Targeting Agricultural Input Subsidy Coupons in Malawi *

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Abstract: This paper analyses the factors that influence access to agricultural input subsidies in Malawi. The results show that vulnerable households such as the poor and elderly-headed are less likely than other households to receive fertilizer coupons and receive less of the subsidized fertilizers. Households with larger parcels of land and those who sell part of their produce (commercialized) are more likely to receive coupons and also tend to acquire more fertilizers. Use of open meetings in the allocation of coupons tends to favour the poor and the poor receive more fertilizer compared with discrete of coupons. We also find a positive relation between participation in other social safety nets and access to subsidized fertilizer coupons, suggesting that households that participated in other social safety net programmes are not excluded from the input subsidy programme by virtue of benefiting from other social assistance programmes.

1.0 Introduction

In order to address some of the problems in agriculture and to raise the incomes of the resource poor, the Farm Input Subsidy Programme (FISP) was first implemented in the 2005/06 agricultural season following a poor-harvest season and a high maize import bill to augment domestic supply in 2004/05 agricultural season. In 2008/09, the FISP was in its fourth year of implementation, with a number of changes in the scale, scope and ways of implementation to improve targeting and its effectiveness in assisting more vulnerable members of society. The FISP is largely financed by the government, with donor support being in form of overall budgetary support. The FISP is designed as a targeted input subsidy programme, targeting smallholder farmers with land but who cannot afford to purchase inputs at market rates. The size of the FISP has increased from 132,000 tonnes in 2005/06 to 216,000 tonnes in 2007/08 and in 2008/9 was estimated to directly benefit 67 percent of Malawi's farm households. This paper summarizes targeting issues and factors that determine households' access to subsidized fertilizer coupons in the FISP.

2.0 Coupon Allocation and Targeting in the Malawi Farm Input Subsidy[1]

The agricultural input subsidy programme aims at promoting access and use of fertilizers among smallholder farmers in order to increase agricultural productivity and food security. According to GOM (2008b) the main objective of the agricultural input subsidy programme is to achieve household food self-sufficiency and increased income through increased food and cash crop production. In order to achieve these objectives, the target groups are defined as resource-poor Malawians who owns a piece of land, resident in the village with special consideration to guardians looking after physically challenged persons and vulnerable groups such as child headed, female-headed or orphan headed

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[1] This section draws on Dorward and Chirwa (2009) and Dorward et al. (2010).

households and those households with infected or affected with HIV and AIDS (GOM, 2008b). Although Dorward et al. (2010) note that the targeting criteria place explicit emphasis on vulnerable groups, in practice, there are difficulties in the application of these criteria, particularly due to the fact that the targeting criteria have remained wide and that the criteria fit large numbers of households against the available number of coupons allocated for the area.

The agricultural subsidy programme mainly focuses on the subsidization of maize fertilizers and improved maize seeds. However, the scope of coverage of crops under the subsidy programme has varied over time. In addition to maize the coverage has included tobacco, tea and coffee fertilizers, legume seeds, cotton seeds and chemicals and maize storage chemicals (most notably in 2008/9). However the basic entitlements of a beneficiary household to either a maize package of fertilizers and seeds or a tobacco package of fertilizers or a cotton package of chemicals and seeds. Beneficiaries in 2008/9 were also entitled to a flexible coupon to enable them purchase legume seeds, maize storage chemicals as well as improved maize seeds. In the 2008/09 season, due to substantial increases in the prices of fertilizers, the fertilizer subsidy also covered smallholder tea and coffee farmers. However, since the 2009/10 agricultural season, the FISP has excluded cash crops and concentrates on the subsidization of fertilizers for maize and on subsidization of improved maize seeds and legumes.

2.1 Coupon Allocation Systems

In the 2008/09 season, there were three stages in the targeting process: first updating a register of all farm households, second allocation of coupons to districts and within districts, and third local (village) processes of selection of beneficiaries. The registration of farmers first started in the 2007/08 season and this register was updated in the 2008/09 season between May and August 2008. The register formed the basis of allocation of coupons to the districts and within the villages. The second stage, coupon allocation to districts and within districts, is based on maize areas cultivated and number of farm households. The third stage processes of identification of households have changed over time. Prior to the 2007/08 season, there was no registration of farm families: local leaders and village level development committees were responsible for identifying beneficiaries and, to a varying extent, agricultural staff managed the distribution of coupons. In the 2008/09 season, an open system of identification of beneficiaries (community-based targeting) using the farming households register was introduced (though not universally followed) in the allocation of coupons, with Ministry of Agriculture staff playing a leading role in open meetings for the disbursement of coupons. From 2007/8 there was also greater involvement of other stakeholders in the facilitation of these processes including religious leaders, VDC members, local government, police and civil society representatives as well as Ministry of Agriculture staff.

Table 1 shows the extent to which open meetings were reported in coupon allocation and distribution in the 2008/09 agricultural season across regions. It is evident that the open meeting system was used widely in both the allocation and distribution of fertilizer subsidy coupons. About 81 percent and 96 percent respectively of the households in the sample confirmed that open meetings in allocation and distribution of fertilizer subsidy coupons were held in their communities. The processes were therefore more open than in the past, particularly the distribution of fertilizer coupons. Dorward et al. (2010) note

that due to the large number of eligible households relative to the number of coupons allocated to the villages, there was often an informal system of re-distribution of coupons within the villages after the open meeting, with about 43 percent of the sample reporting that re-distribution took place in the villages.

Table 1 Extent of Use of Open Meeting in Allocation and Distribution of Fertilizer Subsidy 2008/09

Region	Allocation (% of sample)	Distribution (% of sample)
North	88	99
Central	71	97
South	88	95
Total	81	96

Source: Dorward et al. (2010)

Targeting is one of the critical elements of the effectiveness of the subsidy and in achieving efficiency in resource use. In an economy where the private marketing system in input markets is functioning, it is important to ensure that the subsidy does not displace commercial sales of fertilizers. In other words, the subsidized fertilizers should be targeted at households that could not have bought fertilizers at the prevailing market prices. Hence, the efficiency of a targeted programme depends on the extent to which errors of inclusion and exclusion can be minimized in the selection of beneficiaries.

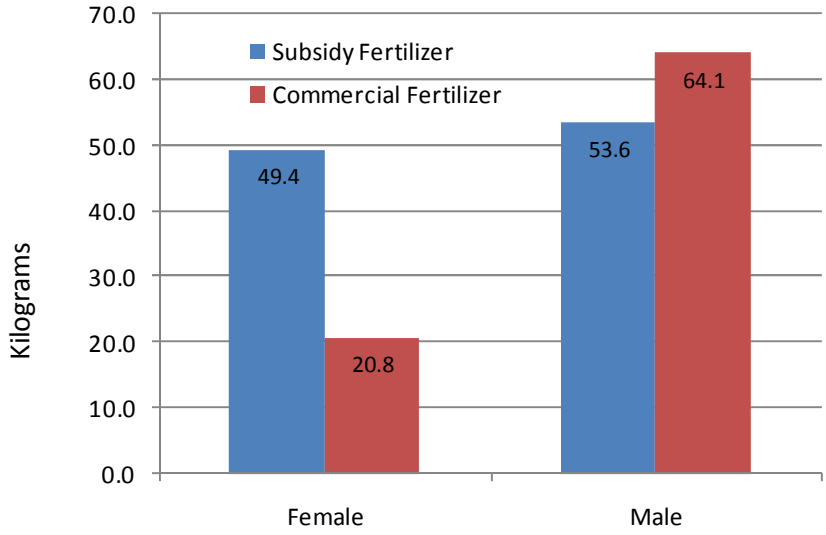
According to Coady et al (2002) errors of inclusion (leakage) occur when the non-poor or unintended households are included in the programme while errors of exclusion (under coverage) occur when the poor or intended households are not included in the programme.[2] The problems of targeting social programs are well-known in the literature due to lack of information, high cost of acquiring information and social stigma. The literature provides a number of alternative targeting methods in social programs including using individual/household assessments based on socio-economic data, categorical targeting, self-selection and community based targeting. These different methods have their own advantages and shortcomings in different contexts (Morley and Coady, 2003). Although more recently community based targeting is being advocated, as a participatory approach to identification of beneficiaries, as Morley and Coady (2003) note there is a danger of elite capture and variable interpretation of the programme beneficiary identification criteria. Dorward et al (2010) and Chinsinga (2009), in the context of the input subsidy programme, note that the criteria for beneficiary identification remains wide and subject to different interpretation and communities tend to emphasis on different vulnerable groups. Similarly, the 20-30 percent estimated displacement of commercial fertilizer in the 2006/07 programme also suggest that a substantial number of households that could afford fertilizers at prevailing market prices were erroneously included in the programme (SOAS et al, 2008).

[2] These errors are also known as E-mistakes (excessive coverage) and F-mistakes (failure in prime objective), respectively (Cornia and Stewart, 1995). See Coady and Skoufias (2001) for alternative interpretations.

2.2 *Gender and Targeting of Fertilizer Coupons*

The 2008/9 Agricultural Input Subsidy Survey (AISS2) sample comprises 26.8 percent female-headed and 73.2 percent male-headed households. About 68 percent of female-headed households and 66 percent of male-headed households received subsidized fertilizer coupons. Figure 1 shows that female-headed recipient households got less subsidized fertilizers compared to male-headed recipient households, yet female-headed households have severe affordability problems as reflected in the lower average purchase of commercial fertilizers in 2008/09 season. On average, female-headed households acquired only 21 kilograms of commercial fertilizers compared to 64 kilograms acquired by male-headed households. Overall, male-headed households had 67 percent more fertilizers than female-headed households. These results support earlier findings that when female-headed households had access to coupons they tended to receive less than male-headed households (Dorward et al., 2010; SOAS et al, 2008, although reported differences declined from 206/7 to 2008/9).

Figure 1 Subsidized and Commercial Fertilizer by Gender of Household Head



Source: Computed from AISS 2009 data

2.3 *Welfare and Targeting of Coupons*

Table 2 shows the characteristics of rural households by the number of coupons received for subsidized fertilizer. Although since 2006/7, targeting criteria have placed more explicit emphasis on the provision of coupons to more vulnerable households, the evidence point to the fact that the poor and vulnerable groups continue to be generally marginalized. The number of coupons received per household increases with land size, wealth (represented by value of assets and livestock), subjective welfare and food security.

Table 2 Mean Attributes of Households by Number of Fertilizer Subsidy Coupons Received, 2008/9

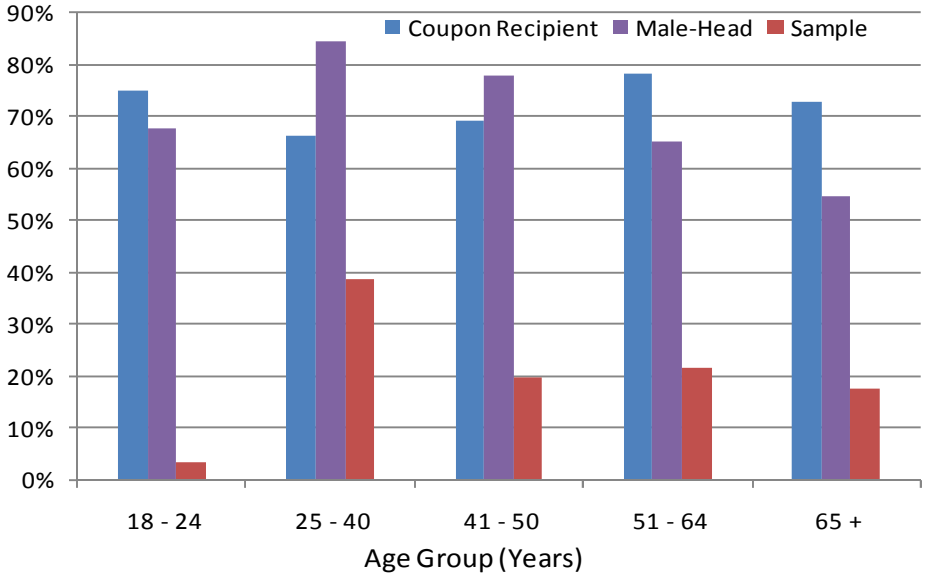
Household Characteristics	Fertiliser Coupon numbers per Household					Sig.
	Zero	0.5 to 1	1.5 to 2	> 2	All	
% Female Headed Households	1.26	1.31	1.24	1.17	1.27	*
Owned Area in Hectares	1.16	1.09	1.48	2.17	1.27	**
Value Durable Assets (MK)	19,621	15,630	20,340	28,111	18,702	
Value Livestock Assets (MK)	18,689	22,947	41,807	58,946	28,699	*
Subjective Score of HH Food Consumption over past 12 months *(1=inadequate, …., 3=more than adequate)*	1.5	1.5	1.6	1.7	1.5	*
Subjective Score on Welfare *(1=very unsatisfied, …., 5=very satisfied)*	2.3	2.2	2.5	2.8	2.3	**
Month after Harvest that Maize ran out	7.2	7.1	7.9	8.6	7.4	*

Notes: *= one or more differences significant at p=0.05, ** = one or more differences significant at 0.01
Source: Dorward et al. (2010)

2.4 Age of Household Head and Targeting of Coupons

Apart from female-headed households other vulnerable groups included in the targeting criteria are child headed, orphan headed households and those households with members infected or affected with HIV and AIDS. Since the survey draws the sample from the 2004/05 integrated household survey with random replacement of households in subsidy evaluation surveys, the data is biased against new and hence younger households (that may largely be in the youth group). Hence, the data has limitations to shed light on youths, child-headed households and households infected or affected with HIV and AIDS. Given these limitations, the analysis of access to subsidized fertilizers by age groups provides some indication of targeting to elderly-headed households and to less extent youth-headed households. Figure 2 provides the distribution of the sample (weighted) by age groups and, receipt of subsidized fertilizer coupons and gender distribution within age groups. The sample is dominated by household heads between the ages of 25 and 40 accounting for 39 percent, followed by 51-65 year olds accounting for 21 percent, with the youths (18 – 24 years) only accounting for 3 percent of the sample. Male-headed households also dominate in all the age groups with the exception of the elderly in which 55 percent of the households are male-headed. There are also differences in access to subsidized fertilizer coupons across the age groups with the lowest proportion of 66 percent among households in the 25-40 year age group and the highest proportion of 78 percent among households in the 51-64 year age group. Among the elderly group (65 years and above), 73 percent received subsidized fertilizer coupons. There is therefore no bias in favour of the elderly-headed household in targeting of subsidized fertilizers: this would not be expected if the targeting guidelines were followed, as vulnerable groups are expected to account for a higher proportion of those with access to subsidized fertilizers.

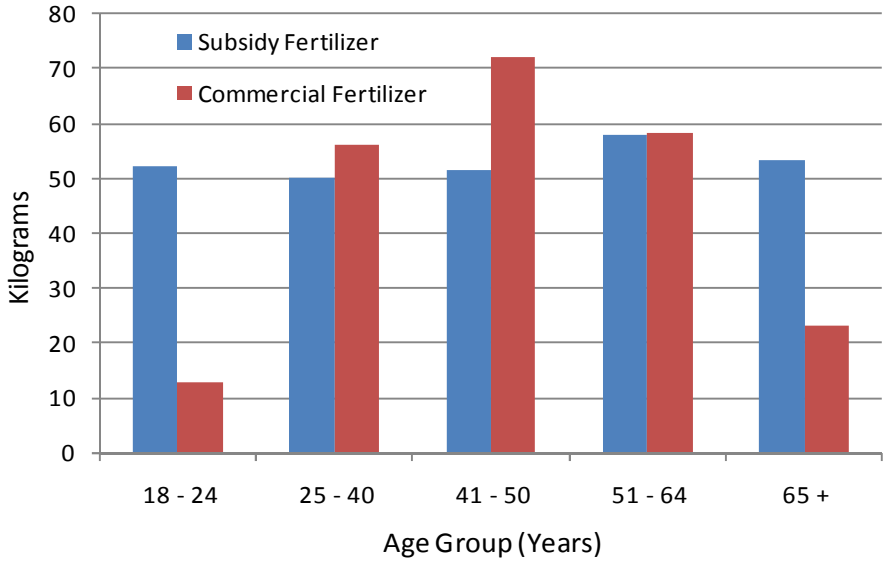
Figure 2 Receipt of Coupon, Household Headship and Sample by Age Groups



Source: Computed from AISS 2009 data.

There are also differences in the quantity of fertilizers acquired by households across the age groups (Figure 3). The average amounts of subsidised fertilizers acquired by households across the age groups do not substantially differ although the households headed by 51-64 year olds has the highest average access to subsidized fertilizers. However, there are substantial differences in the average amount of commercial fertilizers acquired by households, with the households headed by 41-50 year olds acquiring on average 72 kilograms compared with the 18-24 year olds who acquired 13 kilograms from commercial purchase. The elderly acquired 23 kilograms. The low level of commercial purchase for the households headed by the youths and the elderly may indicate high affordability problems for this group – new households as new entrants into farming may have particular cash constraints.

Figure 3 Subsidized and Commercial Fertilizers by Age of Household Head



Source: Computed from AISS 2009 data.

As noted earlier, the difficulties in targeting vulnerable households arise from practicalities of applying the prescribed targeting criteria. Dorward et al. (2010) note that fundamental difficulties in targeting therefore arise because of ambiguities, tensions and contradictions among different targeting criteria, related to difficulties in clearly establishing measures for applying these criteria, both of these being related to large numbers of households apparently deserving of coupons relative to the number of coupons available. As a result there are many variations in the characteristics of beneficiaries of fertilizer subsidy coupons, and the better-off households tend to dominate the vulnerable households, and the vulnerable households tend to receive less.

3.0 Factors Influencing Targeting of Beneficiaries

It is important to determine the factors that affect access to fertilizer subsidy coupons or acquisition of subsidized fertilizers. This is pursued here through a regression analysis of the determinants of access to subsidized fertilizers using two definitions of access. The first definition of access is the receipt of fertilizer coupons, whether the household uses it or not to purchase subsidized fertilizers. SOAS et al. (2008) estimated a similar regression model; however, their model focuses on access to subsidized fertilizers – those households that actually used their coupon allocations to purchase fertilizers. The second definition incorporates use of the coupons and measures access in terms of the amount of subsidized fertilizers acquired by the household (SOAS et al., 2008). Annex Table 1 present descriptive statistics of variables included in the models.

The results from a regression model (see Annex Table 2) of access to subsidized fertilizer coupons confirm a number of observations made from the earlier discussion of simple descriptive statistics, and also reveal new insights:

- The age of the household head matters, and older household heads are more likely to receive fertilizer coupons than younger household heads. Since residence in the village is one of the targeting criteria, older household heads may have

lived in the village longer than younger households, so this positive relationship is consistent with the targeting criteria.

- Households that are headed by the elderly are unlikely to receive fertilizer coupons, suggesting exclusion errors. This is contrary to the emphasis on special vulnerable groups that has been placed recently in the targeting criteria for the subsidy programme. It may also be the case that elderly headed households are labour-constrained for farming activities and therefore use the coupons least in farming.
- Households with larger parcels on land under cultivation are more likely to receive subsidized fertilizer coupons. The positive relationship is expected since land is one of the main criteria for targeting smallholder farmers.
- Cultivation of tobacco, maize marketing and general produce marketing all increase the probability of receiving fertilizer coupons. This implies that fertilizer coupons are likely to go to those smallholder farmers that earn cash incomes from agriculture with the potential to purchase fertilizers at prevailing market prices. This would not seem to support current targeting objectives and criteria, and suggests existence of inclusion errors.
- Households that bought commercial fertilizers in the previous season are less likely to be allocated subsidized fertilizer coupons, and purchase of commercial fertilizers marginally leads to reduction in the probability of accessing coupons. This suggests weak adherence to targeting that should reduce inclusion errors and ineffectiveness and inefficiency from subsidising farmers who would have bought commercial fertilizer without the subsidy.
- Households that view themselves as poor are less likely to receive coupons. In the first two years of the subsidy, evidence of households having cash for coupon redemption was a pre-condition in some communities for households to receive fertilizer coupons (ICL et al., 2007 and SOAS et al., 2008). SOAS et al. (2008) find similar results on the effect of own poverty evaluation on the likelihood of receiving fertilizers, with wealthier households receiving disproportionately more coupons than poor households.
- Participation in the labour market either through salaried or *ganyu* employment in the 2007/08 season reduced the household's chances of receiving coupons in the 2008/09 season. This implies that those in salaried employment are excluded as they are capable of purchasing fertilizers at commercial prices and those in *ganyu* employment maybe those households that do not have adequate land and use their labour resource in *ganyu* labour. Nonetheless, ganyu labour is also the second most important source of cash for redeeming the coupons (SOAS et al., 2008 and Dorward et al., 2010).
- Receipt of remittances in the previous season increases the probability of receiving coupons. Remittances are an important source of cash for redemption of coupons and for purchase of farm inputs in the rural areas.
- Access to other social safety nets in the previous season is positively associated with receipt of fertilizer coupons in the 2008/09 season. This implies that participants in other social safety nets are not excluded from the fertilizer vouchers, and if these safety nets are well targeted then they can provide additional information about the vulnerable households in the communities.
- Households that benefited from the subsidy in the previous season were more likely to receive the coupons in the next season. The probability of receiving fertilizer coupons increases by 45 percent for households targeted in the previous

season. The targeting impacts of this of course depend upon the criteria used in targeting the previous year and on criteria used in excluding precious beneficiaries and including new ones.

- Open forums for allocating coupons increase the chance of targeting those that ranked themselves in the poor category. This suggests that community based targeting may be superior to allocations that involve traditional leaders and committees, as was previously the case in the 2005/06 up to the 2007/08 season.

The second model examining the factors associated with the quantity of subsidized fertilizers acquired by the households in 2008/09 season (see Annex Table 3) revealed the following results, generally similar to those of the first model:

- There is a positive relationship between quantity of subsidized fertilizers and land size, tobacco cultivation, maize marketing and general crop marketing. Cultivation of tobacco raises the amount of subsidized fertilizers by 28 kilograms. This implies that on average tobacco farmers received more fertilizers than non-tobacco farmers.
- There is no evidence of a significant relationship between subsidized fertilizers and commercial fertilizers; however the weak negative relationship suggests that the programme includes some households that can afford commercial fertilizers, leading to some displacement of commercial sales.
- Households that rank themselves in the poor category are likely to receive about 15 kilograms less than households in the non-poor category. As with coupons, there is a tendency for the subsidized fertilizers to reach the better off farmers.
- Households that are food secure tend to receive 7 kilograms more subsidized fertilizers than food insecure households, perhaps suggesting inclusion errors.
- As with the first model, participation in the labour market is negative and statistically significant at the 1 percent level.
- Access to subsidized fertilizer in the previous season increases the amount of subsidized fertilizer in the 2008/09 season. Households that are successively receiving subsidized fertilizers receive 56 kilograms (just more than a 50 kg bag) more that households that only received fertilizers in the 2008/09 season.
- Transparency in coupon allocation also tends to favour the poor with the coefficient of the interaction of open forum and poverty being positive.

4.0 Conclusions

The paper set out to investigate factors that facilitate access to subsidized fertilizer coupons in Malawi. The agricultural input subsidy programme targets smallholder farmers who are resource-poor but own a piece of land. The targeting criteria also recognizes special vulnerable groups as targets such as guardians looking after physically challenged persons, child-headed, female-headed and orphan-headed households and households infected or affected with HIV and AIDS. There are some contradictions in the targeting criteria in reaching out to vulnerable groups. Nonetheless, the targeting criteria remain wide and there are variations in the use of the targeting guidelines in different communities, particularly since the number of needy households tends to be much larger than the available number of fertilizer coupons. The following conclusions emerge:

- Although the poor and vulnerable households are also allocated subsidized fertilizer coupons, they are less likely and receive less than the better off smallholder farmers that have larger parcels of land and wealthier. Elderly-headed households and the poor are less likely to access subsidized fertilizer coupons while households with larger parcels of land and those that market part of their produce are more likely to receive subsidized fertilizer coupons.
- The programme, however, succeeds in excluding households that earn incomes from the labour market, particularly those that earn income from non-*ganyu* labour. There is a weak relationship between access to coupons and quantity of fertilizers from commercial purchases, implying that the inclusion errors of targeting result in some displacement of commercial sales of fertilizers.
- Participation in other social safety nets in the past does not exclude households from the input subsidy programme. The beneficiaries of other social safety nets are more likely to access subsidized fertilizer coupons, hence demonstrating some complementarities among social safety nets. Some of the social safety nets that target the poor and vulnerable households, such as cash for work or public works programs ease the cash constraint of vulnerable households and enable them to redeem the fertilizer coupons. In addition, if other social safety nets are well targeted at the vulnerable groups, it implies that participation in such programmes provide additional information on vulnerability in targeting the input subsidy programme.
- Openness in the implementation of the input subsidy programme is pro-poor. The introduction of the open forums in the allocation of subsidized fertilizer coupons tends to raise the likelihood of the poor, who are generally marginalized, to access subsidized fertilizer coupons and to acquire more subsidized fertilizers than when the process is not transparent.

The results therefore suggest that for the subsidy programme to effectively target resource poor farmers there is need to review the targeting criteria so that they recognize the vulnerable groups as the main target group, provided such households have cultivatable land. For instance, using a point system on the existing criteria has the potential to increase access to subsidized fertilizers to the vulnerable groups. While possession of land should be the basic condition for access to fertilizer coupons, households should gain additional targeting points if they also qualify as vulnerable households as defined by the existing criteria. For instance, an elderly female-headed household would get two additional targeting points while an elderly male-headed household would only get one additional targeting point. Households with land and high targeting points should be prioritized in the allocation of coupons using an open forum held in the community. Such a points system might also promote transparency and accountability in the identification of beneficiaries and distribution of coupons.

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Annex Table 1 Descriptive Statistics

Variables	Mean	SD	Min	Max
Access to fertilizer coupons in 2008/9 (0/1)	0.699	0.459	0.00	1.00
Quantity of subsidized fertilizers acquired 2008/9 (KG)	53.589	49.910	0.00	600.0
Age of household head (years)	47.133	16.063	18.00	99.00
Male headed household (0/1)	0.736	0.441	0.00	1.00
Elderly headed household (0/1)	0.155	0.362	0.00	1.00
Household size (adult equivalents)	4.714	2.109	0.00	16.98
Value of assets in US dollars in 2008/9	165.22	632.76	0.00	18064
Cultivated land in hectares in 2008/9	0.978	0.722	0.00	6.88
Tobacco cultivation in 2008/9 (0/1)	0.156	0.363	0.00	1.00
Crop marketing in 2008/9 (0/1)	0.330	0.471	0.00	1.00
Maize marketing in 2008/9 (0/1)	0.101	0.302	0.00	1.00
Quantity of commercial fertilizers bought in 2007/8 (KG)	43.02	230.43	0.00	6700
Own poverty assessment as poor in 2007/8 (0/1)	0.865	0.342	0.00	1.00
Adequate food consumption in 2008/9 (0/1)	0.462	0.499	0.00	1.00
Business enterprise in 2007/8 (0/1)	0.395	0.489	0.00	1.00
Labour market participation in 2007/8 (0/1)	0.497	0.500	0.00	1.00
Remittance receipts in 2007/8	0.392	0.488	0.00	1.00
Access to social safety nets in 2007/8 (0/1)	0.147	0.354	0.00	1.00
Access to fertilizer coupons in 2007/8 (0/1)	0.593	0.491	0.00	1.00
Open forum allocations 2008/9 and poor 2007/8 (0/1)	0.709	0.454	0.00	1.00
Northern region (0/1)	0.192	0.394	0.00	1.00
Central region (0/1)	0.363	0.481	0.00	1.00
Southern region (0/1)	0.446	0.497	0.00	1.00

Notes: (0/1) indicates dichotomous variable equal to 1 for the included category, otherwise equal to 0 for the base category.

Annex Table 2 Probit Estimates for Access to Fertilizer Coupons in 2008/09

Variable	Model 1		Model 2	
	dF/dx	*z*	*dF/dx*	*z*
Age of household head (years)	0.0032	3.11[a]	0.0027	2.54[b]
Male headed household (0/1)*	0.0021	0.08	-0.0032	-0.13
Elderly headed household (0/1)*	-0.1304	-2.75[a]	-0.1226	-2.44[b]
Household size (adult equivalents)	-0.0113	-2.02[b]	-0.0075	-0.89
Value of assets in US dollars in 2008/9	0.00001	-0.67	0.00001	-0.88
Cultivated land in hectares in 2008/9	0.0561	3.03[a]	0.0624	3.36[a]
Tobacco cultivation in 2008/9 (0/1)*	0.1720	5.29[a]	-	-
Maize marketing in 2008/9 (0/1)*	0.1126	3.22[a]	-	-
Crop marketing in 2008/9 (0/1)*	-	-	0.1011	4.27[a]
Quantity of commercial fertilizers bought in 2007/8 (KG)	-0.0002	-2.50[b]	-0.0001	-2.39[b]
Own poverty assessment as poor in 2007/8 (0/1)*	-0.0802	-2.19[b]	-0.0706	-1.88[c]
Adequate food consumption in 2008/9 (0/1)*	0.0202	0.91	0.0221	0.99
Business enterprise in 2007/8 (0/1)*	0.0051	0.23	0.0006	0.03
Labour market participation in 2007/8 (0/1)*	-0.0411	-1.83[c]	-0.0490	-2.17[b]
Remittance receipts in 2007/8 (0/1)*	0.0747	3.26[a]	0.0741	3.23[a]
Access to social safety nets in 2007/8 (0/1)*	0.0704	2.36[b]	0.0792	2.67[a]
Access to fertilizer coupons in 2007/8 (0/1)*	0.4460	20.21[a]	0.4515	20.46[a]
Open forum allocations 2008/9 and poor 2007/8 (0/1)*	0.0981	3.39[a]	0.0854	2.92[a]
Central region (0/1)*	-0.0367	-1.11	-0.0520	-1.55
Southern region (0/1)*	-0.0321	-0.99	-0.0432	-1.35
Number of observations	1982		1982	
Wald chi-squared (18)	517.51		518.39	
Prob > chi-squared	0.000		0.000	
Pseudo R-squared	0.2703		0.2582	

Note: The dependent variable is a dummy variable for access to subsidized fertilizer coupons received in the 2008/09 agricultural season. (*) dF/dx (marginal effect) is for discrete change of dummy variable from 0 to 1. Robust t-statistics with superscripts *a*, *b* and *c* denotes significance at the 1, 5 and 10 percent levels, respectively.

Annex Table 3 Tobit Estimates for Access to Subsidized Fertilizers in 2008/09

Variable	Model 1		Model 2	
	coeff.	*z*	*coeff.*	*z*
Age of household head (years)	0.227	1.69[c]	0.118	0.84
Male headed household (0/1)	1.698	0.49	0.921	0.26
Elderly headed household (0/1)	-7.940	-1.49	-4.926	-0.85
Household size (adult equivalents)	-1.172	-1.62	0.165	0.16
Value of assets in US dollars in 2008/9	-0.004	-1.09	-0.004	-1.29
Cultivated land in hectares in 2008/9	12.947	4.75[a]	13.679	5.15[a]
Tobacco cultivation in 2008/9 (0/1)	27.639	7.21[a]	-	-
Maize marketing in 2008/9 (0/1)	15.934	3.32[a]	-	-
Crop marketing in 2008/9 (0/1)	-	-	17.277	5.45[a]
Quantity of commercial fertilizers bought in 2007/8 (KG)	-0.014	-1.28	-0.010	-1.00
Own poverty assessment as poor in 2007/8 (0/1)	-15.299	-2.62[a]	-13.819	-2.37[b]
Adequate food consumption in 2008/9 (0/1)	6.501	2.23[b]	6.179	2.10[b]
Business enterprise in 2007/8 (0/1)	0.432	0.15	-0.389	-0.13
Labour market participation in 2007/8 (0/1)	-8.217	-2.85[a]	-9.297	-3.20[a]
Remittance receipts in 2007/8	5.049	1.63	4.486	1.44
Access to social safety nets in 2007/8 (0/1)	4.666	1.40	5.906	1.79[c]
Access to fertilizer coupons in 2007/8 (0/1)	56.109	15.82[a]	57.306	16.19[a]
Open forum allocations 2008/9 and poor 2007/8 (0/1)	13.167	3.36[a]	11.489	2.89[a]
Central region (0/1)	-24.973	-6.35[a]	-28.354	-6.97[a]
Southern region (0/1)	-18.023	-4.51[a]	-20.761	-5.20[a]
Constant	3.257	0.35	4.675	0.50
Number of observations	1982		1982	
F (18, 1963)	27		26.3	
Prob > F	0.000		0.000	
Pseudo R-squared	0.0406		0.0388	

Notes: The dependent variable is quantity of subsidized fertilizer acquired in the 2008/09 agricultural season. Robust t-statistics with superscripts *a*, *b* and *c* denotes significance at the 1, 5 and 10 percent levels, respectively.