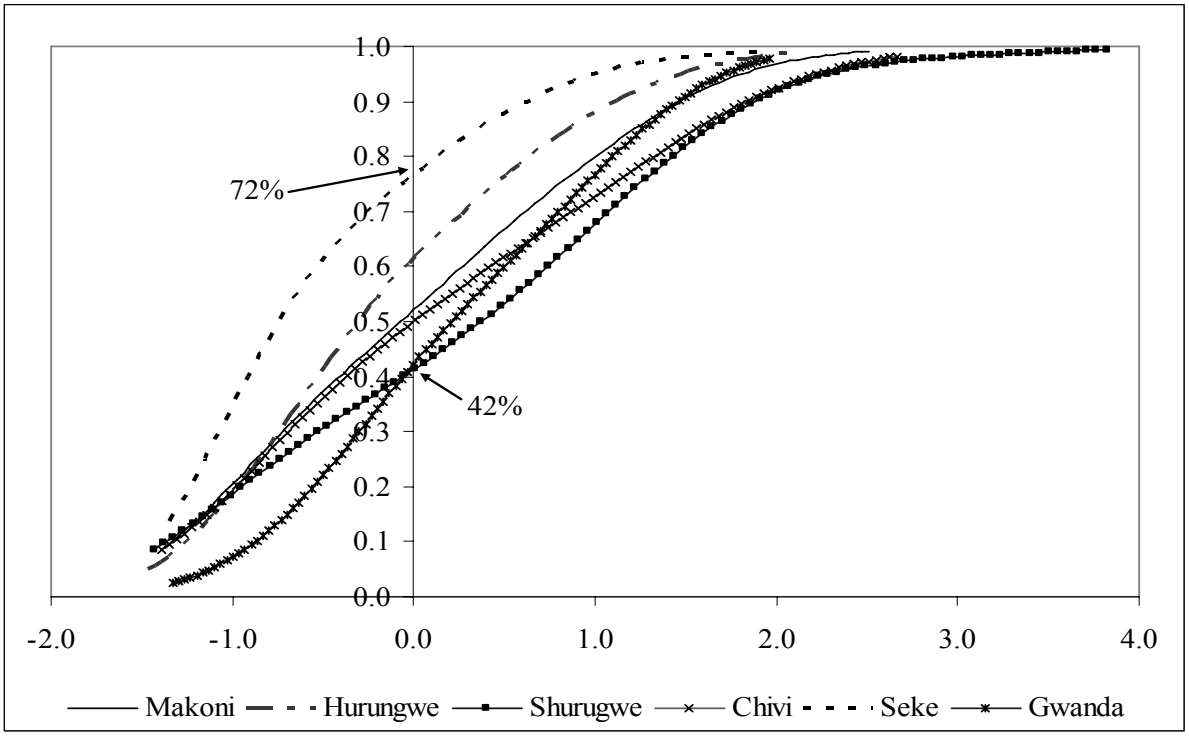
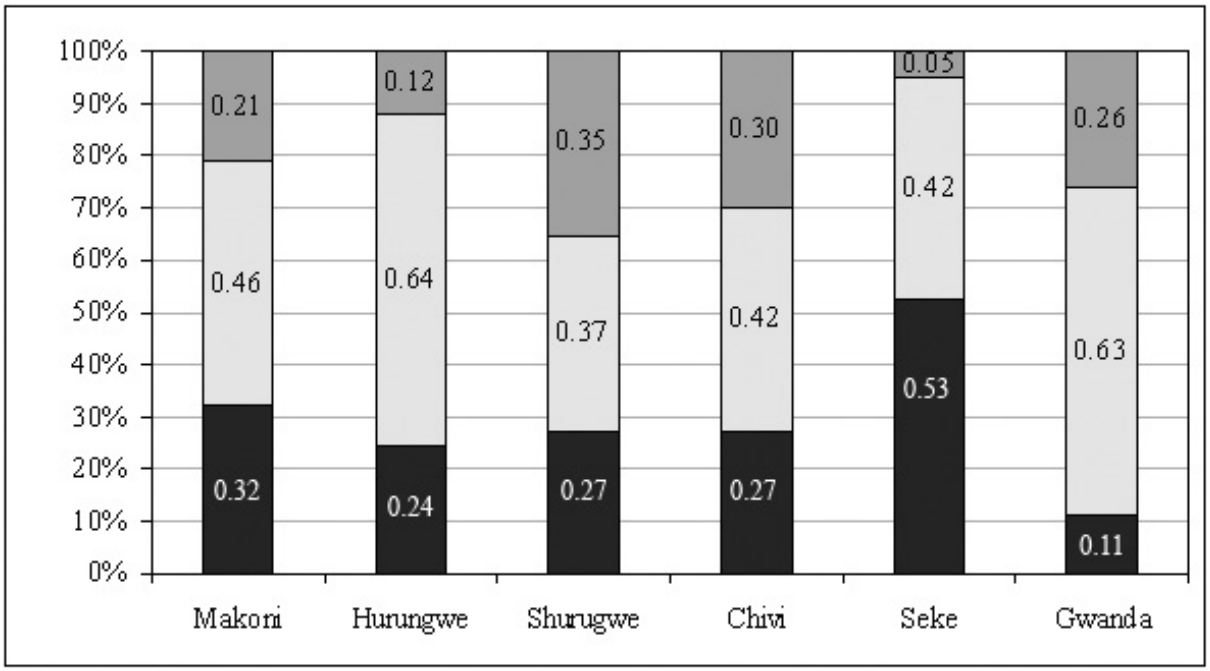


Figure 3: Wealth index ranking of households in selected districts in Zimbabwe



	Makoni	Hurungwe	Shurugwe	Chivi	Seke	Gwanda
Prob (Below mean of poorly endowed)	0.32	0.24	0.27	0.27	0.52	0.10
Prob (Between poorly- and well- endowed)	0.46	0.65	0.38	0.43	0.43	0.64
Prob(Above mean of well-endowed)	0.21	0.11	0.34	0.29	0.05	0.26

Figure 4: Probability distribution of households by wealth categories

Distribution of productive assets by wealth category

After estimating the wealth indices it was found expedient to examine the distribution of selected assets between the poorly- and well-endowed households. There did not seem to be any difference in the distribution of beneficiaries and non-beneficiaries of relief seed within wealth groups. A striking difference in the distribution of gender of household head within the wealth categories was, however, observed (Table 5). About 64% of the female-headed households fall under the poorly-endowed households compared with only 48% of the male-headed households. The proportion of farmers within the well-endowed group owning physical assets such as pair of bullocks, ploughs, harrows, scotch carts, etc., far exceeds that within the poorly-endowed group (Figure 5). In the case of land use, 63% of the cultivated land is owned by the 45% of well-endowed households (Figure 6). The numbers of cattle, goats, sheep and fowls owned by the well-endowed are equally significantly larger than those for the poorly-endowed.

Table 5: Selected households wealth indicators by wealth category in Zimbabwe

	Wealth category	
	Poorly-endowed (322)	Well-endowed (275)
Economic index	-0.79	0.92
Female headed households (%)	64.3	35.7
Male headed household (%)	48.2	51.8
Access to relief seed program (%)		
Beneficiaries	54.4	45.6
Non-beneficiaries	52.4	47.6

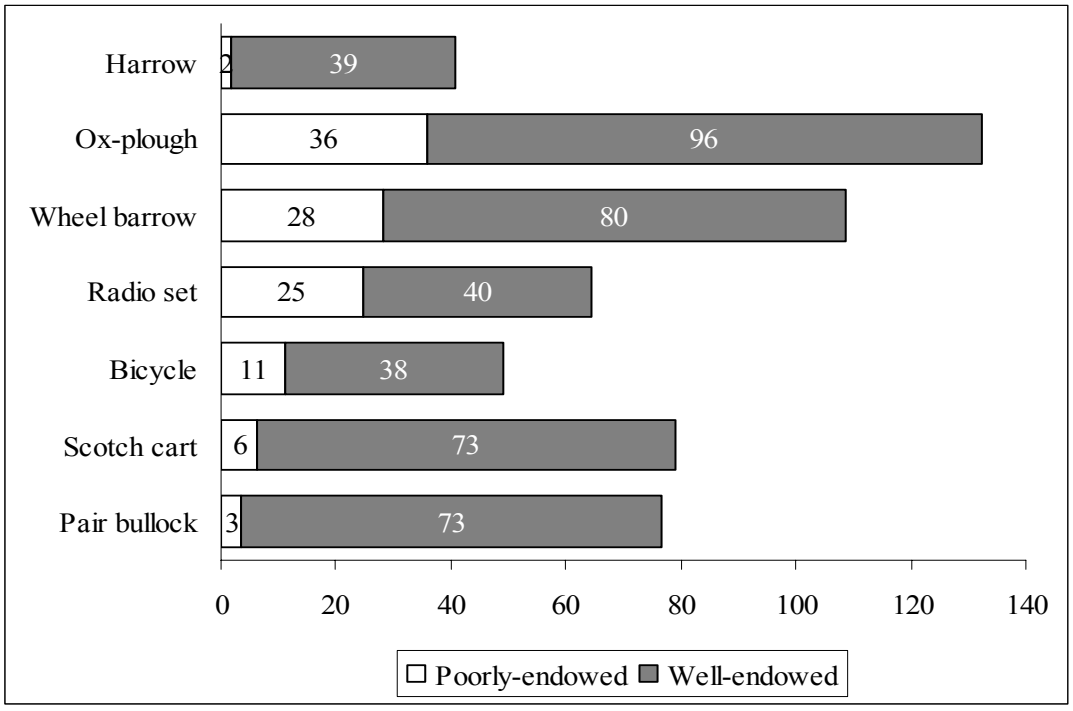


Figure 5: Proportional distribution of assets by wealth group

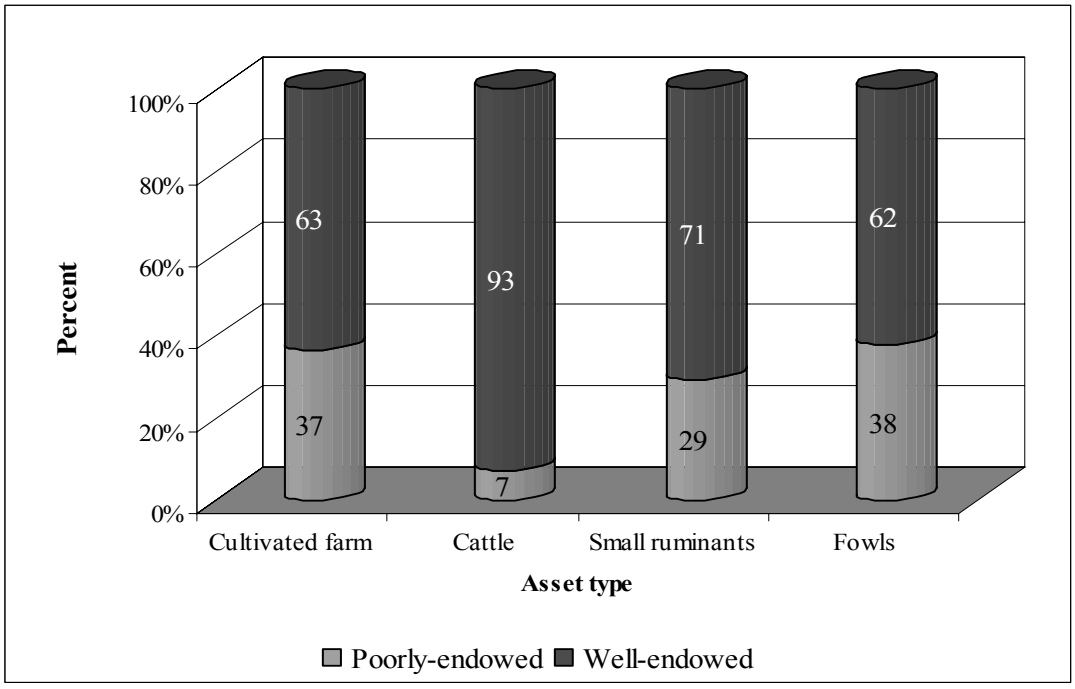


Figure 6: Proportional distribution of productive assets by wealth group

Maize varietal knowledge

Farmers grow both maize hybrids and OPVs. Identifying individual varietal names is sometimes a challenge to them. For instances, it is common to hear farmers mention the names of some varieties by the name of the seed company that has the proprietary rights to the variety (e.g., PANNAR), or the symbolic names given by seed companies to describe the maturity group (e.g., *imbizi*, or *zebra*). Popular maize varieties among farmers include the SeedCo series, the ZMs and Kalahari early pearl (KEP) (Table 6). Clearly, the dominant seed procured from the markets was the SC series while the ZM series and KEP were mostly distributed by NGOs.

Data in Table 6 (column 6) and Table 7 suggest that some farmers recycle both maize hybrids and OPVs. Asked if it was a common practice to recycle OPVs and hybrids, the majority of them answered "yes" but about half of them actually recycle both. Most farmers think OPV seeds are relatively cheaper than hybrids but agreed that they were hardly available on the local markets. Seed venders are less willing to retail OPV seeds than hybrid seeds in the outlying areas because, apart from the fact that farmers in these areas have low purchasing power, it is believed that they would after purchasing once they would continue to recycle and not procure any fresh seed. Because farmers in Seke had little experience with OPVs, none of them could compare the seed costs but over 90% of them agree that hybrids are more readily available. One reason for availability of hybrid seed in Seke is its proximity to Harare with a well-developed seed infrastructure compared to the other districts. The results, however, show a split in the proportion of beneficiaries who think that the yields of recycled OPVs and hybrids are similar.

Table 6: Sources of maize seed planted by farmers in Zimbabwe

	NGO support	Govern-ment support	Seed fairs	Neigh-bor	Market	Recycled	Other sources	Total
ZM 521	35.7	-	-	0.2	0.5	0.7	0.5	37.6
ZM 421/623	2.4	-	-	-	-	-	-	2.4
MATUBA	3.4	-		0.4	0.1	0.7	0.1	4.6
Kalahari early pearl	9.7	-	-	-	-	0.8	0.7	11.1
Hickory king	-	-	-	0.2	0.2	1.8	0.5	2.7
Other OPVs	-	-	0.1	-	-	0.3	0.0	0.4
SC 513	1.0	1.3	0.6	-	11.1	1.7	1.3	16.9
SC 401	0.4	0.2	0.1	0.1	2.5	0.4	0.4	4.1
SC 501	0.4	-	0.2	-	1.2	0.1	0.1	2.0
SC 517	-	0.1	0.1	-	0.8	-	0.1	1.0
SC 403	0.4	0.1	-	0.1	0.4	0.1	0.1	1.1
SC 407	0.2	0.1	-	-	0.4	0.1	0.1	0.9
Other SC series	-	-	-	-	0.8	0.1	0.1	1.1
REDCORK	-	-	-	-	-	0.1	-	0.1
R 215/201	-	-	-	-	0.2	-	-	0.2
PIONEER	1.2	0.3	-	-	1.1	-	0.2	2.8
PANNAR	3.6	1.4	-	-	4.7	0.1	0.5	10.4
Other hybrids	-	0.1	-	-	0.4	0.2	-	0.6
TOTAL	58.4	3.4	1.0	1.0	24.5	7.1	4.5	99.9

Comparing the physiological characteristics of OPVs and hybrids, fewer farmers in Makoni compared with those in all other districts consider OPVs superior to hybrids. In particular, two-thirds of them think OPVs are inferior to hybrids in terms of their resistance to field and storage pests and tolerance to low soil fertility or drought (Table 7). More than three-quarters think OPVs yield less and that the cobs are smaller than those of hybrids. In contrast, over 50% of the farmers in the other districts think otherwise for most of the characteristics mentioned above, except for tolerance to soil fertility, where farmers in Seke think OPVs are superior to hybrids. In terms of maturity, over 70% of the farmers in all the districts are convinced that the available OPVs mature earlier than hybrids, compared to about 40% of those in Makoni district.

Similarly, most farmers in Makoni district do not believe that sadza or roasted green maize from OPVs are more palatable than those from hybrids, contrasting sharply with the perceptions of farmers in all other districts. The reason for the strong dichotomy of perceptions about the comparative characteristics of OPVs and hybrids between farmers in Makoni district and all others interviewed is not clear.

Table 7: Comparison of OPV and hybrids by farmers in terms of selected characteristics

	Makoni (n=100)	Hurungwe (n=100)	Shurugwe (n=100)	Chivi (n=99)	Seke (n=99)	Gwanda (n=99)
Knowledge of recycling maize seed types (%)						
Knowledge of differences between OPV and hybrids	100	99	99	98	99	97
OPV recycling a common practice	74.0	87.8	84.5	82.7	27.8	77.0
Hybrid recycling a common practice	86.7	82.3	81.8	80.2	81.8	76.0
Farmers who actually recycle OPV	37.1	69.7	60.6	54.8	20.8	57.5
Farmers who actually recycle hybrid	55.0	70.8	50.5	65.3	48.5	44.3
Recycled OPV yields higher than recycled hybrid	18.1	77.3	65.6	47.4	75.0	29.4
Seed cost and availability (%)						
OPV seed less costly than hybrid seed	26.4	90.9	88.0	94.1	0.0	66.7
OPV more readily available than hybrid seed	7.1	7.4	12.7	4.8	6.4	12.1
Physiological and physical characteristics (%)						
OPV early maturing than hybrid	43.4	97.1	76.3	68.7	69.2	70.4
OPV more resistant to field pests than hybrid	27.6	66.7	47.8	59.7	56.8	67.4
OPV more resistant to storage pests than hybrid	32.3	76.1	67.5	64.4	62.9	80.4
OPV more tolerant to low soil fertility than hybrid	28.6	42.4	43.4	65.0	20.4	45.9
OPV more tolerant to low soil moisture than hybrid	30.3	64.3	63.3	60.0	55.6	50.0
OPV more higher yielding than hybrid	15.3	15.2	33.3	46.3	22.7	39.7
OPV has larger cobsize than hybrid	15.0	17.4	37.1	26.5	23.5	42.0
Consumption attributes (%)						
OPV sadza more palatable than sadza from hybrid	35.0	73.5	57.6	54.8	67.2	53.0
Roasted OPV more palatable than roasted hybrid	47.0	85.7	78.7	68.8	79.1	69.6

Maize seed relief program activities

Maize seed distributed to beneficiaries

Maize seeds were distributed to beneficiary households in the Makoni, Hurungwe, Shurugwe, Chivi, Seke, and Gwanda districts. Of the 597 respondents, 417 benefited from the PRP seed relief program. An estimated 26% (or 108) of the 417 beneficiaries received maize seed in 2003/04, 52% (or 216) in 2004/05 and 76% (or 316) in the 2005/06 (Table 8). Across the 3 seasons, 54% of them received seed more than once.

Table 8: Information flow between NGOs and farmers

	Makoni	Hurun-gwe	Shuru-gwe	Chivi	Seke	Gwanda	Whole sample
	---------- 2003/04 ----------						
Number of relief seed beneficiaries	31	14	17	26	5	25	118
Beneficiaries informed of type of seed to be given (%)	32	57	47	46	-	48	46
Beneficiaries who thought the seed was supplied on time (%)	48	36	71	58	-	84	59
At least one extension visit by participating NGO (%)	43	0.0	35	37		24	28
Beneficiaries who received OPV maize seed (%)	68	50	29	46	-	84	56
	---------- 2004/05 ----------						
Number of relief seed beneficiaries	50	45	42	49	8	39	233
Beneficiaries informed of type of seed to be given (%)	40	69	50	47	50	62	53
Beneficiaries who thought the seed was supplied on time (%)	32	33	45	47	63	74	49
At least one extension visit by participating NGO (%)	44	18	36	41	38	21	33
Beneficiaries who received OPV maize seed (%)	74	98	60	49	75	97	75
	---------- 2005/06 ----------						
Number of relief seed beneficiaries	67	38	53	69	67	47	341
Beneficiaries informed of type of seed to be given (%)	39	74	57	57	73	70	62
Beneficiaries who thought the seed was supplied on time (%)	31	37	51	58	75	83	56
At least one extension visit by participating NGO (%)	42	5	25	61	52	23	35
Beneficiaries who received OPV maize seed (%)	78	79	79	90	99	100	88

Beneficiaries in the Seke district appear least favored in terms of seed distribution in the first two years of the program, notwithstanding the fact that a larger proportion of households there than in the other districts are poorly-endowed.

In terms of type of seed distributed, Table 9 suggests that the ZM series (mainly ZM 421, 423, 523 and 521) were the most popular among the OPVs distributed, while among the hybrids, the SC series (mainly SC 530, 513, 501, 413, 405, 403, and 401) dominated. Figure 9 shows that in the three years of the program, relatively more poorly-endowed than well-endowed households benefited, suggesting that the distribution was pro-poor at the district levels.

The quantities of seed received by household varied from 5 kg in Seke in the 2005/06 crop season to 16 kg in Hurungwe in the 2003/04 crop season when the program started (Table 10). Whereas over 70% of the farmers in Shurugwe and Gwanda thought that the seed was delivered on time for planting in 2003/04 crop season, less than half of those in all other districts except Seke (where the representative sample contained only five beneficiaries and was not included in that analysis) agreed. The proportion of farmers, especially in Makoni, Shururgwe and Gwanda districts, agreeing that seeds were distributed on time decreased over the years.

Table 9: Maize varieties distributed under the PRP program over the last three years (%)

	Cropping year			
	2003/04 (n=118)	2004/05 (n=233)	2005/06 (n=341)	Average
ZM series[1]	29.7	42.9	66.3	46.3
Kalahari early pearl	17.8	15.0	16.4	16.4
SC series[2]	22.0	9.9	3.8	11.9
Pannar	17.0	10.3	6.5	11.2
Matuba	8.5	16.7	5.0	10.1
Pioneer	1.7	3.4	1.2	2.1
Other hybrids[3]	2.5	1.7	0.9	1.7
Hickory king	0.9	0.0	0.0	0.3
Total	100.0	100.0	100.0	100.0

Note: [1]ZM series include: ZM 421, ZM 423, ZM 523 and ZM 521;
[2]SC series include: SC530, SC 513, SC 501, SC 413, SC 405, SC 403, and SC 401;
[3]Other hybrids include: R 215, R 201 and Imbizi

Table 10: Average quantity of seed in (kg) received by beneficiary farmers

District	2003/04	2004/05	2005/06
Makoni	14.2 (6.2)	14.5 (5.4)	11.9 (6.5)
Hurungwe	16.4 (12.2)	12.1 (3.1)	12.1 (4.3)
Shurugwe	15.3 (11.1)	10.7 (7.1)	13.0 (9.2)
Chivi	8.8 (2.1)	10.7 (5.3)	10.4 (9.9)
Seke	13.0 (6.7)	11.1 (6.0)	5.4 (2.3)
Gwanda	12.0 (7.8)	10.8 (7.7)	10.7 (7.3)

Note: In parentheses are standard deviations

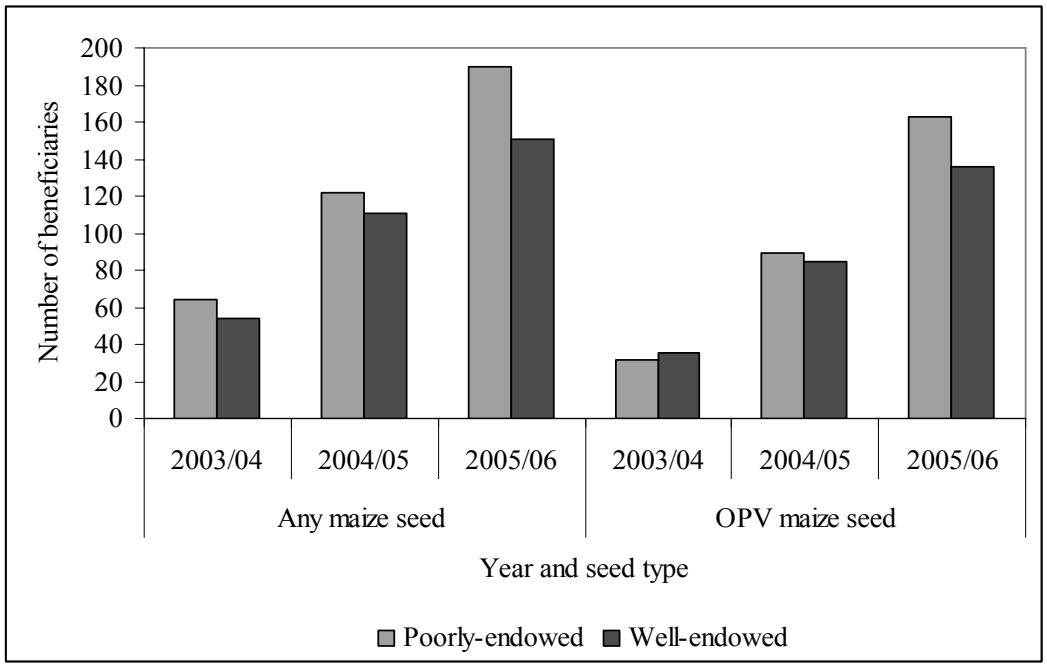


Figure 7: Distribution of relief seed type by wealth group

Effectiveness of maize seed assistance to vulnerable households

As noted earlier, the decision to supply farmers with OPVs was to give them the possibility to recycle without severe loss in genetic vigor of the seed. Under the PRP program, NGOs were expected to inform farmers of the types of seed being distributed and the need to select, store and re-use the seed the following and subsequent seasons. Community level spillovers are expected if farmers share the selected seeds with their neighbors. To assess the effectiveness of the relief program, the following operational definitions were adopted:

1) The flow of information from NGOs to beneficiary households on the types of maize seed distributed and the need to select the OPV maize seed, and
2) The proportion of farmers who actually selected OPV maize seed and shared with their neighbors for re-use in subsequent years.

Less than half of the beneficiaries in the first year of the program were informed of the type of seeds to be provided but the proportion (and hence number of beneficiaries) increased to more than 60% over time (Figure 10). Information on OPVs was limited to the fact that they can be recycled. Compared with farmers who were informed of the type of seeds to be distributed, fewer farmers were paid extension visits by the participating NGO during the crop growing season. In terms of farmers' preferences for the seed distributed, far fewer OPV than hybrid maize variety recipients liked the varieties possibly due to the fact that few farmers participated in the choice of variety to be distributed (Figure 11).

An estimated 408 of the 417 sampled beneficiaries ever received OPV maize seed in one of the three years of the program, 65% receiving more than once. In the first year, 118 (or 29%) received, in the second 233 (or 57%) and in the third, 341 (84%).

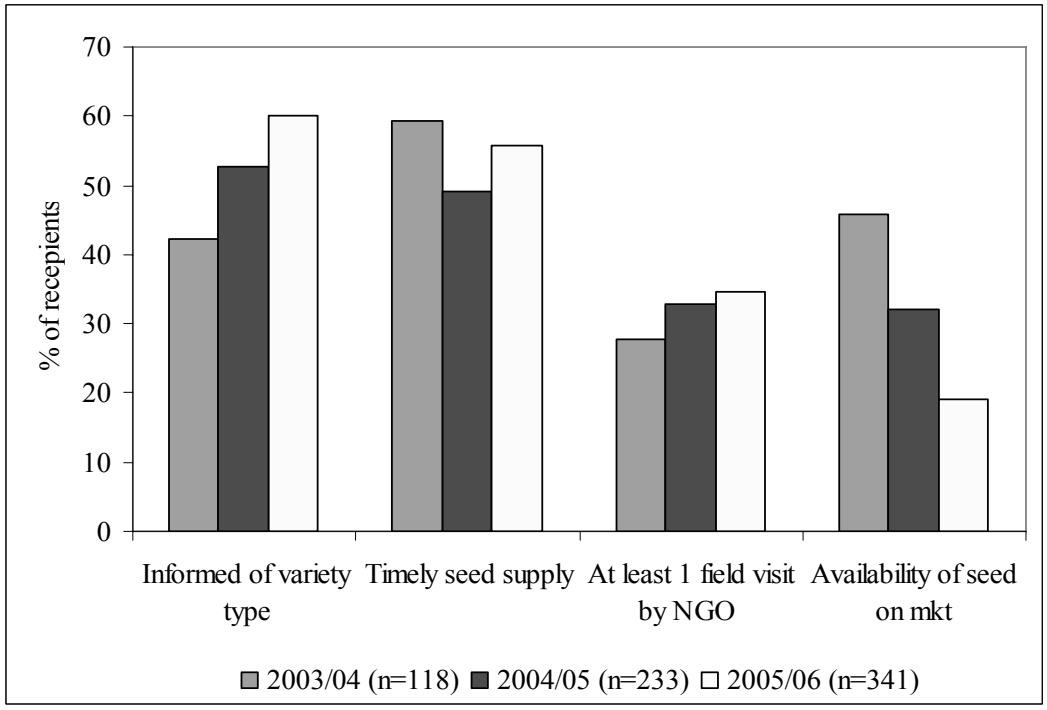


Figure 8: Access to and use of information by seed relief beneficiaries

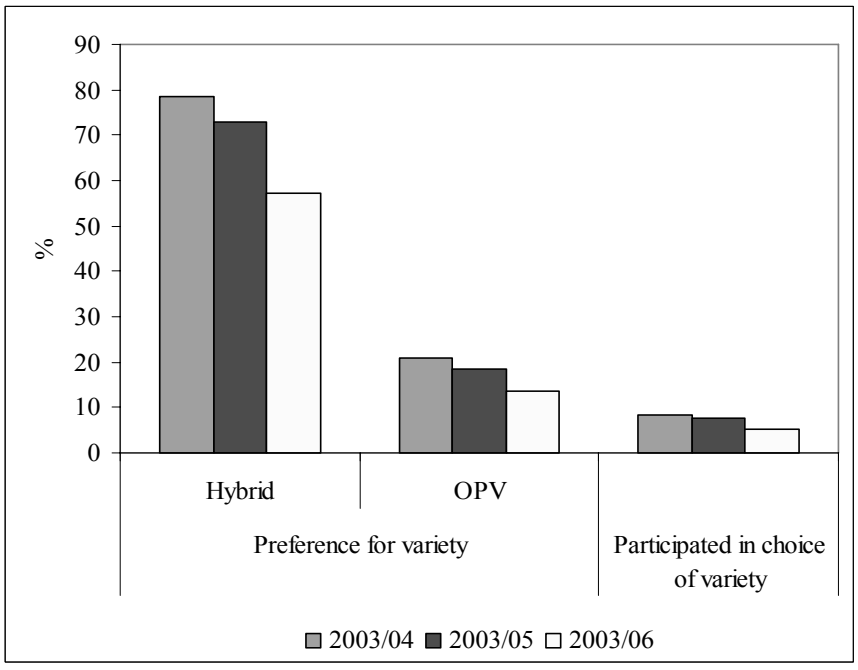


Figure 9: Information on seed type and beneficiaries' preferences for the seed

Whereas all the OPV beneficiaries in Shurugwe and over 50% of those in Makoni, Hurungwe and Chivi districts were informed about selecting seed for replanting, less than half of those in Gwanda benefited from such education (Table 11). As indicated in Table 11 and Figure 12, the proportion of OPV maize seed beneficiaries informed about selecting seed increased from 55% of the 118 (or 65 beneficiaries) in the first year to 62% of the 341 (or 211 beneficiaries) in the third. In terms of provision of seed selection information, Figure 12 shows that 25% received such information more than once, and 75% only once. In terms of teaching farmers how to select or store seed, less than 50% of them benefited in the three consecutive years (Figure 13 and Table 11).

To have an idea about household preferences for the distributed OPVs, beneficiaries were asked if they would have bought similar varieties from the market using their own money. More than half of them answered "yes," suggesting that the varieties distributed met their preferences. However, the proportion liking the varieties decreased over time, possibly because farmers were not consulted on the types of seed they needed. The unavailability of the varieties on the local markets was also of concern to more than 80% of beneficiaries (Table 11).

Nearly all beneficiaries were happy with the taste of the "sadza" made from the distributed seeds. Notwithstanding the fact that the varieties seemed to meet the preferences of most beneficiaries in terms of performance in the field and food qualities, less than 50% of them actually selected seed. In fact, a far smaller proportion of those informed about selecting the seed actually did. In terms of actual number of farmers selecting seed, 24 did in the first year, 50 in the second and 126 in the third. Whether or not information on seed selection coupled with teaching farmers how to select had a greater impact on seed selection was assessed. Figure 14 shows that the probability of getting a farmer to select seed is much higher if the farmer is informed and taught how to select. This means that greater benefits would be achieved by complementing the information with field level teaching on best practices in seed selection.

Although fewer well-endowed households were given OPV maize seed, they were favored in the dissemination of seed selection information (Figure 15), possibly explaining why more of them selected seeds than the poorly-endowed. Gender bias in terms of the information flow was somewhat mixed. The proportion of males that got seed selection information in the first year of the program was greater than that for females, and remained relatively constant over time, while that for females increased linearly and surpassed males in the third year (Figure 16). In terms of seed selection per se, the same Figure shows that females appear more willing than males.

Table 12 suggests that nearly all farmers who select seeds re-plant. But sharing the selected seeds with neighbors seems unpopular among them. In the second year of the program, beneficiaries in Shurugwe were more willing to share seeds with their peers, contrasting the actions of their colleagues in Gwanda.

Table 11: OPV maize seed beneficiaries' attitudes toward seed selection

	Makoni	Hurungwe	Shurugwe	Chivi	Seke	Gwanda	Whole sample
	---------- 2003/04 ----------						
Number of OPV maize seed beneficiaries	21	7	5	12	-	21	66
Beneficiaries advised to select seed (%)	62	57	100	50	-	43	55
Beneficiaries taught how to store (%)	57	57	80	42	-	29	46
Beneficiaries taught how to select (%)	29	57	80	50	-	29	39
Beneficiaries indicating seed readily available on sale (%)	29	14	40	17	-	14	21
Beneficiaries who would have bought same seed (%)	76	86	100	83	-	76	81
Beneficiaries who liked the taste of sadza (%)	90	86	100	100	-	100	96
Beneficiaries who selected seed (%)	24	43	80	33	-	38	36
	---------- 2004/05 ----------						
Number of OPV maize seed beneficiaries	37	44	25	24	6	38	175
Beneficiaries advised to select seed (%)	65	50	80	50	17	55	57
Beneficiaries taught how to store (%)	54	32	60	42	0	26	40
Beneficiaries taught how to select (%)	38	16	68	46	0	29	34
Beneficiaries indicating seed readily available on sale (%)	22	9	24	29	17	16	18
Beneficiaries who would have bought same seed (%)	51	75	84	75	83	82	73
Beneficiaries who liked the taste of sadza (%)	86	95	100	96	100	92	94
Beneficiaries who selected seed (%)	32	36	16	29	17	29	29
	---------- 2005/06 ----------						
Number of OPV maize seed beneficiaries	52	30	42	62	66	47	300
Beneficiaries advised to select seed (%)	62	90	79	55	45	62	62
Beneficiaries taught how to store (%)	42	63	69	48	14	38	42
Beneficiaries taught how to select (%)	31	33	64	45	15	38	36
Beneficiaries indicating seed readily available on sale (%)	21	7	19	16	5	15	14
Beneficiaries who would have bought same seed (%)	48	62	76	81	61	79	68
Beneficiaries who liked the taste of "*sadza*" (%)	73	83	95	100	94	94	91
Beneficiaries who selected seed (%)	13	57	48	66	24	55	42

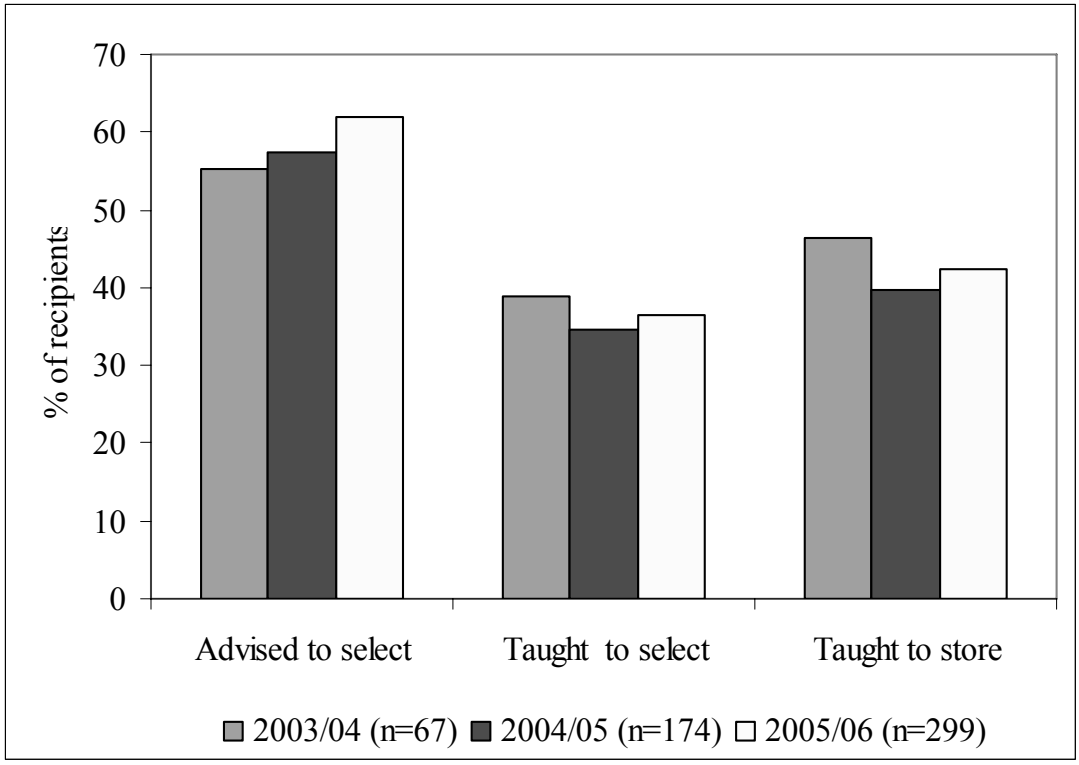


Figure 10: Flow and use of OPV seed selection information by beneficiaries

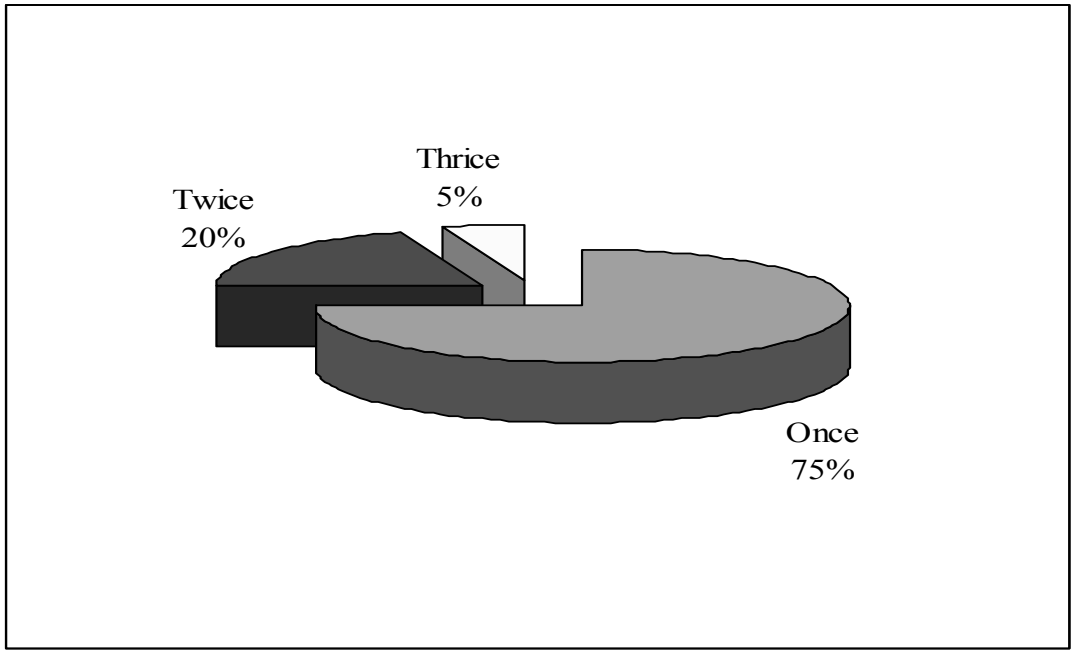


Figure 11: Access to recycling information by OPV maize seed beneficiaries

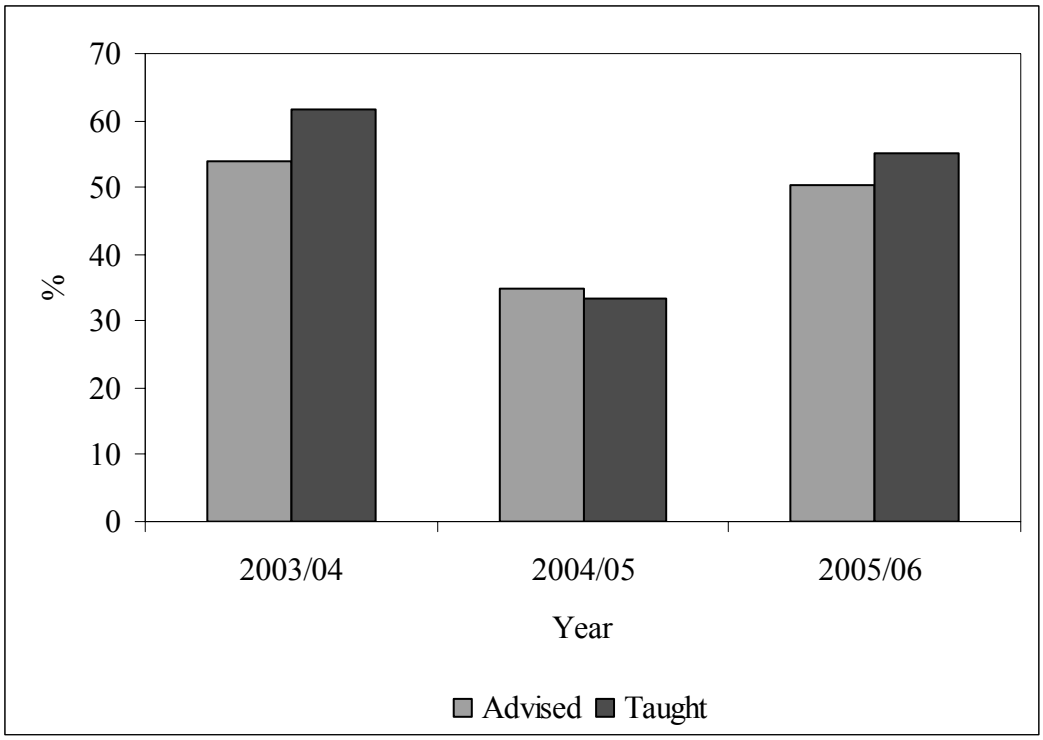


Figure 12: Seed selection behavior of beneficiaries based on information and knowledge

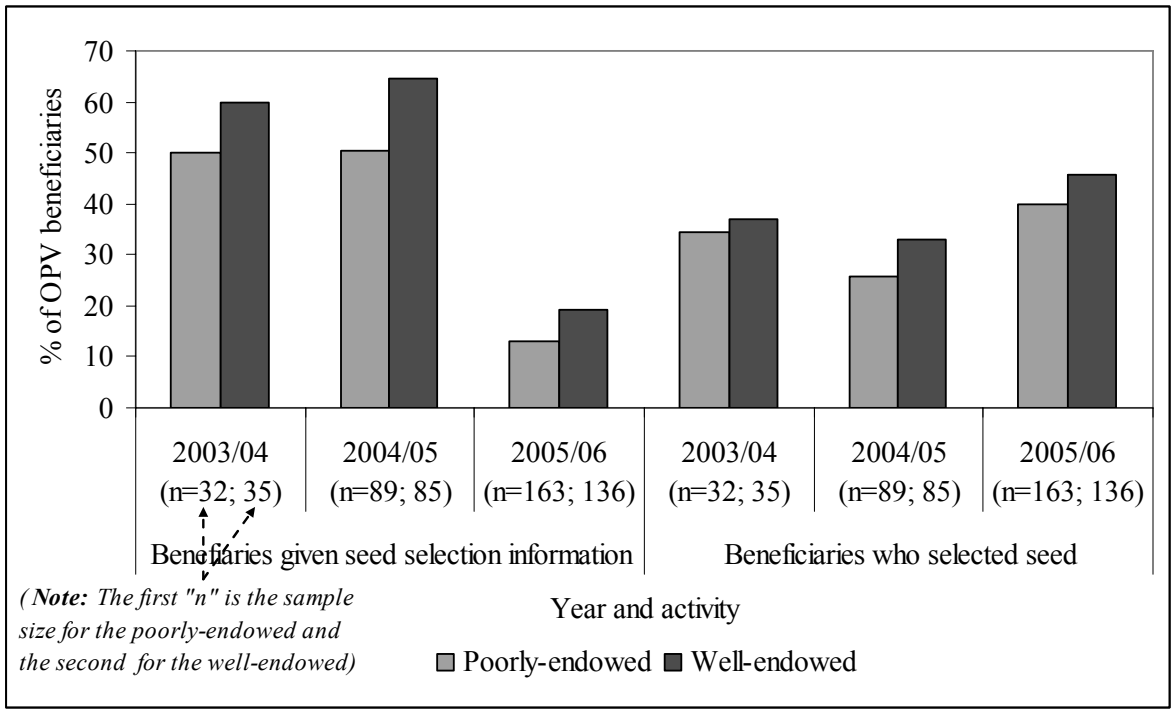


Figure 13: Information on and seed selection behavior of beneficiaries by wealth group

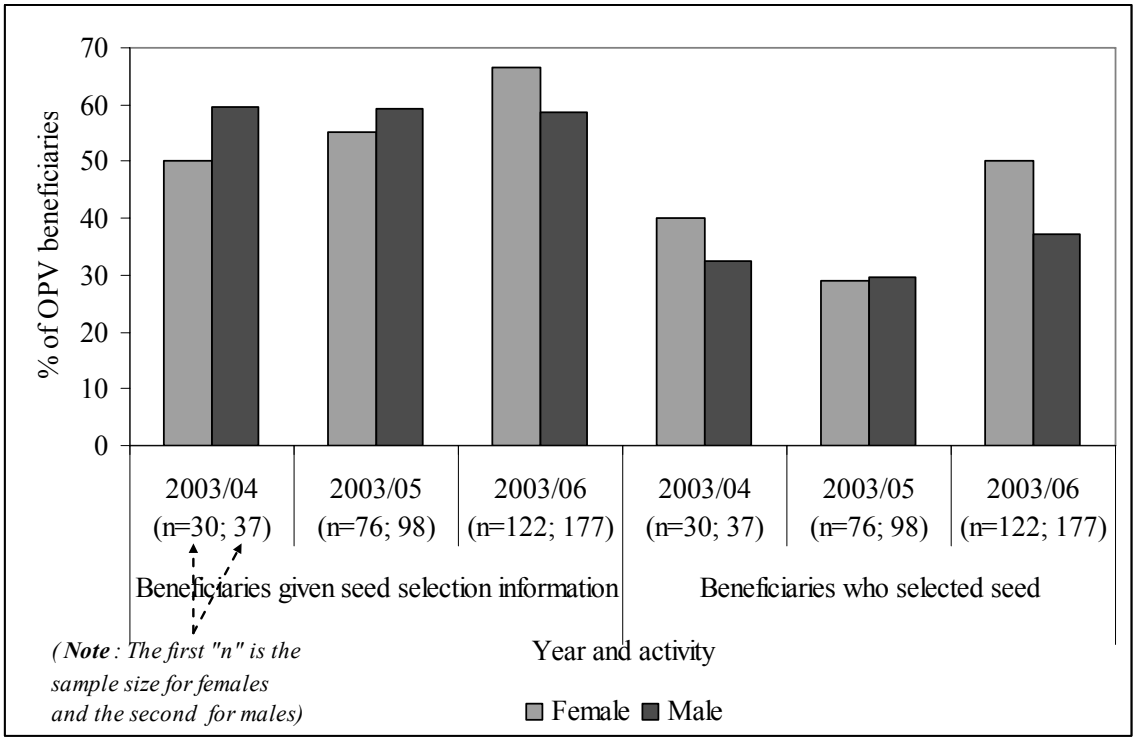


Figure 14: Information on and seed selection behavior of beneficiaries by gender

Table 12: Distribution of selected seed within the communities[1]

	Makoni	Hurungwe	Shurugwe	Chivi	Gwanda
Beneficiaries who re-planted selected (%)	67	88	86	84	91
Beneficiaries who donated selected seed to neighbors (%)	19	29	55	31	11
Non-beneficiaries who received seed from beneficiaries (%)	11	20	12	0	20

Note: [1]Seke was not included because the sample size was either zero or one

Factors determining the recycling of relief seed by households

The decision by relief seed beneficiaries to recycle seed or not was influenced by factors such as the information they had and past experience. To make realistic recommendations on how to improve recycling of OPV among farmers in selected communities, collective and relative impacts of selected factors were examined using a simple Probit[4] model. The model measures

[4] A mathematical treatment of the Probit model is not included in this paper as its usage is common in applied economics research. Thorough treatments of the model may be found in Greene (2000) or any standard econometric book.

the probability that a seed relief beneficiary would recycle OPV maize seed received. The following three hypotheses were tested:

- Farmers would not recycle OPV seed even if provided seed selection information,
- Previous knowledge on recycling OPV maize has no influence on seed selection decisions by beneficiaries, and
- Maize varietal preferences have no influence on farmers' seed selection behavior.

The probit model was run on a sample size of 408 OPV beneficiaries. At the 99% confidence level, the results[5] rejected the null hypothesis that, even if provided information on seed selection, farmers would not select, in favor of the alternative hypothesis that, given the information, farmers would select. That is, beneficiaries would consider seed recycling a suitable option for securing seed for subsequent seasons. The marginal effects suggest that, with 99% confidence, the probability of getting a farmer to recycle will increase by 22%, if the NGO representative providing the seed informs him/her about doing so.

The null hypothesis of no influence of previous experience on seed selection was rejected in favor of the alternative that previous experience has a significant effect on seed selection decisions by farmers. The probability that a farmer initially without any experience with OPV maize seed recycling would recycle will increase by 24% with just a year's experience with the seed. This seems to confirm the proportionate increase in recycling over time, especially among those who had previously handled OPVs under the program. With time, beneficiaries developed the confidence to recycle and more readily did it than when initially exposed to the practice.

If provided with seed that met their preferences, beneficiaries were more likely to select than otherwise. This supports the alternative hypothesis that preferences have a positive impact on seed selection decisions. That is, by targeting varieties farmers themselves choose, the probability of increasing the recycling rates among them would increase by 13%.

Apart from Chivi district where beneficiaries appear more willing to select seed than in Gwanda (the base district), no significant difference was observed among all the districts. There is a 33% greater probability of convincing beneficiaries to recycle in Chivi than in Gwanda; in other words, more effort would be needed to convince farmers in Gwanda and all other districts to recycle seed.

The effectiveness of getting beneficiaries to select seed varied with the participating NGO. Compared with CAFOD (the base NGO)[6] and all other NGOs, World Vision International, Action Aid and Christian Care appear to have made significant positive impacts on their beneficiaries' decisions to select seed.

[5] The estimated regression results can be obtained directly from the lead author.
[6] CAFORD was deliberately chosen simply because it supplied the largest quantity of seed to beneficiaries in the target districts in 2006, but any NGO could have been chosen without affecting the results.

Lessons learned from maize seed relief to vulnerable groups in Zimbabwe

The flow of information from NGOs to program beneficiaries on seed selection

Survey results clearly show that, over the three-year (2003/04 – 2005/06) period when OPV maize seeds were distributed to vulnerable farm households under the PRP, decisions regarding the type of seed to be distributed were mostly at the discretion of the participating NGO. Less than 10% of the beneficiaries noted ever participating in decision-making. About 20% of them were informed beforehand regarding the type of seed to be provided. Seeds distributed (especially the OPVs) were not commonly found on the market, mainly because of seed companies' reluctance to produce and sell OPV maize seeds. Recent reports suggest that seed companies produce OPV maize seeds on request through tenders by NGOs. Companies believe that if OPV maize seeds are put on the market, farmers may buy once and continue to recycle, thereby not guaranteeing them (companies) a stable market. However, the current results showed that farmers recycle both OPV and hybrid maize and are split on whether or not recycled OPVs are superior to recycled hybrids in yield.

In the first year of the program, about half the beneficiaries were informed about the need to select, store, and re-use OPV seed by the participating NGOs. By the third year, this proportion increased to 62%. The proportion taught how to select was far less than that simply advised to select. Disaggregating the data by gender, the results show that more males (60%) than females (50%) were informed about selecting in the first year. However, the proportion of females advised about selecting increased to 68% by the third year, surpassing that for males, which remained relatively constant. When disaggregated by wealth group, relatively more well-endowed than poorly-endowed households were advised to select over the three years, although more of the latter were given OPV maize seed.

The relative importance of factors influencing farmers' seed selection decisions

Not all beneficiaries advised about and/or taught to select, store, or re-use seed complied. The survey results suggest that each year, fewer than half of those advised about selecting actually selected. If seed selection information is complemented by teaching farmers how to select, the proportion of those selecting increases. Unfortunately, far fewer beneficiaries were actually taught how to select. Aggregated over the years, the flow of seed selection information was gender insensitive. However, females appear more aggressive in selecting seed. Disaggregating the data by wealth category, fewer poorly-endowed than well-endowed farmers actually selected seed, reflecting the fact that the flow of information was skewed against them.

Some important conclusions could be drawn regarding factors important in determining beneficiaries' seed selection decisions. Based on the tobit regression analysis (not reported here)[7], the survey results demonstrate that if given seed selection information, the probability that farmers would select seed will increase significantly. As expected, the probability that a beneficiary would select seed will increase significantly if the seeds donated meet his/her

[7] Contact the lead author if you need the detailed results.

preferences. Farmers with previous knowledge on OPV maize seed selection show a greater propensity to select than those experiencing it for the first time. Some NGOs appear more effective than others in convincing their beneficiaries to select seeds.

Concluding remarks

Based on the findings of the study the following recommendations are made to improve seed assistance to vulnerable groups in Zimbabwe to ensure greater spillover effects.

- Experience with OPV maize seed recycling is important in influencing farmers' recycling decisions. Ways to extend similar interventions for a few more years should be explored. In this way, many more farmers would have experienced handling OPV maize seed and hence be recycling seed, ensuring greater spillover effects within the communities.
- Given that the relatively "well-endowed" farmers are more willing to recycle OPV seed, targeting them can potentially ensure large-scale spillovers.
- NGOs should endeavor to ensure that all beneficiaries be provided with seed selection information. They should follow up the information with field-level training/demonstration of seed selection practices during the crop growth period. This could help foster greater adoption of selection than simply providing information.
- Seed selection information should emphasize the need to select only OPV maize, since farmers are inclined to select any type of variety.
- Participating NGOs should share their seed selection information strategies so that less successful ones can learn from those able to ensure that large proportions of their beneficiaries select seed.
- Beneficiaries should be given the opportunity to select the varieties they want, because the probability of recycling is higher if a variety meets their preferences.
- Seed companies should promote OPVs: farmers recycle both OPVs and hybrids but, if given a choice, they will purchase fresh seed every year, thereby creating an OPV market.
- A simple varietal naming system should be developed to help farmers remember the names of the varieties they receive and to distinguish between hybrids and OPVs.

Annex 1:

Coverage of past OPV maize seed distribution programs

Province	District	Ward	Participating NGO	No. assisted	No. selected	Year	Seed received (kg)
Masvingo	Chivi	1	CARE	425	8	2005/06	2.5
Masvingo	Chivi	1	IFRC	390	8	2005/06	10
Masvingo	Chivi	1	Danish Red Cross	390	8	2004/05	10
Masvingo	Chivi	4	CARE	451	9	2005/06	2.5
Masvingo	Chivi	4	IFRC	390	8	2005/06	10
Masvingo	Chivi	4	Danish Red Cross	338	7	2004/05	10
Masvingo	Chivi	10	IFRC	79	2	2005/06	10
Masvingo	Chivi	10	CAFOD	996	20	2004/05	10
Masvingo	Chivi	10	Danish Red Cross	79	2	2004/05	10
Matebeleland South	Gwanda	2	IFRC	54	1	2005/06	10
Matebeleland South	Gwanda	2	Danish Red Cross	54	1	2004/05	10
Matebeleland South	Gwanda	2	HELP	1,000	12	2004/05	8
Matebeleland South	Gwanda	4	IFRC	54	1	2005/06	10
Matebeleland South	Gwanda	4	WVI	1,174	15	2005/06	5
Matebeleland South	Gwanda	4	Danish Red Cross	54	1	2004/05	10
Matebeleland South	Gwanda	4	WVI	1,448	18	2004/05	6
Matebeleland South	Gwanda	14	WVI	745	9	2005/06	5
Matebeleland South	Gwanda	14	WVI	1,024	13	2004/05	6
Mashonaland West	Hurungwe	10	Cadec	2,193	23	2005/06	10
Mashonaland West	Hurungwe	10	ChristianCare	1,978	21	2004/05	5
Mashonaland West	Hurungwe	14	GOAL	500	5	2004/05	5
Mashonaland West	Hurungwe	17	ChristianCare	1,971	21	2004/05	5
Manicaland	Makoni	3	ZimPro	1,437	20	2005/06	10
Manicaland	Makoni	3	MDA	1,000	14	2004/05	15
Manicaland	Makoni	15	ZimPro	445	6	2005/06	10
Manicaland	Makoni	15	FACT Rusape	360	5	2005/06	5
Manicaland	Makoni	15	GOAL	670	9	2004/05	5
Manicaland	Makoni	15	MDA	400	6	2004/05	15
Manicaland	Makoni	19	FACT Rusape	360	5	2005/06	5
Manicaland	Makoni	19	MDA	348	5	2004/05	15

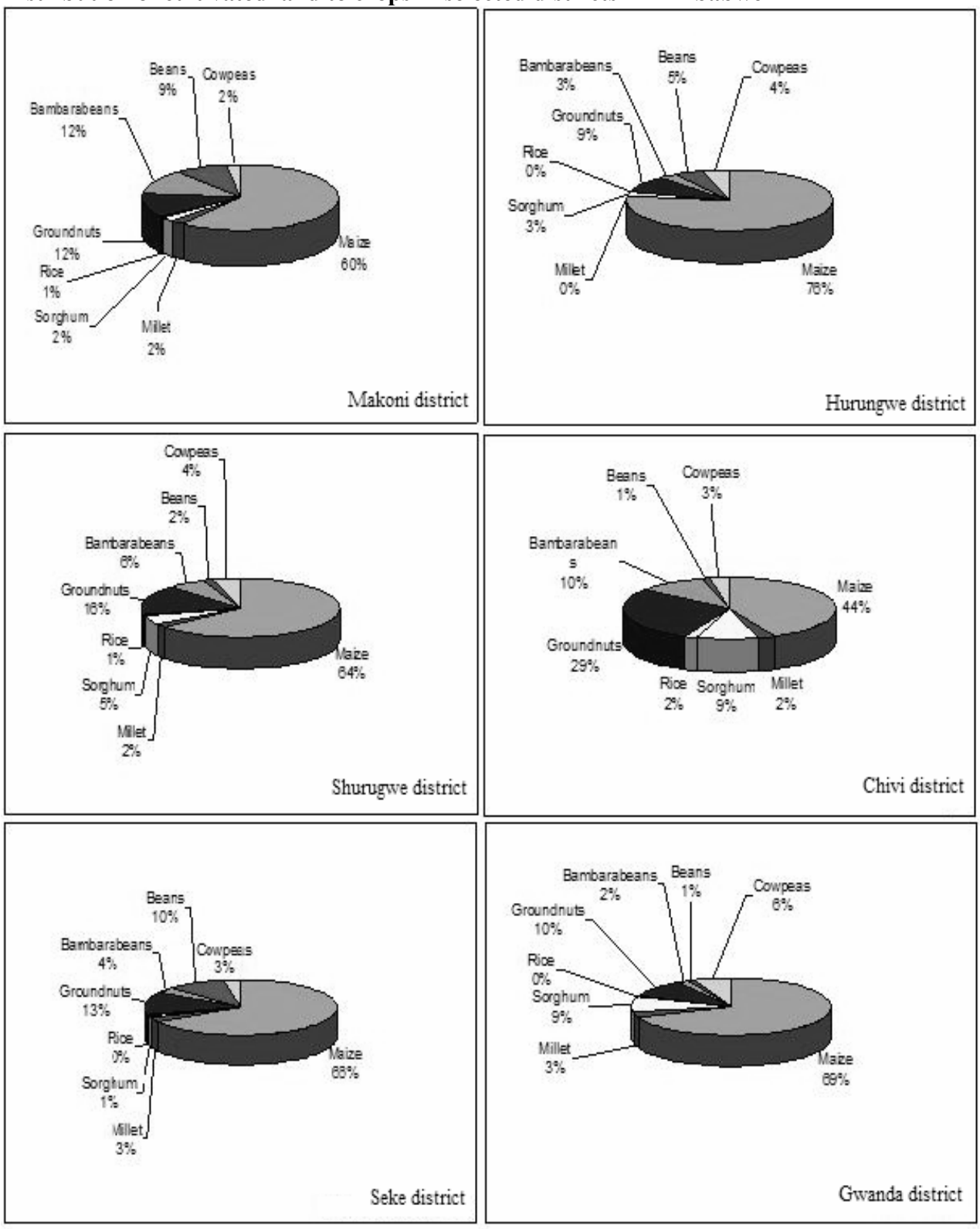
Annex 1: (Cont.)

Province	District	Ward	Participating NGO	No. assisted	No. selected	Year	Seed received (kg)
Mashonaland East	Seke	1	Oxfam America	625	17	2005/06	5
Mashonaland East	Seke	1	CAFOD	223	6	2004/05	10
Mashonaland East	Seke	5	Oxfam America	625	17	2005/06	5
Mashonaland East	Seke	5	CAFOD	223	6	2004/05	10
Mashonaland East	Seke	8	Oxfam America	625	17	2005/06	5
Mashonaland East	Seke	8	CAFOD	223	6	2004/05	10
Midlands	Shurugwi	5	HELP-GERMANY	100	4	2005/06	10
Midlands	Shurugwi	5	IFRC	11	0	2005/06	10
Midlands	Shurugwi	5	IFRC	12	0	2004/05	20
Midlands	Shurugwi	5	Christian Care	301	11	2004/05	15
Midlands	Shurugwi	10	HELP-GERMANY	100	4	2005/06	10
Midlands	Shurugwi	10	IFRC	11	0	2005/06	10
Midlands	Shurugwi	10	IFRC	102	4	2004/05	20
Midlands	Shurugwi	10	Christian Care	424	16	2004/05	15
Midlands	Shurugwi	15	HELP-GERMANY	100	4	2005/06	10
Midlands	Shurugwi	15	Action Aid	620	23	2005/06	4
Midlands	Shurugwi	15	MASO	100	4	2004/05	3

Source: FAO-Zimbabwe Office, 2006

Annex 2:

Distribution of cultivated land to crops in selected districts in Zimbabwe



Source: File survey data, 2006

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