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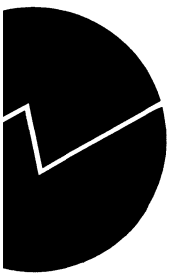

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Documents

Supply Response in a Gender-Perspective, The Case of Structural Adjustment in Zambia

Technical Appendices

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Technical Appendices

Abstract:
Persistent poverty, low economic growth, deteriorating public service, prolonged public budget deficits, and large foreign debt have forced the majority of Sub-Sahara African countries including Zambia to implement structural adjustment type of economic reforms. By getting prices right and reducing market imperfections reforms are designed to ensure that higher prices on agricultural crops will serve as an incentive for women and men small, medium and large scale farmers a like to increase production and hence economic and social welfare. This study address the empirical impact of such a reform program in Zambia step by step, as follows:

- by assessing how economic reforms affect price and market conditions at community level;
- by assessing how price, market and other local conditions at community level affect the supply-response and welfare of women and men small and medium scale farmers; and finally
- by determining whether these conditions are causing a gender-biased supply-response and welfare impacts.

The study starts off by testing central assumption in gender economics literature with a focus on legal gender constraints, gender obligations and preferences, gender based division of labor and bargaining power within households. Crop prices and prices for a simplified consumer price index are collected at community level, aggregated and presented as deflated prices at district and centrality level. National price time series are presented for a range of crops. Farmers response to changing prices are presented both over time and by a cross sectional regression analysis. Data sources for regression analysis are two linked households surveys, one social and one agricultural survey. Cross sectional supply response is analyzed according to three household models; the uniform household, female- versus male-headed households and finally by bargaining power within households. The welfare impact of a certain crop production is analyzed by a reduced form regression analysis for the same three households models; the uniform household, gender of the household head and the bargaining within households. Finally, based upon conclusions from the empirical analysis, three main recommendations for improved economic reforms are presented.

Keywords: Women farmers, crop production, supply-response, welfare analysis, households, gender, bargaining power, economic reforms, sub-Sahara. Africa, Zambia

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Introduction

The study on «Supply Response in a Gender-Perspective, The Case of Structural Adjustment in Zambia» is published as Report 97/3 with the same title and this companion Document with the title «Supply Response in a Gender-Perspective, The Case of Structural Adjustment in Zambia, Technical Appendices» comprising three appendices; Prices and marketing; Regression analysis, methodology and results; and Participatory rural appraisal.

The study has been undertaken by a team[1] comprising Bjørn K Wold, editor and team leader, Statistics Norway, Oslo; Tom Langer Andersen, Statistics Norway, Oslo; Efrida Chulu, Central Statistical Office, Lusaka; Regis Gwaba, Farming Systems Association of Zambia, Chilanga; Ruth Haug, Noragric, Ås; John Kabongo, Farming Systems Association of Zambia, Chilanga; Joyce Kanyangwa-Luma, Central Statistical Office, Lusaka; Angela Keller-Herzog, Ottawa; Mwila Lwaile, Farming Systems Association of Zambia, Chilanga; Astrid Mathiassen, Statistics Norway, Oslo; Nancy Mukumbuta, Farming Systems Association of Zambia, Chilanga; Monica Munachonga, Farming Systems Association of Zambia, Chilanga; Julius Shawa, Central Statistical Office, Lusaka; Patrick Sikana, Farming Systems Association of Zambia, Chilanga; Espen Sørensen, Statistics Norway, Oslo; Johnny S Y Valen, Noragric, Ås.

The background, objective, approach and findings of the study are presented in the Abstract. As presented there to understand how economic reforms affect women farmers. it is necessary to follow the process from the national (macro) level, through the community (meso) level and down to the individual and household (micro) level. The study covers how macro conditions affect both the economic and social options and conditions at community level, which in turn are the options and determinants for individual and household behaviour.

Report 97/3 presents the overall findings, but in order to follow the process, we had to leave out quite some detailed information. However, some of the steps from macro to micro level are more critical than others and in order to share our findings and contribute to the cumulative learning process we are hereby presenting three critical steps in this process as separate appendices.

Appendix 1: Prices and marketing was drafted by Andersen and Sørensen. This appendix aims at documenting how economic reforms aimed at ensuring a switch from a public crop marketing system which indirectly taxed the farmers to a private crop marketing system affects the prices and marketing conditions at an early stage. The unique feature of this appendix is the national coverage providing both crop prices allowing for a cross-sectional documentation of nominal prices and the consumer goods prices and a few input prices, allowing for the calculation of real crop prices across the country. The main methodological issues, approach and findings are presented in the main Report. This appendix gives however the details including details down to district level. Combined with information on transport costs (refer to CSO 1994b) this would allow for a study on trade margins and even a calculation of the efficiency of the private crop marketing system. A shortcoming of the study should be mentioned. It provides only information on the situation at an early stage of implementing the economic reform program. This shortcoming is however addressed in Appendix 3.

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[1] Gunvor Iversen and Jan Lyngstad assisted in planning the study and writing terms of reference. The latter and Ib Thomsen reviewed a draft document and provided valuable comments on the structure, content and presentation. Liv Daasvatn, Frank Kakungu, Kristian Lønø and Nelson Nkoma prepared clean analysis files and Kakungu and Nkoma assisted in the data analysis. John Dagsvik and Marie Arneberg assisted in planning, conducting and reporting from the meso-micro analysis. Iulie Aslaksen reviewed the document from a gender economic perspective and provided valuable ideas and inputs. However, none of these are responsible for any shortcomings of the study nor these appendices, which remains the sole responsibility of the study team.

Appendix 2: Regression analysis, methodology and results was drafted by Mathiassen, Valen and Wold based upon a theoretical outline by Wold and the analysis undertaken by Mathiassen and Valen with support from Wold. This appendix aims at analyzing how individual farmers and households adapt to the obligations, options and conditions at community level. The main report presents the main findings, but this appendix gives the detailed regressions results for the full range of crops and household models. The analysis combines information from a Community Survey, a social and economic survey (Priority Survey II) and finally an agricultural survey (Crop Forecast Survey). Due to technical difficulties the study team managed to match information for only half the planned sample of around 3000 households. This reduced the test power and hence the probability of rejecting a true hypothesis. As presented in the main study and further documented here, we have still managed to verify important elements in both the hypothesis of farmers acting as households rather than firms and the hypothesis that the bargaining power of women farmers will affects whether a household aims at maximizing only economic or also social welfare.

Appendix 3: Participatory rural appraisal was drafted by Sikana, Gwaba, Haug, Kabongo, Lwaile, Munachonga, and Mukumbuta.

Reckognizing the limitations of quantitative information at national level and survey information at community, household and individual level, the study included a qualitative component, a Participatory rural appraisal. This appraisal aims at documenting the options and conditions for the farmers in six villages, one remote village and one close to the provincial capital in each of 3 provinces. By spacing the survey and the participatory rural appraisal in time, it also allowed for learning about the impact of the economic reforms in a longer time horizon. The main findings are integrated in the main Report, but the appendix presents the findings in further details.

1. Prices and marketing[2]

1.1. Prices - principles, concepts and methodological aspects

This section presents basic principles, concepts and methods used in the processing of the CS price information. The processing is based on well known methods concerning corrections for partial and total non-response, identifying outliers, imputations and estimations. Aggregates are based on weighted price ratios for each comparable item within the involved communities. Average urban Lusaka prices serve as basis and reference.

Survey data - some areas for further improvements

The CS-survey provides various types of information - among this also prices on consumer items, important output products and input products. The CS is however not especially designed for collecting information for price studies. Several weaknesses might have had influence on the results.

The CS uses a group of community heads as the observation unit. Although the observation unit for many purposes is relevant and also cost-efficient some problems might appear when collecting price information. The price information collected should be actual prices on important consumer items, producer prices and input prices - when sold either at the local market (community) or at the nearest district centre market. If the important items/products - due to seasonal variations etc. - were not available during the surveying period the group of heads should provide price-guesses, i.e., prices as they were when the item last were available in the local or district centre market. Several problems are

[2] A short version of this appendix appears as Appendix E in the main Report. The appendix was drafted by Tom Langer Andersen and Espen Sørensen and was reviewed by Bjørn K. Wold.

inherited in this - some might be critical or have a distorting effect on results, at least at lower levels of aggregation.

One problem is related to the principle of asking the observation unit to indicate the important products of the community and provide the information requested. The problem is that this is done without providing the interviewer with fairly detailed descriptions of some common representative items as a basis for the interview.[3] Although there are much sense in asking the respondents to indicate the important items - the lack of some common basis for collecting prices taking quality-aspects into consideration most likely have contributed to the quality-problems of data. Parts of the price-variations is undoubtedly the result of deviations due to uncontrolled qualitative aspects of the items. A more preferable approach for the price collection would be using a fixed set of representative items giving a fairly detailed description of the most typical items and focusing on the important qualitative aspects and also using a standardized unit (although there are local variations in the units). The survey should in addition collect prices for local brands or qualities. For such items the inter-viewer needs some further specifications of information to be collected - to secure a common quality standard and comparability.

A second problem concerns the types of prices collected - actual prices and/or price-guesses. When important items are non-available during the surveying period two aspects seem important - do respondents remember the true prices for the items, and do prices refer to a period in time where prices are high or low compared to the surveying period? The time-lags between the surveying period and the last actual prices might in some occasions be substantial. The use of the last actual price as an estimate gives an indication on the local price level but might just as well be misguiding and turn out to be an outlier. The mixture of actual prices and in some cases the respondents estimates (true or not) implies that the studies - for some communities - might end up comparing prices from different seasons or different phases of the seasons. Large price level differences between on- and off-seasons will most likely have a larger impact on the rural estimates - areas where the availability of items seems more scarce and the probability for recording price-guesses is higher. Coding actual prices and price guesses separately during the interview would also improve price information.

The size of the sample and the number of selected communities within provinces and districts does not seem ideal for price analysis. The sampling issues should be re-examined for further surveys. The major problem in a price-context is related to a high sampling error on detailed levels - but also at slightly more aggregated levels (district) - and in some cases it turns out to be unacceptably high. A part of this problem is the size of the non-response which contributes - especially for rural areas - to weak estimates on district levels.

Non-response - 51 percent of the possible cells (total but most frequently partial non-response) will in general have different causes. In the Zambian survey we expect that the phenomenon mainly reflects two reasons: the items are normally not sold/consumed in the sampling-area - or are temporarily non-available (off-season etc.). We expect the first reason to be the important one. We believe that - due to issues discussed in this section - the survey showed have a substantial portion of observations which could be labelled extreme values - outliers. Such problems might even have several other causes than mentioned e.g. measurement errors (when converting from one unit to another etc.) or entry errors - to mention some typical problem-issues. In spite of the possible sources for errors we see reasons for being careful in the process of correcting the identified outliers. Studies on a detailed level shows that there are surprisingly large differences in the price levels within districts and also between closely related/located districts. Such differences might be the result of types of errors in a statistical sense but do more likely reflect aspects like distances/transport to markets, low integration of markets,

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[3] A list of items were provided however without giving any kinds of details.

availability of items, seasonal aspects etc. The studies on a detailed level confirms that there are large and most likely true price level differences existing in a transitional economy like the Zambian.

Sources, principles and methods

Main input data for the study have been the Community Survey 1993 (CS), the Priority Survey II 1993 (PS2), the Crop Forecast Survey 1992/1993 Season (CFS) and Post Harvest Survey 1992/1993 Season (PHS). The CS is performed at community level, while the PS2 and the CFS is at household level. PHS-figures are at district level. For weighting purposes the CPI weighting structure and population figures from the 1990 Census of population, housing and agriculture have also been used in the calculations.

Representative items

The CS provides price information for a large number of items - some common all over the country while others were typical local items not found elsewhere. Among the items provided some representative items were selected - fulfilling some basic criteria. The dominant criteria were: the representative item should be available in more than one province and also found in Lusaka, urban (the reference area); the item should be typical both for rural and urban consumption - and last the total number of observations within a province / district had to be sufficient to provide reliable estimates of the aggregated price ratios. Refer to Table 1.1. for list of representatives.

Weights

The main sources for weighting in the consumer-part were PS2, CS and CPI. In estimating producer prices and input prices, information from the CFS and PHS have been used.

Table 1.1.* Items in the consumer price level index, by consumer groups

Consumer group	Item	quantity
1. Food		
1.1 Cereals	Maize-meal	25 kg
	Cassava-meal	1 kg
	Rice	1 kg
1.2 Meat and fish	Capenta	1 kg
	Dry fish	1 kg
	Beef	1 kg
	Chicken	1 kg
	Pork	1 kg
1.3 Other food items	Cabbage	1 kg
	Dry beans	1 kg
	Rape	1 kg
	Pumpkin	1 kg
	Cooking oil	2,5 kg
	Sugar	2 kg
	Salt	1 kg
2. Other consumer items		
2.1 Clothing	Men's shirt	1 piece
	Chitenje	2 meter
2.2 Fuel	Firewood	1 kg
	Charcoal	90 kg
	Paraffin	1 litre
2.3 Other household items	Soap	500 gram
	Aspirin	1 tablet
	Battery	1 piece

*Table 1.1. is equal to table E1 in the main Report, Appendix E.

Consumer prices

CS collects price information both for the local and district centre markets. There are two evident reasons for collecting actual prices in both markets. First - the households living in the remote areas will normally not find all types of consumer items in the local markets. Their only alternative is to buy such items in the nearest district centre market. A parallel situation exists for input items. For a realistic coverage of the actual prices paid by the households in achieving all kinds of products the district centre market price have to be taken into consideration. Second - local knowledge about prices existing in the nearby district centre markets indicates the opportunity costs of not being able to buy in the local market.

For some communities only prices from one of the markets were available - in this case normally the local market prices. The prices collected indicates that consumer items are bought both in the local as well as the district markets. However neither CS nor PS2 provides direct information on the relative importance of the markets in buying items. To establish a combined price (including both local and district prices) the information available on the number of price observations observed in the local and the district markets (on province level) were utilized as weights or a proxy on the importance of the markets for each of the consumer items.

Aggregation of price ratios to analytical levels (district, province, grouped by centrality, rural - urban dimension and consumption-groups) were based on expenditure information from PS2. The number of communities not covered by PS2 were under 1 percent. For communities lacking PS2 expenditure data - expenditure shares were estimated using consumption patterns for comparable communities within the same province or district.

Table 1.2.* Consumer price level weights (expenses in mill. kwacha) and expenditure shares by province

Province	Total index	1. Food	1.1 Cereals	1.2 Meat and fish	1.3 Other food	2. Other consumer items	2.1 Clothing	2.2 Fuel	2.3 Househ. items
Central	31004	17782	7774	3236	6772	13223	1806	2527	8890
Copperbelt	178607	104815	39006	20765	45044	73792	9452	17776	46564
Eastern	20282	12813	5993	1912	4908	7469	1194	1591	4683
Luapula	13813	8688	4186	1505	2997	5126	1032	1007	3088
Lusaka	155588	83330	32143	17438	33750	72258	6911	20935	44412
Northern	21335	13854	5372	2733	5749	7481	1768	1106	4608
North Western	8471	5407	2408	895	2104	3064	773	453	1838
Southern	27215	15455	5987	3550	5918	11760	1480	1915	8365
Western	14034	9324	4840	1620	2864	4710	951	857	2902
Expenditure shares, percent of totals:									
Central	100	57	25	10	22	43	6	8	29
Copperbelt	100	59	22	12	25	41	5	10	26
Eastern	100	63	30	9	24	37	6	8	23
Luapula	100	63	30	11	22	37	7	7	22
Lusaka	100	54	21	11	22	46	4	13	29
Northern	100	65	25	13	27	35	8	5	22
North Western	100	64	28	11	25	36	9	5	22
Southern	100	57	22	13	22	43	5	7	31
Western	100	66	34	12	20	34	7	6	21

* Table 1.2. is equal to table E2 in the main Report, Appendix E.

For the weighting procedures expenditure information on various levels and from different sources were utilized. The PS2 provides expenditure data for the consumption-group aggregates for each of the communities. For aggregation within two of the groups - cereals (group 1.1) and household items (group 2.3) - more detailed item expenditures from PS2 including own consumption, were utilized.[4] Expenditure data on item level were however not available for the other 4 groups. To overcome this, weight-information from the Zambian CPI were utilized - as a tool for a further breakdown of the expenditure totals according to PS2. The CPI provides information restricted to urban areas however with a breakdown according to households income - low and high. CPI expenditure shares for high income households were used in the breakdown of PS2 expenditures of the urban communities located in Lusaka, Ndola, Kitwe and the province capitals. The expenditure shares of low income households were used in the breakdown for the other communities. For items not having a weight according to the CPI weighting structures (e.g. firewood) an expenditure share were estimated utilizing the expenditure shares for other fuel items (charcoal).

The total population expenditure in a community was calculated, by using the PS2 expenditure figures (see above), CS community information and populations figures which formed the basis for the weighting structure on the community level. Table 1.2 presents the weights in absolute figures and percent of total.

Producer/input prices:
For processing of output and input prices the sole purpose were to estimate weighted averages on item level grouped by province, district etc. An important source for weighting and aggregation on item level across communities were the PHS which provides production values on district level. For a further breakdown of the PHS-figures to community level, household data from the CFS were used. Due to the fact that no CFS-information were available for the provinces of Luapula and North-Western a further breakdown to community level were established using the PHS production values on district level using population figures.

Furthermore no expenditure information were available on inputs items. The weights on community level were established using the size of planted acreage of maize as a proxy for both hybrid maize seed and fertilizer.

Outliers - identification and imputations
Although outliers clearly were found in the data we had all reasons to handle such problems with great care. Large price level differences were expected to be found and had to be analyzed carefully before implementing correction-procedures. The data were edited in two main stages, first in Zambia, by examining potential outliers with the questionnaires. Secondly the data, free of the most obvious errors, were run through tests in Norway, were potential outliers - treated or not - were identified using tests on the price-ratios[5] using a quartile-approach in setting the boundaries [6]. The identification-process took place on two levels. The procedure started out at province-level - flagging extreme prices in a provincial sense. As a second step the procedure continued on district-level - flagging extremes. The district-step were run to exclude false outliers due to special local price-patterns invoked in the data in a province. In general only the extremes that were flagged both on province and district level became a subject for further consideration and eventually correction.

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[4] The inclusion of own consumption is according to the international principles used in the CPI.

[5] Local prices in a community divided by the weighted average price in Lusaka, urban.

[6] The principles and methods are described in Hidiroglou and J.M. Berthelot, June 1986.

Table 1.3. Imputed and corrected outliers grouped by province and consumer group

Province	All	1. Food	1.1 Cereals	1.2 Meat and fish	1.3 Other food	2. Other consumer items	2.1 Clothing	2.2 Fuel	2.3 Househ. items
All	453	281	51	105	125	172	47	64	61
Central	46	34	7	14	13	12	7	3	2
Copperbelt	79	51	5	23	23	28	6	9	13
Eastern	50	32	6	10	16	18	6	7	5
Luapula	35	25	10	5	10	10	4	5	1
Lusaka	73	26	1	11	14	47	18	10	19
Northern	63	43	10	15	18	20	2	14	4
North Western	35	20	6	3	11	15	2	4	9
Southern	40	33	4	20	9	7	2	2	3
Western	32	17	2	4	11	15	0	10	5

Although a reasonable number of potential outliers were identified we sought to minimize the number of corrections made - to preserve as much as possible of the price-variations inherited in the data. In practice the corrections were limited to extreme observations - likely wrong - which highly distorted the group-estimates.

Table 1.4. Identified and imputed outliers grouped by province

Province	Beans	Cassava	Cotton	Ground-nuts	Maize	Millet	Sorg-hum	Sun-flower	Hybrid maize-seed	Ferti-lizer
All	17	29	13	105	58	13	7	3	26	8
Central	0	0	2	7	1	1	2	0	0	0
Copperbelt	5	9	3	13	18	2	1	0	3	0
Eastern	4	4	2	38	4	2	0	1	4	0
Luapula	4	6	1	5	9	3	0	0	2	0
Lusaka	0	0	2	3	1	0	0	0	3	0
Northern	2	3	0	10	4	3	1	2	2	2
North Western	2	2	0	3	14	0	0	0	3	0
Southern	0	0	3	18	5	1	3	0	4	2
Western	0	5	0	8	2	1	0	0	5	4

The outliers that were identified as true had to be corrected. For this procedure the clean local price-data on district level formed the basis for estimating the substitutes. The most frequent estimate used was the average of the district prices. For corrections within districts were the price-information available were limited the province-average were used.

Groundnuts turned out to be the most frequent corrected producer item - mainly due to differences in quality of the items observed in the CS (shelled / unshelled groundnuts). The prices for shelled groundnuts were on average 3 times larger. A fairly small number of outliers were found and corrected for the input products. The small variations in the input prices on district and province level are most likely explained by the lack of local production of these products.

Special problems handling partial non-response

The partial non-response, both prices and weights, created several problems which had to be treated in different ways. In the aggregations of the consumer price level indices some community aggregates turned out to be highly influenced of the availability and non-availability of items. An example based on the consumption group cereals - cassava and maize-flour - can illustrate this. The cereal aggregates

for communities reporting prices on cassava - which normally had an especially low price in the rural areas - and providing no prices for maize-meal turned out unrealistically low. A low price for cassava in rural areas is the result of an excess local supply of an item having large importance for some of the rural households but of only marginal interest for the consumers in the more urbanized markets. The substantially higher prices for cassava observed in Lusaka, urban first of all reflects a higher general cost of living in the urbanized areas. A comparison between rural and urban communities having Lusaka as the reference - and based on cassava as the sole representative for cereals - created results which does not seemed reliable. Due to the fact that maize-flour prices were observed for surrounding communities and that this is a very common item among the cereals all over the country we decided that the lack of such prices had to be considered as a partial non response. Thus - for communities lacking prices for maize-flour estimates were made however providing the estimated representative with a minor weight.

As a general rule at least one price observation had to exist in each of the consumer-group. If a community had a total non response in one of the groups the price of the most consumed item in the consumer-group were estimated as a substitute. Table 1.5. shows that 271 consumer prices were imputed constituting 4 percent of all the partial and total non response.

Table 1.5. Number of partial non-responses imputed grouped by province. Consumer prices

Province	All	1. Food	1.1 Cereals	1.2 Meat and fish	1.3 Other food	2. Other consumer items	2.1 Clothing	2.2 Fuel	2.3 Househ. items
All	271	142	59	51	32	129	40	51	38
Central	21	12	4	5	3	9	3	3	3
Copperbelt	20	13	5	6	2	7	3	2	2
Eastern	15	8	4	2	2	7	1	5	1
Luapula	22	11	8	2	1	11	5	4	2
Lusaka	36	19	5	8	6	17	6	6	5
Northern	83	50	23	17	10	33	10	12	11
North Western	30	8	4	0	4	22	6	9	7
Southern	38	19	5	10	4	19	5	8	6
Western	6	2	1	1	0	4	1	2	1

Table 1.6. Number of partial non-responses imputed grouped by province. Producer prices and input prices

Province	Beans	Cassava	Cotton	Ground nuts	Maize	Millet	Sorg hum	Sun flower	Hybrid maize seed	Ferti lizer
All	158	161	119	262	167	142	106	108	310	167
Central	10	1	19	27	5	17	25	22	16	5
Copperbelt	27	30	24	25	50	13	4	0	59	29
Eastern	34	16	40	19	13	5	21	53	53	17
Luapula	38	14	0	20	18	27	0	0	49	24
Lusaka	0	0	11	11	4	9	5	8	7	5
Northern	33	64	0	55	24	33	26	0	42	27
North Western	14	14	0	21	14	2	2	0	17	11
Southern	1	0	24	41	22	16	8	25	29	24
Western	1	22	1	43	17	20	15	0	38	25

For the treatment of non response as concerns output and input prices at community level another approach were used. For communities located in districts where the CS and PHS indicated production or sale of the product concerned and not providing a producer price were imputed. The most frequent observed output and input prices - groundnuts, maize, hybrid maize seed and fertilizer - are important all over Zambia.

Special issues handling producer prices and input prices

Real output and input prices (in a spatial sense) were estimated by dividing the community product or input prices with the grand total consumer price level index of the community. The treatment of partial non response and identification of outliers were done directly on the real price level. Corrections and imputations when necessary were based on relatives comparing the average price of the product concerned to the price average of maize within the district or province.

Aggregations

For comparing price levels across consumption groups and for totals, across districts and provinces the study use price level indices which are estimated with the Lusaka, urban-area as a price base and also as the reference base (=100). The results presented covers aggregates mainly using local weights, i.e. outside Lusaka, urban-consumption patterns. Some results which reflects the average price level taking both the local and the Lusaka-urban weights into consideration are presented in Table 1.7.

Aggregates were estimated using a spatial type of the Paasche-formula - with Lusaka, urban-prices as basis and with local weights. Due to partial non-response the price level indices had to be estimated in a dynamic system. When a price-ratio were necessary, in order to establish an index for a consumer-group aggregate, the price was imputed - else not. All in all the need for imputations were highly reduced.

Calculation of price ratio for item i for a community - with Lusaka as price basis, where:

r_i is the price ratio for item i in a sample community
ω_{ij} is the expenditure in kwacha for item i in each of the communities in Lusaka, urban
p_i^C is the price for item i in a community,
p_{ij}^L is the price for item i in each of the j (j=1,....,k) communities in Lusaka, urban.

1.2. Prices - data

Table 1.7. Real producer prices and input prices grouped by province by centrality. Kwacha/unit. (cont.)

Province and centrality	Beans	Cassava	Cotton	Ground-nuts	Maize	Millet	Sorghum	Sun-flower	Hybrid maize-seed	Ferti-lizer
	90 kg	90 kg	1 kg	80 kg	90 kg	90 kg	90 kg	90 kg	1 kg	50 kg
Unit										
Central	15946	.	33	10900	2904	5227	4072	7274	161	5722
Other towns along line of rail	.	.	35	14389	2937	.	3033	7961	139	6858
Within 50 km from line of rail	.	.	38	13646	3187	.	3268	8602	154	4958
Other district centres	13912	.	35	9386	2807	5000	5697	6665	163	6298
Within 50 km from district centres	17867	.	29	9678	2711	5108	6323	6431	166	5650
More than 50 km from line of rail	.	.	32	12436	2743	.	2896	7437	155	4928
More than 50 km from other centres	15521	.	33	8737	3171	5452	5693	7706	175	5541
Copperbelt	16262	7373	.	18731	3649	5212	16222	.	151	8292
Kitwe, Lusaka and Ndola	27453	.	.	30660	6054	.	.	.	259	8974
Other towns along line of rail	25351	.	.	30461	4555	.	.	.	229	8258
Within 50 km from line of rail	15789	7683	.	21688	3338	4960	20895	.	132	7945
Other district centres	15904	6626	.	13964	3659	5489	10020	.	138	8443
More than 50 km from other centres	13881	7555	.	11780	3624	5297	15407	.	158	8525
Eastern	5477	.	35	9114	3564	2794	7166	3211	196	6609
Other province capitals	4377	.	37	10048	4059	.	.	1882	216	6592
Within 50 km from province capitals	3558	.	34	9596	3494	.	.	1629	178	7131
Other district centres	7542	.	42	8648	3560	2154	5540	3426	219	6751
Within 50 km from district centres	8225	.	34	8692	3476	2625	5827	3515	194	6495
More than 50 km from other centres	6669	.	36	11359	4359	2987	8391	3262	236	5974
Luapula	22645	3154	.	23593	4144	5975	.	.	177	7370
Other province capitals	24881	3189	.	24516	3679	4438	.	.	149	7246
Within 50 km from province capitals	24288	2541	.	30803	3812	6469	.	.	154	7508
Other district centres	15418	2781	.	22174	3834	8676	.	.	182	6714
Within 50 km from district centres	19423	3655	.	19486	4805	6938	.	.	209	6425
More than 50 km from other centres	23790	2817	.	25315	4178	5935	.	.	182	8256
Lusaka	.	.	.	23358	4441	5256	5119	6593	224	6214
Other towns along line of rail	.	.	.	25415	4765	5718	5435	7308	216	6269
Within 50 km from line of rail	.	.	.	24677	4627	5552	5475	6775	260	6532
Within 50 km from district centres	.	.	.	.	4552	.	.	.	162	6886
More than 50 km from line of rail	.	.	.	16486	3379	3709	3614	5014	177	4707

Table 1.7. (cont.). Real producer prices and input prices grouped by province by centrality. Kwacha/unit

Province and centrality	Beans	Cassava	Cotton	Ground-nuts	Maize	Millet	Sorghum	Sun-flower	Hybrid maize-seed	Ferti-lizer
	90 kg	90 kg	1 kg	80 kg	90 kg	90 kg	90 kg	90 kg	1 kg	50 kg
Unit										
Northern	12790	3856	.	9039	2989	3808	7393	.	214	7967
Other province capitals	6862	3899	.	7542	2290	1600	.	.	113	7758
Within 50 km from province capitals	6905	3853	.	8168	2027	1572	.	.	92	7306
Other district centres	13569	3409	.	9974	2954	3992	6759	.	239	8837
Within 50 km from district centres	12308	3450	.	9323	3222	5103	7022	.	241	7756
More than 50 km from other centres	13196	4122	.	8977	3033	4030	7893	.	216	8015
North Western	23908	3830	.	15852	3948	.	10854	.	217	6326
Other province capitals	32975	3945	.	2679	4719	.	.	.	192	9791
Within 50 km from province capitals	21940	3945	.	18931	4719	.	.	.	211	5780
Other district centres	24262	5249	.	16603	3369	.	14274	.	219	5486
Within 50 km from district centres	24231	2398	.	14487	3344	.	.	.	248	6070
More than 50 km from other centres	22976	3650	.	19910	4424	.	3516	.	205	6775
Southern	.	.	81	18596	4007	5623	7037	5478	153	9001
Other towns along line of rail	.	.	87	19450	3738	4283	.	4712	150	9171
Within 50 km from province capitals	.	.	81	18738	4477	5193	.	5364	155	9628
Other district centres	.	.	.	16547	3591	7037	7037	5392	134	8941
Within 50 km from district centres	.	.	.	14958	3217	7037	7037	4796	148	7526
More than 50 km from line of rail	.	.	79	19712	3664	4907	7037	6204	152	8814
More than 50 km from other centres	.	.	.	20287	3646	.	.	5212	156	6769
Western	.	4156	.	14362	3559	5291	4599	.	294	5782
Other province capitals	.	4162	.	19047	4025	.	.	.	299	6152
Within 50 km from province capitals	.	3634	.	19462	4112	.	.	.	306	6286
Other district centres	.	5316	.	14123	3253	4292	3995	.	253	4736
Within 50 km from district centres	.	4436	.	12638	3503	5763	4683	.	315	6437
More than 50 km from other centres	.	4523	.	15889	3490	5232	4948	.	290	5423

2. Regression analysis, methodology and results[7]

2.1. Supply Response Analysis, methodology

Variable list

Variable	Description
Q_m	Production of maize
Q_c	Production of non-maize crops
PQ_c	Probability of producing a specific non-maize crop
PS_m	Probability of producing maize for sale
QC_m	Consumption share of production of maize
p_i	Vector of relative input prices: fertilizer price, hybrid maize-seed price
p_m	Relative maize price
p_c	Relative price of other crops
p	Vector of relative prices
Ag	Vector of agricultural inputs at household level: Land available for cultivation, total area under cropping, ownership of equipment (plough), use of inputs: fertilizer, hybrid seeds
w	Off farm salary, i.e. a vector of agricultural sector salary at community level: (piecework) agricultural wage for men, (piecework) agricultural wage for women
Y_{non}	Non-farm income
A_{com-e}	A community vector comprising: agro-ecological zones*, producer markets*, access to food market
A_{com-n}	Centrality*
A	A vector comprising A_{com-e} and A_{com-n}
H_e	A household adult vector comprising: dependency ratio, life cycle stage*, average number of days being sick, maximum education level of wife or husband
H_n	A household family vector comprising: dependency ratio, life-cycle stage*, child sickness indicator, maximum education level of wife or husband
H	A vector comprising H_e and H_n
Bw	A vector comprising the difference in income and education between wife and husband; income share (wife - husband), measured as income by wife/ income by wife + husband and relative education (wife - husband) measured as difference in years of education (years by wife - years by husband)

*Refer to specification below.

Regressions and models

Any small or medium scale farmer in Zambia will grow some crops for own consumption. We assume that the area cultivated for these crops are exogenous and not affected by prices. Maize is the main crop for sale and we assume that the production of maize is only affected by the relative maize price/ income elasticity and not by other crops prices/ cross price elasticities. It is however reasonable to

[7] A short version of this appendix comprising the text part and two tables appears as Appendix F in the main Report. The theoretical outline and the text component of this appendix was drafted by Wold, Mathiassen drafted the regression tables, Valen and Mathiassen conducted the supply response and Mathiassen and Valen the welfare regression analysis. Mathiassen, Valen and Wold reviewed each others contributions.

assume that the production of other crops for sale are determined by both the specific crop price and the maize price/ by cross price elasticities.

We have used three different types of supply response production regressions;

- Probit regression where we are estimating the probability that a certain household will cultivate a certain crop: groundnuts (for all households and separate for female headed and male headed households) and maize for sale.
- Tobit regression where we estimate the total production of a crop assuming a theoretical normal distribution starting below zero, while the observed values obviously are restricted to non-negative ones. Tobit estimates are presented for total maize production (for all households and separate for female headed and male headed households), groundnuts, cassava, millet, sorghum, mixed beans, and maize for sale
- Ordinary regression analysis of the consumption share of a certain crop: maize and groundnuts

We have tested three different models:

- A uniform household model for all households, - tested for all left side variables
- Separate models for female headed and male headed households, tested for the probability of producing groundnuts and for the production of maize and groundnuts.
- Bargaining power household model for producing households, tested for the consumption share of maize and groundnuts.

Supply response / production functions.
Total maize production per household member and maize production for sale, for all households or separate for female headed and male headed households:

(1) $Q_m=a_1+b_1\,p+c_1Y_{non}+\,d_1Ag+e_1H_e+f_1w+g_1A\,e$, where $p = p\,(p_m, p_i)$

Total production of a non-maize crop, for all households or separate for female headed and male headed households:

(2) $Q_c= a_2+b_2\,p+c_2Y_{non}+\,d_2Ag+e_2H_e+f_2w+g_2A\,e$, where $p = p\,(p_m, p_i, p_c)$

Probability for production of a specific non-maize crop:

(3) $PQ_c= a_3+b_3\,p+c_3Y_{non}+\,d_3Ag+e_3H_e+f_3w+g_3A\,e$, where $p = p\,(p_m, p_i, p_c)$

Probability of producing maize for sale:

(4) $PS_m= a_4+b_4\,p+c_4Y_{non}+\,d_4Ag+e_4H_e+f_4w+g_4A\,e$, where $p = p\,(p_m, p_i)$

Consumption share of maize production, model includes bargaining within the household:

(5) $QC_m= a_5+b_5\,p+c_5Y_{non}+\,d_5Ag+e_5H_e+f_5w+g_5A\,e, +h_5B_w$ where $p = p\,(p_m, p_i)$

Consumption share of a specific non-maize crop, model including bargaining within the household:

(6) $QCc= a_6+b_6\,p+c_6Y_{non}+\,d_6Ag+e_6H_e+f_6w+g_6A\,e, +h_6B_w$ where $p = p\,(p_m, p_i, p_c)$

Detailed variable specification
Some of the variables specified might need some further explanation:

Dependency ratio is defined as the ratio between number of «non-productive» members in the household (person below the age of 12 years or older the 65 years), relative to all the household members.

We divide the households into four life-cycle stages.

1. households where the husband and/or the wife is older than 40 years old, and none of the members is younger than 16 years.
2. households where there is at least one child younger than 7 years and no children between 7 and 16 years.
3. households with children between 7 and 16 years. (we split between group 2 and 3 expecting that household with older children will have less dependency burden since the older children take care of the younger)
4. households where all members is between the age of 16 and 40 years.

Level 4 is the reference level in the analysis.

Areas are grouped in four agroecological zones, as follows.

1. Luangwa-Zambezi, rift valleys, this region is characterized by low rainfall and a short growing period.
2. Central, Southern and Eastern, plateaus, characterized by moderate rainfall and a longer growing season.
3. Western, semi-arid plains, moderate rainfall and a longer growing period, but with less fertile soil than the plateaus.
4. Northern, high rainfall zone, high rainfall, long growing season, relative infertile soils, and level 4 is the reference level which all the others are compared to in the regression.

Centrality is categorized in six levels for rural analysis as follows;

1. Hinterland within 50 km from towns along the line of rail;
2. Hinterland within 50 km from the provincial capital;
3. District centres;
4. Hinterland within 50 km from district centres;
5. Remote areas to Lusaka, Ndola, Kitwe and other towns along the line of rail; and
6. Remote areas to provincial capitals or districts centres.

Level 1, the most central areas, is the reference in the analysis.

Producer markets categorized as follows.

- Farmgate: Sale from location of the production. For maize this will often be from the farmers house since the shelling and packing usually are done there.
- Creditor at farmgate: Sale to a trader who is also a creditor in some sense, usually by providing inputs free of charge. The trader will usually share the risk with the farmer. If the production fails due to climatic constraints, then the farmer have no obligations. On the other hand the price is considerably lower than on the free market.
- Local co-operatives: real co-operatives where a group of farmers or a whole community join each other in marketing.

- Local markets: Any market close to the community, while not being the main market in the district.
- District markets: The main market in the district
- Public market depot: A public depot which is buying from farmers, local co-operatives and traders.

2.2. Supply response analysis, Results

In the following tables the significance is reported by stars (or no stars):
*- significance at 10 percent level **- significance at 5 percent level ***- significance at 1 percent level.

Table 2.1. Total maize production, tobit regression

	All households	
Regressor	Estimate	Std.error
Continuos variables		
intercept	38.3***	(5.97)
producer maize price	-0.072	(0.48)
fertilizer price	0.00007	(0.0003)
hybrid maize-seed price	0.011	(0.009)
non-farm income	0.00009**	(0.00005)
dependency ratio	8.9**	(3.12)
max. education	0.042	(0.14)
agric. wage for man	0.0014	(0.002)
agric. wage for woman	0.0034	(0.0018)
Classification variables		
life-cycle level		
1	-8.2***	(3.1)
2	-12.5***	(3.14)
3	-12.1***	(2.8)
agroecological zones		
1	1.7	(2.04)
2	4.23***	(1.5)
3	-5.7***	(2.11)
owner of plough (default=no)	4.69***	(1.18)
land available for cultivation (default=no)	0.35	(1.05)
centrality		
2	-1.103	(2.1)
3	1.95	(2.03)
4	1.14	(1.54)
5	-2.7	(2.23)
6	-3.42	(1.8)
use of fertilizer (default=no)	16.14***	(1.1)
use of respective producer markets (default=no use):		
farmgate	-7.37	(2.6)
creditor at farmgate	18.91***	(4.61)
local co-operatives	1.97	(1.83)
local markets	-0.29	(2.74)
district markets	-1.141	(1.19)
public market depot	-0.152	(1.3)
Log-likelihood	-6022.4	
# observation	1600	
# noncensored	1358	
#censored	242	

Table 2.2. Groundnuts production, tobit regression

	All households	
Regressor	Estimate	Std.error
Continuos variables		
intercept	-8.90***	(2.67)
producer price groundnuts	0.0053	(0.0054)
producer price maize	-0.041**	(0.018)
total area under crop	4.08***	(0.26)
non-farm income	0.00000077	(0.000021)
dependency ratio	-0.68	(1.39)
education (max. of wife and husband)	-0.099	(0.062)
agricultural wage for man	-0.000056	(0.00065)
agricultural wage for woman	0.000080	(0.00077)
Classification variables		
life-cycle level		
1	-0.96	(1.35)
2	-0.64	(1.37)
3	-0.22	(1.21)
agroecological zones		
1	-0.34	(0.90)
2	1.62**	(0.66)
3	-3.12***	(1.03)
owner of plough (default=no)	0.27	(0.49)
land available for cultivation (default=no)	0.22	(0.45)
centrality		
2	2.73***	(0.95)
3	1.80*	(0.97)
4	2.58***	(0.73)
5	-0.039	(0.98)
6	1.96**	(0.86)
use of respective producer markets (default=no use):		
farmgate	-1.78	(1.17)
creditor at farmgate	-3.80*	(2.19)
local co-operatives	-0.47	(0.78)
local markets	1.38	(1.17)
district markets	0.96*	(0.55)
public market depot	0.0013	(0.55)
Log-likelihood	-2095.8	
# observation	1466	
# noncensored	533	
#censored	933	

Table 2.3. Probability for groundnut production

		All households	
Regressor		Estimate	Std.error
Continuos variables			
intercept		-1.20***	(0.45)
producer price groundnuts		0.0020***	(0.00077)
producer price maize		-0.0090***	0.0031
total area under crop		0.20***	(0.056)
non-farm income		0.0000024***	(0.056)
dependency ratio		-0.17	(0.24)
education (max of wife and husband)		-0.0070	(0.011)
agricultural wage for man		0.000053	(0.00011)
agricultural wage for woman		-0.000024	(0.00013)
Classification variables			
life-cycle	level	yes	
	1	0.026	(0.25)
	2	0.059	(0.25)
	3	0.16	(0.23)
agroecological zones		yes***	
	1	-0.51***	(0.15)
	2	0.24**	(0.11)
	3	-0.89***	(0.17)
owner of plough (default=no)		0.18**	(0.085)
land available for cultivation (default=no)		0.087	(0.078)
centrality		yes**	
	2	0.45***	(0.16)
	3	0.34**	(0.16)
	4	0.39***	(0.12)
	5	-0.021	(0.17)
	6	0.24*	0.14)
use of respective producer markets (default=no use):			
farmgate		-0.35*	(0.20)
creditor at farmgate		0.057	(0.35)
local cooperatives		-0.24*	(0.13)
local markets		-0.42**	(0.21)
district markets		0.24***	(0.094)
public market depot		-0.15*	(0.092)
# observation		1466	
#groundnut producers		533	
#non-groundnuts producers		933	

Table 2.4. Production of cassava[8], tobit-model

	All households	
Regressor	Estimate	Std.error
Continuos variables		
intercept	-0.088	(0.48)
producer cassava price	-0.0014	(0.0018)
producer maize price	-0.0056**	(0.0025)
total area under crop	0.028	(0.055)
dependency ratio	0.46**	(0.18)
education (max of wife and husband)	-0.0030	(0.0082)
agricultural wage for man	0.00016*	(0.000097)
agricultural wage for woman	-0.00020	(0.00015)
Classification variables		
life-cycle level	yes	
1	0.20	(0.18)
2	0.083	(0.19)
3	0.098	(0.17)
agroecological zones	yes***	
1	-0.30	(0.19)
2	-0.34**	(0.17)
3	0.11	(0.075)
owner of plough (default=no)	0.075	(0.088)
land available for cultivation (default=no)	0.18***	(0.072)
centrality level	yes***	
2	0.79***	(0.20)
3	0.48***	(0.16)
4	0.52***	(0.16)
6	0.44***	(0.14)
use of respective producer markets (default=no use):		
farmgate	0.33	(0.31)
local cooperatives	-0.022	(0.097)
local markets	0.088	(0.20)
district markets	0.023	(0.068)
public market depot	0.091	(0.13)
Log-likelihood	-205.92	
# observation	429	
# noncensored	156	
#censored	273	

[8] Excluded Southern province due to few produsents.

Table 2.5. Production of millet[9], tobit-model

		All households	
Regressor		Estimate	Std.error
Continuos variables			
intercept		-4.34***	(1.61)
producer millet price		-0.013	(0.0079)
producer maize price		0.013	(0.013)
total area under crop		0.066	(0.19)
dependency ratio		0.80	(0.80)
education (max of wife and husband)		-0.010***	(0.037)
agricultural wage for man		0.00037	(0.00049)
agricultural wage for woman		-0.00051	(0.00077)
Classification variables			
life-cycle	level	yes	
	1	0.64	(0.79)
	2	0.72	(0.81)
	3	0.14	(0.72)
agroecological zones		yes***	
	1	1.17***	(0.45)
	2	-1.14***	(0.38)
	3	-0.74*	(0.40)
owner of plough (default=no)		0.29	(0.34)
land available for cultivation (default=no)		-1.15***	(0.29)
centrality	level	yes***	
	3	4.09***	(0.77)
	4	2.48***	(0.67)
	5	-1.24	(0.83)
	6	3.01***	(0.66)
use of respective producer markets (default=no use):			
local cooperatives		0.97**	(0.42)
local markets		-2.10*	(1.21)
district markets		-0.019	(0.31)
public market depot		-0.51	(0.39)
Log-likelihood		-700.81	
# observation		559	
# noncensored		238	
# censored		321	

[9] Excluded Copperbelt due to few produsents in this province.

Table 2.6. Production of sorghum[10], tobit-model

	All households	
Regressor	Estimate	Std.error
Continuos variables		
intercept	3.85	(2.44)
producer sorghum price	-0.0064**	(0.0031)
producer maize price	0.016	(0.010)
total area under crop	-0.64**	(0.29)
dependency ratio	1.94**	(0.90)
education (max of wife and husband)	-0.048	(0.041)
agricultural wage for man	0.0017	(0.0024)
agricultural wage for woman	-0.0017	(0.0024)
Classification variables		
life-cycle level	yes	
1	0.037	(1.08)
2	-0.61	(1.07)
3	-0.070	(0.98)
agroecological zones	yes***	
1	-1.42***	(0.52)
2	-1.70***	(0.55)
3	-2.38***	(0.69)
owner of plough (default=no)	0.87**	(0.37)
land available for cultivation (default=no)	-1.18***	(0.41)
centrality level	yes**	
3	-1.15*	(0.59)
4	0.26	(0.50)
5	0.91	(0.74)
6	-0.26	(0.51)
use of respective producer markets (default=no use):		
farmgate	3.46**	(1.37)
local cooperatives	1.19**	(0.50)
local markets	-0.56	(1.03)
district markets	-0.61*	(0.35)
public market depot	-0.59	(0.46)
Log-likelihood	-398.38	
# observation	369	
# noncensored	135	
#censored	234	

[10] Excluded Eastern and Northern provineces, due to few produsents.

Table 2.7. Production of mixed beans, tobit model[11]

Regressor		All households	
		Estimate	Std.error
Continuos variables			
intercept		-0.88	(1.23)
producer beans price		0.0026	(0.0028)
producer maize price		-0.034***	(0.0096)
total area under crop		1.06***	(0.17)
dependency ratio		0.56	(0.68)
education (max of wife and husband)		0.00059	(0.68)
agricultural wage for man		-0.000020	(0.00025)
agricultural wage for woman		-0.00093**	(0.00046)
Classification variables			
life-cycle	level	yes	
	1	-0.84	(0.61)
	2	-0.62	(0.62)
	3	-0.96	(0.54)
agroecological zones		yes***	
	1	-2.36**	(0.93)
	2	-0.65**	(0.31)
owner of plough (default=no)		0.23	(0.33)
land available for cultivation (default=no)		-0.22	(0.29)
centrality	level	yes***	
	2	0.32	(0.69)
	3	1.53***	(0.56)
	4	1.45***	(0.50)
	6	1.77***	(0.47)
use of respective producer markets (default=no use):			
farmgate		-0.21	(0.63)
local cooperatives		0.28	(0.31)
local markets		-0.30	(0.58)
district markets		0.27	(0.26)
public market depot		-0.21	(0.28=
Log-likelihood		-390.98	
# observation		670	
# noncensored		126	
#censored		544	

[11] Excluded Western province due to few produsents.

Table 2.8. Total maize production for female and male headed households, tobit regression

	Male-headed		Female-headed	
Regressor	Estimate	Std.error	Estimate	Std.error
Continuos variables				
intercept	43.6***	(6.9)	1.6	(12.9)
producer maize price	-0.073	(0.06)	-0.053	(0.085)
fertilizer price	0.00005	(0.0003)	0.0002	(0.0005)
hybrid maize-seed price	0.001	(0.01)	0.019	(0.02)
non-farm income	0.0001*	(0.0001)	0.0001	(0.00012)
dependency ratio	10.7***	(3.8)	2.4	(5.4)
max. education	-0.11	(0.18)	0.5*	(0.3)
agric. wage for man	0.001	(0.002)		
agric. wage for woman	0.01*	(0.002)	-0.0015	(0.002)
Classification variables				
life-cycle level				
1	-11.3***	(3.6)	14.9*	(7.9)
2	-14.8***	(3.5)	10.6	(8.3)
3	-14.9***	(3.1)	12.1	(7.8)
agroecological zones				
1	1.7	(2.4)	0.45	(3.6)
2	4.2*	(1.8)	4.3*	(2.5)
3	-5.4*	(2.5)	-4.6	(3.9)
owner of plough (default=no)	4.7***	(1.4)	3.8	(2.7)
land available for cultivation (default=no)	1.3	(1.2)	-3.05	(1.9)
centrality				
2	1.04	(2.4)	-5.8	(3.7)
3	1.2	(2.4)	4.9	(3.6)
4	-1.5	(1.8)	1.4	(2.8)
5	-1.9	(2.6)	-2.6	(3.9)
6	-3.7*	(2.1)	-1.7	(3.1)
use of fertilizer (default=no)	16.1***	(1.3)	15.8***	(1.9)
use of respective producer markets (default=no use):				
farmgate	-7.9***	(3.03)	-3.5	(4.5)
creditor at farmgate	22.1***	(5.2)	-0.13	(10.12)
local cooperatives	0.7	(2.2)	7.5*	(3.2)
local markets	-0.5	(3.2)	1.5	(4.8)
district markets	-0.04	(1.4)	-4.3*	(2.1)
public market depot	-0.4	(1.5)	1.4	(2.2)
Log-likelihood	-4707.3		-1276.8	
# observation	1218		380	
# noncensored	1057		299	
#censored	161		81	

Table 2.9. Production of groundnuts for female and male headed households, tobit regression

	Male-headed [12]		Female-headed	
Regressor	Estimate	Std.error	Estimate	Std.error
Continuos variables				
intercept	-9.11***	(3.20)	-11.06	(104031.9)
producer price groundnuts	0.0031	(0.0071)	-0.0025	(0.0021)
producer price maize	-0.050**	(0.023)	-0.0087	(0.0083)
total area under crop	4.64***	(0.32)	0.70***	(0.14)
non-farm income	-4.19E-6	0.000024	-0.000017	(0.000016)
dependency ratio	-0.90	1.79	0.043	(0.57)
education (max. of wife and husband)	-0.16*	(0.082)	0.036	(0.028)
agricultural wage for man	-0.00045	(0.00079)	not included	
agricultural wage for woman	0.00050	(0.00094)	0.00014	(0.00022)
Classification variables				
life-cycle level				
1	-2.37	(1.71)	1.41*	(0.83)
2	-0.83	(1.63)	0.96	(0.87)
3	-0.43	(1.43)	1.02	(0.82)
agroecological zones				
1	-0.69	(1.14)	-0.13	(0.38)
2	1.23	(0.85)	0.75***	(0.27)
3	-2.97	(1.27)	-1.35***	(0.51)
owner of plough (default=no)	0.17	(0.61)	0.46*	(0.25)
land available for cultivation (default=no)	0.37	(0.57)	-0.25	(0.19)
centrality				
2	4.12***	(1.21)	-0.07	(0.42)
3	2.27*	(1.26)	0.33	(0.40)
4	3.50***	(0.92)	0.19	(0.32)
5	1.27	(1.24)	-0.40	(0.42)
6	3.11***	(1.09)	-0.23	(0.37)
use of respective producer markets (default=no use):				
farmgate	-1.18	(1.51)	-0.60	(0.47)
creditor at farmgate	-3.68	(2.56)	-8.81	(104031.9)
local cooperatives	-0.29	(0.99)	-0.20	(0.33)
local markets	1.76	(1.46)	-0.47	(0.55)
district markets	0.57	(0.71)	0.51**	(0.23)
public market depot	-0.017	(0.70)	-0.20	(0.22)
Log-likelihood	-1639.67		-306.18	
# observation	1108		356	
# noncensored	408		124	
#censored	700		232	

[12] Including bargaining power in the regression on male-headed do not give any significant effects.

Table 2.10. Probability for groundnut production for female and male headed households

	Male headed		Female headed	
Regressor	Estimate	Std.error	Estimate	Std.error
Continuos variables				
intercept	-0.87*	(0.48)	-8.96	(95946)
producer price groundnuts	0.0031***	(0.001)	-0.00042	(0.0016)
producer price maize	-0.011***	(0.0035)	-0.0065	(0.0074)
total area under crop	0.15**	(0.059)	0.77***	(0.23)
non-farm income	1.09E-6	(3.80E-6)	-0.000013	(0.000013)
dependency ratio	-0.11	(0.28)	-0.051	(0.50)
education (max of wife and husband)	-0.018	(0.013)	0.014	(0.025)
agricultural wage for man	0.000037	(0.00012)	not included	
agricultural wage for woman	-0.000075	(0.00014)	0.000089	(0.00021)
Classification variables				
life-cycle level	yes		yes	
1	-0.42	(0.27)	1.04	(0.73)
2	-0.16	(0.26)	0.76	(0.77)
3	-0.065	(0.23)	0.93	(0.72)
agroecological zones	yes***		yes***	
1	-0.59***	(0.18)	-0.36	(0.33)
2	0.20	(0.13)	0.45*	(0.23)
3	-0.85***	(0.19)	-1.14***	(0.42)
owner of plough (default=no)	0.17*	(0.10)	0.40*	(0.24)
land available for cultivation (default=no)	0.17*	(0.09)	-0.16	(0.17)
centrality	yes**		yes	
2	0.69***	(0.18)	-0.12	(0.38)
3	0.42**	(0.19)	0.16	(0.37)
4	0.51***	(0.14)	-0.062	(0.29)
5	0.23	(0.19)	-0.79**	(0.38)
6	0.43***	(0.16)	-0.32	(0.33)
use of respective producer markets (default=no use):				
farmgate	-0.30	(0.23)	-0.55	(0.41)
creditor at farmgate	0.16	(0.38)	-7.21	(95946)
local cooperatives	-0.28*	(0.25)	-0.22	(0.26)
local markets	-0.33	(0.34)	-0.52	(0.48)
district markets	0.19*	(0.11)	0.50**	(0.20)
public market depot	-0.24**	(0.11)	0.0075	(0.20)
Log-likelihood	-622.23		-191.37	
# observation	1108		356	
#groundnut producers	408		124	
#non-groundnuts producer	700		232	

Table 2.11.[13] Production of maize for sale and maize for consumption, tobit regression

	Sale		Consumption	
Regressor	Estimate	Std.error	Estimate	Std.error
Continuos variables				
intercept	54.2***	(9.02)	10.49***	(1.99)
producer maize price	-0.26***	(0.09)	0.0085	(0.018)
fertilizer price	-0.00023	(0.00044)	0.00017*	(0.000096)
hybrid maize-seed price	0.022*	(0.013)	-0.0029	(0.0027)
non-farm income	0.00015	(0.000065)	-8.76E-6	(0.000016)
dependency ratio	6.85	(5.03)	4.74***	(1.07)
max. education	0.16	(0.22)	0.029	(0.048)
agric. wage for man	0.0013	(0.0023)	0.00011	(0.00052)
agric. wage for woman	0.0026	(0.0026)	0.00092	(0.00061)
Classification variables				
life-cycle level				
1	-14.22***	(4.91)	-1.44	(1.12)
2	-17.13***	(4.95)	-4.05***	(1.14)
3	-15.53***	(4.42)	-3.99***	(1.03)
agroecological zones				
1	-12.46***	(3.53)	1.56**	(0.68)
2	-4.56**	(2.17)	2.94***	(0.50)
3	-9.56***	(3.73)	-1.80**	(0.75)
owner of plough (default=no)	8.80***	(1.79)	0.75*	(0.40)
land available for cultivation (default=no)	1.95	(1.64)	0.013	(0.36)
centrality				
2	-7.77**	(3.22)	1.15	(0.71)
3	-0.13	(3.07)	0.48	(0.69)
4	-1.16	(2.41)	0.674	(0.54)
5	-0.85	(3.44)	0.044	(0.76)
6	-7.17***	(2.76)	-1.04*	(0.60)
use of fertilizer (default=no)	31.56***	(1.82)	4.37***	(0.37)
use of respective producer markets (default=no use):				
farmgate	3.47	(3.77)	-3.57***	(0.87)
creditor at farmgate	27.4***	(7.01)	6.72***	(1.55)
local cooperatives	1.87	(2.73)	-0.13	(0.63)
local markets	-6.80	(4.30)	1.31	(0.94)
district markets	-2.82	(1.86)	0.10	(0.41)
public market depot	-0.35	(1.92)	0.15	(0.43)
Log-likelihood	-3251.11		-4572.39	
# observation	1600		1600	
# noncensored	643		1352	
#censored	957		248	

[13] This table appears also as Table F1 in Appendix F of the main Report.

Table 2.12. Probability for sale of maize

Regressor	Estimate	Std.error
Continuos variables		
intercept	-0.84	(0.52)
producer maize price	-0.02***	(0.004)
fertilizer price	-0.00005	(0.00002)
hybrid maize-seed price	0.003***	(0.001)
total harvest of maize	0.22***	(0.01)
non-farm income	3.52	(4.81)
dependency ratio	0.09	(0.27)
max education	0.04***	(0.01)
agric. wage for man	0.0003	(0.0001)
agric. wage for woman	-0.0003	(0.0002)
Classification variables		
life-cycle level	Yes***	
1	-0.16	(0.29)
2	0.41	(0.29)
3	0.73*	(0.26)
agroecological zones	Yes***	
1	-1.66***	(0.20)
2	-0.87***	(0.12)
3	-0.85***	(0.17)
owner of plough (default=no)	0.43***	(0.10)
land available for cultivation (default=no)	0.02	(0.09)
centrality	Yes***	
2	-0.51***	(0.18)
3	-0.07	(0.17)
4	-0.14	(0.13)
5	0.08	(0.19)
6	-0.37*	(0.15)
use of respective producer markets (default=no use):		
farmgate	0.23	(0.22)
creditor at farmgate	-0.22	(0.45)
local cooperatives	0.06	(0.16)
local markets	-0.72***	(0.25)
district markets	-0.04	(0.10)
public market depot	0.16	(0.11)
Log-likelihood	-619.37	
# observation	1600	
# producers of maize for sale	643	
#non-producers of maize for sale	957	

Table 2.13. Consumption share of maize, bargaining model, linear regression

Regressor	Estimate	Std.error
Continuos variables		
intercept	21.5**	(7.5)
producer maize price	-0.06	(0.05)
fertilizer price	-0.0004	(0.0003)
hybrid maize-seed price	0.01	(0.009)
non-farm income	0.00004	(0.0005)
dependency ratio	11.8***	(3.4)
max. education	-0.04	(0.17)
relative education (wife-husband)	-0.06	(0.17)
income share (wife-husband)	-3.8	(0.00001)
agric. wage for man	0.002	(0.002)
agric. wage for woman	0.003	(0.002)
Classification variables		
life-cycle level		
1	1.24	(3.7)
2	-3.96	(3.5)
3	-4.11	(3.23)
agroecological zones		
1	2.3	(2.1)
2	5.3***	(1.5)
3	-3.03	(2.04)
owner of plough (default=no)	4.1***	(1.24)
land available for cultivation (default=no)	1.53	(1.11)
centrality		
2	-1.03	(2.3)
3	0.1	(2.13)
4	0.7	(1.7)
5	-2.8	(2.3)
6	-4.5*	(1.9)
use of fertilizer (default=no)	13.2***	(1.12)
use of respective producer markets (default=no use):		
farmgate	-2.93	(2.71)
creditor at farmgate	5.1	(5.85)
local cooperatives	0.18	(1.96)
local markets	3.47	(3.1)
district markets	0.35	(1.23)
public market depot	-0.71	(1.34)
R-square	0.39	
significance of model	0.0001	
#observations	1077	

Table 2.14.[14] Consumption share of groundnuts, bargaining model, linear regression

Regressor		Estimate	Std.error
Continuos variables			
intercept		0.86***	(0.27)
producer price groundnuts		0.00057*	(0.00035)
producer price maize		-0.0024	(0.0019)
total area under crop		-0.028	(0.022)
non-farm income		-0.00000073	(0.0000014)
dependency ratio		-0.086	(0.14)
education (max. of wife and husband)		-0.011*	(0.0064)
relative education (wife-husband)		-0.0058	(0.0070)
Income share (wife-husband)		5.9E-5**	(2.9E-6)
agricultural wage for man		-0.000098	(0.000072)
agricultural wage for woman		0.000093	(0.000082)
Classification variables			
life-cycle	level		
	1	-1.40	(2.12)
	2	0.77	(2.00)
	3	0.61	(1.80)
agroecological zones			
	1	0.16	(0.088)
	2	0.086	(0.062)
	3	-0.058	(0.098)
owner of plough (default=no)		-0.068	(0.050)
land available for cultivation (default=no)		0.0066	(0.042)
centrality			
	2	0.076	(0.087)
	3	-0.067	(0.088)
	4	0.071	(0.070)
	5	0.0043	(0.090)
	6	0.074	(0.081)
farmgate		-0.078	(0.13)
creditor at farmgate		0.088	(0.26)
local cooperatives		-0.069	(0.079)
local markets		0.28**	(0.13)
district markets		-0.060	(0.052)
public market depot		-0.0099	(0.054)
Significance for model		0.1390	
R-square		0.1238	
# observations		299	

[14] This table appears also as Table F2 in Appendix F of the main Report.

2.3. Welfare analysis, Methodology

Variable list

variable	description
Z	Utility
ET	Total consumption
N	Nutritional status
FT	Food consumption
NT	Non-food consumption
EF	Food consumption from own production
NF	Food consumption *not* from own production
L_F	Labor at farm
L_N	Labor off-farm
w	Off farm salary, i.e. a vector of agricultural sector salary at community level: (piecework) agricultural wage for men, (piecework) agricultural wage for women
Y_{non}	Non-farm income
I	Income from other sources than work, e.g. inheritance
Q	Farm production
p	A vector of relative prices
A_{com-e}	A community vector comprising: agro-ecological zones*, producer markets*, access to food market
A_{com-n}	Centrality*
A	A vector comprising A_{com-e} and A_{com-n}
H_e	A household vector comprising: dependency ratio, life cycle stage*, average number of days being sick, maximum education level of wife or husband
H_n	A household vector comprising: dependency ratio, life cycle stage*, child sickness indicator, maximum education level of wife or husband
H	A vector comprising H_e and H_n
Bw	A vector comprising the difference in income between wife and husband and the difference in education between wife and husband

*Refer to the detailed variable specification of the production model is this appendix under «Supply response analysis, methodology».

The household utility function

The household utility function (Z) can be defined as follows:

(1) $Z=Z(ET, N, L_F, L_{N,})$

where

(2) $ET=Y_{non}+Q(L_F, H_e, A_{com-e}, p)=L_N*w+I+Q(L_F, H_e, A_{com-e}, p)$

(3) $N=N(FT, H_n, A_{com-n})$,

(4) $ET=NT+FT=NT+EF+NF$

This is a simultaneous system which is solved by maximizing the utility function with subject to equation 2-4. The solution gives the demand functions, which we assume to be linear in all variables:

(5) $ET=a_1+b_1w+c_1H+d_1A+e_1I+f_1p$

(6) $EF=a_2+b_2w+c_2H+d_2A+e_2I+f_2p$

(7) $N=a_3+b_3w+c_3H+d_3 A+e_3I+f_3p$

(8) $L_F=a_4+b_4w+c_4H+d_4A+e_4I+f_4p$

(9) $L_N=a_5+b_5w+c_5H+d_5A+e_5I+f_5p$

The simplified models (equation 10-15), or the pseudo-relations, are derived from the above equations. The simplified models is the ones we have used in the estimation. In these models the dependent right-hand side variables are treated as exogenous. A small increase in for example non-farm income, is hence assumed to be caused by an increase in the exogenous off-farm salary which exactly correspond to the increase in income. Variables which are assumed to have no direct impact on the left -hand side variables is not included in these models. This is the case with for example the indicator for sickness among children in the analysis on consumption.

Both Q and Y can be expressed by the same variables as the demand functions. Manipulating with these equations gives us:

Total consumption per household member:

(10) $ET=a_1+b_1Q+c_1Y_{non}+d_1H_e+e_1A_{com\text{-}e}$

Own produced food consumption per household member:

(11) $EF=a_2+b_2Q+c_2Y_{non}+d_2H_e+e_2A_{com\text{-}e}$

Nutritional status for children:

(12) $N=a_3+b_3ET+c_3Q+d_3H_n+e_3A_{com\text{-}n}$

The equation for total consumption per household-member, included bargain power can be specified:

(13) $ET=a_1+b_1Q+c_1Y_{non}+d_1H_e+e_1A_{com\text{-}e}+f_1B_w$

The equation for food consumption from own production when including bargain power can be expressed:

(14) $EF=a_2+b_2Q+c_2 Y_{non}+d_2H_e+e_2A_{com\text{-}e}+f_2B_w$

Nutritional status for children included bargain power can be specified:

(15) $N=a_3+b_3ET+c_3Q+d_3H_n+e_3A_{com\text{-}n}+f_3B_w$

2.4. Welfare analysis, results

In the following tables the significance is reported by stars (or no stars):

*- significance at 10 percent level,
**- significance at 5 percent level,
***- significance at 1 percent level.

Table 2.15. The uniform household model: regression results on total consumption

		All households	
Regressor		Estimate	Std.error
Continuos variables			
intercept		3044.9***	(391.7)
value of production		8.30***	(1.00)
sickness among productive members		12.4	(7.69)
dependency ratio		-1485.0***	(302.9)
education (max. of wife and husband)		156.9***	(15.9)
income non-farm production		21.0**	(9.1)
distance to food market		-5.54*	(2.94)
Classification variables			
cycle	level		
	1	285.7	(382.0)
	2	-673.1*	(381.0)
	3	-1584.3***	(347.9)
sale (default=no sale)		-56.1	(124.5)
centrality			
	2	-73.0	(211.9)
	3	-67.0	(226.5)
	4	-241.2	(167.4)
	5	-526.0**	(246.2)
	6	-270.9	(184.8)
Significance for model		0.0001	
R-square		0.1884	
# observation		1595	

Table 2.16.[15] The uniform household model: regression results on total consumption, female- and male-headed households

	Male-headed households		Female-headed households	
Regressor	Estimate	Std.error	Estimate	Std.error
Continuos variables				
intercept	2856.2***	(414.5)	4527.8***	(1170.9)
value of production	7.5***	(1.1)	15.0***	(3.5)
sickness among productive members	29.9***	(9.66)	-11.7	(13.3)
dependency ratio	-1725.2***	(357.3)	-804.8	(600.2)
education (max. of wife and husband)	170.2***	(18.5)	96.6**	(39.8)
income non-farm production	20.0**	(9.66)	32.0	(27.0)
distance to food market	-6.26*	(3.31)	-3.31	(6.50)
Classification variables				
cycle level				
1	466.9	(418.2)	-1399.8	(1135.8)
2	-482.8	(401.8)	-2479.6***	(1162.3)
3	-1421.3***	(364.1)	-3237.6***	(1093.1)
sale (default=no sale)	-155.9	(138.7)	196.1	(298.4)
centrality				
2	-176.9	(240.6)	366.4	(454.7)
3	-105.5	(250.4)	-8.6	(521.1)
4	-313.5*	(184.3)	49.3	(387.1)
5	-481.2*	(272.5)	-660.8	(577.0)
6	-392.3*	(203.3)	178.0	(428.9)
Significance for model	0.0001		0.0001	
R-square	0.1940		0.2113	
# observation	1205		388	

[15] This table appears also as Table F3 in Appendix F of the main Report.

Table 2.17. Regression results on total consumption when including bargaining power

		All households	
Regressor		Estimate	Std.error
Continuos variables			
intercept		2393.6***	(516.4)
value of production		6.7***	(1.5)
dependency ratio		-2235.1***	(446.6)
non-farm income		0.77	(14.0)
sickness among productive household members		15.9	(11.4)
education (max. of wife and husband)		168.9***	(24.7)
relative education (wife-husband)		-34.9[16]	(24.7)
income-share (wife-husband)		-3.9*	(2.3)
distance to food market		-6.01*	(3.43)
Classification variables			
cycle	level		
	1	960.6*	(525.2)
	2	288.2	(500.7)
	3	-757.1*	(460.5)
sale (default=no sale)		-85.7	(155.4)
centrality	level		
	2	-40.2	(298.1)
	3	-72.6	(277.7)
	4	-467.1**	(217.5)
	5	-532.2*	(300.6)
	6	-508.4**	(230.1)
Significance for model		0.0001	
R-square		0.1780	
# observation		879	

[16] When excluding max. education, relative education (wife-husband) becomes significant with a value of -81.44***.

Table 2.18.[17] Regression results on total consumption when including bargaining power, excluding max education (only male-headed households)

		All households	
Regressor		Estimate	Std.error
Continuos variables			
intercept		3983.8***	(515.6)
value of production		4.7***	(1.4)
dependency ratio		-1995.5***	(459.1)
non-farm income		-2.0	(14.0)
sickness among productive household members		41.8	(547.8)
relative education (wife-husband)		--81.1***	(24.6)
income-share (wife-husband)		-4.9**	(2.2)
distance to food market		-7.59**	(3.43)
Classification variables			
cycle	level		
	1	41.8	(547.8)
	2	-146.3	(533.1)
	3	-1278.8	(492.0)
sale (default=no sale)		-84.7	(159.0)
centrality	level		
	2	-158.9	(298.2)
	3	-163.9	(286.5)
	4	-697.6***	(222.6)
	5	-609.9*	(310.8)
	6	-691.8***	(236.6)
Significance for model		0.0001	
R-square		0.1210	
# observation		879	

[17]This table appears also as Table F4 in Appendix F of the main Report.

Table 2.19. The uniform household model: Regression results on own produced food consumption

		All households	
Regressor		Estimate	Std.error
Continuos variables			
intercept		726.1***	(228.8)
value of production		2.14**	(0.97)
value of prod.-squared		-0.0025*	(0.0013)
sickness among productive members		-2.56	(4.16)
dependency ratio		91.9	(162.8)
education (max. of wife and husband)		39.7	(25.5)
education-squared		-3.31	(2.39)
income non-farm production		2.02	(4.80)
distance to food market		2.31	(1.59)
Classification variables			
cycle	level		
	1	615.0***	(221.6)
	2	41.4	(220.0)
	3	-251.3	(203.1)
sale (default=no sale)		184.7***	(69.7)
centrality	level		
	2	-7.13	(112.5)
	3	173.9	(120.0)
	4	203.7**	(89.6)
	5	-29.4	(133.1)
	6	227.7**	(100.3)
Significance for model		0.0001	
R-square		0.0746	
# observation		1546	

Table 2.20. The uniform household model: regression results on own produced food consumption for female and male-headed households

		Male headed households		Female-headed households	
Regressor		Estimate	Std.error	Estimate	Std.error
Continuos variables					
intercept		761.4***	(253.0)	685.2	(671.8)
value of production		1.82*	(1.09)	5.96*	(3.04)
value of prod.-squared		-0.0021	(0.0014)	-0.012	(0.0078)
sickness among productive members		0.61	(5.33)	-3.17	(6.87)
dependency ratio		-120.1	(197.2)	508.1*	(303.5)
education (max. of wife and husband)		24.9	(31.3)	4.04	(56.2)
education-squared		-3.02	(2.75)	-1.18	(6.07)
income non-farm production		2.41	(5.19)	6.10	(13.77)
distance to food market		2.38	(1.85)	0.51	(3.33)
Classification variables					
cycle level	1	788.6***	(246.9)	220.3	(651.8)
	2	141.3	(237.8)	-305.9	(665.4)
	3	-216.3	(218.1)	-385.6	(634.4)
sale (default=no sale)		157.0**	(80.1)	155.3	(155.1)
centrality	level				
	2	-2.37	(130.7)	-9.75	(227.4)
	3	173.5	(137.6)	163.3	(254.9)
	4	175.9*	(102.1)	312.6	(191.4)
	5	53.3	(151.3)	-315.2	(292.8)
	6	187.3	(114.4)	343.0	(215.5)
Significance for model		0.0001		0.0063	
R-square		0.0780		0.0954	
# observation		1185		359	

Table 2.21. Regression results on own produced food consumption when including bargaining power

Regressor		All households Estimate	Std.error
Continuos variables			
intercept		894.1***	(298.2)
value of production		-0.36	(1.49)
value of production-squared		0.00089	(0.0024)
dependency ratio		-530.8**	(242.8)
non-farm income		2.87	(6.12)
sickness among productive household members		-1.07	(6.12)
education (max. of wife and husband)		26.0	(34.8)
education-squared		-2.76	(3.07)
relative education (wife-husband)		-12.0	(13.5)
income-share (wife-husband)		-1.32	(0.81)
distance to food market		2.67	(1.87)
Classification variables			
cycle level	1	752.2***	(291.1)
	2	256.5	(277.6)
	3	-190.0	(257.4)
sale (default=no sale)		178.9**	(87.4)
centrality-level			
	2	98.7	(152.3)
	3	100.4	(149.2)
	4	65.2	(116.8)
	5	-167.4	(162.6)
	6	145.3	(126.7)
Significance for model		0.0001	
R-square		0.0810	
# observation		864	

Table 2.22. The uniform household model: regression results on nutritional status

	Weight for age		Weight for height	
Regressor	Estimate	Std.error	Estimate	Std.error
Continuos variables				
intercept	-1.33***	(0.18)	-0.16	(0.21)
total value of agricultural production	0.0019	(0.0021)	0.0016	(0.0025)
value of agric. production-squared	0.0000026	(0.0000065)	0.0000024	(0.0000075)
value of consumption	-0.00060	(0.055)	-0.088	(0.063)
value of consumption-squared	0.0014	(0.0055)	0.0096	(0.0063)
sickness among children	-0.014***	(0.0044)	-0.014***	(0.0051)
dependency ratio	0.067	(0.34)	0.54	(0.40)
education (wife-husband)	-0.024	(0.034)	-0.039	(0.040)
education-squared	0.0037	(0.0031)	0.0067*	(0.0036)
Classification variables				
cycle level 2	-0.17*	(0.11)	-0.058	(0.12)
sale (default=no sale)	0.048	(0.096)	0.15	(0.11)
centrality level				
2	0.055	(0.15)	0.21	(0.17)
3	-0.087	(0.16)	0.12	(0.18)
4	0.15	(0.12)	0.38***	(0.14)
5	-0.064	(0.17)	-0.21	(0.20)
6	0.087	(0.13)	0.28*	(0.15)
Significance for model	0.0348		0.0017	
R-square	0.03478		0.04735	
# observation	753		753	

Table 2.23. Regression results on nutritional status, included bargaining power, (only male-headed households)

Regressor		Weight for age		Weight for height	
		Estimate	Std.error	Estimate	Std.error
Continuos variables					
intercept		-1.20***	(0.27)	-0.31	(0.32)
value of production		0.00027	(0.0028)	0.00072	(0.0032)
value of prod-squared		0.0000070	(0.0000078)	0.0000015	(0.0000091)
total value of consumption		-0.0039	(0.072)	-0.16*	(0.085)
value of consumption-squared		0.0027	(0.0072)	0.000019**	(0.00001)
sickness among children		-0.017***	(0.0062)	-0.017**	(0.0072)
dependency ratio		0.38	(0.489	0.96*	(0.56)
education (max. of wife and husband)		-0.082	(0.053)	0.011	(0.062)
education-squared		0.0079*	(0.0045)	0.0038	(0.0052)
relative education (wife-husband)		0.021	(0.018)	0.014	(0.021)
relative income (wife-husband)		-0.0022	(0.0015)	-0.0011	(0.0017)
non-farm income		-0.000030	(0.0079)	-0.0031	(0.0092)
Classification variables					
cycle	level 2	-0.21	(0.15)	-0.16	(0.17)
sale (default=no sale)		0.12	(0.13)	0.24	(0.15)
centrality	level				
	2	0.067	(0.21)	-0.086	(0.25)
	3	-0.18	(0.21)	0.22	(0.24)
	4	0.19	(0.16)	0.35*	(0.19)
	5	-0.12	(0.22)	-0.36	(0.25)
	6	0.22	(0.17)	0.28	(0.19)
Significance for model		0.0587		0.0112	
R-square		0.6148		0.07441	
# observation		456		456	

3. Participatory rural appraisal[18]

3.1. Introduction

The Participatory Rural Appraisal (PRA) is carried out by the Farming Systems Association of Zambia (FASAZ) to complement the analyses with a qualitative approach in a few selected villages. The current PRA residual analysis represents the concluding stage of the empirical part of the study. The PRA study complements the quantitative parts by an approach rich in details, up to date and providing disaggregated information for each gender, socio-economic group, and geographical areas.

3.2. Objectives

The aims of this PRA draw on the objectives of the quantitative studies, the general policy objectives and empowerment of the people in the selected villages:

- To understand why the expected positive effect of structural adjustment reforms (increased real prices on agricultural produce) does reach women farmers in some communities while not in others.
- To understand why some women farmers are able to respond to higher prices while others are not, to understand why women farmers are responding differently than men farmers, to understand how an increase in production and/or marketing could affect the economic welfare (measured as total consumption) and social welfare (focusing on children's nutritional status).
- To ensure that the findings of this study could serve as an input to identify widespread gender biases and mechanisms which either reduce or increase the ability of women farmers to respond to higher prices, and to ensure that the findings are presented in a manner accessible across a broad range of professions and backgrounds.
- To enable the people in the selected rural areas to share, enhance and analyze their knowledge and community conditions, to plan and to act in order to improve their economic and social welfare.

3.3. Major assumptions of the study:

The underlying assumption of the study is that free market reforms and trade liberalization in the agricultural sector will reduce the indirect and direct taxation of farmers. This will reduce price distortions that were introduced during the state controlled and subsidy driven production and marketing arrangements of the pre–adjustment years. In other words, free market reforms are seen as a prerequisite for energizing the production potential of the small scale farmers by creating an environment in which farmers are able to obtain higher prices and to increase production. It is also expected that this reorientation in the goals and scale of production will have a direct bearing on several other facets of the production system, such as food consumption trends, gender division of labor, child malnutrition, social differentiation, etc.

This study analyzes whether the expected outcome of trade liberalization (i.e. higher prices and increased production) does materialize, and indicate how and why they do or do not. This required that we did not only look at the expected *outcome* but also at the actual *process* of trade liberalization. By looking at the process, factors that mitigate the realization of the expected outcomes were identified. For example, reduced access to credit and agricultural inputs have proved to be more significant than prices in determining production decisions of women and men farmers in all the six

[18] A summary of the most important and relevant findings of this PRA study is presented in the main Report and those and other findings are integrated throughout that Report. The PRA study was conducted and the report drafted by a Zambian/ Norwegian team comprising Sikana, Gwaba, Haug, Kabongo, Lwaile, Munachonga, and Mukumbuta.

villages visited. It is quite obvious that farmers, women as well men, are not able to exploit the opportunities that liberalization was expected to generate.

3.4. Methodology

The qualitative analysis was based on Participatory Rural Appraisal (PRA) design. PRAs were conducted in six villages in three provinces. PRA is defined as a family of approaches and methods to enable rural people to share, enhance and analyze their knowledge of life and conditions, to plan and to act (Chambers 1992, 1994). PRA is not a totally new approach, but includes elements of applied anthropology, farming systems research, participatory research, agroecosystem analysis (Theis & Grady 1991). It was developed from Rapid Rural Appraisal, an approach to provide acceptably fast, systematic and valid information in a cost-effective way, avoiding the pitfalls of quick and unstructured development tourism (McCracken et al 1988). In practice, PRA has three foundations: methods; behaviour and attitude; and sharing (Pretty et al. 1995). The reasons for choosing this qualitative method was to get an in depth understanding of the research issues to complement the quantitative survey. In particular, an objective was to investigate why some villages were doing better than their neighbouring villages in spite of apparently equal conditions (regarding road situation, access to urban markets, community organization, household resources and time constraints).

The six villages were selected according to their high score in the household and community survey (agricultural production per household member and total consumption). Two villages were identified in each of the Eastern, Central and Northern Provinces. These three provinces were selected purposively to represent three different situations regarding drought and closeness to main urban markets. Limited resources did not accommodate more than three provinces to be included in the appraisals. In each province, one village was selected to represent remote villages and one village to represent hinterland situated villages. CSO provided the necessary names of villages and maps to identify the villages.

Three teams (each consisting of one or two women and one man) conducted participatory rural appraisals in one province (two villages per team). In each village about seven days were spent carrying out the fieldwork. A two days planning workshop was conducted jointly to prepare for the fieldwork. A tentative plan including different techniques such as key informant interviews, informal group interviews, focus group interviews, transect walks, resource mapping, social mapping, matrix ranking, wealth ranking, Venn diagram, pie chart labor distribution, seasonal calendars, yearly consumption calendar, trend diagrams and observations. Triangulation and gender specific information as well as on the spot analysis were integrated in all the different approaches and techniques.

Every adult individual residing in the villages were encouraged to participate in the PRA activities by their headmen. During the different sessions people would join and leave according to time constraints and other commitments. Basically, no selection of people were undertaken except in certain cases e.g. to make sure that the views of the poorer women where included, the views of female-headed households involved in cash-cropping as well as regarding specific household level case studies. The social maps and the wealth-ranking were used to make sure that the different groups of local people were represented among the participants at all time (e.g. female-headed households, poorer households), and that their voices were heard. The information from the above listed approaches and techniques were analyzed in collaboration with the local people in the field and the findings recorded in draft reports at the end of each village case study. The analytic framework outlined in the terms of reference served as guideline for the analysis and presentation of findings.

3.5. Limitations

The PRA was conducted in 1995 while the household survey was conducted in 1992/93. This lapse of time might make it difficult to assess, e.g. why these villages were doing better than their neighbours. The situation is likely to have changed during this time period, something which was indeed observed.

As stated, three different teams conducted the PRAs in six villages, two for each of Northern, Central, and Eastern Provinces. The teams approached the issues of the study separately such that there were differences in which information that was recorded, which might have effected the basis for making comparisons among the provinces. We expect however that the joint planning workshop reduced this kind of variation.

One important aspect when conducting a PRA is the issues of *empowerment* and promotion of local people's ability to analyze their own situation. It is difficult to facilitate empowerment processes when the main focus is to extract information. However, although the study might be somewhat lacking regarding the empowerment issue, we still think we should be allowed to define our methodology as PRA since we sincerely tried to operationalize empowerment into something workable for the situation in each village, e.g. regarding provision of seeds and solving of water problems.

3.6. Agricultural policy reforms in Zambia

At independence, Zambia inherited a characteristic dual economy with a huge urban economy and an impoverished rural population (Dumont and Moltin, 1983). The rapidly expanding urban population was not accompanied by significant advances in the production of the main urban staple, maize meal. This brought immense pressure on the government that was forced to double food imports between 1964 and 1974 (Robert, 1976). Thus, since the mid 1970s, the government had to increasingly look to the peasantry for the production of maize. Furthermore, peasant involvement in hybrid maize production was seen by the politicians as the only vehicle through which national wealth could be redistributed from the centre to the impoverished rural areas (Sano, 1988). Increased peasant involvement in hybrid maize production was accomplished in the following ways:

- State controlled agricultural support institutions were mainly oriented towards the production of maize. For example, credit for agricultural inputs was made available to farmers at concessionary rates that enabled male and female farmers to take up hybrid maize production (Mwansa et al. 1994). Similarly, other services such as input supply, research and extension were invariably biased towards hybrid maize production.
- Prices of agricultural inputs and produce were fixed by the government, regardless of factors affecting returns to agricultural produce. For example, hybrid maize was heavily subsidized by the state which provided inputs at uniform costs and bought maize at uniform prices irrespective of distances from centres of input production and mealie–meal consumption.
- The government also embarked on a highly expensive door–to–door maize purchasing and maize collection strategy, which enabled farmers in the most remote corners of the country to be involved in maize marketing, with all the expenses born by the state.
- Thorough extension programs and various political involvement at the community level. The official public policy had emphasized and fostered the notion of development in terms of the transformation of agriculture from traditional subsistence to market–oriented agriculture (Gatter 1993).

The overall effect of the government campaign to promote hybrid maize production was the transformation of traditional farming systems in most parts of the country. Hybrid maize became the dominant crop even in provinces such as Northern, Western and Luapula Provinces, which were

designated as unsuitable for hybrid maize production during the colonial period. For example, according to Bolt and Holdsworth (1987), between 1976 and 1985, marketed maize production increased by 50% at the national level and by as much as 500% in Northern Province. The implications from changes of this scale at the household level in terms of labor allocation, income levels, consumption patterns and dietary preferences, etc., can not be overemphasized.

In 1992, the new pro–reform Zambian government questioned the economic wisdom of most of the agricultural policies put in place by their predecessors. In line with the requirements of the structural adjustment program advocated by the new government and the international donor community, agricultural policy reforms were instituted, with the aim of providing an environment in which the private sector would play a leading role in produce marketing, credit and input supply. Advocates of trade liberalization argued that government subsidy in agriculture distorted the true market value of agricultural produce and imposed high levels of direct and indirect taxation on farmers. They further argued that government subsidies only benefited urban consumers, who were able to purchase mealie–meal at a depressed price.

Thus, liberalization in the agricultural sector has centred around input supply, crop marketing, agricultural pricing, withdrawal of government subsidies, and privatization of agricultural credit and marketing parastatals (Mwansa et al. 1994). This has presented numerous challenges for different farmer categories in the community as we hope to demonstrate in this study.

3.7. Results

The following sections contains summarized results from the detailed PRAs identifying the evidence regarding some of the main issues from the quantitative analyses and summaries of the results for the individual provinces as reported by the teams.

Price effects

Farmers in the surveyed villages all face large price differences, both during the year, and between the village and distant market where they can market their crops.

It is natural to divide the year into seasons to evaluate the prices they can sell their crops for and for the food insecurity they face during the seasons. There are great seasonal fluctuations in crop prices. This may in many cases penalize poor households who are unable to hold some of their crops to sell at peak prices, on the other hand they are more likely to be in deficit in the peak price season and forced to buy additional maize at peak prices if the can afford. In the Eastern Province it is also reported that private traders are buying in Wachepa village after harvest and they then resell at peak season.

Price for maize have increased substantially in both the Eastern and the Central Province during the five year period from 1990-95, but since the production level is often below the subsistence needs for the households they have to buy maize "imported" by traders selling expensive. Another situation exploiting the farmers irrespective of gender, was the traders in the Northern Province barter exchange maize for beans in the bean growing season when households have depleted their maize stocks, and they are doing so at terms of trade very much in the farmers disfavour. It is obvious that traders are acting as monopsonists or oligopsonists.

Supply response

All villages in the PRA report that yields have declined during the last few years, a trend coinciding with the shift away from hybrid maize. The farmers also reports that they rarely have any surplus for sale. The other crops show normal yields, and the areas of these lower-yielding crops have increased which compensates for some of the loss of hybrid maize production.

The cassava production has increased in the Northern Province, but the increase has been hampered by a resurgence of cassava mealy-bug disease as reported in Chafwa village. Another supply response limiting factor is that much of the land previously cropped with hybrid maize and chemical fertilizer has been burnt out, i.e. the soil is so deprived of nutrients that other crops such as cassava show significantly reduced yields or fails completely. The intensively used soils are also suffering from a higher incidence of pests and diseases on other crops such as beans and groundnuts, crops which used to be parts of the Chitemene rotation cycles[19].

The Central Province villages have shifted most of their production from hybrid to local maize. Mwanamungule village has in particular reported this. Some of the hybrid maize areas have been replaced by cotton production. This has been increasing as Lonhro and other commercial companies have been providing free seeds and credit. It is now the most important cash crop in Mwanamungule. The production of other cash crops have either stagnated or declined.

The yields have been very low for all crops over the last years for both villages in the Eastern Province due to the severe drought that has hit the Southern Africa. Output was very high during the 1989/90 season, but has declined ever since. Hybrid maize has disappeared from the fields as the subsidies for seeds and fertilizer disappeared. Farmers in Wachepa village are also growing cotton and the yields have been good.

Gender related effects

Gender effects are less prevalent in the villages than expected. These expectations were based on theory and the outcome of the quantitative analysis which predicted that significant differences could be observed.

Households in the Northern Province shows a gender difference in the choice of Irish and sweet potatoes where Irish potatoes are chosen by men and sweet potatoes by women. The team identified these crops as potential cash crops that could be developed. Households in the Northern Province reveal various coping strategies to deal with the declining income from crop sales. These strategies are clearly gender differentiated. Men may choose activities such as charcoal burning and wage employment (for farmers in Chafwa which is near Kasama, the provincial capital), and wild fruit collection, beer brewing and sales are the choices for women. Previously female dominated activities are becoming more popular among men as they experience the earnings potential. Vegetables are becoming important crops in villages near major markets, such as in Chafwa. The gender responsibilities are different, but they are both engaged in the growing, while men are more involved in the sales. Sweet potatoes are becoming a success in Chafwa where the most advanced farmers have established nurseries, and they are all men, although the crop is traditionally a female crop.

Some farmers in the Central Province villages are able to shift into growing some other crops to replace hybrid maize for sales. Men choose cash crops as cotton, they engage in charcoal burning, or they sell their cattle. Women shift into other crops such as soy beans and vegetables. Poor households with few opportunities for growing sufficient crops for subsistence and none for sale turn to work in other farmers fields, either for cash or for food.

Central Province farmers spend their income somewhat differently whether they are men or women. Women spend most on staple foods, while men prefer to spend on farm inputs and equipment.

In Wachepa village in the Eastern Province only one woman was involved in cotton production, the only significant cash crop. Women in Wachepa are taking up work in and around Chipata to make

[19] Zambian shifting cultivation system.

some extra earnings. This opportunity does not exist in Malewa, and only one woman has taken up vegetable production to improve her income earning capacity.

Household head gender effects
In many instances it seems that the loss of hybrid maize production has lead to a more egalitarian distribution of income between the genders. In both the villages in the Northern Province a higher share of the female-headed households are categorized as poor than for male-headed.

It is interesting to observe that there is quite some difference how female-headed households appear in the wealth ranking for the two Eastern Province villages. Female-headed households were significantly scoring worse in Malewa village than in Wachepa village.

Intra-household bargaining
The observations from the Northern Province shows that there is little evidence of women having a subordinate role in the conjugate households. In most cases there is an elaborate scheme of sharing most operations between the genders, but some heavy operations are mainly carried out by the men, like land preparation. There is evidence of some bias against women, but this follows traditional rules for sharing of labor tasks within the household.

Women in Wachepa village control their own income from their crops which are grown in the same fields as the men. In Malewa women have separate fields, but they are obliged to give preference to the men's fields. The women there are controlling the income from their own plots. As can be inferred from these observations women in the Eastern Province have some bargaining power.

Welfare effects
Economic welfare
Economic welfare has declined for most households with the loss of hybrid maize as a crop used for both sales and own food consumption. This is clear for the Northern Province villages, but most severe in Kanyapwa which is more remote. In the villages in the Central Province immigrant households are doing better than the local tribes.

The Central Province villages are strongly dependent on oxen drought power. Many of the drought animals and cattle in general have been killed by Corridor disease over the last years, something which has severely eroded the crop production and income earning capability of many households. There are significant seasonal differences and most crop prices have increased (including maize), but few households are able to take advantage of this fact as they are hardly able to produce sufficient for their own sustenance. Malakata villagers are able to co-operate by discussing their minimum sales price willingness and share the information. In Mwanamungule farmers are selling through middle men who charge a commission, something which they consider unfair, but the only way to access distant markets.

Food insecurity and social welfare
Farmers in most of the villages report that it is becoming increasingly more difficult to feed the family properly throughout the year. The number of months during the year with inadequate food supply has increased.

Very few farmers are growing hybrid maize in any of the six sample villages. In the Northern Province it is reported that some families harvest their cassava prematurely in periods of food deficit, and the processing time is shortened such that the harvested tubers are small and cyanide toxicity is much more prevalent. In Kapwanya village the annual period of deficiency of starchy staples have increased from 4-5 months in 1990 to 7 months currently. It is also interesting to note that the share of food-deficit households is much higher among female-headed (82%) than among male-headed households (37%) for Chafwa village, and for Kapwanya village the ratios were 52% and 41%

respectively. This has lead to declining nutritional status, greater reliance on wild fruits and dependency on exchange of labor where this is possible. The heavier reliance on subsistence crops have given women more time to spend for housework, but at the same time less food is available so children may be more vulnerable to malnutrition. Access to food is the most important indicator of social welfare in the Northern Province villages.

In 1990 most households in the Central Province were producing enough food for their own food consumption. This has changed since 1992. This has particularly hit poor and middle-income households. Many households have also lost their cattle, and the province has also been somewhat hit by the severe droughts that have left the Southern part of the country with huge crop losses over the last years. Households in the Central Province reports that they spend less labor time on farm production after hybrid maize was abandoned. Poor child nutrition is also here reported to be due to lack of sufficient food rather than caused by women spending "too much time" in the field. Families are in general more reliant on purchasing some of dietary needs as they are not self-sufficient with staple foods, but often they have no cash to spend so they are barter exchanging with labor or other crops.

In the Eastern Province farmers in Wachepa depend on collection of wild fruits together with maize, livestock and pumpkins for their dietary needs, while farmers in Malewa grow a much wider spectre of crops, although on a very small scale. Most farmers report a decline in their ability to provide for their nutritional needs, and particularly in Wachepa there is a deficit of maize in February and March. Relief maize has been available and there is little if no evidence of child malnutrition. Women are also sacrificing their own dietary needs in favour of the children when needed as reported from Malewa. The reported loss of weight among children under five is attributed to diarrhea and other diseases.

Credit availability

Credit is not easy to obtain in the remote villages. Most credits in agriculture have been tied to cash crop production and for small scale farmers this has almost exclusively meant hybrid maize. Recently, a few companies, especially Lonhro, have introduced credits to farmers so that they can obtain the seeds and other production inputs for cotton production.

Credit is available for fertilizer purchases in the Northern Province from traders in Kasama and Mpika, but the farmers have to transport the fertilizer themselves from town. No inputs have been delivered to either villages since 1992. The Zambian government has recently appointed Cavmont Merchant Bank to administer credit to farmers through local stockists of fertilizer. The farmers have to repay the fertilizer loan by two bags of maize for delivery of each of the two bags of fertilizer, one basal and one top dressing, that they typically need per lima (50x50 m) a unit equivalent to 1/4 ha. In addition to this all receivers of loans must have collateral. The new tone from the government is that they support credit only on commercial terms, which has led to great difficulty for farmers to obtain farm inputs at all. Farmers commonly finds this new regime exploitative.

Farmers in the Central Province villages are upset about the loss of subsidized inputs and a secure marketing arrangement for their crops. Today there are many new marketing institutions in the two villages in contrast to the villages of the Northern Province. The most important are the companies providing inputs to cotton production and then buy the crops.

Wachepa village in the Eastern Province saw credits disappear completely with the closure of the governments subsidies. In Malewa village on the other hand credit continued to be available and it was used by male farmers. Female farmers discontinued their marketing of maize as the effects of both the hybrid maize abolition and the drought made their impacts.

Remoteness and transport bottlenecks
Since the public buyers of hybrid maize have disappeared, the marketing of crops to distant markets have become much more difficult and virtually impossible in the most remote villages. A few farmers in Chafwa village near Kasama, the provincial capital of the Northern Province still maintains some surplus maize production which is bought by traders from Kasama. In Kapwanya village 120 km away from Mpika town, farmers are producing too little for their own support such that the only trading taking place is by traders coming to the village to sell maize meal. They are particularly clever and arrive in the beans harvesting season when the local maize is all consumed and barter maize for beans at favourable rates (unfavourable to the farmers).

Some farmers are colluding in their sales by sending one representative to the town market with the crops for sale. This strategy is found in Kapwanya village where the common crop for sale after hybrid maize disappeared is beans. It is especially the well-doing households that are sending representatives to town with the crops of several farmers. The top 25% income farmers are also travelling far away to towns along the line of rail to take advantage of the higher prices.

The Central Province farmers have better access to town market than farmers in the Northern Province, although the output available for sale have declined over the last years. The farmers in Wachepa, close to Chipata, in the Eastern Province are transporting some of their crops to Chipata for sale, but the profits are very small because of the high transport costs.

Summary of the main results from each province
Northern Province
The major conclusions derived from the PRA study in the Northern Province is that contrary to the expectations of policy makers, rural farmers have not been able to benefit from higher prices expected from liberalization because of their weaker bargaining power in relation to other participants in a liberalized market, such as long distance mobile traders. Married women are especially disadvantaged, because they are unable to travel to long distance urban markets where prices are higher, due to cultural restrictions and domestic and child care responsibilities. Poor female-headed and male–headed households are also unable to travel to long distance urban markets because of high transport expenses and also because they rarely produce sufficient surpluses to make it worthwhile to travel to such markets.

The overall effect of the removal of credit and input subsidies has been a shift from hybrid maize to low yielding subsistence crops such as cassava, sorghum and finger millet. This has led to declined ability for most households to produce enough staples which can last the whole year. This has in turn increased the vulnerability of most households because of their increased dependence on the food market, which is controlled by long distance mobile traders. Labor deficit female-headed households are at a greater disadvantage compared to men and women in conjugal households.

Central Province
Seasonal price differentials range from 35 to 150 percent for major crops other than cotton. Reasons include seasonality, ability to bargain for a price, proximity to trade centres and availability to traders. However the above mentioned variables are not adequate enough to enable different categories of farmers to take advantage of the prevailing situation.

In Malakata, both women and men farmers cited size of output, mediated through ownership of work oxen (cattle), ability to purchase fertilizers and other inputs, as prerequisites if one is to benefit from the current marketing arrangements. For resource affluent farmers in particular, access to market information and consultations with each other, are important in deciding the price if they are to obtain higher returns from the produce. It was only farmers in Malakata who were able to take advantage of this.

Furthermore farmers from this category seemed to favour price liberalization as it enhanced their real incomes. Contrary to this view, the poor stratum consider it a disincentive as they are required to pay so much money to meet their food and other requirements. Furthermore for the poor, the new marketing arrangements have worsened their poverty status. Incentives such as access to credit which previously enabled some to produce 'more' for the market have been withdrawn. Compounded with factors such as drought and corridor disease, their inability to produce even enough food for themselves has resulted in them being *«always food insecure»*.

Non–availability of maize seed and fertilizer has serious implications for long–term household food security and general welfare of the people in the village as will be shown later. Under these new conditions, farmers are trying to make *«adjustments»* to grow maize by adopting the following strategies:

- return to subsistence agriculture (see also Keller–Herzog and Munachonga 1995: 23),
- using cattle manure, instead of chemical fertilizer, for those who still have animals,
- crop rotation, and
- planting lower yielding local maize varieties (which do not require fertilizer) rather than hybrid maize.

All this have led to reduction in the production of maize by the majority of farmers visited. This means that the number of small scale farmers who have benefited from SAP–induced measures is a tiny minority. In Mwanamungule village, only one farmer who is a recent retiree is doing well. Malakata village has some relative advantage over Mwanamungule because of the presence a larger number of traders, and proximity to larger market dealers at Chisamba, Kabwe and Lusaka, the district, province, and national capital respectively. A reduction in the output of maize and other crops have negatively affected farmers' participation in the new marketing system. When farmers lack cash reserves, they may not manage to wait to sell their crops when prices are highest. With the introduction of user fees in health and education, farmers are under increased pressure to sell their crops early to meet these needs.

Based on the findings of this PRA study we conclude that the SAP induced measures, i.e. withdrawal of subsidies for the distribution of inputs and marketing of crops have resulted in reduced agricultural production and consequently increased the deterioration in social welfare in the villages. The main constraint centre around access to hybrid maize seed and fertilizers, aggravated by other factors like drought and loss of work oxen. Consequently farmers have become more dependent on purchase of maize to supplement their inadequate food stocks. For poor households, food insecurity has become a greater problem. In a gender perspective, the findings indicate that SAP related policies have had a differential impact on men and women, with the latter becoming even more disadvantaged than men, in terms of access to information, inputs, transport services, etc.

Eastern Province

Production has drastically fallen in both villages not only due to the inability of farmers to acquire loans, but also due to the drought that has hit the southern region of Africa. Farmers in both villages studied rely on rainfall for production and the timing of field operations with rainfall patterns is becoming increasingly difficult to time.

Neither farmers in Wachepa nor Malewa have benefited adequately from the structural adjustment program as they are having problems adjusting and adapting to current agricultural policies, except for the 19 percent who are cotton growers in Wachepa. Most of the farmers are used to produce on a loan basis which are no longer easy to acquire. Most farmers are not able to put up with the high interest rates, ledger fees and other conditions being demanded by the lending institutions.

In order to cope with the worsening in the livelihood situation the people in Wachepa have increased the piece work activities and many are relying upon employment in Chipata, the provincial capital. They are not looking for options within agriculture except for increasing their cotton production. No more arable land has become available for increasing acreage. On the other hand, Malewa did not seem to have much in terms of options. A few farmers in Malewa have gone into dambo cultivation. This lack of options in Malewa may be due to the fact that the majority of the people in the village are elderly.

Increased reliance on piece work in Wachepa has resulted in decreased attention to own production. This worsens their livelihoods because labor is mainly remunerated in food, e.g. mangoes and maize. Also, there is an influx of cheaper labor from Malawi.

Nutritional status has been declining in general in both villages partly because of the unpredictable and erratic rainfall and also the inability of farmers to cope with the change in the agricultural policies. Women in both villages will go out of their way to make sure that the children are fed.

Most farmers in both areas do not have the ability to hold their produce and take advantage of price fluctuations in order to sell at peak prices primarily due to low levels of production (0.5 lima[20] to 1.5 ha) and the fact that they need the money to purchase immediate household requirements.

Farmers in both Wachepa and Malewa have little bargaining power to determine the prices at which they should sell their produce. This is more so if they produce on loan basis.

Buyers are competing for cotton in Wachepa, whereas in Malewa, Aliboo seems to be monopolizing the market. Farmers also complained about not having any alternatives. Prices are determined by the buyers rather than the producers partly because farmers are not united in bargaining for the prices. Others sell at lower prices out of desperation to meet immediate needs.

Very few gender differences exist in either village. This could be due to limited integration into the market economy and to the fact that it does not seem to matter who gets the loan within the household. It can be either the husband or the wife. It also appears as if there is an equal level of participation in agricultural activities by men and women.

There are several reasons why Wachepa may have done better than the neighbouring villages in 1993. These include good leadership, successful cotton production, closeness to the road, employment in Chipata, strong family ties and support, strong women and piece work opportunities, although the value of labor is declining. Similarly Malewa may also have done better than the neighbouring villages in 1993 because of the wider crop base for food consumption, relatively better soils, access to purchased fertilizer, access to market at Mwase–Lundazi sub–boma, proximity to Malawi, access to oxen, dambos and manure.

3.8. Conclusions

The major conclusion of this PRA study is that whereas it may make economic sense to remove subsidies on hybrid maize production at the macro–economic level, this has been at the expense of reduced levels of welfare, i.e. inadequate access to an all year round supply of food, for most rural households, male farmers and female farmers alike. Whereas many proponents of SAP have argued that the major beneficiaries of subsidized hybrid maize production are urban consumers, i.e. who benefited from depressed maize prices, we contend that this position grossly underestimated the

[20] 1 lima is 50 x 50 meters.

central role hybrid maize gradually attained as a major starch staple, in addition to being a cash crop, for most rural households.

Whereas the above conclusion holds true for all the six villages in the three provinces studied, there are some noticeable differences in opportunities and fortunes for the three provinces under trade liberalization. The Central Province appears to fare better, followed by the Eastern Province, with farmers in the Northern Province being worst affected. This is reflected by the following;

- There seems to be a greater diversity in sources of income for farmers in the Central Province, and to a lesser extent, in the Eastern Province. As we noted in the Central Province report for instance, richer households can derive incomes from livestock sales, in addition to crops. The ability to secure income from alternative sources enables richer households in these provinces to continue growing hybrid maize without government support.
- In Northern Province, many people, including households classified in the well–to–do category, are unable to support hybrid maize production with own resources. Thus, for example, wealth and well-being in the province are perceived merely in terms of the extent to which a household can satisfy its basic food requirements. This is contrary to the situation in Central and Eastern provinces, where ownership of assets such as oxen and ox–drawn implements is an important proxy for wealth and well-being.
- In both the Central and the Eastern Provinces, the private sector has moved much more quickly to fill the gap left by government–organized credit, input supply and marketing institutions. For example, Lonhro has successfully supported cotton production as an upcoming alternative cash crop to hybrid maize in the two provinces. This has not been the case for Northern Province.

The field work shows that the government and other interested parties should examine the possibility of supporting crops of strategic importance to the welfare of female and male households, especially in areas not favoured by the private sector. More official support may also be needed for crops which have income earning potential for women such as groundnuts for Eastern and Central provinces, and sweet potatoes and beans for Northern province.

Official support does not need to be in the form of direct government investment. Instead, indirect support of the kind given to investors in the commercial sector could be given, such as tax rebates for private companies willing to support strategic crops or upcoming cash crops for women in less favoured areas.

The field work also shows that female and male farmers will not be able to take advantage of market incentives brought about by trade liberalization unless official support is rendered to increase their production capacity.

3.9. PRA Northern Province

Introduction

The PRA exercise in the Northern Province was conducted in the two villages of Chafwa and Kapwanya. Chafwa village is situated about 15 km north–west of Kasama town while Kapwanya village is located some 120 km from Mpika town and about 10 km off the Great North Road. The two villages were selected to reflect different degrees of access to markets and other support services. Thus, Kapwanya village was designated as a remote village while Chafwa was classified as a relatively well–serviced and accessible village.

We present the findings of this study by first looking at the major changes which have happened at the community level as a result of trade liberalization. This will then be followed by an examination of

the effects of these changes at the community and household levels, and the differential responses of different categories of farmers in the community.

Change in marketing arrangements and the expected rise in the price of agricultural produce will be discussed first, because prices were assumed to be the most critical factor which would influence the production decisions of male and female farmers. The other change which we discuss is the reduced access to credit and agricultural inputs for small scale farmers, which we found to be even more significant than prices in determining subsequent production strategies for rural households.

Marketing Arrangements and Price Changes After Liberalization

Before 1991/92 season the government, through state–run institutional buyers, purchased most of the major farm produce (of which hybrid maize was the most important) from depots which were close to the villages or from agreed points near farms. In addition private traders and local buyers participated, to a much lesser extent, in the purchasing of the other crops not routinely bought by institutional buyers. The liberalization of agricultural marketing was expected to result in private traders participating on a wider scale than had hitherto been the case. However the scenario from 1992 to date has been that of declining participation of institutional buyers without a corresponding increase in the activities of the private buyers.

To demonstrate the above, we present data obtained from the two villages of Chafwa and Kapwanya. As shown in Table 3.1. the data indicate that the significance of institutional buyers in the purchase of hybrid maize has steadily declined between 1990 and 1995 for Chafwa village. Although the data also show a slight increase in the importance of private buyers for hybrid maize since 1990, this is only in relative terms, because the numbers and capacity of private traders is not yet adequate to absorb all the marketed output from the village. For example, those who were able to grow hybrid maize in 1992 were unable to sell their produce after the lending institution which had provided them with inputs for that season told them to find their own market. This resulted in the following;

- Some farmers who tried to store their maize incurred heavy wastage due to poor storage. This was due to lack of storage chemicals which were too expensive or unavailable in Kasama town.
- People had no choice but to sell their produce in small quantities either in Kasama town or to the few private traders who managed to come to the village. For those who sold to the private traders in the village, their bargaining power was greatly reduced because in situations such as this one, the village market is effectively a buyer's market, since the available maize stocks far outstripped demand. Meanwhile, only those people who owned bicycles were able to transport small quantities of maize to Kasama town. Since ability to transport a reasonable amount of produce to Kasama market depended on bicycle ownership, female–headed households, who do not normally own bicycles, were clearly at a disadvantage.
- Most long–distance private traders preferred barter exchange to purchase maize and other produce rather than using cash. Barter enables long–distance traders to more effectively manipulate the terms of trade in their favour. We revisit this important point in various sections of this report.
- The few relatively wealthy people who were able to hire motorized transport to move their maize in bulky to Kasama town had to pay K 2,000 per bag of maize. This in effect meant that they had to sell their maize at K 2,000 less than the going price, which greatly reduced their profit.
- The combination of the above factors put farmers in an awkward situation, as they were unable to mobilize sufficient cash to pay back their loans. As a result, their creditworthiness for future loans was greatly jeopardized.

Because of the above uncertainties, many people have since abandoned hybrid maize production and concentrated on the production of traditional food crops, as we will show later. Most of these crops

are grown on a modest scale and sold or bartered in small quantities to private traders or locally within the village to meet contingent household needs.

Table 3.1. The relative significance of institutional buyers, Private buyers and local sales for different crops in Chafwa village 1990–1995

	1990			1993			1995		
Crop	Inst.	Pr.	Loc.	Inst.	Pr.	Loc.	Inst.	Pr.	Loc.
Maize	3	0	1	0	1	2	0	1	1
Millet	0	0	1	0	0	1	0	0	1
Cassava	0	0	1	0	0	1	0	0	1
Groundnut	0	1	1	0	1	1	0	1	1
Beans	0	3	1	0	3	1	0	3	1
Vegetable	0	3	1	0	3	1	0	3	1

Note: 0 = absent
1 = not very significant
2 = significant
3 = very significant

Inst. = Institutional buyers
Pr = Private traders
Loc. = Local sales (village level)

As shown in Table 3.2., in Kapwanya, like in Chafwa, the significance of institutional buyers for hybrid maize purchasing has declined steadily between 1990 and 1995. By 1993, the institutional buyers who had previously operated in the area had all stopped. However, unlike in Chafwa, the involvement of private buyers in hybrid maize purchasing had completely stopped by 1995.

Private buyers have stopped coming to Kapwanya to purchase maize because there is no more hybrid maize to purchase (as we will see shortly, private traders are bringing maize and maize meal into the area instead). This is unlike in Chafwa village, where a few private traders still come to purchase hybrid maize from a few individuals who are still able to grow maize. Since Chafwa village is located near the provincial capital, where input suppliers and lending institutions are based, it is still possible for some people in Chafwa village to travel, at a reasonable expense, to Kasama town to purchase inputs or to lobby for loans. In Kapwanya village, on the contrary, the withdrawal of parastatal input distributing agencies and lending institutions has put an abrupt and complete stop to hybrid maize production, as we explain later. The little maize still being grown in the area is of the local variety (called *Kalimwa*) and is mostly consumed by the households, or to a limited extend, bartered or sold locally within the village.

Table 3.2. The relative significance of institutional buyers, private traders and local sales for the different crops grown in Kapwanya 1990–1995

	1990			1993			1995		
Crop	Inst	Pr.	Loc.	Inst.	Pr.	Loc.	Inst.	Pr.	Loc.
Maize	3	0	1	0	1	2	0	0	1
Sorghum	0	0	1	0	0	1	0	0	1
Millet	0	1	1	0	0	1	0	0	1
Beans	0	3	1	0	3	1	0	3	1
Cassava	0	0	1	0	0	1	0	0	1
Groundnut	0	2	1	0	1	1	0	1	1

Notes: 0 = absent
1 = low significance
2 = average significance
3 = high significance

Ins = Institutional buyers
Pr = Private traders
Loc. = Local sales

All the other staples in the village such as sorghum, finger millet and cassava are also sold or bartered on the local village market, indicating low production levels and therefore lack of surpluses to attract private traders. Private traders have however become quite important for beans, Irish potatoes, and sweet–potatoes, as is discussed at a latter stage.

In Kapwanya village, market–driven prices of different crops at different market outlets, have had a negative impact on the most vulnerable groups of rural producers. Table 3.3. shows the premium prices for the important crops in Kapwanya when sold at the village level and in Mpika town.

In Table 3.3., it can be seen that the price of hybrid maize and finger millet is respectively 62% and 60 % higher in Kwapwanya village as compared to Mpika market. This represents a big disadvantage to food–deficit households who depend on additional purchased staples to supplement their limited food stocks (as will be elaborated later). In other words, resource–poor households, a significant proportion of whom are women, are forced to bargain on a seller's market, where prices for these essential staples are determined by the long–distance traders who manage to bring them to Kapwanya village. Richer households within Kapwanya, who are able to travel to Mpika town, have also tended to take advantage of these price differentials by buying maize from Mpika at a lower price for resale (at a higher price) or for labor exchange at Kapwanya village.

Table 3.3. Current price of important crops at Kapwanya and Mpika market outlets

		Price	
Crop	Quantity	Kapwanya	Mpika
Maize	20 litre Tin	K 4,500	K 2,800
Beans	5 litre Tin	K 2,500	K 4,000
Finger millet	5 litre Tin	K 5,000	K 3,000
Sweet Potato	20 litre Tin	K 1,000	K 2,000
Irish Potato	20 litre Tin	K 1,000	K 2,500

On the contrary, the prices for beans, Irish potatoes and sweet– potatoes, which are emerging as important sources of cash income for Kapwanya residents, are much higher in Mpika District than at Kapwanya village. Once again, resource–poor households, who are unable to transport their produce to Mpika, are at the mercy of long–distance traders and local entrepreneurs, who purchase the produce from cash–strapped and food–deficient households at a lower price, for resell in Mpika at a much higher price.

The most poignant example with respect to the above is that of beans. Since some of the beans in Kapwanya village is harvested during the hunger period, when many household do not have sufficient starch staples of their own, long–distance traders have taken advantage of the situation by bringing maize and maize–meal (which, as we have seen, fetch a higher price at the village level) to exchange with beans (which are cheaper at the village level). According to local people, during the hunger period, a 5 litre tin of beans, valued at K2,500 at the village level (but at K4,000 in Mpika), is exchanged for a 5 litre tin of mealie meal, valued at K 1,125 at the village level (but at a mere k700 in Mpika). In short, by speculating at the two market outlets, long–distance traders are able to convert mealie–meal worth only K700 in Mpika, into beans which can later fetch up to K4,000 in Mpika. The pressure to exchange beans for mealie–meal during the hunger period greatly depletes beans harvests, and limits the potential of beans to replace hybrid maize as a major source of income for rural households in Kapwanya village.

To conclude, it can be seen that the free–market policies which came with liberalization have put a great majority of rural producers in a no–win situation. Although it was envisaged that rural producers

will obtain higher prices for their produce, this has not been the case because of their weaker bargaining power in relation to other actors on the stage, such as the long– distance traders.

Input supply and credit availability after liberalization

Prior to the liberalization, all inputs were delivered by parastatal institutions to rural depots within the village. The dependence of these institutions on government subsidies and the subsequent removal of this subsidy eroded the ability of these institutions to participate in the new liberalized markets. Private traders were expected to fill the gap left by these institutions in the agricultural input supply sector.

One of the major arguments in favour of the removal of government subsidy on fertilizer is that this distorted the real market value of agricultural produce. It is further argued that it is the urban consumers, rather than the rural producers who stood to benefit from this subsidy, because the former were able to purchase mealie–meal at a cheap price. The validity of this argument is critically examined at a latter stage.

In Chafwa village, according to the farmers, the last delivery of seed and fertilizer to the local depots was in 1992. From 1992 to 1995 only those farmers who are able to purchase these inputs from Kasama and transport them to their farms or are able to qualify for loans from lending agents can use purchased inputs. The lending agents which were active in the area prior to 1992 include Lima Bank, Zambia Co-operative Federation, and the Credit Union and Saving Association. In the 1991/92 season most farmers were not able to sell their produce as the previous marketing arrangements of door–to–door collection of produce by government institutions had been discontinued. As it has already been noted above, there were no private traders to buy the produce, and as a result, farmers were unable to repay their loans and could not subsequently qualify for loans the next season. The high level of defaulting in turn reduced the ability of the parastatal lending institutions to expand their lending facilities.

The input supply situation in Kapwanya village since 1992 is similar to that in Chafwa village. No inputs were delivered to the village depot since then. However, owing to its greater distance from Mpika District, very few people are able to travel to Mpika to procure inputs at their own expense. For example where as the actual price of a bag of basal and top dressing fertilizer in Mpika is K13,500 and K16,000 respectively, an individual travelling at own expense has to bear additional costs for two bags as listed in Table 3.4.

Table 3.4. Transport costs for Kapwanya village

Cost item	Cost
Transport money to Mpika	K 2,500
Transport money from Mpika	K 2,500
Transporting fertilizer to road–side	K 1,000
Transporting fertilizer from Mpika to local station	K 2,000
Transporting fertilizer from local station to village	K 2,000
Meals while in Mpika	K 1,000
Total additional expenses	K11,000

Thus, each of the two bags of fertilizer will cost K 5,500 more, bringing the total landed cost of fertilizer at the village to K 19,000 Kwacha for basal and K 21,500 for top dressing. Needless to say, only very few well–to–do people in Kapwanya village can manage to purchase fertilizer from Mpika

(a group of men interviewed identified only 3 male–headed households in the whole village, out of a population of nearly a hundred households).

The demise of the pre–reform government–run input supply and lending institutions has left a void which private enterprise has been unable to adequately fill since 1992. The current pro–reform government has not been able to formulate a clearly defined and long–term credit and input supply policy. Thus several options were tried, such as the highly unpopular use of area Member of Parliament (MP) to administer input supply and produce marketing.

In the 1995 agriculture season, the government has come up with an input supply and produce marketing strategy which is aimed at being the basis for a future long–term policy. This year, the government has appointed Cavmont Merchant Bank to administer credit and input distribution on behalf of the government. The underlying rationale is that since agriculture credit, input supply and produce marketing all belong to the domain of «business», then these functions must be carried out by competent commercial concerns, rather than by the government. As it can be seen, this is in contrast to the previous government, in which the above functions were primarily seen as «services» rather than «enterprises».

Cavmont Merchant Bank operates by lending inputs to appointed dealers and stockists, who must in turn loan out the inputs to the farmers. This means that if both Cavmont and the appointed dealers have to make a profit, each party must put up a profit margin on the interest they charge, and these costs are borne by the farmers.

In Northern province, Cavmont Merchant Bank has appointed a number of stockists, which include GBM and House of Kasama. To be appointed, aspiring stockists must prove that they are already an existing business concern with buildings and transport. Furthermore, all stockists must pledge collateral to the Bank, as security for obtaining the fertilizer loans. This means that the stockists will be particularly concerned about the ability to recover their money from farmers and to make some profit as well. This orientation is best summarized by the Credit Co-ordinator for GBM, who said, during an interview in Kasama that; «*The whole thing is that we are trying to do business*»

Because of the above orientation, the conditions for obtaining inputs on loan have been greatly tightened, unlike in the pre–liberalization years, when inputs could be obtained by anyone, including those who had not cultivated any land (who would instead sell the fertilizer or exchange it for food or beer). Some of the conditions for obtaining inputs on loan which were cited in Chafwa and Kapwanya villages include:

- For each bag of fertilizer given on loan the farmer repays two bags of maize after harvesting. Farmers do not favour this system as they think it is exploitative. For example, a lima (50 by 50m) of maize, requires two bags of fertilizer, one basal dressing and one top dressing. According to the Block Supervisor in charge of Chafwa area, average yields per lima ranges between 5 and 15 (90 kg) bags of maize, depending on type of seeds planted and on the level of management. When inputs are late and farmers must mix both basal and top dressing in a single application, yields per lima range between 4 and 8 (90 kg) bags of maize (see Table 3.5.) below. Thus for those who only manage to get less than eight bags per lima, most of their produce (i.e. 4 bags) will be surrendered to the lending institution. In poor years, or in situations where inputs are late, some people may stand to lose all their entire harvest to the lending institutions. Thus, one female farmer pointed out during a group discussion; «*Four bags of maize for two bags of fertilizer is unfair, what about my labor ?* »
- The other requirement which is particularly disadvantageous for resource poor female farmers is that inputs can only be given to people who are able to cultivate at least one hectare or more. Resource–poor female farmers, especially female–headed households, who typically cultivate small

plots due to labor constraints, are automatically excluded from obtaining inputs. In the past, an individual could obtain inputs for even a lima.

- The other requirement is that farmers must pays 10% up front of the value of the fertilizer before delivery. Although the price of fertilizer in Kasama is K13,000 and K18,000 for basal and top dressing respectively, the value of both types of fertilizer given out on loan is put at k20,000. Thus when we use the later value, a farmer must pay K2,000 up front, for each bag obtained on loan. Many farmers, especially female farmers complained that this was beyond what a majority of people could afford.
- Improved seed has not been included as a component of the loan this year. Farmers are expected to purchase their own seed. This was considered a disadvantage as most farmers do not have money for buying seed. This leads many people to plant second generation seed, which significantly reduces yields. In addition to the above, as at 2/12/95 no loan agent had either inspected the fields nor signed any loan agreement with the farmers in spite of the Ministry of Agriculture recommendation that the planting of maize must be completed before the 15 of December for optimal yields.
- Finally, all applicants must have collateral in the form of fixed assets, such as a hammermill, a burnt brick house, tractor, livestock etc. Again as can be seen, most resource–poor female –headed households are unlikely to obtain loans, as they typically do not have any of the above assets.

The final outcome of liberalization in terms of input supply has been the proliferation of different types of fertilizers on the market, some of which are unsuitable for the agro–ecological conditions of the Northern province. For example, according to the Department of Agriculture, the Danish fertilizer which was imported for the 1994/95 season has been found to be deficient in sulphur. The recommended sulphur content for Northern Province is 9% while the Danish fertilizer has only 2% . The Department of Agriculture has responded to this by advising farmers *«not to use the fertilizer where possible or to use alternative fertilizer where available»*. Both options are untenable for small–scale farmers since this was the only fertilizer available on loan.

Table 3.5. Average yields per lima for different hybrid maize varieties under different management levels

Variety	Level management	Yield/lima in 90kg bags
1. Early maturing 603/604		
	High	8 – 10
	Average	7 – 9
	Low	5 – 6
2. Late maturing 612/752		
	High	10 – 15
	Average	8 – 12
	Low	6 – 8

Note: Yields are subject to timely planting and application of fertilizer.

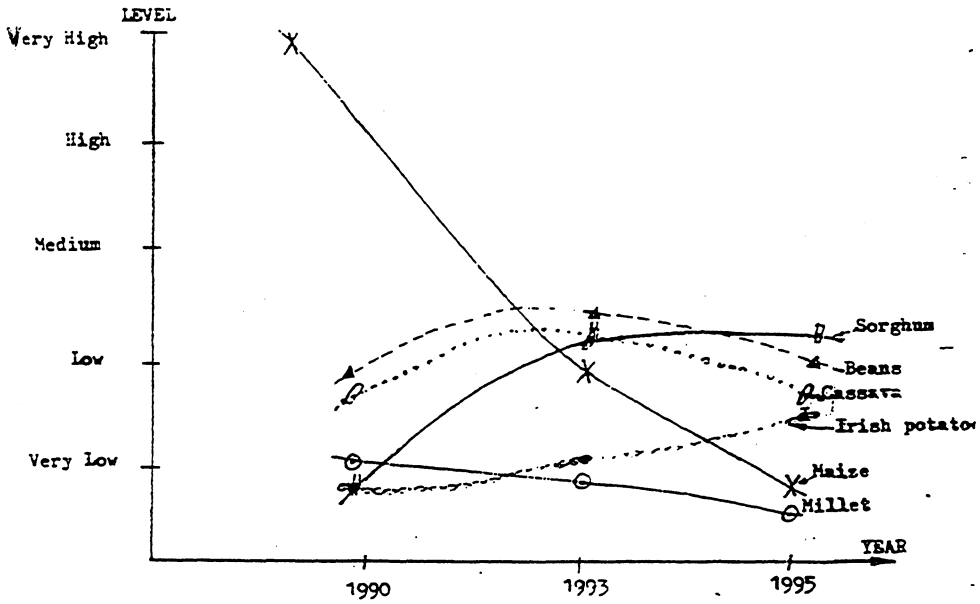
Production Trends

Between 1990 and 1995, the trends of production in the villages of Chafwa and Kapwanya have been characterized by a dramatic shift from the hybrid maize–dominated farming systems of the pre–liberalization years. In both areas, the unreliability of the input delivery system and the lack of access to credit under liberalization has forced farmers to revert back to subsistence– oriented production of traditional food crops such as cassava, sorghum and finger millet.

The change to subsistence oriented food crop production is most noticeable in Kapwanya village in rural Mpika. Between 1990 and 1995, sorghum has become the most important starch staple, while the production of hybrid maize has drastically declined (in fact, the little maize still being grown in

the area is mainly of the local flint type known as *Kalimwa*, which can be grown traditionally without the application of fertilizer). As we shall elaborate at a later stage, the shift from hybrid maize to reliance on sorghum has had a negative effect on social welfare (defined by local people as the ability of a household to secure an all year round supply of food). Cassava is the other traditional food crop which has grown in importance in Kapwanya village, especially during the last two years. Despite the increased importance of cassava in the village, production levels have not been sufficient to adequately fill the void left by hybrid maize. Time devoted to finger millet cultivation has also increased, albeit, without corresponding increase in the volume of production, because of an ever increasing shortage of trees for making chitemene gardens, and the resultant need for people to travel greater distances to find suitably wooded sites for chitemene gardens. Beans have assumed a central position for both male farmers and female farmers, as a local medium for barter exchange and as a source of cash to supplement shortfalls in sorghum and cassava production. Irish potatoes are also emerging as an important source of cash, especially for male farmers, while sweet potatoes are increasingly being grown for both home consumption and for sale by both male farmers and female farmers. The significance of these new «cash–crops» and their contribution to the household economies of different categories of farmers will be discussed in more detail at a later stage. Figure 3.1. depicts production trends of the major crops grown in Kapwanya village over the last five years, as perceived by a group of male farmers and a group of female farmers.

Figure 3.1. Production trends of the major crops grown in Kapwanya between 1990 and 1995: an assessment by a group of male and female farmers



The situation in Chafwa village also reflects a shift away from hybrid maize production to subsistence oriented food crop production. However, for various reasons, efforts to revert back to food crop production appear to be more tenuous in Chafwa village, for both male farmers and female farmers. For example, where as more and more people are switching back to cassava cultivation, this has not been accompanied by an increase in the volume of production because people are forced to harvest their cassava under duress, to satisfy immediate subsistence requirements. The propensity to harvest cassava prematurely (which was also noted in Kapwanya village), has important implications for household food security, and this will be discussed in more detail at a later stage.

The other factor limiting expanded production of cassava in Chafwa village is the resurgence of the cassava mealy–bug disease, which had first appeared in the Northern province in the late 1980's but was subsequently contained in the early 1990's by the use of biological control.

Another factor which was commonly cited by both male farmers and female farmers is that due to scarcity of trees necessary to cultivate the chitemene–based sequence of crops which include cassava, people are increasingly relocating cassava production to land previously used for hybrid maize production, which, according to local opinion, has been «*burnt out*» («*umushili wa lipya*») and rendered unproductive by successive use of chemical fertilizers. It is argued that the use of such «*tired*» («*umushili wa linaka*») and fertilizer–dependent soils for other crops, cassava included, has significantly reduced yields over the past five years.

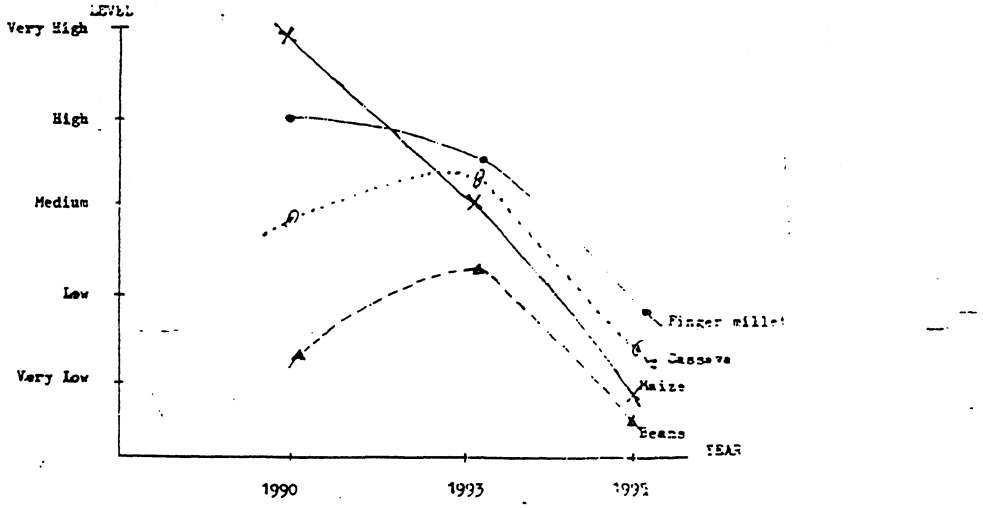
The above scenario also obtains for finger millet, another important traditional staple once widely used before the pre-eminence of hybrid maize. Due to scarcity of suitable land for chitemene, finger millet production has progressively dwindled in the last five years. Unlike cassava, which can still give reasonable yields under exhausted fertilizer–dependent permanent field conditions, finger millet will not perform well under permanent field conditions, without the application of fertilizer.

Production of the two pulse crops of groundnuts and beans has also been affected by greater reliance on permanent fields. Beans and groundnuts have always been grown on a modest scale in the village, mainly as components of the chitemene–based sequence of crops. It is noted that increased reliance on exhausted permanent fields has resulted in a higher incidence of pops on groundnuts, for which the only officially recommended solution hitherto is the use of lime, which is expensive and difficult to obtain for both male and female farmers. Similarly, the increased reliance on permanent fields for beans has brought new pests and diseases such as the bean stem maggot and the Otheca beetle, which are not commonly experienced in *fifwani* gardens (old chitemene gardens from the second year onwards). Thus, the production of groundnuts in Chafwa village has stagnated between 1990 and 1995 while that of beans has actually declined during the same period.

The other significant development in Chafwa village is the emergence of new crops such as exotic vegetables, and to a lesser extent, sweet potatoes, as important sources of income for some categories of households between 1990 and 1995. The significance of these two crops as sources of income for male farmers and female farmers will be discussed in more detail later.

Figure 3.2 shows production trends of the major starch staples and pulse crops in Chafwa village, as perceived a group of male farmers and female farmers.

Figure 3.2. Crop output trends as represented by a group of female and male farmers in Chafwa village: 1990–1995



The graphs portray a somewhat more pessimistic picture for Chafwa village as compared to Kapwanya village. Owing to Chafwa village 's proximity to Kasama town and to a higher population density, the switch from chitemene to fertilizer–dependent hybrid maize production during the pre–liberalization years was much more definitive and widespread, to the extend that it is now very difficult to revert back to food crop production using traditional methods. Because of the above, there appears to be more reliance on cash to purchase additional staples for household subsistence in Chafwa village (mainly maize and maize flour purchased from the near–by town of Kasama). However, it must also be noted that declined production of staples at the house–hold level in Chafwa village does not automatically translate into lower levels of social welfare as compared to Kapwanya village. Chafwa village has some relative advantages over Kapwanya village because of its proximity to the provincial capital. For example, food deficit households in Chafwa can purchase supplementary staples at a much lower cost as compared to Kapwanya. Secondly, opportunities to earn additional income from trading and formal employment seem to be much greater in Chafwa village than in Kapwanya, and finally, the emergent cash crops of vegetables and sweet–potatoes in Chafwa village can be more readily marketed at a higher price and at less cost to the producer in the nearby town of Kasama. All these issues will be discussed in more detail later.

The major conclusion which can be drawn from the discussion on production trends is that for both villages, the most important impact of the Structural Adjustment Program has been the disruption of the well–entrenched but expensive–to–run system of hybrid maize production using purchased inputs and modern scientific methods. Although conventional wisdom had tended to classify hybrid maize as a «cash crop» and «an urban staple», our findings suggest that for various reasons (which will be discussed later), hybrid maize had in fact become a preferred starch staple for a great majority of rural households, and had therefore played the dual roles of being a cash crop as well as a food crop.

The above conclusion was only reached after exhaustive interviews with both male and female farmers in the two villages. The PRA team felt that the independent opinion of male versus female farmers is critical when dealing with the subject of hybrid maize, because of the generally held view that hybrid maize production had negatively affected female farmers by diverting female labor from food crop production to the male–controlled hybrid maize enterprise (see for example Gatter and Sikana 1990). This argument further suggests that the resultant appropriation of female labor for «cash cropping» had tended to jeopardize the food security situation at the household level and to

foment conjugal conflict over control of income from maize sales. Against the above background, the PRA team wondered whether women were equally unhappy about the demise of hybrid maize production. In both Chafwa and Kapwanya villages, women emphatically stated that the decline of hybrid maize production has seriously affected the food security situation at the household level. In other words, the alleged conjugal conflict associated with hybrid maize production has been a bit overstated, because hybrid maize has been both a cash crop and a food crop, and therefore both men and women have been willing stake–holders in the enterprise.

In the section which follows, we specifically look at the extent to which household food security has been affected in the two villages by looking at food consumption trends between 1990 and 1995.

Food consumption trends

As we have already noted above, the shift from hybrid maize production to the traditional food crops of sorghum, cassava and finger millet has resulted in conspicuous changes in food consumption patterns both in the long–term (i.e. 1990 to 1995) and across seasons. In both Chafwa village and Kapwanya village, the general consensus is that the non availability of hybrid maize has reduced the food base and elongated the hunger period for most rural households. This sentiment is best captured in the following seasonal food calendars constructed by male and female farmers in Kapwanya village for a typical season when fertilizer was readily available (i.e. 1990 and before) and for the period between 1991 and 1995.

Table 3.6. A typical seasonal food consumption calendar between 1980 and 1990, when fertilizer was readily available. Kapwanya village

Monthly Food Availability: Relative Quantities	J	F	M	A	M	J	J	A	S	O	N	D
Crop												
Maize	0	1	2	2	3	3	4	4	4	4	3	2
Cassava	2	2	3	3	4	4	4	4	4	3	3	1
Sorghum	0	0	0	0	0	3	3	2	2	2	0	0
Beans	3	4	4	3	0	0	0	0	0	0	0	0
Millet	0	0	0	4*	0	4	4	4	4	4	4	3
Sweet potatoes	0	0	0	2	2	3	3	3	2	0	0	0

0 = not available, 1 = very little, 2 = little, 3 = sufficient, 4 = plentiful.

Note * Finger millet available in April is the early maturing variety called Mwangwe which was in the past grown on a small scale and consumed before the main finger millet harvest in June.

As can be seen from the two calendars tables 4.6. & 4.7., the availability of starch staples has sharply declined since 1990. For example, before 1990, the hunger period in Kapwanya village used to last for a period of only 4 to 5 months, between February and May, because of the availability of hybrid maize for the remaining 7 months from July up to January. It was also pointed out that the hunger period before 1990 was not as acute as it is at present, because of the availability of cassava the whole year round, and of finger millet as from May, before the harvest of hybrid maize. This is collaborated by other studies carried out in the province, which indicated that during the hybrid maize boom period, the hunger period was partly due to the difficult to process and dry cassava because of the rains, rather than due to an absolute scarcity of alternative starch staples (Sikana and Simpungwe, 1993).

Table 3.7. A typical seasonal food consumption calendar between 1990–1995, when fertilizer was no longer available: Kapwanya Village

Monthly Food Availability: Relative Quantities	J	F	M	A	M	J	J	A	S	O	N	D
Crop												
Maize (mainly local variety)	0	1*	1*	2	1	1	1	1	0	0	0	0
Cassava	0	0	0	0	0	0	0	0	0	3	3	0
Sorghum	0	0	0	0	0	4	4	3	3	2	1	0
Beans	2	2	2	1	1	1	1	1	1	1	1	0
Millet	0	0	0	0	0	2	2	1	1	0	0	0
Sweet potatoes	0	0	0	3	3	2	2	1	1	0	0	0
Irish potatoes	3	2	1	0	0	0	0	0	0	0	0	0
Groundnuts	0	0	0	3	2	2	1	1	1	0	0	0

Note:* In February and March, fresh maize is consumed on the cob as a «snack», until April when it is milled and made into thick porridge (Nshima).

The striking feature of the seasonal food consumption calendar for the period between 1990 and 1995 is the much elongated hunger period which now lasts for up to seven months from November to May. There are several reasons for this:

- Because of the absence of hybrid maize, there is increased consumption pressure on alternative starch staples such as sorghum, cassava and finger millet. Consequently, these alternative starch staples are quickly expended.
- Yields per unit area are extremely low for alternative staples such as sorghum. For example, during a visit to the fields of the village headman for Kapwanya village, we were shown a one hectare plot of land which the headman is going to devote to sorghum production this season, because of lack of fertilizer. The headman expects only 4 bags (90 kg) of sorghum from the one hectare plot as compared to 18 bags (90 kg) of hybrid maize he used to get from the same plot of land. According to the village headman, the four bags of sorghum can only last him 3 to 4 months while in the past, he used to retain 6 to 7 bags of hybrid maize for home consumption, which would be sufficient to last him for most of the year.
- According to local people in both villages of Kapwanya and Chafwa, maize meal is more bulky and therefore lasts longer than most of the available alternative staples. Women farmers in Chafwa village argued that one requires less maize meal per unit of water when preparing a meal than is the case for other staples such as finger millet and cassava. This implies that the same quantity of maize meal can support a lot more people than can any of the available alternative staples (sorghum included).
- The hunger situation between 1990 and 1995 can also be attributed to further depletion of food stocks through barter exchange and sometimes through cash transactions with long distance traders. Trade liberalization has brought with it an ever increasing influx of long–distance traders who come to merchandise all sorts of wares; such as second–hand (*salaula*) clothes, blankets, radios, bicycles, mealie–meal and other perishable groceries. According to the local people in both Chafwa and Kapwanya villages, some of these goods are given in advance before harvest, leaving farmers with little option but to pay up immediately after harvest.
- The absence of hybrid maize has increased dependence on cassava as an alternative staple and this has led to premature harvests to satisfy immediate household consumption needs. In both Chafwa and Kapwanya villages, we were told that existing cassava varieties take up to four years to reach full maturity. However, because of the increased dependence on cassava, people are harvesting their

cassava after only one year. Because of this, a big field of cassava can be consumed within a few months.

Because the cassava tubers are harvested when they are still very small, even the method of harvesting has changed. Instead of removing only a few tubers from each cassava plant, leaving the rest of the tubers to store in the ground, whole plants are uprooted, which means that people have to look for new planting materials every season and plant a new field every year. It therefore seems that, in their desperation, the local people are attempting to convert a perennial crop into an annual crop.

Similarly, the cassava processing method has also changed for hard–pressed, food–deficit households. Instead of going through the long–drawn process of soaking, drying and finally pounding into meal which may, depending on the weather, take up to 7 days (Namposhya 1994), some people uproot the cassava, mash it, dry it and pound it into meal all on the same day. This is done irrespective of the cassava variety being processed. It was also noted that premature harvesting has led some households to pound the cassava tubers without peeling them. To put the above point across, one lady in Chafwa village, on one occasion, waved to us a tiny looking cassava tuber and asked; «*Can you see how small this is. If I peel it, what will remain?*»

In sum, it can be seen that the increased reliance on cassava as an alternative staple to hybrid maize has undermined most of the traditional rationales which had in the past guided the cultivation, processing and consumption of cassava. Because of this mishandling of cassava, it was reported in Chafwa village for example, that some people get intoxicated due to higher levels of cyanide toxicity. Incidents of illnesses resulting from dietary cyanide exposure has been reported in other African countries when populations facing severe food shortage are forced to make short–cuts in the usual cassava processing methods (see for example, Mayambu 1993 for Zaire, Mlingi 1995 for Tanzania and Namposya 1994 for Zambia and Mozambique).

The arguments presented above call for a rethink of some of the assumptions which have been used to justify de–subsidisation of hybrid maize production under liberalization. Where as it was hoped that de–subsidization will lead to diversification into other food crops in marginal areas, and thereby increasing food availability at the household level, the outcome has not been as expected. The evidence presented above lead to the conclusion that all the available alternative staples; sorghum, cassava, and millet, are inferior to hybrid maize in terms of yields per unit area. This is partly because these crops have not been adequately supported by agricultural research and extension as is the case for hybrid maize.

The declined food base and the elongated hunger periods between the years 1990 and 1995 have placed female–headed households at a greater disadvantage, as compared to male–headed households. Since female–headed households are characteristically labor– deficit households, they are least able to cultivate bigger fields to grow more of the low yielding and less bulky alternative staples as discussed above. In other words, the area under cultivation for female headed households tend to remain small, despite the need to cultivate more land. Consequently, female–headed households are also likely to be food–deficit households. For example, as we will elaborate at a later stage, 52% of all the female headed households in Kapwanya village were ranked as food–deficit households while only 41 % of male–headed households were placed in the food deficit category. In Chafwa village, 82% of the female–headed households were placed in the food–deficit category as compared to 37% of the male–headed households.

Food deficit households (the majority of whom, as we have seen, are women) find it difficult to break the vicious cycle of food insecurity because they tend to spend most of their labor working for food to meet immediate consumption needs instead of investing into own production for longer term food security goals. The terms of exchange between labor and staples are so unfavourable for food–deficit households. For example, in Kapwanya village, a 20 litre tin of maize (called tepe) is first converted to its monetary value currently obtaining in the village, which is K 4,500. A plot of land deemed to be

commensurate with that amount of cash is then demarcated and assigned to the hired hand to cultivate. It was noted that in most cases, the hired hand's family will have consumed all the maize by the time they finish cultivating the demarcated plot of land. In other words, by using the local monetary value of grains (which is very high at the village level), food deficit households are made to work more for very little food, and this traps them in perpetual dependence.

Apart from entrapping food–deficit households into perpetual dependence on exchanging their labor for food, the hunger squeeze of the period 1990 to 1995 has also led to a reduction in the frequency of meals. We were variously informed in both Chafwa village and Kapwanya that some food–deficit households may go without Nshima (the mandatory starch staple) for anything between two days to up to seven days. During such times, people derive their sole nourishment from wild fruits such as Masuku (*Uapaca Kirkiana*), or from relishes such as mushrooms and cassava leaves, taken on their own without Nshima.

The hunger squeeze has also increased the level of school absenteeism for children from food–deficit households. We were informed that some children stay away from school to help their households find food; they go out with their families to work for food, they go out in the forest to collect masuku and edible caterpillars (*homorocoryphus* spp), they help grow crops for sale etc. We were unable to get complete data on school attendance trends across seasons because the attendance register is not regularly kept. However, according to members of staff at Mabonga primary school (which serves Kapwanya village), school attendance is lowest during the hunger period from the beginning of November up to April. The second school term which stretches from May up to August records the highest school attendance, because of relative abundance of food after the harvest of most field crops. Estimates given by a senior teacher at the school indicate that out of his class of 39 pupils, 28 to 29 (71% to 74%) attend classes regularly during the second school term, in the third term which marks the beginning of the hunger period, 18 to 20 pupils (46 to 51%) attend classes regularly, while in the first term (January to April) which represent the height of the hunger period, only 18 pupils (46%) manage to attend school regularly.

The other outcome of the hunger squeeze we wish to consider is the ever increasing reliance on cash to satisfy food consumption requirements for most households, especially the food–deficit ones. In other words, since most households are unable to entirely subsist on their own farm produce, the market–place has become an increasingly important arena on which entitlements to food are negotiated. This has led both male and female farmers to devise means to raise the necessary cash with which to bargain on the food market. In the chapter which follows, we examine in more detail the range of on–farm and off–farm sources of income for male and female farmers, as well as the level of control over income disposal by male and female farmers.

Income sources, control and disposal for men and women

In both villages, agriculture (especially hybrid maize production) was the main source of income for most people. The reduction in the cultivation of maize has subsequently resulted in declined total incomes for most families. Table 3.8. gives the major sources of income for Chafwa and Kapwanya villages, before the collapse of the hybrid maize system.

Table 3.8. Major income sources for men and women in Chafwa and Kapwanya villages before the collapse of the hybrid maize system

Chafwa village		Kapwanya village	
Men	Women	Men	Women
Maize	Maize	Maize	Maize
	Beans		beer
	off–farm		beans
	beer		caterpillars

The collapse of the hybrid maize system had the double effects of reducing the food security base of rural households, and the subsequent need for cash income with which to purchase additional food, while at the same time reducing the opportunities for most households to earn the required income. Below, we look at the range of off–farm and on–farm income earning strategies devised by different types of households to deal with the above impasse.

Off–farm income sources:
In Chafwa village, the major source of off–farm income include charcoal burning, collection and sale of edible caterpillars and sale of the wild *masuku* fruits, and to a lesser extent, beer brewing. Wage employment and piece work in the near–by town of Kasama was also reported to be important especially for men. Remittances from offspring in urban employment was mentioned as a major source of income for some households, including female headed households.

Charcoal burning is an exclusive male activity while masuku selling and beer brewing tend to be dominated by women. Caterpillar collection, an activity previously dominated by women, is increasingly becoming attractive to men because of the high demand for caterpillars in the local town of Kasama and along the line of rail.

Attempts to assess the relative significance of the above sources of income proved futile, as this varies from season to season. However we were able to establish that beer brewing tends to be more significant for well–to–do female heads of households and married women who have the necessary resources (i.e. cash and starch staples such as maize and finger millet) to invest into the enterprise. Control of income from beer brewing is exercised by women. Income from forest products such as masuku and caterpillars is more significant for the poor female heads of households as well as poor married women.

In Kapwanya village, the most important source of off–farm income is caterpillars followed by the sale of chikanda (*habenaria*). The more prosperous men and women in the village are also involved in long distance trading, which involves bartering urban consumer goods with local products such as caterpillars and beans, which are then resold in the towns of Mpika and Serenje and along the line of rail. Beer brewing was not reported as a very significant source of income, because most of the beer is exchanged for other commodities (most notably caterpillar) or used as payment for labor, rather than being bought for cash.

In Kapwanya village, like in Chafwa, caterpillar collection is important for both men and women, and it is very common for couples to go out together on a joint caterpillar collection venture. In such instances, the caterpillars are routinely divided between husband and wife before being sold or bartered, rather than being kept in the same bag. According to a group discussion with women farmers, the above arrangement is necessary because men tend to exchange a substantial part of their caterpillar harvests for beer, while women spend 90% of their harvests on household provisioning. A subsequent group discussion with male farmers countered the above argument; they pointed out that in the absence of a reliable source of income owing to the decline in hybrid maize production,

caterpillars are no longer regarded as a boon to be recklessly expended on leisure, but have become a strategic resource which have to be carefully managed to meaningfully contribute towards household food security and well-being. They however admitted that there are a few irresponsible men, who are unable to foster a harmonious relationship with their wives, who would spend all their caterpillars on beer.

Agricultural income sources

We have already mentioned at several points in this report that in both Chafwa and Kapwanya villages, there is evidence that certain crops are slowly emerging as alternative sources of income for different categories of farmers. However, none of these crops has yet usurped the position previously held by hybrid maize as the major source of income for the greatest majority of rural households.

In Chafwa village, vegetables are the most important emerging cash crop, the most commonly grown being tomatoes, eggplants, okra, and leafy vegetables such as rape and cabbage. Vegetable growing has the potential to favourably compete with maize in the future because it needs less capital, can be grown throughout the year has a ready market and has a short growing period. because of these attractive attributes, vegetable growing has expanded considerably since 1990, such that there are currently 21 vegetable growers in Chafwa village now, as compared to only 3 or 4 about five years ago. In fact, Chafwa and other surrounding villages seem to have already established a reputation as a vegetable growing enclave, because several traders, including two major food suppliers from the town of Kasama, come to buy vegetables in bulk from the area.

All the 21 known vegetable growers happen to be men, giving a first impression that vegetable gardening is an exclusive male activity. However, it was noted during a discussion with a group of young men that most (16 out of 21) vegetable growers are married and therefore work jointly with their spouses on the vegetable enterprise. To prove the above assertion, we constructed an activity profile to determine the division of labor between men and women during the vegetable growing circle. The following picture was obtained.

Table 3.9. Activity profile and gender division of labor and responsibilities in vegetable growing, Chafwa village

Activity	Male	Female
Land Preparation	3	1
Making Bed	3	–
Planting seedlings	3	–
Watering	2	3
Aeration/weeding	2	2
Pruning	3	–
Harvesting	3	–
Selling	2	1

Degree of workload and responsibility for various operations:
1 = low, 2 = medium, 3 = heavy.

As can be seen from Table 3.9., most of the tasks in vegetable growing from land preparation to selling are undertaken by men. However, it should be noted that women tend to be more involved than men in watering, one of the most monotonous, tedious but very critical operation in the vegetable growing circle. Similarly, women tend to be involved to the same degree as men in aeration/weeding, another labor intensive operation in vegetable gardening. The other important point to note is that men tend to be more involved than women in the selling of vegetables, and by implication, it is expected that men exercise greater control over income obtained from vegetable sales. Although most men

maintained that income from vegetable sales is spent on household priorities jointly agreed upon by both spouses, the degree to which women have influence in the disposal of vegetable income could not be objectively determined during this PRA.

Resource–poor female headed households are not directly involved in the actual growing of vegetables because they lack the necessary capital, labor and skills. However, some of them actively participate in vegetable trading; they buy from producers in the village and resell at a profit in Kasama. This being the case, it can be argued that there are opportunities for the potential benefits from expanded vegetable production to trickle down to resource–poor female–headed households.

Apart from vegetables, sweet potatoes are also gaining modest importance as a source of income for some male and female farmers in Chafwa. Since 1992, marketers from Kasama town have provided a ready market for sweet potatoes from Chafwa and surrounding villages. According to the local people, the increased popularity of sweet potatoes was enhanced by the introduction of a new higher yielding improved variety of sweet potatoes called *Chingobwa. Chingobwa*, which seems to be poised to become 'the commercial sweet potatoes' for the future, is one of the most celebrated success stories of the research and extension establishment in recent years. Currently, there are 5 people who have established *chingobwa* nurseries in Chafwa village for the specific purpose of selling cuttings (which are on very high demand) to other villagers as a commercial venture. All the five people who own nurseries are men, because the concept of raising nurseries is associated with vegetable gardening, which, as we have seen, is dominated by men.

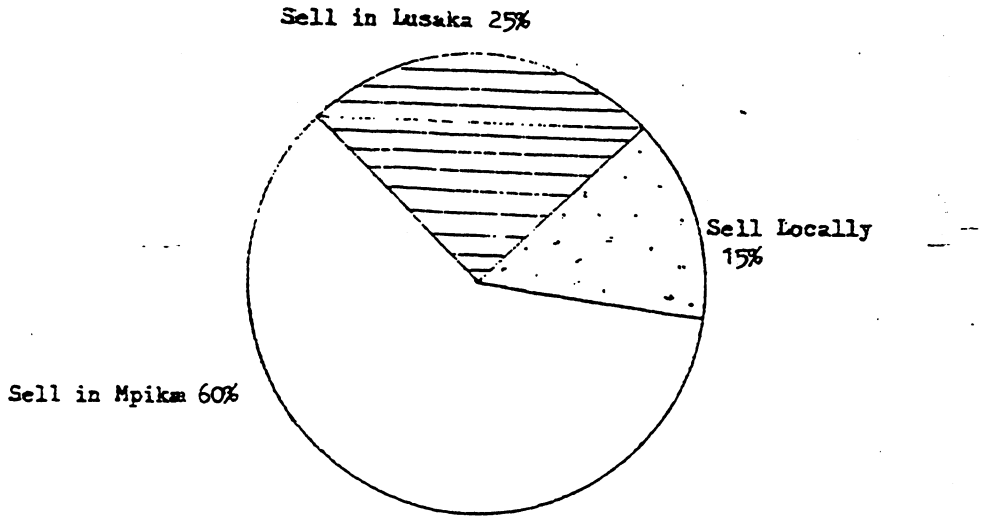
Although sweet potatoes have always been regarded as «a woman's crop», its potential as a «cash crop» has made it attractive to male farmers as well. In fact, it was pointed out that at present, male farmers plant larger areas of sweet–potatoes (sometimes up to 2 limas) than women farmers. This is because traditional sweet potato varieties can only do well on virgin land. Women farmers do not always have sufficient labor to open up new virgin land to exploit the potential of these varieties. The introduction of *chingobwa* is likely to make a big difference for women farmers, because it does not require unopened virgin land to perform well. The *chingobwa* case is a good example of how research and extension can positively contribute towards the goal of crop diversification embodied in the Structural Adjustment Program.

In Kapwanya village, beans, Irish potatoes and sweet potatoes, in that order of importance, are the major sources of on–farm income since the decline of hybrid maize.

The status of beans as a source of income, and its role in direct household provisioning, are complex issues which warrant some close scrutiny. For example, some women discussion groups emphasized the significance of beans more as a medium for barter exchange, especially for mealie– meal during the protracted hunger period. On the other hand some people maintained that beans is also an important source for direct cash income, in addition to being bartered. The only way to reconcile the above opposing views is to take note of how the term 'income' acquires different local meanings at different times of the year. There are two plantings of beans in a year; one is harvested during the long hunger period between January to April, while the second planting is harvested after June, during the time of relative plenty. Thus, the first bean harvest is some kind of non–monetary income, which is mainly used as a medium for barter exchange with mealie–meal, to meet immediate subsistence requirements, while the second harvest is converted into cash income during the time of plenty, to attend to secondary household priorities. Against the above background, we can reach a conclusion that most households have an opportunity to sell some beans for cash, during the period of plenty.

The above conclusion was confirmed by a group of three men and one woman, who used stone counters to represent the proportion of the village population who are able to sell beans at three different market outlets (locally, in Mpika town and along the line of rail). Figure 3.3. presents the results of this assessment.

Figure 3.3. Proportion of village population able to sell beans at different market outlets in Kapwanya village



From the above diagram, 15% of the households in Kapwanya village have very little surplus beans which they sell locally, or have no surplus to sell at all. This is the poorest segment of the village population. It includes both female–headed households and male headed households as well as the aged and disabled. Because they can only sell locally, they fetch the lowest price for their beans (see price differentials for beans across the three locations in table A.3.3.). The 60% who sell in Mpika constitute the majority who are able to produce a reasonable surplus beans to make it worthwhile to travel to Mpika town. Although they do not sell in large quantities, they often group themselves into networks of co-operating households which take turns to market beans on behalf of other group members and to procure commodities from Mpika town. This strategy is used to spread costs of travel and subsistence to and from Mpika. The top 25 % who travel to long distant markets along the line of rail (Ndola, Kabwe and Lusaka) represent the most entrepreneurial segment of the village population. In addition to their own harvest, they may also speculate on the local market by buying off beans (with cash or in exchange with urban commodities) from the other two groups for resell at a profit at any of the market outlets along the line of rail. Both men and women, especially well–to–do female–headed households, make use of this strategy.

There was conflicting opinion about the ability for married women to be involved in long distance trading. Women stated that this would be a recipe for divorce since most men do not like the idea of their wives going unaccompanied to long distance markets, while some men maintained that in fact it is desirable that the wife, rather than the husband, should travel to long distance markets because women are generally more careful with money and would therefore spend less whilst in the urban area. Generally, it appears as though normative expectations and domestic and child care responsibilities restricts the participation of married women in long–distance trading. In this respect, it can be argued that married women are least able to obtain higher prices offered in urban markets.

Apart from beans, the other two emerging cash–crops in Kapwanya village are Irish Potatoes and sweet potatoes. Irish potatoes are regarded as a man's crop while sweet potatoes are regarded as a woman's crop. However, married couples would typically work together in each of the two

enterprises. Table 3.10. shows the gender division of labor, responsibilities, and control of income for sweet potatoes and Irish potatoes. What should be noted in the table is that although men and women control the income from Irish potatoes and sweet potatoes respectively, men tend to take more responsibility than women for land preparation in both the sweet potatoes and Irish potatoes enterprises, while women play a big role at harvesting in both enterprises. This requires us to rethink some of the assumptions conventionally made about the male authority system and control over women's labor. This will be discussed in more detail in the next chapter.

Table 3.10. Gender division of labor, responsibilities and control of income for sweet potatoes and Irish potatoes, Kapwanya village

	Sweet Potatoes		Irish-Potatoes	
	Men	Women	Men	Women
Land preparation	3	2	3	1
Planting	1	3	2	1
Ridging	–	–	2	2
Harvesting	–	3	2	3
Selling	1	3	3	1
Income control	1	2	3	1

Note: Degree of workload and responsibility for various operations.
1= low, 2= medium, 3= high.

The last point to be mentioned about sweet potatoes production in Kapwanya is that, like in Chafwa village, market demand has attracted men into relatively large scale sweet–potatoes production (for example, we were informed about a man who had one hectare of sweet potatoes last season). Thus, there appears to be a tendency for men to move into commodities which were traditionally female–controlled, once such commodities realize a high market value.

Gender and level of labor input into cash cropping

In this section we briefly discuss the commonly held assumption that as cash–cropping becomes important, there is increased labor burden on women in conjugal households, because they are called upon to assist their husbands in the male–controlled cash– crop enterprise, in addition to, and sometimes at the expense of their own female–controlled food crops. This is a difficult hypothesis to test, given that in both villages, there is yet no cash–crop being grown on a large scale or grown exclusively for sale. However, it is still possible to make inferences by looking at the way in which tasks and responsibilities were allocated during the pre–liberalization hybrid maize boom period and also by looking at gender division of labor in the emerging cash crops of the two villages.

Men and women in both Chafwa and Kapwanya villages emphasized that in the majority of cases, married couples work together on both food crops and cash–crops as joint household enterprises. Both enterprises are considered important, because doing otherwise would jeopardize the well–being of the household as a unit. Thus, if the wife works in the hybrid maize field, she is not «helping» the husband but is merely performing her socially prescribed duties in what is essentially a «family» enterprise. Although the allocation of tasks and responsibilities may be biased against women, both husband and wife share the ultimate goal of securing the livelihood of the household unit.

To support the above argument, we revisit the data presented in table A.3.10., which shows that men do most of the land preparation in both the Irish potatoes and the sweet potatoes, while women also do most of the harvesting in both crops, despite the designation of Irish potatoes as a man's crop, and sweet potatoes as a 'woman's crop. This shows that there is an element of negotiation between the two spouses about how best to maximize the productive capacity of the household unit. Those who

emphasize conflict have tended to overly portray women as «victims», and to underestimate their capacity to bargain and to influence production decisions.

Impact on Child Nutrition

We are looking at the question of child nutrition for two reasons; firstly, because child nutrition has often been linked to the issue of women's workload, and secondly, because child nutrition was chosen in the overall study as a measure of social welfare.

In Chafwa village, we were unable to obtain data to show annual or seasonal trends in child nutrition from the local health centre. In any case, such an exercise would have been futile because the number of children who attend the under–five clinic at the local health centre is only a small fraction of the total number of under–five children in the village. Out of 50 under five children in Chafwa village, only 10 were registered at the local health centre and these did not all attend the clinic regularly to facilitate monitoring of annual or seasonal trends.

However, the information obtained from female farmers on division of labor casts doubt on the link between women's work–load and higher levels of child malnutrition. Female farmers contend that during the hybrid maize boom period, the nutritional status of children was okay despite the fact that they devoted less time to household chores. This is because there was always adequate food available to the household. After the change to traditional crops, women have more time at home because of reduced workload, but the inability of the family to have adequate food within the household has resulted in poor quantity and quality of food for children. The other example we were given is that harvesting of finger millet is one of the busiest time for women, but children are generally well–fed because there are a lot of ripe food crops such as green maize and pumpkins which can be prepared for children at the field site or at home by an elder caretaker. In other words, during labor peak periods, young children are taken along to the field and fed on snacks which the mother prepares at the field site, or left at home under the care of an elder caretaker.

The conclusion drawn from the above is that whereas women's workload may indirectly influence the nutritional status of children, food availability is a much more significant determinant. This being the case, the tendency to emphasize a direct association between women's workload and child nutrition is rather reductionism, because this does not take into account the range of strategies and support networks women use to deal with their dual responsibilities of farm work and child care.

We would also like to question whether it was adequate to use child nutrition as a proxy of social welfare for the whole family. As we have pointed out, only a small number of children in the rural areas are routinely monitored at local clinics. Secondly, and more importantly, the criteria used by the local people to define social welfare focuses on the household unit as a whole rather than on children (i.e., the ability by a household to secure an all year round supply of food. See below). Thus, if we were to use the local definition of welfare, then the nutritional status of children, especially as it is officially defined, may not always reflect the amount of food available to the household. For example, a household which has sufficient cassava will not go hungry but the young members of this households may show signs of malnutrition due to protein deficiency. In both villages, it is access to starch staples which was used by the local people to defined welfare rather than access to protein. The other source of bias is the fact that in both villages, women maintained that children are given priority during times of scarcity. If this is the case, then there is a possibility that children may appear to be well–nourished when the adult members of the household are starving. Thus, the nutritional status of children will not adequately reflect food reserves available to the household and therefore does not correspond to how the local people define 'social welfare'.

Social Differentiation

The study has focused on the way in which the Structural Adjustment Program has affected the ability of different categories of rural households to bargain on the unfamiliar arena of a liberalized market,

and how this have had an impact on availability and access to resources of production, to food entitlements, and to cash incomes. Throughout this report, we have attempted to reflect the importance of social difference in terms of gender and class, and to relate coping strategies to the specific circumstances of different social categories. In this section, we consolidate our observations by looking at the way the local people themselves recognize and interpret social difference.

In both Chafwa and Kapwanya village, we found that access to food has become the most important criterion of well–being. Looking at the list of criteria the local people used to group people into wealth categories, it becomes apparent that most of them are linked to the ability to produce sufficient food; e.g. whether or not a household can command extra–household labor, whether or not a household exchanges labor for food, whether or not a household relies on food purchases, etc. Our opinion is that this is symptomatic of a rural economy in which livelihoods have become so precarious that households now have to struggle to fulfil the most basic of all human needs, food. In other words, during the hybrid maize boom period of the 1980s, people measured wealth in terms of the amounts of sellable surpluses available to the households and not solely in terms of the ability to attain food sufficiency. We now look specifically at the results obtained from the two villages.

In Chafwa village, households were classified into three well-being categories. The first category comprises households with the following characteristics:

- ability to have at least two meals per day throughout the year.
- ability to produce more than enough for the family food requirements.
- ability to hire labor for farm operations (mainly paid for in food).
- asset ownership, especially livestock (goats or cattle)

The poorest category comprises people who are unable to fulfil basis subsistence needs. It comprises households with the following characteristics; categorized by:

- Low agricultural production
- Inability to provide food for the family throughout the year, with an average of only one meal every two days during periods of hunger.
- Propensity to hire out family labor in exchange for food during the growing season.
- Reliance on road–side purchases of small quantities of food.

The middle wealth category is less defined but generally includes all households who do not fall into the wealthiest and the poorest groups. For example, these households will depend on own produce for a good part of the year but eventually run out of food during certain periods.

Chafwa village has a total of 105 household out of which 60 are male headed household, 39 are female headed households and 6 are polygamous household. Of the 6 polygamous households, 2 comprises of a husband and two cohabiting wives, 2 comprises a husband with two wives living in different villages, 1 household comprises an absentee husband with three wives living in different villages and the sixth household comprises an absentee husband with 4 wives living in different villages. The 105 households were classified into the three wealth categories as shown in Table 3.11.

Table 3.11. Wealth ranking of households in Chafwa village

Household type	Well–to–do	Medium	Poor
Male headed	5	30	21
Female headed	2	5	32
Polygamous	–	1	5
Total	7	36	58

From the ranking almost 55% of the population was considered too poor to afford basic food throughout the year. One noticeable feature is that of the 58 households classified as being poor, 63% are either female–headed or wives in polygamous relationships. This supports our assertion that the great majority of resource–poor and food–insecure households are women. It should also be noted that all the polygamous households where husbands are either absent or living with other wives in different villages were placed in the poor category. In other words, wives with absentee husbands or part–time husbands are de facto female heads of households, because they make their own production decisions with little or no support from the husbands.

In Kapwanya village, the criteria used to rank households into well–being categories also centred on the ability to secure an all year–round supply of food. Thus, well–to–do households in Kapwanya are those with the following attributes;

- Cultivate a wide range of crops on a large scale
- Have food the whole year round and eat regularly
- Use hired labor extensively
- Are able to plough back food surpluses or cash from crop sales into expanded production.
- Have asserts such as cattle and goats

Poor households are defined in terms of the following attributes:

- Only cultivate small areas of a limited range of crops such as sweet potatoes, sorghum millet and pumpkins.
- Do not have sufficient food for most part of the year
- Work for food or simply beg for most part of the year

The middle category are those who are neither in category 1 or category 3. Again the characteristics of this group is somewhat ill defined.

The total population of Kapwanya village was given at 96 households of which 62 are male headed and 34 are female headed. There are no polygamous relationships. The 96 households were classified as follows into the three well–being categories.

Table 3.12. Wealth ranking of households in Kapwanya village

Household type	Well–to–do	Medium	Poor
Male headed	3	33	26
Female headed	6	10	18
Total	9	43	44

From Table 3.12. it can be seen that about 46% of all the households were classified as poor, 45% as medium and only 9% were classified as well–to–do. Again like in Chafwa, the proportionate number of female–headed households falling into the poor category is greater compared to that of male–headed households. For example, of total of 34 female–headed households, 18 or 52% are poor, while only 41% of male–headed households were classified as being poor. However, unlike in Kapwanya, there are more female–headed households classified as well to do than men.

Conclusions
The major conclusions derived from the PRA study in the Northern Province is that contrary to the expectations of policy makers, rural farmers have not been able to benefit from higher prices envisaged under liberalization because of their weaker bargaining power in relation to other participants in a liberalized market, such as long–distance mobile traders. Married women are especially disadvantaged, because they are unable to travel to long–distance urban markets where prices are higher, due to cultural restrictions and domestic and child care responsibilities. Poor female–headed and male–headed households are also unable to travel to long–distance urban markets because of high transport expenses and also because they rarely produce sufficient surpluses to make it worthwhile to travel to such markets.

The overall effect of the removal of credit and input subsidies has been a shift from hybrid maize to low yielding and less bulky subsistence crops such as cassava, sorghum and finger millet. This has led to declined ability for most households to produce enough staples which can last the whole year. This has in turn increased the vulnerability of most households because of their increased dependence on the food market, which is controlled by long– distance mobile traders. Labor deficit female–headed households are at a greater disadvantage as compared to men and women in conjugal households.

3.10. PRA Central Province

Community Profiles
The two villages which were visited are briefly described below.

Mwanamungule
The village is inhabited by people from different linguistic and ethnic groups including Karanga (Shona) people from Zimbabwe, although most of these have moved to Chamuka area, Kabwe Rural District. The few Karangas who have remained are among the well–to–do villagers. Many current residents originally came from the Southern Province, Particularly Monze District in search of adequate agricultural land. There are also a few families from the Bemba and Lozi groups. Then there are the local Lenje people. Most families ranked in wealth categories I and II are originally from outside the area.

Mwanamungule village, which is located about 90 kilometre west of Lusaka and 2 kilometre to the west along the Lusaka–Mumbwa Road, was established in 1958. At the time of this research, it had a total of 37 households. The village is serviced by a school and a clinic located in a neighbouring village to the west. The village also has relatively easy access to larger medical facilities such as a clinic at Kapyanga and a health centre at Nangoma Mission both towards Mumbwa Boma.

This village has plenty of agricultural land much of which is not currently under cultivation. It also has a lot of underground water, as reflected by the fact that the majority of homesteads have individual wells. The village falls under the Mambule Agricultural Camp located about 10 minutes drive North–west of the village. It also has a depot at its north–west boundary.

Malakata
Malakata village is found in Chief Chamuka's area, Kabwe Rural District in the Central Province of Zambia. it is about 1 hour drive east of Kabwe town. The village falls under Lifwambula Agricultural Camp. According to the village register, Malakata has a total of one hundred and seventeen households. There are numerous ethnic groups living in the village. They include Lenjes who are the natives and Shona immigrants from Zimbabwe and Tongas from the Southern province of Zambia, who were attracted by the much favourable rainfall conditions. Other groups include Bembas and Ngonis of Northern and Eastern provinces of Zambia respectively. There is one noticeable difference in terms of wealth between the Lenje natives and immigrants from Zimbabwe and settlers from Southern Province. In general terms, the «foreigners» belong to the wealthier groups while the natives

belong to the middle and poorer categories. This is evident in terms of property ownership (e.g. farm implements) and levels of production.

The village has a number of natural resources, including land. Traditionally, land is obtained from the chief through the appointed headman. Although land is still in abundance, there are differences in terms of access to this important production asset. However, as we will shown at a latter stage, local people consider the ability to cultivate a large plot of land as being more important, rather than total land holding per se. There is a noticeable difference between natives and immigrants in terms of ability to cultivate large plots of land.

Adjacent to the village is a forest reserve which is a source of fuel and wild foods. A perennial streams borders the village and the forest reserve. It is an important source of water for both humans and livestock. The stream plays another crucial role in terms of vegetable gardening, which is an important source of income for the middle wealth category.

Draught Power

In both Malakata and Mwanamungule villages, ownership of work oxen is not only an indicator of wealth but was cited as a major factor which explains why some individuals are doing well under market liberalization. The number of oxen owned and degree of usage varied among socio economic categories identified in the communities. Whereas the lower stratum depend entirely on hand– hoe, the middle stratum use hand–hoes and oxen while the richer stratum use oxen or tractors.

During the last five years, some households have lost their entire cattle herds due to corridor disease (*denkete*). Consequently this has adversely affected their ability to produce crops for the market and for own consumption.

Crops grown in the areas
In terms of female/male participation in crop production in both villages visited, both men and women are involved in almost all crops, but within a gender division of labor for specific tasks e.g. land preparation, planting, weeding, harvesting etc. Many traditional crops are inter–cropped with maize. To illustrate patterns of production, matrix 1 based on information from Mwanamungule is given in Table 3.13.

Table 3.13. Matrix of Crops by Gender

Crop	Grown by:	Qualification
Maize	M/W	
Cotton	M/W	
Groundnuts	W	
Sunflower	M/W	
Okra	M/W	Men grow it for sale only
Rape	M/W	Men grow it for sale only
Beans	M/W	
Bambara nuts	W	
Sweet potatoes	M/W	
Irish Potatoes	M/W	
Tomatoes	M/W	Men grow it for sale only
Sorghum	M/W	
Pumpkins	M/W	Inter–cropped with maize
Water melon	M/W	" " "
Cucumber	M/W	" " "
Squashes	M/W	" " "
Cow peas	M/W	" " "
Local Sugar Cane	M/W	" " "

Production Trends
The major crops produced in Mwanamungule and Malakata include maize (both hybrid and local), cotton, sunflower, and groundnuts, although there have been variations over the years. In terms of production, maize continues to dominate especially for richer households, while cotton production is on the upswing.

Between 1990 and 1995, the trends of production in the villages of Mwanamungule and Malakata have been characterized by a dramatic shift from the hybrid maize–dominated farming systems of the pre–liberalization years. In both areas, the unreliability of the input delivery system and the lack of access to credit under liberalization has forced most farmers to revert back to subsistence–oriented production of local maize.

The reduction in hybrid maize production has, however, not led to diversification to other food crops neither in terms of production nor consumption. People have continued to want to produce maize and they still buy or work for maize grain for consumption. The shift towards subsistence oriented food crop production is most noticeable in Mwanamungule village. Between 1990 and 1995, local maize has become the most important starch staple, while the production of hybrid maize has drastically declined. The shift from the hybrid maize–dominated production system to reliance on local maize have had a negative effect on household food security.

The scenario obtaining in Malakata village is not very different. Other than the wealthier category, a shift from hybrid maize production to local maize production was reported. Growing hybrid maize is said to be too expensive for the majority.

There are two main reasons for this shift. One reason relates to availability of seed and related inputs. The majority of farmers in the two areas reported that they had no maize seed, because no seed and inputs have been taken to their areas. The other constraint highlighted regarding access to maize seed is the costs of travel to Lusaka and Kabwe to buy seed and the high price of maize seed.

During the last three years, cotton has become the most important cash crop for most farmers in the two areas. Several reasons account for this shift; despite being more labor intensive than hybrid maize for instance, inputs for cotton production are more accessible for most farmers. Conversely due to non–availability of inputs for hybrid maize production, farmers have opted to cotton as a source of cash income. Furthermore Lonrho' policy of giving free seeds seems to play a crucial role in this shift. In addition, Lonrho offers a higher price and this is seen as an incentive. In particular, cotton production has emerged as the most important agricultural enterprise in Manamungule. However, this shift has negative effects on social welfare as discussed in the next section.

Due to persistent droughts over the years, production of groundnuts in both villages has stagnated between 1990 and 1995 while that of soybeans has actually declined during the same period. The decline in production of soybeans is also attributed to non-availability of seed in the local market. Although the price for soya is higher than for most crops, farmers fail to take advantage of the situation because of the above mentioned reason. Similarly, sunflower production has tremendously declined. According to farmers, lack of seed explains this decline.

The level of dependency on input supply institutions varies according to wealth groups. The wealthier group has the ability to purchase their inputs from distant markets. Their major sources of inputs are Lusaka and Kabwe. For the middle group, locally–based institutions tend to be the main source of agricultural inputs. The poor category do not usually purchase any inputs and mainly depend on retained seed.

Marketing Arrangements and Price Changes after Liberalization

So far, the effects of agricultural liberalization is varied as we will show at a later stage. At this point we present the PRA– based data, on price changes for the major crops in the villages between 1990 and 1995 in Table 3.14. and Table 3.15.

Table 3.14. Seasonal Price Trend at Mwanamungule village

Market location	Price at harvest time	Price around Dec.
Local market	K3,00 per bucket	K4,500 per bucket
Situmbeko market	K8,000 per 90 kg bag	K30,000 per 90 kg bag
Soweto market	K8,000 per 90 kg bag	K24,000 per 90 kg bag
Lusaka***		

Notes:
* Located about 30 minutes drive from the village towards Lusaka.
** Villagers explained that at this time of the year, they do not have maize to sell. Instead they buy the maize at the various markets.
*** At Soweto market the farmers are forced to sell their crop through middlemen (Bakaponya) who charge commission fixed by themselves.

Table 3.15. Seasonal Price Trend at Malakata village

Crop	Lowest	Highest
Maize	K7,500	K20,000
Cotton	K235 per kg LINTCO	K290 per kg Lonrho/Kalangwa
Groundnuts	K10,000 x 90 kg	K15,000 x 90 kg
	(Unshelled) long Distance and local Buyers	(Unshelled) Long Distance and Local Buyers
Sunflower	K5,000 x 50 kg	K16,000 x 50 kg
	Chisamba Marketing Co., Local Trader, BRR	Chisamba Marketing Co., Local Traders, BRR
Soybeans	K16,000	K20,000
	Chisamba Marketing Co.	Chisamba Marketing Co.

Note: **** The list of institution/agents involved in Mwanamungule village is presented in a separate list.

Between 1990 and 1995, there has been very sharp price increases for the major crops in the two villages. High rates of inflation are partly responsible. The price of maize, which is the most important staple for both Malakata and Mwanamungule rose at least 500% between 1990 to 1995. This huge increase has affected different categories of female and male farmers in different ways. For the poor category, this has been a big disadvantage given their dependence on food purchases to augment shortfalls in household production of staples. Except for the few wealthier households, the majority of farmers reported purchasing maize from local farmers and nearby markets. Therefore, high prices are a disadvantage to the majority of female and male farmers in the area.

Several factors are responsible for determining price differentials for the two villages studied. They include, seasonality, geographical location of the market, availability of traders and ability to bargain for a price. Let us look at each factor briefly in turn.

Seasonality

In identifying seasonal price variations for the most important crops, discretion was given to local people to divide the year according to their own criteria. Three time periods were identified, harvesting period, post–harvest and planting periods. The pattern which emerged is that prices for maize and other crops are lowest during the harvesting period and highest during the planting period. Reasons for seasonal price variations include availability of the commodity versus the demand for it, and availability of markets.

Irrespective of the time period when the produce is sold, delivery of agricultural produce to outside markets generally enable farmers to obtain higher prices. Conversely, buying of maize from outside markets is more costly for those buying it. For Mwanamungule and Malakata villages, the intra–seasonal price variations range from 50% and 200% with the former getting a higher percent for the lowest maize price during the 1994/95 period. Notable differences between the two villages were seen in terms of reliance on maize purchases from the outside markets; households in Mwanamungule predominantly rely on the outside markets while Malakata households find their maize from the local markets mostly.

It must be emphasized that, only farmers in the wealthier category are taking advantage of these price variations. In Mwanamungule for instance, the only household with a hammermill dominates in the selling of maize, while Situmbeko Market and nearby markets are the other important source of maize. In Malakata, sources include several community based local traders.

However, the majority of households, both women and men are unable to respond to this price incentive for several reasons; first, their production levels during the last four years has not been

adequate enough to allow them take advantage of the situation. Here the major setback is twofold; recurrent drought which destroys their crops and loss of animal draught power due to corridor disease. For example, the research team found headman Mwanamungule and his family members pulling an ox–driven plough to prepare their cotton field, due to loss of oxen. Although common to the two villages, loss of animal draught power was more acute in Mwanamungule than in Malakata village.

The shift from using work oxen to use of human physical power to pull agricultural implements is a desperate measure and a very serious situation which calls for immediate attention. But for Malakata, there were a few households who even after losing their work oxen, have the ability to hire from those who still have. In general, women and men farmers' ability to produce for the market has been reduced. For the resource poor farmers, their inability to produce surplus for the market is the main constraint.

Seasonal price variations were also noticeable for groundnuts. The pattern in variation is similar to that obtainable for maize. Immediately after harvest, the lowest price obtained from the two villages was K10,000 and the highest was K24,000 when sold at Soweto market in Lusaka. However, women farmers explained that during planting time and period preceding harvest, they do not have groundnuts to sell. Rather, they buy groundnuts at the high price of K24,000 which was reported to be unaffordable for the overwhelming majority.

Ability to bargain for a price

Depending on the social stratum of a farmer, the ability to bargain for a higher price or indeed lack of it is considered in the two villages studied either as an advantage or constraint. For women and men farmers in the poorer category, desperation for cash forces them to sell their produce at lower prices (even if their production is low, they sell part of their food crops to raise cash for other needs). On the other hand, farmers in the middle stratum do not have effective bargaining power for a higher price for several reasons; they are less organized at village level to negotiate for the lowest possible price which would give them higher returns for their agricultural produce. In addition, they lack adequate market information upon which to fix a minimum price. Consequently, some traders take advantage of their inability to negotiate. According to this category of farmers, it is the traders and not the farmers who are benefiting from a liberalized pricing situation.

The strategy used by rich farmers in Malakata village is to co-operate and consult each other about the lowest price to offer to interested buyers. Equipped with the knowledge about price variations in different markets, they are in a better position to determine a price with a higher return fro their produce. By contrast, findings from Mwanamungule show that most farmers are forced to sell their agricultural commodities through self–appointed middlemen (*bakaponya*) who charge commission fixed by themselves. Almost everyone in this village cited this as an unfair state of affairs commonly practised at Soweto.

Geographical location of the market

In terms of inability to bargain for a price, it is interesting to note that, for Mwanamungule farmers, market prices of different crops at different market outlets has not been as advantageous as it has been to a few Malakata farmers. It was revealed that different trade points, namely, the local markets Lusaka and Kabwe in the case of Malakata sellers, offer different prices for their crops. For the wealthier Malakata farmers, the availability of information about price differentials is very important. Information availability and the ability to organize themselves is closely linked to the ability to bargain for better prices. This is especially true for maize and to a limited extent, groundnuts. For Mwanamungule the pattern that emerged was individual farmers taking their produce to Soweto market in Lusaka. For Malakata, the pattern is for wealthier farmers finding a major buyer either in Lusaka, Chisamba or Kabwe for a negotiated price between sellers themselves and the prospective buyer.

In most instances, the general pattern observed was that farmers delivering their produce beyond the local market tended to receive higher prices in contrast to those selling locally. This pattern was notable for crops like groundnuts, maize and soybeans. But for cotton, the private dealers and parastatals operating in the villages already determine what price to buy the commodity. Furthermore, there are no seasonal price variations reported for cotton. Its marketing begins immediately after harvest. However, price varies according to who buys. In Mwanamungule there are two buyers, namely LINTCO and Lonrho. In 1993/94 season, LINTCO bought cotton at K250 per kilo compared to Lonrho who bought it at K290 per kilo. In 1994/95, LINTCO bought cotton at K290 per kilo compared with Lonrho who bought it at K350 per kilo. In 1995, the lowest cotton price was K235 offered by LINTCO and K290 by Lonrho.

It is to be noted here that although prices have been liberalized, there are not yet as many dealers in purchasing cotton as in maize marketing for instance. Thus in a sense, marketing of cotton is still being «oligopolized» by three institutions, two of which provide seed cotton and chemicals to farmers on credit basis.

Availability of traders

The other major reason why farmers obtain different prices for respective agricultural commodities is that different traders offer different prices. This was more evident in Malakata Village where, in addition to easily accessible outside markets for those farmers with the capacity to exploit the advantage, there are numerous private institutions and individual long–distance traders operating in the area. Price differentials among buyers range from 100% to 150% for sunflower. For maize differences are very minimal. In Manamungule, farmers preferred selling their sunflower in Lusaka to Premium Oil Industries who offer a higher prices than a local trader identified only as the Greek Trader.

Uncertainty about availability of buyers is reported to be a constraint to some farmers. This was a major concern by most farmers in Mwanamungule, both women and men farmers. This issue also came up strongly among women and men farmers in the middle wealth category in Malakata. According to them, despite the numerous institutions operating in the area, lack of regular and fixed buyers is a major problem. Unlike what used to happen before liberalization, there is no guarantee that these institutions will sustain their marketing activities in the community. There is a feeling of helplessness and concern about the availability of other buyers. This lack of guarantee, seems to correlate with the aspect of the capacity of private marketing institutions to buy the produce from all farmers. According to some farmers the tendency of selling smaller quantities of maize makes it difficult to keep money.

Summary on price differentials

Seasonal price differentials range from 35% to 150% for major crops other than cotton. Reasons include seasonality, ability to bargain for a price, proximity to trade centres and availability to traders. However the above mentioned variables are not adequate enough to enable different categories of farmers to take advantage of the prevailing situation.

In Malakata, both women and men farmers cited size of output, mediated through ownership of work oxen (cattle), ability to purchase fertilizers and other inputs, as prerequisites if one is to benefit from the current marketing arrangements. For resource–affluent farmers in particular, access to market information and consultations with each other, are important in deciding the price if they are to obtain higher returns from the produce.

Furthermore farmers from this category seemed to like price liberalization policy as it enhanced their real incomes. Contrary to this view, the poor stratum consider it a disincentive as they are required to pay so much money to meet their food and other requirements. Furthermore for the poor, the new marketing arrangements have just worsened their poverty status. Incentives such as access to credit

which previously enabled some to produce 'more' for the market have been withdrawn. Compounded with factors such as drought and corridor disease, their inability to produce even enough food for themselves has resulted in them being *«always food insecure»*.

Input supply and credit availability after liberalization

According to the majority of farmers, both women and men, in the two villages covered by this study, changes in input delivery and availability, and also declined access to agricultural credit have had major impact on their production decisions in particular, and on their welfare in general. Rapid liberalization has not only contributed to confusion over the marketing system but has also left small–scale farmers in a more vulnerable position than they were under the government controlled system. Prior to liberalization of marketing, all inputs were delivered by quasi–governmental organizations to rural depots within the villages. The dependence of these institutions on government subsidies and the subsequent removal of this subsidy have eroded the ability of these institutions to participate in the new liberalized markets. Private traders were expected to fill up the gap left by these institutions in the agricultural input supply sector, but this has not materialized.

Both women and men farmers in the two villages studied talked of inputs not being brought to them through the depot. Recent studies focusing on experiences of small–scale farmers also refer to these changes. For example Keller–Herzog and Munachonga (1995: 21) observe that:

> *«Under the previous system governing marketing, and distribution of small-scale farm inputs and outputs, farmers received fertilizer delivery to a nearby depot. At harvest time, maize would then be collected from the depot and payment made later. Under the new liberalized system, farmers are responsible for finding their own fertilizer, and selling maize to mobile buying agents or transporting maize to markets elsewhere».*

Thus liberalization in the agricultural sector has not only resulted in the end of the existence of fixed and centrally controlled input distribution and marketing arrangements, but also a new system of bargaining for prices of crops between farmers and numerous mobile buying agents who are better informed and knowledgeable about the new systems than the farmers.

Farmers in Mwanamungule village talked of not «seeing» fertilizer or buyers although the village has a depot at it north–west boundary and is about 2 kilometres off the tarred road. Consequently, those who can afford have resorted to travelling to Lusaka to buy inputs and to sell their produce. In general, discussions and case studies (see appendix 8.4.) indicated that the majority of farmers have found it very expensive to grow maize under the liberalized input distribution and marketing system.

The farmers complained that they do not have the cash reserves, especially after two years of drought, to afford inputs being increasingly provided on a cash basis. In Mwanamungule, the majority of farmers are still not sure how they will obtain maize seed. Even the Agricultural Extension Officer who accompanied the Research Team could not give them specific information about the availability of seed and fertilizer. The confusion over inputs such as fertilizer is a source of frustration among the farmers.

Since 1990, the number of people with access to credit has very much reduced. During the last two seasons, farmers reported that there were few farmers who had obtained the facility.

Traders

Between 1990 and 1995, the number of marketing institutions in both Mwanamungule and Malakata has expanded. Whereas previously there were few marketing and financing institutions operating in Malakata village in the 1990 (namely CUSA, Lima Bank, ZCF, LINTCO), the number of new dealers has tremendously expanded. Currently the dealers range from individual buyers, transport

organizations and pure marketing institutions. The following are some of the more prominent institutions currently operating in Mwanamungule village:

- Chiyangeyange: – Distributes sunflower seed through camp officer for sale to farmers for cash.
- Africare:– Directly sells Ram presses to individuals and women's club.
- Cargil:– Sells seed to farmers (CG 4141 variety – early maturing and locally nicknamed "*tanda–nzala*" i.e. that which chases hunger). Also conducts demonstrations using new seed varieties. Will in future work with camp officer.
- Greek:– Buys sunflower from farmers but at low prices (K8,000 compared to 12,000 in Lusaka).
- LINTCO:– Sells cotton seed and chemical for cash or provide these on loan. Also buys sunflower.
- Lonrho:– Distributes cotton seed free and provides credit facilities for chemicals to farmers.**
- Zamseed:– Sells varieties of maize seed to farmers for cash.
- Omnia:– Sells varieties of maize seed for cash.
- Pannar:– Sell maize seed varieties for cash.
- Carnia:– Sell maize seed for cash.

In addition, there are private individuals and agents who come to buy produce with cash or barter with commodities such as second-hand clothes, soap and salt.

It was explained that LINTCO distributes and sell delinted cotton seed while Lonrho distributes un–delinted (fuzzy) cotton seed which farmers have to delint manually before planting.

The research team was informed by the Camp officer that the credit facilities provided by Lonrho for chemicals are quoted in US dollars which may mean that farmers do not know exactly how much to repay in future in kwacha terms. In Makalata village, credit and marketing institutions include the following:

- LINTCO,
- Lonrho,
- Chisamba Farms,
- Nkongolo Farms,
- Isado Farms,
- Kalangwa Estates,
- Chisamba Marketing Company,
- C.K. Motors,
- RANA,
- Emba Wholesalers,
- CUSA,
- ZCF/FS,
- Lima Bank,
- AGP Motors, and

- Co-operative Bank.

Despite the expansion in the number of dealers in crop outputs, different social strata expressed different perceptions about the opportunities and benefits this has had on their welfare. The cause of these differences may be in individual farmers' ability to take advantage of the obtaining marketing arrangements.

In Malakata, both women and men farmers from the wealthier category showed some evidence about the positive effects of this increase in number of traders. Farmers in the middle category are divided; for some their perception is that this is good given their ability to produce for the market. On the other hand, others have tended to argue that while the volume of traders has increased, the benefits which used to be enjoyed under the previous arrangements are no longer made available.

The poor stratum only described this change as a disincentive for their welfare as we will show later. Let us examine what is happening with respect to each major crop.

Production Trends

Maize

Before 1993, the provincial co-operative unions, and three parastatal organization, namely CUSA, Lima Bank, and ZCF/FS were the dominant input suppliers and buyers of hybrid maize in the two villages. Although a number of private institutions have come to dominate maize purchasing, few of them are involved in giving out agricultural credit.

In terms of significance, farmer assessment in Malakata village revealed that commercial farmers' organizations are being more dominant while the parastatals have completely phased out as at 1/12/95. No private trader seemed to have the capacity to serve farmers' input requirements for maize.

The majority of private institutions, based at Lusaka and Kabwe respectively, are mostly involved in the purchasing of maize. Whereas the government envisaged that the private traders would fill up the gap in input supply, the demise of quasi governmental institutions has negatively impacted on the farming community in Malakata village. For the majority, lack of fertilizer and seeds in the village depot has led to reduced maize production for both home consumption and for marketing. Consequently, the majority of households are not having to rely on purchasing maize to supplement their inadequate food stocks. Although fertilizer and seeds are available in Kabwe and Lusaka, lack of cash (limited by reduced income levels), and huge transport costs, makes it difficult to obtain their input requirements. In Malakata, only a few farmers from the middle stratum obtain agricultural credit from the institutions involved. Others from the same category have continued to purchase their own inputs, like one female–head of a household. Only very few are able to procure inputs using their own resources. The general trend observed however, is that even the wealthier categories is disadvantaged by the non-availability of inputs at the local depot.

Cotton

Long before agricultural liberalization was implemented, the Lint Company of Zambia (LINTCO), a parastatal organization, dominated the supply of seed cotton and the required chemicals in both Mwanamungule and Malakata Villages. During the last three years, however, Lonrho has emerged as a stronger competitor. Farmer assessments of significant input suppliers and buyers revealed that Lonrho has operated in Mwanamungule and Malakata for three and two years respectively. For the former village, Lonrho has become more dominant in providing credit. Its operations have tremendously expanded through their deliberate policy of giving free seed cotton to interested farmers. Access to credit by both female and male farmers for cotton production was said to have been enhanced. In part, this explains why most households are involved in cotton production.

While the two companies are involved in both the delivery of credit to farmers and the purchase of produce, Kalangwa Estates exclusively deals in buying of the output and is restricted to Malakata village and the surrounding areas.

Other Crops

The input supply for other crops still continues to be problematic in the two villages. Sunflower seed and soybeans was said to be non-available in the local markets. Although there are a few traders who buy the output, no private trader has taken on the challenge to supply inputs for the two crops which have potential as alternative sources of cash for the farming community. This suggests that under the liberalization of agricultural marketing, certain crops have become marginalized. This is in contradiction of the aim of widening the crop base and increasing agricultural income opportunities under liberalization policy. In reality, current patterns of input supply and marketing reflect a different scenario.

In terms of female/male access to credit facilities, previous research findings show that the system of credit provision has favoured men; that women, especially married women have been discriminated against. Our PRA–based research findings seem to support this argument given that women have had no access to credit. Many indicated that they had not applied for loans. Reasons for this are complex but must be understood within the prevailing cultural values which influence policy and administrative practices. Credit institutions tend to give loans to husbands because they are officially and generally regarded as heads of households. Based on our PRA findings, only one married women from Malakata got a loan last season, and this was because her husband could not get one as he had failed to repay his previous loan from Barclays Bank. Emphasis on credit– worthiness as the main criterion – which means having collateral and being able to make the down payment of 10% of the loan – disqualifies the majority of women. Villagers from Malakata, for example, complained that lending institutions and private traders involved in provision of credit charge exorbitant fees. For processing an application form, a non–refundable fee which range from K10,000 to K24,000 per Ha is charged. Complaints against these charges came particularly from poorer categories of farmers. Wealthier farmers can afford these charges because they are able to raise money from sale of livestock.

Discussions revealed that the terms preferred by credit institutions tend to place farmers at a disadvantage. It was reported by Malakata villagers, for example, that some agents demand two 90 kg bag of maize in exchange for one 50 kg bag of fertilizer.

Lack of agreement on conditions of repayment was cited as another constraint farmers are facing. Out of desperation to obtain inputs, farmers accept credit without agreeing on specific conditions. However, after harvest, farmers are then told retrospectively what the interest rates for credit obtained the previous season are. Farmers feel cheated about such arrangements.

Summary

Non–availability of maize seed and fertilizer has serious implications for long–term household food security and general welfare of the people in the village as will be shown later. Under these new conditions, farmers are trying to make «adjustments» to grow maize by adopting the following strategies:

- Return to subsistence agriculture (see also Keller–Herzog and Munachonga, 1995:23),
- Using cattle manure, instead of chemical fertilizer, for those who still have animals,
- Crop rotation, and
- Planting lower yielding local maize varieties (which do not require fertilizer) rather than hybrid maize.

All this has led to reduction in the production of maize by the majority of farmers visited. This means that the number of small–scale farmers who have benefited from SAP–induced measures is a tiny minority. In Mwanamungule village, only one farmer who is a recent retiree is doing well. Malakata village has some relative advantage over Mwanamungule because of the presence a larger number of traders, and proximity to larger market dealers at Chisamba, Kabwe and Lusaka. A reduction in the output of maize and other crop has negatively affect farmers participation in the new marketing system. When farmers lack cash reserves, they may not manage to wait to sell their crops when prices are highest.

With the introduction of user fees in health and education, farmers are under increased pressure to sell their crops early to meet these needs.

Access to agricultural technology under liberalization

Currently, there is no effective linkage between the end–users of agricultural technology and extension agents. The study revealed reduced interaction between farmers and the extension officers irrespective of gender. Farmers in both villages claimed not having received general agricultural extension technical messages for several years now. This may be explained in terms of non–availability of inputs around which extension services used to be centred. The role of the extension officer under the liberalized system in transmitting various technological messages cannot be over–emphasized here. Discussions with respective extension officers revealed that long distances to be travelled and lack of transport are major constraints to service provision.

These findings suggest that the role of the extension officers under the new system is not easy, given previous emphasis in service provision relating to maize production and fertilizer application. Farmers' expectations of the extension officer still centre around his/her ability to assist them in getting maize seed and fertilizer, which cannot be easily guaranteed under a market driven system. Only Lonrho and LINTCO provide a technical backup to farmers on cotton growing.

Food consumption trends

In 1990, the main form of food procurement had been through own production. Since 1992 however, the level of dependency on domestic food production has changed for different categories of households. A discussion of the present welfare status in the two villages revealed worsening trends in terms of access to food. The seasonal food availability ranking exercise revealed that whereas the majority of households produced enough staple food in 1990, a different scenarios is noticeable in the subsequent years.

The inability to produce sufficient staples for household subsistence is most noticeable among the poor and middle wealth categories, and this is linked to non-availability of inputs for hybrid maize production. Other factors which were cited include drought and the loss of cattle due to corridor disease. Among the middle wealth category, some people still have their farm implements but have lost their work oxen. For this group, the need to hire work oxen was cited as a new constraint they have to deal with. Many who can not afford to hire work oxen have resorted to hand–hoe cultivation. Thus, a number of people who were formerly in the middle wealth category have now moved down to the poor wealth category. For the wealthier category, own food production still continues to be the main form of food procurement.

The situation obtaining in Mwanamungule is more pessimistic. A significant shift in people's wealth status was given, whereas there were more households in the middle category, of which the majority of the farmers now belonging to the poorer category.

In sum, the local people cited the following constraints to production in descending order of importance;

- Lack of work oxen and lack of farm implements in some cases.
- Lack of capacity to purchase agricultural inputs, especially hybrid maize seed and fertilizers.
- Non-availability of inputs in the local depot and lack of credit for both inputs and oxen.
- Drought.

It was found that an increasing number of people have to work for small quantities of maize for consumption or go without food.

Illness were reported to be on the increase. The impoverishment of the farmers is, according to them, confirmed by their failure to provide food to visitors such as the PRA team.

In both areas, results indicate an ever increasing reliance on cash to satisfy food consumption requirements for most households, especially the food deficit ones. This had led both male and female farmers to come up with various strategies to raise the necessary cash with which to bargain on the food market. These are discussed in the following chapter.

Income Sources, Control and Disposal for women and men

One of the objectives of this study is to assess whether women's access and control over income has diminished with increased emphasis on male–controlled cash crop production. To do this, it is necessary to first identify the range of activities/assets used by different categories or male and female farmers to earn income. The following sources of cash income were stated from the villages visited:

- Crop sales,
- Beer brewing (commonest non–agricultural activity by women).
- Selling livestock (goats, chickens).
- Hammer mill.
- Houses for renting out in Lusaka (one retiree).
- Gardening and selling vegetables (tomato, rape, okra).
- Sewing and knitting (women).
- Selling seasonal fruits (mangoes, guavas, etc.).
- Making charcoal.
- Petty/informal trade.
- Sale of labor/piece work, and
- Hiring out oxen.

Whereas in general, crop sales ranked as the major source of cash income, different sources are important for different categories of farmers. In Malakata, the wealthier group has a more diverse range of crops sold while the range of crops for the middle stratum is less diversified. Hybrid maize, cotton, groundnuts and soybeans are the main sources of income. Of these, hybrid maize predominates as an important source of income for the richer households who are able to grow maize without government support. Cotton is on the upswing owing to availability of inputs and credit being provided by Lonrho and also due to price incentive and a reliable market.

In Mwanamungule, the scenario is slightly different from that obtaining in Malakata. Prior to agricultural liberalization, hybrid maize was the major source of income for the majority of farmers. During the past season however, cotton sales ranked first.

Soybeans was said to be a male crop while groundnuts are the dominant and independent source of income for women farmers from all wealth categories and household types.

Vegetable production was reported to be an important source of cash for the middle stratum. Another income generating activity important for women is beer brewing. Income from beer sales is used to meet recurrent household expenses and to purchase staples to supplement household food stocks. For women farmers in the lowest stratum, sale of sweet beer is an important source of cash. They money realized is mainly used to purchase food.

For the poor households, both women and men, working in other people's fields is an important source of either cash or food income. Piece work for cash or food is mostly done for the more resource–affluent households. Activities for which labor is hired include ploughing, weeding and harvesting. This was reported from both villages.

Some farmers work on other people's fields in exchange for use of oxen. Thus, ownership of oxen is an important source of both cash income and extra–household labor.

Livestock sales is another source of income. For the wealthier category, sale of cattle predominates. Income realized is used to purchase agricultural inputs like seed and fertilizers.

Cattle keeping is dominated by male farmers while virtually no women farmers own them. For the lower stratum, sale of goats, pigs and poultry is an important source of cash for food purchases and other immediate requirements.

Charcoal burning is a male domain and is important for those in the middle and lower strata.

Petty or informal trade is another source of income for a few households. Both women and men are involved. Items sold range from groceries to second hand clothes. Here, sale of second hand clothes is dominated by women.

Income control and disposal

In order to identify who controls each income source in a household, a question about patterns of expenditure was included. Case studies are also used for illustration (last paragraphs of this appendix).

One school of thought is that women's access to, and control over income diminishes with increased emphasis on male–controlled cash cropping. From our data, it appears that income expenditure patterns benefits both men and women.

However, while items on which cash income is expended may be similar, the amounts spend by respective households varies. Whereas poor women and men spend much of their cash incomes to meet their staple food requirements (mainly maize purchases and grinding fees), wealthy women and men spend more on other things such as agricultural inputs, oxen, farm implements and spare parts. Thus, while poor women and men spend their cash income on recurrent food expenses, richer farmers (majority of whom are men) are able to invest their income into expanded production and in durable assets. I should however be noted that investment into inheritable property may not necessarily benefit women when they become widows.

Gender and level of labor–input into cash cropping

One argument suggests that women's time is being squeezed as more labor is devoted to cash cropping. It is further argued that this has negative implications for child nutrition. Discussions held in the two villages revealed that lack of access to inputs has actually reduced overall labor input into agricultural production. Although a switch from hybrid maize to cotton has occurred, especially in

Mwanamungule, the scale of production, and hence the level of labor input is less, compared to the hybrid maize boom period.

Women's workload and child nutrition trends

Participants in this PRA refuted the generally held assumption that increased workload of women due to involvement in cash crop production is the cause of child malnutrition. They explained that children are usually left at home in the care of older siblings or other adults who are responsible for preparing food and feeding the children.

Thus, although child malnutrition was acknowledged this was not attributed to women/mothers spending too much time in production activities. Rather, it was attributed to the general lack of food due to reduced production and the scarcity of money to buy food. In both villages, it was explained that there is not much cultivation being undertaken by women due to lack of inputs.

A number of women in the village indicated that they were members of women's clubs at which they are taught how to feed their families. However, they are unable to apply this knowledge because of shortage of appropriate food. This finding does not necessarily mean that women's workload has no negative impact. However, it appears that it is not a sufficient factor in explaining the prevalence of malnutrition.

Social differentiation

Social differentiation at community level was assessed through wealth ranking. The exercise was used to determine existing socio–economic categories. This laid background to understanding and analyzing differential strategies used by different social categories under liberalization. By looking at these strategies, we should be able to assess why some women and men are responding to new marketing opportunities.

In both Mwanamungule and Malakata villages, wealth ranking was preceded by the identification of local concepts of wealth. This was then followed by the identification of wealth indicators in the community. Tables 4.16 and 4.17. show local wealth categories obtained from the two villages.

Table 3.16. Wealth categories in the villages

Malakata	Mwanamungule
1 Mumvubi (successful farmer)	1 Mumvubi Ncobeni (Wealthiest)
2 Mumvubi Asyoonto (medium wealthy)	2 Mumvubi Asyoonto (medium wealthy)
3 Mujetewo (Poor person)	3 Mucete (poor)
4 Mucete Uyindilila (poor)	

Characteristics/Indicators of wealth/poverty

Distinguishing characteristics among categories identified were given as indicated in the matrix below.

As indicated above, three wealth categories were identified by Mwanamungule villagers compared with four categories identified by Malakata villagers. The information was collected through mixed groups of female and male Key Informants. The information from the wealth ranking exercise was later used for identifying case studies (see appendix 8.4.). In both villages, ownership of farm implements and household food security were stressed as key indicators of social status and welfare. Size of land owned was not considered important. From their perspective, it is the ability to effectively and efficiently cultivate land (for highest yields) that matters. They argued that a poor

person may have a big portion of land but is unable to produce much from it while a wealthy person may produce a lot from a relatively small field.

Table 3.17. Matrix on Wealth/Poverty Indicators

Wealth category	Mwanamungule	Malakata
I (Wealthiest or successful)	Knowledge of agricultural technologies Cattle ownership over 4 pairs oxen Has goats Has hammermill Produces 300–500 bags maize and 30– 40 bail cotton Cultivates 45–50 acres Food secure all year	Owns cattle, oxen Farm implements including ploughs, tractor Small livestock (goats, pigs, chickens) Has money to buy spare parts for plough, chemicals Produces 500 bags maize Field size of at least 15 Ha Owns vehicle (only women gave this) Has hammermill (only women gave this) Food secure all year
II (Medium Wealth)	Owns cattle, 1–3 pairs oxen Owns small livestock (goats, chickens) Cultivates 10–25 acres Produces 30–100 bags maize and 10– 18 bales cotton Food secure	Has cattle/oxen Small livestock, mainly chickens Has fewer implements – e.g. ploughs Produces surplus for sale Food secure Can hire oxen and/or labor Animal husbandry knowledge Tends to resell fertilizer
III (Poor)	Owns only ax and hoe Begs or works for food Low production due to simple technology used Cultivates only 5–10 acres No maize sold, sells only up to 3 bales cotton May be married and have children but no property (emphasis added by the villagers interviewed).	Lacks oxen, farm implements, Uses hoes No money for hiring oxen Hires out own labor Works for food Depend on relatives Grows only for home consumption, though some may sell little Cultivate maximum of 1 ha
IV (Extremely Poor)	No such category identified	Tend not to have permanent homes Usually not married No implements No means of survival Beg for food and/or beer

Household types

This PRA research has revealed that in Mwanamungule villages, only one family (that of the recent retiree) belong to category I (*Mumvubi ncobeni* – wealthiest person); 7 families belong to category II (*Mumvubi asyooto* – medium wealthy). The rest of the households belong to category III (Mucete – poor). None of the 5 female heads of households were ranked in the categories I and II, compared to I out of 4 male heads of household who was ranked in category II. Of the 3 polygamous households, 2 were ranked in category II, the third in category III. Table 3.18. presents the household types in Mwanamungule.

Table 3.18. Types of Household in Mwanamungule Village

Type	Number
Monogamous	25
Polygamous	3 (2 with 2 wives each, 1 with 3 wives).
Female–headed (no partner)	5 (2 widowed, 2 divorced, 1 deserted)
Male–headed (no partner)	4 (2 divorced, 1 widowed, 1 single)

Thus, in terms of marriage, monogamy is the predominant type of marriage practised in this village. In Malakata Village, household types were distributed as shown in Table 3.19.

Table 3.19. Household types in Malakata village

Type	Number
Male headed (monogamous)	63
Male headed (Polygamous)	19
Male headed (no partner)	10 (6 divorced, 4 single)
Female headed	36 (11 divorced, 9 widowed, 16 single).

Note: Only one FHH was ranked in wealth category I.

Conclusions

Based on the findings of this PRA study we conclude that the SAP induced measures – i.e. withdrawal of subsidies for the distribution of inputs and marketing of crops have resulted in reduced agricultural production and consequently increased the deterioration in social welfare in the villages. The main constraint centre around access to hybrid maize seed and fertilizers, aggravated by other factors like drought and loss of work oxen. Consequently farmers have become more depended on purchasing maize to supplement their inadequate food stocks. For poor households, food insecurity has become a greater problem. In a gender perspective, the findings indicate that SAP related policies have had a differential impact on men and women, with the later becoming even more disadvantaged than men, in terms of access to information, inputs, transport services, etc.

3.11. PRA Eastern Province

Community Profiles

Wachepa

Wachepa village lies north east of Chipata, 17 km away from the administrative centre in Mnoro Agricultural Block, along the main road to Lundazi (see Figure 3.4a.). It has a total number of 48 households with an average household size of six members. This brings the total village population to 288. The community has one unprotected water well which serves as a source of both drinking and washing water. Though, the community does not have a primary school and health centre of their own, they are serviced by Nyakutwa Primary School and Mnoro Rural Health Centre which are both within a radius of less than 10 km. Extension services are also provided by the camp officer at Mnoro. 15 of the households are female headed, while the remaining 33 are male headed. All the households grow local maize mainly for home consumption. 9 households grow cotton which is the main cash crop in the community. 8 households keep goats/sheep, 3 households keep pigs and only 3 households keep cattle. 10 members of the community are in formal employment in Chipata (6 men and 4 women). The main ethnic group is Nsenga.

Malewa

Malewa village lies north east of Lundazi Boma, 33 km off the main Lundazi road. The village falls within Mwase– Lundazi Agricultural Block and in Mwase II camp (see Figure 3.4b.). It is 6 km away from Mwase Lundazi Sub–Boma where health services are provided at Mwase Lundazi Rural Health Centre and extension services by the camp officer stationed in the same area. Market facilities are also available in the Sub–Boma for purchase of inputs and sale of produce. Household requirements are also available for purchase in stores at the Sub–Boma so that the households do not have to travel to the Boma all the time. There is also a basic school at the Sub–Boma. Malewa village is linked to Lundazi Boma by a well graded gravel road which passes through the Sub–Boma. The village is also 10 km away from Malawi in the eastern direction.

Malewa village has a total of 30 households with an average of six members per household. This brings the total population to 180. 20 of these households are male headed, 4 are widowed (3 females and 1 male, who happens to be the Headman), and the remaining 6 are single (2 males and 4 females). All the households cultivate mainly local maize for consumption and the main cash crops grown are hybrid maize, and sunflower. Other crops such as groundnuts, cow peas, millet, cassava, sugar cane, sweet potatoes, fruits and vegetables are also grown. 5 households own cattle. 5 households own work oxen (4 males and 1 widow). Only 3 households own goats and nobody has sheep. Only 1 household has pigs while all the households have chickens. One person in the village is in formal employment in Lundazi Boma. The main ethnic group is Chewa.

Area selection

As for the other provinces, the Priority Survey 2 was used to identify those villages where the farmers on average produced the largest crop per productive household member and had the highest largest consumption. This way a few villages were identified in the hinterland of Chipata and a few in remote areas. Of the identified and listed villages, Wachepa (formerly known as Vick) and Malewa villages were selected by the PRA team upon consultation with the ARPT staff in Chipata. Wachepa and Malewa were recognized as two relatively prosperous villages, one in each of Chipata and Lundazi Districts of Eastern province.

Figure 3.4a. Village map: Wachepa

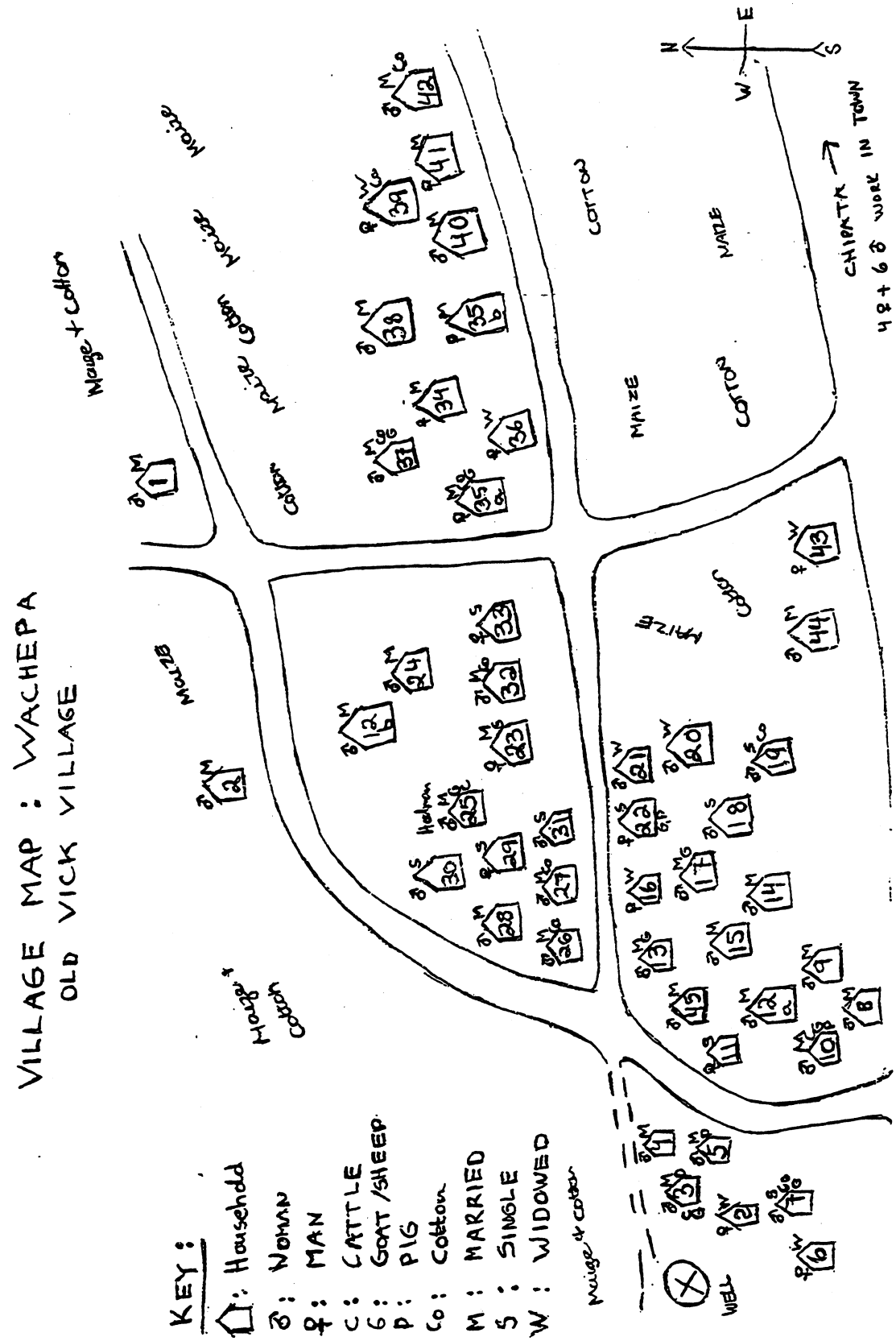
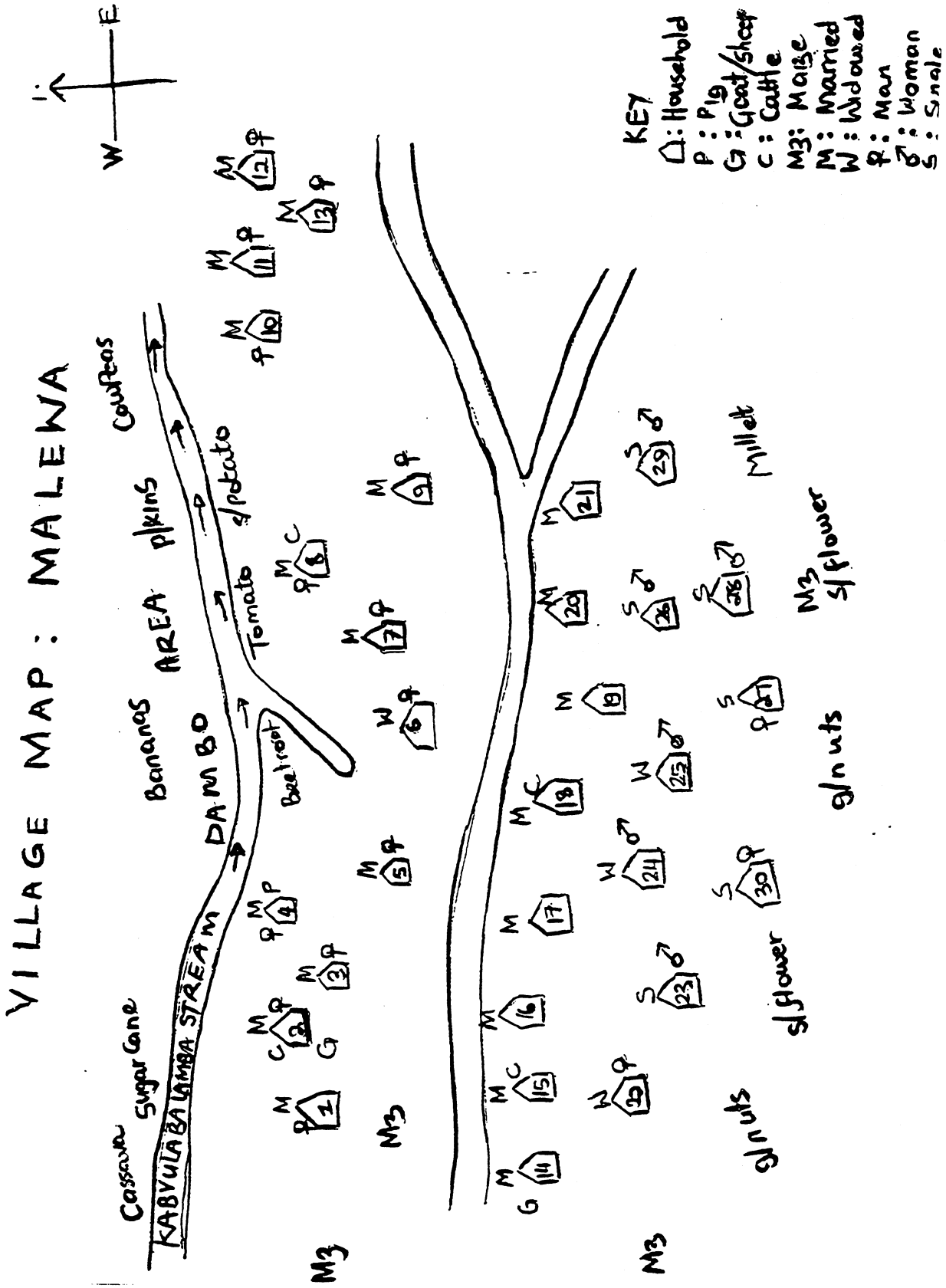


Figure 3.4b. Village map: Malewa



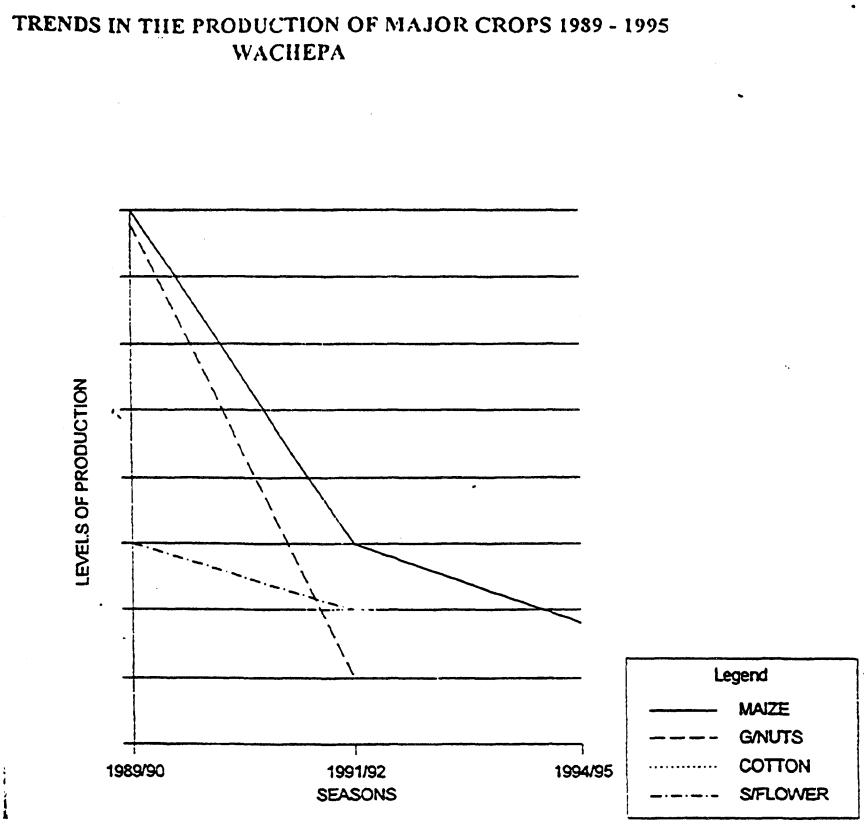
Trends in the production of major crops
A simple matrix ranking using bars was done with a group of 25 men and 39 women in Wachepa and 12 women and 11 men in Malewa. The groups were asked to use bars of different levels to indicate the amount of crop produced (see Figure 3.5a. & b.).

Maize
While farmers in both villages produced large amounts of maize during the 1989/90 season, farmers in Wachepa did not produce any hybrid maize. The good yields were attributed to the good rainfall. While the women in Malewa produced 10 bags, the men only produced 5 bags on average. Unlike Wachepa, married women in Malewa cultivate two fields, one family field which is given priority, and their own personal one which is worked on afterwards.

For both areas, in the 1991/92 season, maize production reduced significantly due to poor rains. This down ward trend continued for the 1994/95 season as insufficient rainfall perpetuated into a drought. By 1994, reduced access to credit and inputs for both male and female farmers had become an additional constraint to hybrid maize production.

The rainfall situation was worse for Malewa because farmers plough on the onset of the rains. The rains started very late in 1994, forcing the farmers to plough and plant late. Unfortunately, just as farmers were applying fertilizer, the rains stopped leading to almost zero production.

Figure 3.5a. Trends in the production of MajorCrops: Wachepa



Groundnuts
As with maize, the 1989/90 season saw farmers in both areas producing large quantities of groundnuts. In Malewa this trend continued through to 1993 with the farmers filling their storage bins to capacity. In Wachepa, the 1991/92 season recorded very poor yields due to poor rainfall. The worst season was 1994/95 for both villages. While in Wachepa farmers recorded zero production, which was exacerbated by the pest (rosette virus) attack which destroyed the whole crop, in Malewa, there was a drastic reduction to almost no yield due to the short rainfall period. Most farmers only harvested enough for home consumption.

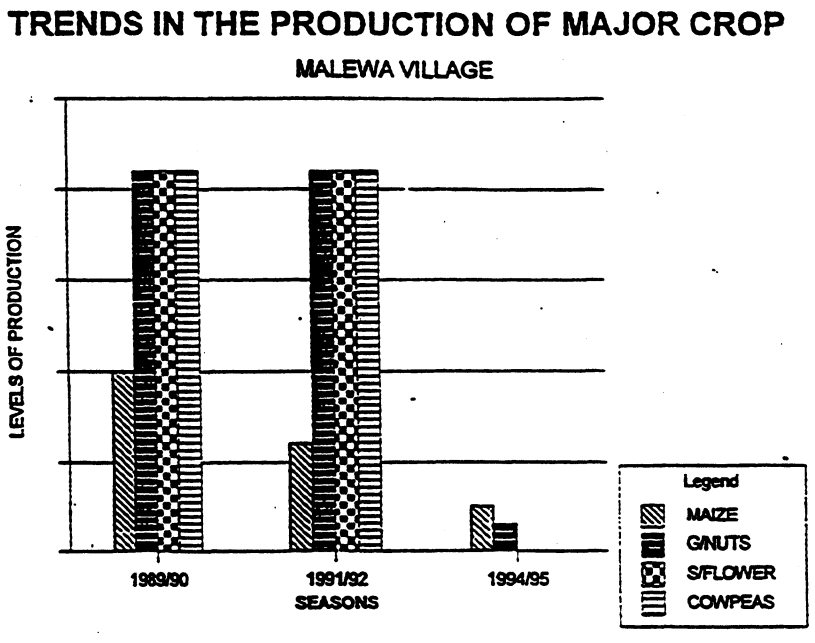
Sunflower
Sunflower production followed the same trend as groundnuts, from 1989 to 1993 production was very high, while falling drastically in 1994/95 as a result of poor rainfall.

Cotton
Cotton is only grown by farmers in Wachepa village. There appeared to be no changes in the cotton production trend which remained at the same high level throughout the five year period.

Cowpeas
Cowpeas are only grown by farmers in Malewa. The production followed the same trend as for sunflower.

Soybeans
Soybeans was only grown by the farmers in Wachepa in very small quantities during the 1989/90 season because farmers did not have enough seeds.

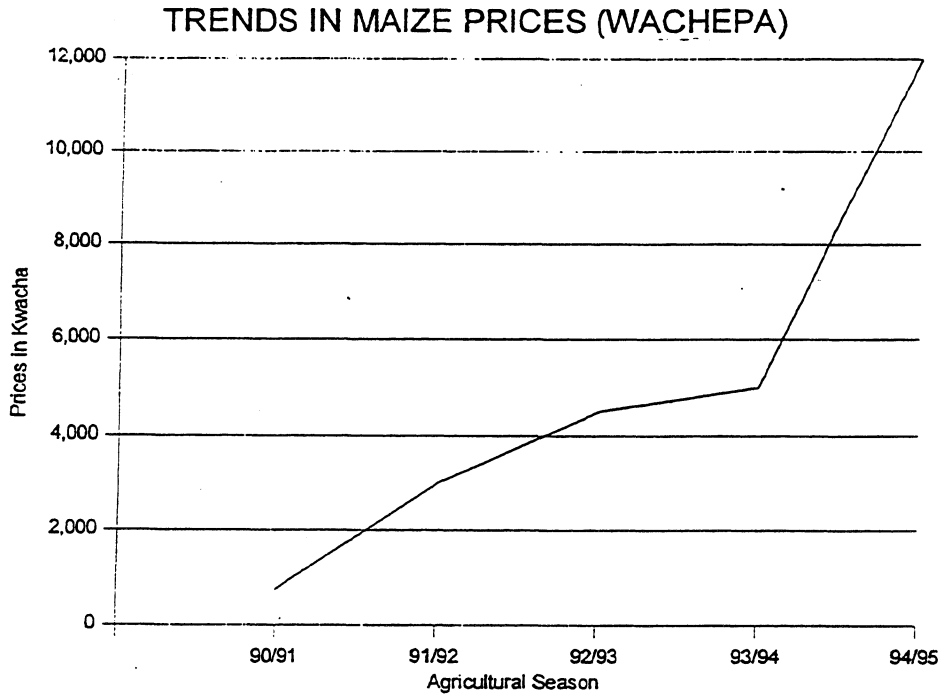
Figure 3.5b. Trends in the production of major crop: Malewa



Trends in marketing arrangements
A simple matrix indicating how much and to whom both male and female farmers sold their crops to was done in both villages during group meetings. This will be elaborated later.

Price trends for major crops
It was difficult to get an overview of the prices for the major crops apart from cotton in Wachepa because non of the farmers have sold any maize and groundnuts (apart from one man) since 1991. In order to get a rough picture of the price ranges, farmers were asked about market price for maize.

Figure 3.6a. Trends in maize prices: Wachepa



Maize
In Wachepa, prices have been increasing over the past five years. In the 1990/91 season, maize was going for K750 per 90 Kg bag. In 1991/92 this figure rose drastically to K3,000. In 1992/93 this rose to K4,500. The 1993/94 season saw a very slight increase of K500 bringing the price to K5,000. The sharpest increase has been the 1994/94 season which saw a steep rise to an average of K11,750 (see Figure 3.6a.). There has however been no sale from Wachepa during this latter years, and hence farmers have not benefited.

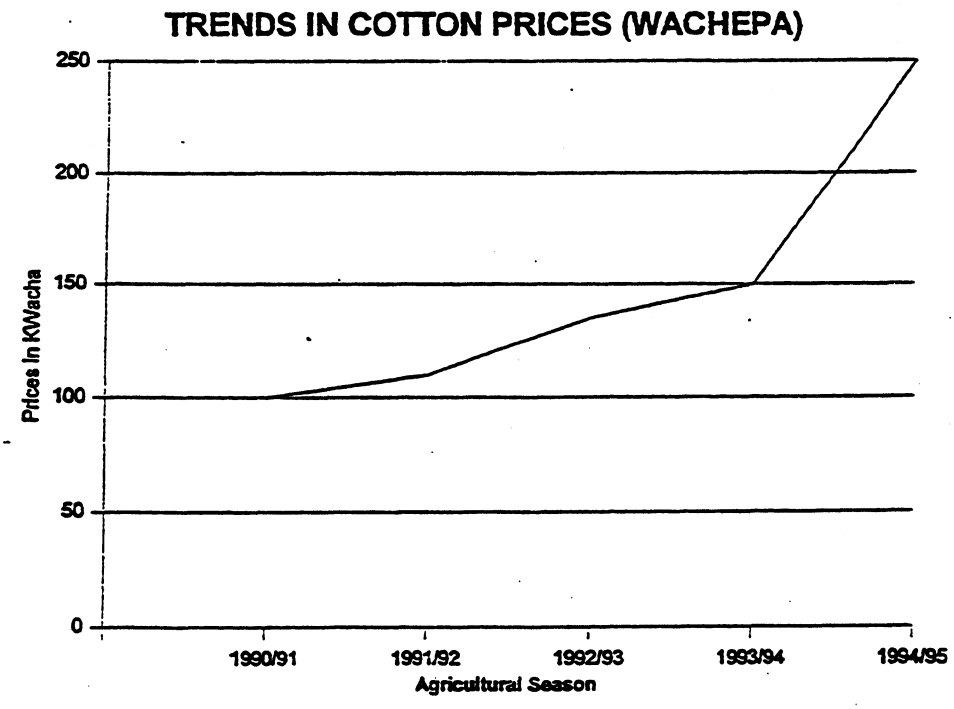
Similarly, in Malewa, in 1980 to 1991, farmers sold their maize in Malawi between K 715 to K 780 (K11 to K12 Malawi kwacha). Farmers did not sell any maize in 1991/92 season due to the almost zero yields. Relief maize was brought in and distributed under the food for work program. In 1992/93 season the price was K2,900 and it rose to K3,000 during the 1993/94 season. In 1994/95 season the prices have been ranging from K4,000 at harvest to K12,000 currently. On the other hand women have not grown any maize for sale since 1993 and have not sold any to Malawi since 1991.

Farmers were then asked what prices they would prefer to sell their maize at. For Malewa prices given ranged between K17,000– K20,000. Female farmers said they would prefer to sell their maize in tins for K4,000 as opposed to whole bags in order to take care of immediate needs. In Wachepa, preferred prices ranged between K6,500 and K 12,000.

Groundnuts
In Malewa, farmers were not able to remember the price of groundnuts from 1989 to 1993. However, in 1994/95 season the prices have been varying from K3,000 to K10,500 per tin/ pail and from K18,000 to K100,000 per 90 Kg bag.

Sunflower
Information on sunflower was scanty as farmers in both areas did not produce enough to sell, particularly in Wachepa. However, in Malewa during the 1989/90 season it was sold at K2,500 per 90 Kg bag. In 1993 it was sold at K4,000. In 1994 it ranged from (K3, 500 per bag (K700 to K800 per tin/pail). In 1995 the tin was sold at K1,200 while a 90 kg bag fetched K 5,500.

Figure 3.6b. Trends in cotton prices: Wachepa



Cotton
From 1990 up to 1994, cotton prices ranged between K 100 – K 150 per kg. 1995 saw a sharp increase to K 250. This was because of the coming of Lonrho which was offering the farmers almost twice the price of LINTCO (see Figure 3.6b.).

While men said they would like to sell their cotton at K 310 per Kg, women said they would like to offer Lonrho K 550 per kg. They suggested that the best way to sell their cotton would be to form groups of about 4 in order to share the costs of chemicals so that they would reduce production costs, thereby making more profit.

Seasonal and geographical variations
Farmers realize that they are being ripped off by traders who buy their maize at harvest time for as little as K 5,000 in Wachepa and begin to resell it around November – March when it fetches the highest prices (K 17,000). As much as farmers would want to hang on to their maize until November–March, they are unable to, because they need money to buy essentials such as soaps, salt etc.

Where farmers in Wachepa have tried to get a better price by taking their maize to Chipata where prices being offered are more favourable, they have not been able to realize much due to higher transport costs.

In Malewa, at harvest, in April a 90 kg bag of maize was sold at K 4,000 and the bag is now being sold at K 12,000 in December. In terms of seasonal variation the 90 kg bag of groundnuts was going at K 50,000 at harvest time in April, whereas now it is fetching as much as K 120,000 in December. At harvest in April, sunflower was sold at K 5,500 per 75–80 kg bag. In August to September it shot up to K 9,000. The variations seem to depend largely on the buyer as the farmers seem to have very little bargaining power especially if the product was produced on loan basis.

Traders/buyers
Farmers in Malewa appeared to have had more alternatives in terms of markets for all their crops. (hybrid maize, groundnuts, sunflower and cowpeas), while Wachepa only had one major crop (cotton) throughout the five year period. For farmers in Malewa, this can be attributed to the fact that farmers were able to produce more from loans they received at one time or another or from purchasing fertilizers and seed using their own resources. Farmers in Malewa had 5 major markets/buyers of their produce. These are Lima Bank, ECU, ADMARC in Malawi, Aliboo and the Local market at Mwase Lundazi Sub–Boma. In Wachepa there were only three, ECU, LINTCO, and Lonrho.

Figure 3.7a. Maize buyers and their relative importance by season and gender: Wachepa

MAIZE BUYERS AND THEIR RELATIVE IMPORTANCE BY SEASON AND GENDER (WACHEPA)

BUYERS	1989/90		1990/91		1994/94	
	M	F	M	F	M	F
ECU	OOOOO	OOOOO				
SABLE						
MOSALI						
SHIFA						
D CU						
LOCAL					OOOOO	OOOOO

KEY
Scale (0-5)
OOOOO Most Important
M Male
F Female

Maize

During the 1989/90 season, all the farmers in Wachepa village sold their crop to the ECU. In Malewa most male farmers and no females got loans from Lima bank and ECU which meant that they had to sell their maize to these two agents. The women on the other hand sold their maize across to Malawi, a distance of about 10 km.

From 1991 onwards, farmers in Wachepa have not sold any maize, mainly because of poor rainfall and lack of credit which have led to poor yields. There however, appears to be no differences of markets for male and female farmers (see Figure 3.7a.).

Figure 3.7b. Maize buyers and their relative importance by season and gender: Malewa

MAIZE BUYERS AND THEIR RELATIVE IMPORTANCE BY SEASON AND GENDER (MALEWA)

BUYERS	1989/90		1990/91		1994/95	
	M	F	M	F	M	F
ECU	OOOOO	OOOOO				
SABLE						
MOSALI						
SHIFA						
D CU						
LOCAL					OOOOO	OOOOO

KEY
Scale (0-5)
OOOOO Most Important
M Male
F Female

In Malewa on the other hand some male farmers continued receiving loans from ECU and selling to them. The women however, changed their marketing strategy by concentrating on the local market. In the 1994/95 season very little maize was sold as most farmers in Malewa kept what they had for home consumption (see Figure 3.7b.).

Cotton

From 1990–1994 all the farmers sold their cotton to LINTCO. With the coming of Lonrho in 1995, farmers changed their market due to better price offered by Lonrho (see Figure 3.7c.).

Figure 3.7c. Cotton buyers and their relative importance by season and gender: Wachepa

COTTON BUYERS AND THEIR RELATIVE IMPORTANCE BY SEASON AND GENDER (WACHEPA)

BUYER	1989/90		1990/91		1994/95	
	M	F	M	F	M	F
LINTCO	OOOOO	OOOOO	OOOOO	OOOOO		
LONRHO					OOOOO	OOOOO

KEY
Scale (0-5).
OOOOO Most Important
M Male
F Female

Groundnuts
In Wachepa, only one married male farmer sold his groundnuts to a local trader called Magregor. None of the female farmers have sold any groundnuts since 1990. The reason given was the size of the fields they cultivated which they said were not big enough to produce large quantities. From 1991–1995, yields were low due to poor rainfall and pest attacks. In contrast, between 1989/90 to 1993/94 groundnuts have been sold to Aliboo by both men and women in Malewa. In 1994/95 season most farmers kept their groundnut crop for home consumption as the poor rains greatly affected yields.

Cowpeas
There were no cowpeas sales for the last three year. However, previously they were sold to Aliboo from 1989/90 to 1991/92.

Sunflower
Although sunflower was listed as a crop produced by farmers in Wachepa, they were not able to indicate which traders bought the crop. Farmers in Malewa have been selling their sunflower seeds to Aliboo since 1989 (see Figure 3.7d.).

Soya beans
As with sunflower, farmers in Wachepa were not able to indicate their market for soya beans

From this exercise, it is clear that maize is losing its significance as a source of cash in Wachepa, while cotton is gaining in popularity as an alternative. This can be attributed to the coming in of Lonrho. Almost all the farmers have received loans this year, which they say are better because the selling price is better than LINTCO and payments are timely.

Figure 3.7d. Sunflower buyers and their relative importance by season and gender: Malewa

SUNFLOWER BUYERS AND THEIR RELATIVE IMPORTANCE BY SEASON AND GENDER (MALEWA)

BUYERS	1989/90		1990/91		1994/95	
	M	F	M	F	M	F
ECU						
LIMA						
ALIBOO	OOOOO	OOOOO	OOOOO	OOOOO	OOOOO	OOOO
MALAWI						
LOCAL						
LOCAL						

KEY
Scale (0-5)
OOOOO Most Important
M Male
F Female

Barter

Bartering is another form of marketing that was found in both villages apart from selling on cash basis. In the case of Malewa, some farmers both male and female cultivate vegetables in the dambo area within the village along Kabvulabalamba stream. When food supplies are low, vegetables are bartered with maize. K 50 worth of vegetables fetches one plate of maize. The vegetables grown include rape, cabbage, tomatoes, okra and pumpkin leaves. The vegetables are sometimes sold at Mwase Lundazi Sub–Boma and some of the money is used to buy more seed to sustain the vegetable enterprise. In certain cases, maize may be bartered with three mangoes or three bananas for a small plate. This is quite common at the hammermill in the neighbouring village. Sometimes vegetables are also exchanged for kraal manure used in the dambo fields.

Access to production resources.

This exercise was done using Venn diagrams (see Figure 3.8a., b., c. & d.). Farmers were asked to write down all the institutions providing inputs, credit and extension services on cards provided and to place them at distances away or near the centre of the circle representing the village depending on how important they perceived them to be.

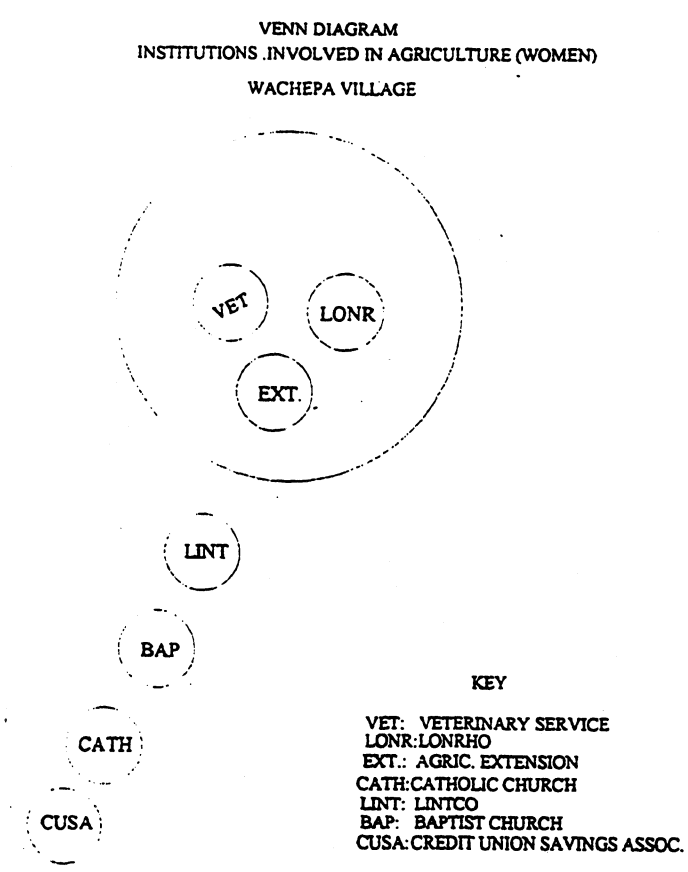
Farmers in both villages placed extension within the village circle indicating that they appreciate the services they are getting from the extension staff.

In Wachepa, both men and women placed Lonrho, and veterinary services at the centre of the village, and agricultural extension within the village. The two churches, Baptist and Catholic were both placed outside the village circle. LINTCO was placed furthest and outside the village circle by the

women because of low prices they offered, while CHAISE was furthest for the men who were no longer able to get loans from there due to high fees.

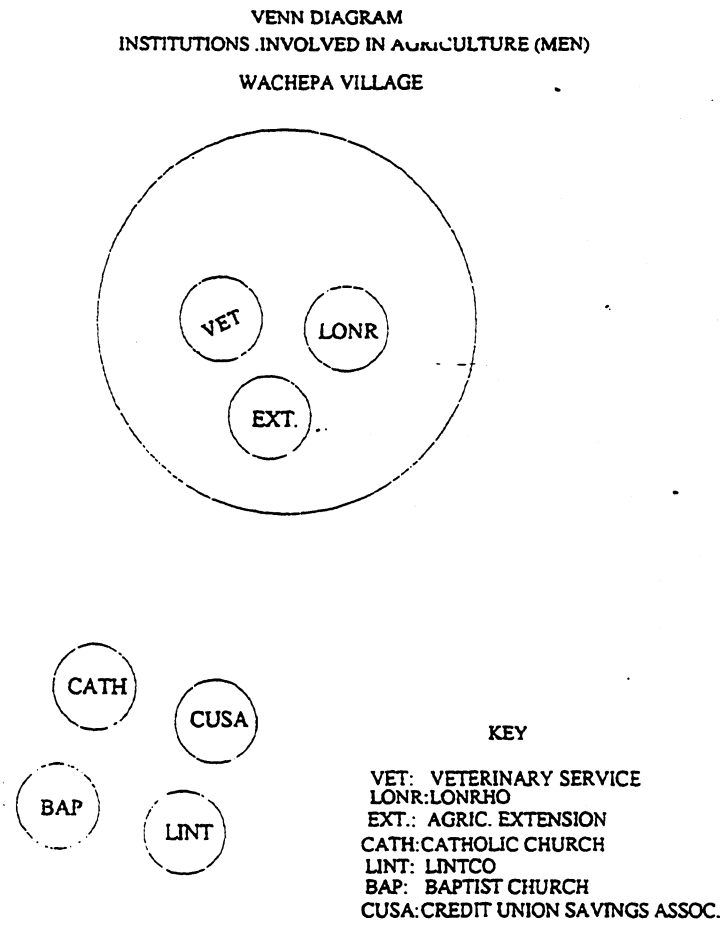
For Malewa the ranking was different. For the women, Aliboo and extension were put in the centre of the circle representing the village. LWF was furthest away followed by Mutaniseke, Sable, Lima Bank, CHAISE and finally ECU. The lending institutions were outside the village because women did not get any loans. However, they acknowledged that they benefit indirectly from their husbands getting loans from these institutions. LWF was furthest for the women because they had been promised bean seed two years ago which has not been delivered.

Figure 3.8a. Institutions involved in agriculture (women): Wachepa



While the men did not place the institutions as far away from the circle as the women, both groups mentioned distances far away from the village circle for those placed outside the circle. Unlike women, men had four institutions within the village circle, Aliboo, who was at the centre, Lima Bank, ECU and Extension who were at similar distances within the circle. Mutaniseke was further away followed by Sable, CHAISE and LWF

Figure 3.8b. Institutions involved in agriculture (men): Wachepa

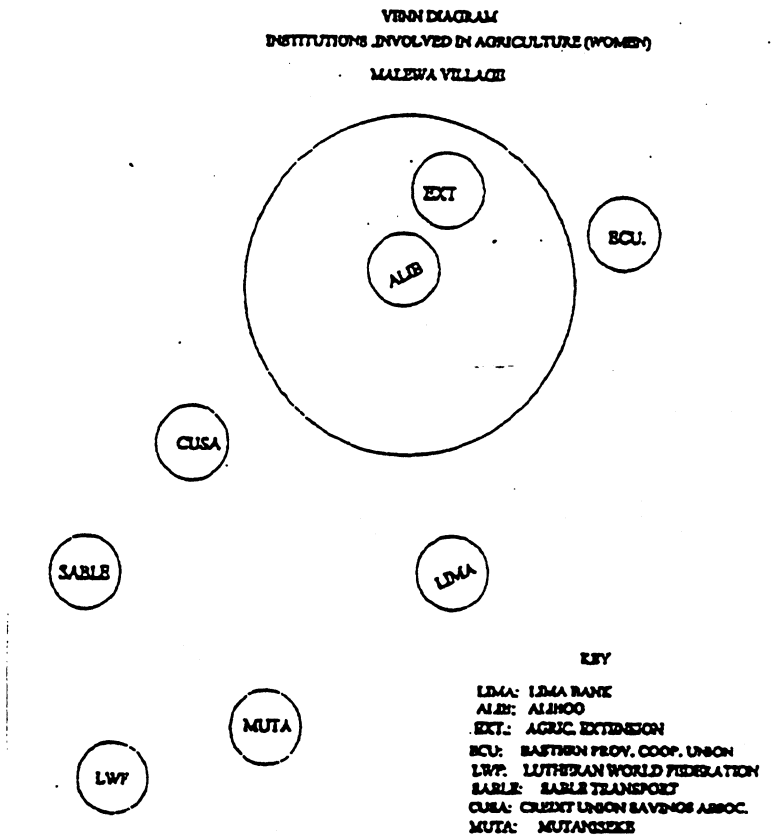


Social differentiation

Farmers in both villages came up with their own criteria of well being which were based mainly on agricultural related activities. Interesting enough, farmers from both villages had similar criteria except that farmers in Malewa also included ownership of assets (ox–cart, plough, bicycle etc.) as an additional indicator while farmers in Wachepa included cotton:

- good harvest, between 10–20 bags of maize,
- access to inputs especially fertilizer,
- livestock ownership,
- hard working,
- healthy family,
- good clothes,
- enough food to eat,
- laziness

Figure 3.8c. Institutions involved in agriculture (women): Malewa

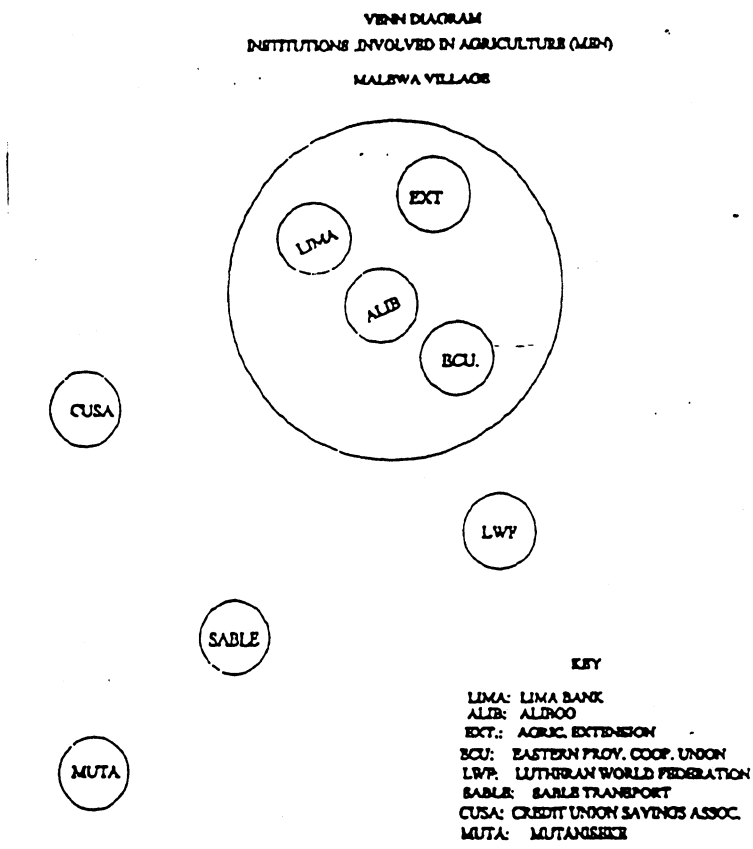


Using the above criteria developed by the community the 48 households 34 (70.83%) male and 14 (29.16%) females, were ranked into three groups (rich, medium, and poor) by three independent Key informants with adequate knowledge about the community. In Chipata District it was done by two females and one male and vice versa in Lundazi District.

In Wachepa 15 (31%) households were ranked as being rich, 26 (54%)as medium and the remaining 7 (15%) as poor. Further divided by sex, the 10 (67%) of the 15 rich households were male, while only 5 (33%) were female. Similarly, 18 (69%) of the medium households were male, while 8 (31%) were female. The households belonging to the poor category, surprisingly had the fewest number, 6 (86%) were male, while only 1 (14%) was female. The variations in wealth particularly between the poor and the rich was strongly attributed to the status of the indicators developed by the community in each household. The positive the indicator the better the household would be ranked and vice versa.

Using the same criteria for farmers in Malewa, out of the total of 30 households, 7 (23%) were ranked as being rich, 16 (54%) were ranked as medium and 7 (23%) were ranked as being poor. Further divided as for Wachepa, all the 7 (100%) under the rich category were males. Almost similarly, under the medium category 16, 94% were males, while only 1 (6%) was females. Of the 7 households ranked under the poor category, 4 (58%) were females while 3 (45%) were males.

Figure 3.8d. Institutions involved in agriculture (men): Malewa



Overall, the women appeared to be doing better than the men when ranked in terms of their total number (14). 36% of the women were ranked as being rich compared to only 29% of the males, 57% fell under the medium category compared to 53% in the males and only 7% fell under the poor category compared to 18% of the males.

In Malewa village, female farmers were worse off than those in Wachepa. None of them fell under the rich category compared to 28% of the males, 20% fell under the medium, compared to 60% of the males while 80% were ranked in the poor category compared to 12% of the males.

The following were advanced by farmers as being some of the factors that may explain the disparity in performance among farmers.

- Access to inputs such as seed and fertilizer;
- Ability to take off in an enterprise;
- Ability to work hard;
- Knowledge and technical capacity;
- Drunkenness; and
- Ability to cooperage and work together with fellow farmers in the community.

Apart from wealth differences between different types of households, the PRA team also attempted to elicit information on differences between villages.

While farmers in Wachepa were not able to give reasons why other villages were either doing better or worse than themselves, farmers in Malewa used soil types as the criteria.

Wachepa:

- Pelisia in the east is better because people there have access to loans from CHAISE.
- Wachepa is the best where cotton is concerned.
- Mpando 3 in the north is worse than Wachepa.
- Kalolu in the west is at par with Wachepa.

Malewa:

- The village is worse of than Zenekeza in the eastern direction because the latter has good soils which can be ploughed even before the rains have began.
- Matimba village which is on the western side is doing better because farmers there have access to credit. They also grow a lot of sunflower which after selling gives them enough money to purchase more inputs.
- Kazipale village in the north was reported to be worse off than Malewa due to poor soils.
- Chinemule village in the south is doing better than Malewa due to good soils.

Gender and level of labor input into cash cropping

In Wachepa, it was difficult to relate labor input to cash cropping because there was only one cash crop (cotton) and only one woman in the group was growing it. In order to see the general trend in labor allocation, the rest of the women were asked to relate labor to maize and groundnuts, since they were the only other crops being grown.

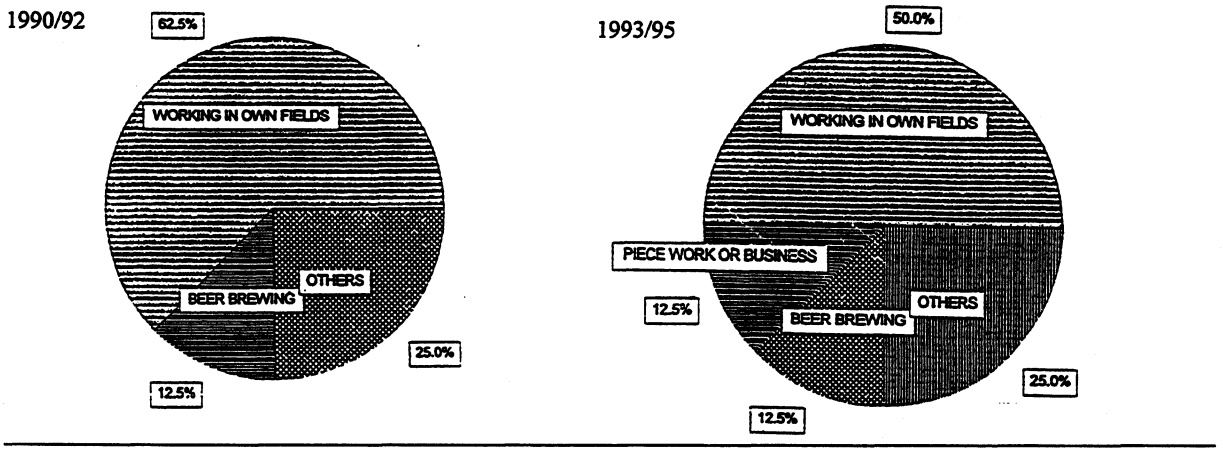
Time allocation in terms of labor has not changed at all over the years. This has been captured through the use of pie charts in both villages (see Figure 3.9a. & b.). Maize is the staple food and therefore requires more time to cultivate.

Women in both villages spent more of their time in the field compared to other activities. For Malewa this was more than Wachepa because of the increased number of crops they cultivate.

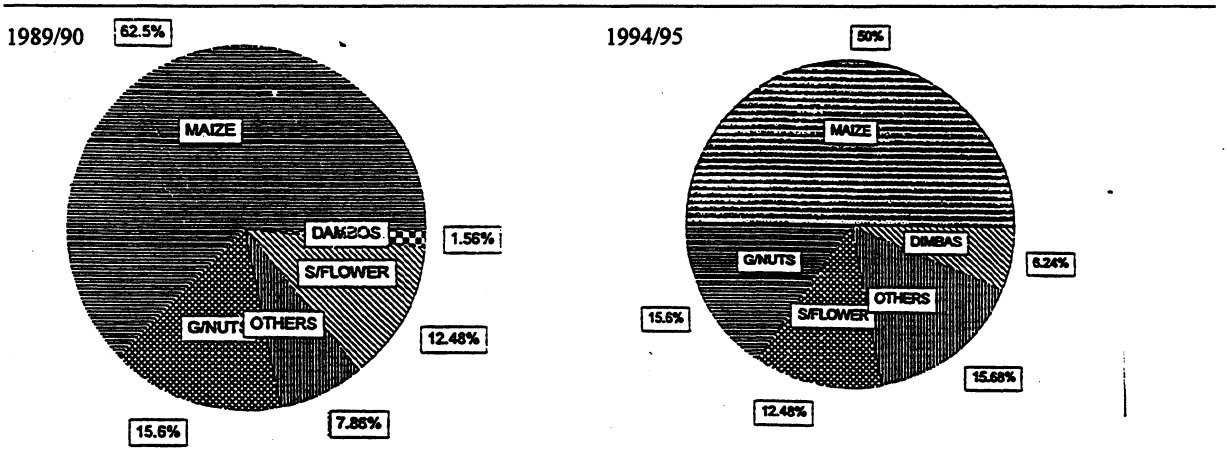
In Wachepa, between 1990–92, women spent about 62.5% of their working day working in the fields while those in Malewa spent a total of 90.6%. (15.6% on groundnuts, 12.5% on sunflower and 62.5% on maize). These figures were higher than in 1995 (50% for both villages because farmers had access to credit facilities and readily available markets. In Wachepa there was no need for piece work as food was adequate the whole year round.

Labor allocated to beer brewing was 12.5%, while that for other activities (child care cooking, cleaning etc.) was 25% in Wachepa. Women in Malewa spent their remaining 7.9% on other activities and 1.5% on vegetable production in the dambos for the one widow.

Figure 3.9a & b. Gender allocation of labor time 1990-1995:
Women in Wachepa. 1990/92 and 1993/95



Women in Malewa. 1989/90 and 1994/95



This picture has changed in 1995 mainly because credit is no longer available for maize. In both villages the time allocated to working in the fields has dropped, in Wachepa from 62.5 to 50%, while in Malewa from 90.5 to 79.2% (50% on maize) while both groundnuts and sunflower remained static at 15.6% and 12.5% respectively. Because of this reduction maize stocks usually run out before the next harvest forcing women to find other sources of income or food.

Unlike in Wachepa where women are sometimes forced to do piece work, brew beer or go into business in order to survive, only one woman in Malewa growing vegetables has increased her area under cultivation and barters or sells the vegetables in order to obtain maize.

Women in Wachepa spend 25% of their time doing piece work or beer brewing, while 25% was spent on other activities (looking after children, looking for food, cleaning the house, cooking etc.). For households that can not brew beer due to religious beliefs, piece work is done.

In Malewa, other activities (cooking, cleaning, child care, drawing water and collecting firewood) were allocated 25% of their labor time. For one woman (widow) who cultivates dambo fields which

are a major source of income and food from sales/barter of vegetables 6.241% of her time was allocated to these fields while the rest (21.84%) was left to other activities.

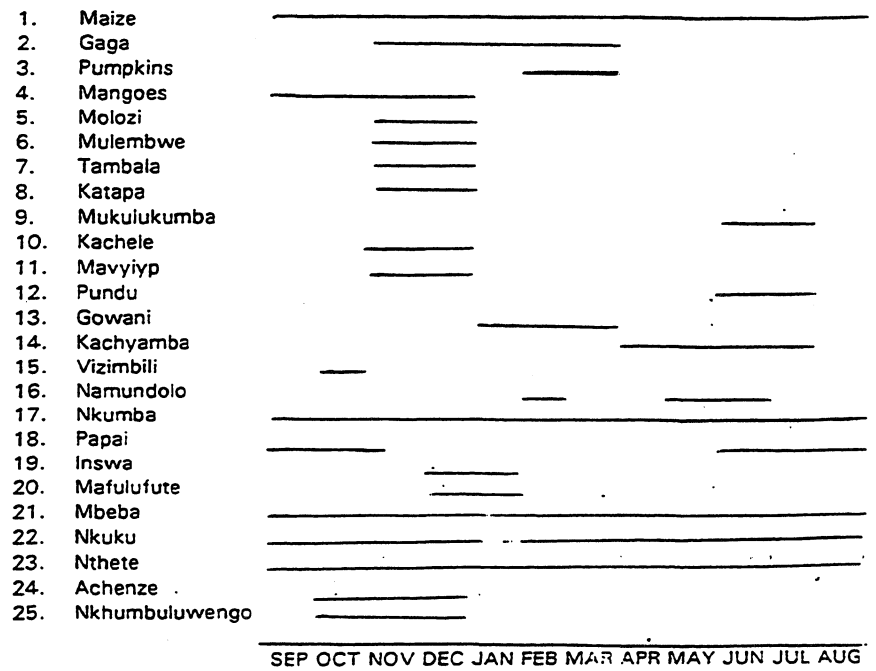
Labor utilization generally appears to have had no impact on time spent looking after children, this might explain why child nutrition is relatively better in both villages.

There appeared to be no general differences in labor allocation to different activities between married and single women. Differences appear when households are looked at individually.

Food consumption trends

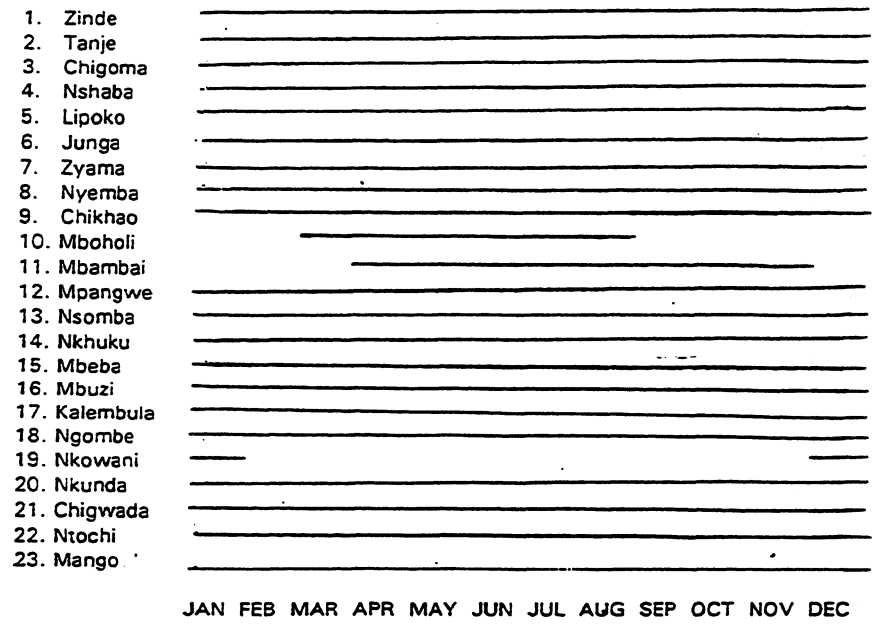
Farmers were asked to list down all the foods consumed during the 1994/95 season (see Figure 3.10a. & b.).

Figure 3.10a. Food consumption trends -1990-1995: Wachepa



Unlike Wachepa village, where farmers, apart from livestock, maize (including maize bran) and pumpkins, survive on foods that grow wild, farmers in Malewa cultivate a wide range of food crops. However ,they cultivate very small portions and this gives rise to food shortfall during certain periods of the year. Maize, which is the staple food is scarce between February and March during which period some farmers substitute it with cassava. Although the food situation appeared to be favourable in view of the wide crop base especially in Malewa, most farmers reported the situation has generally declined over the past five years and was expected to be worse if the rains do not fall in good amounts. This would be a threat to household food security. Nevertheless, the trend in terms of type of food consumed has been the same over the past five years in both villages.

Figure 3.10b. Food consumption trends -1990-1995: Malewa

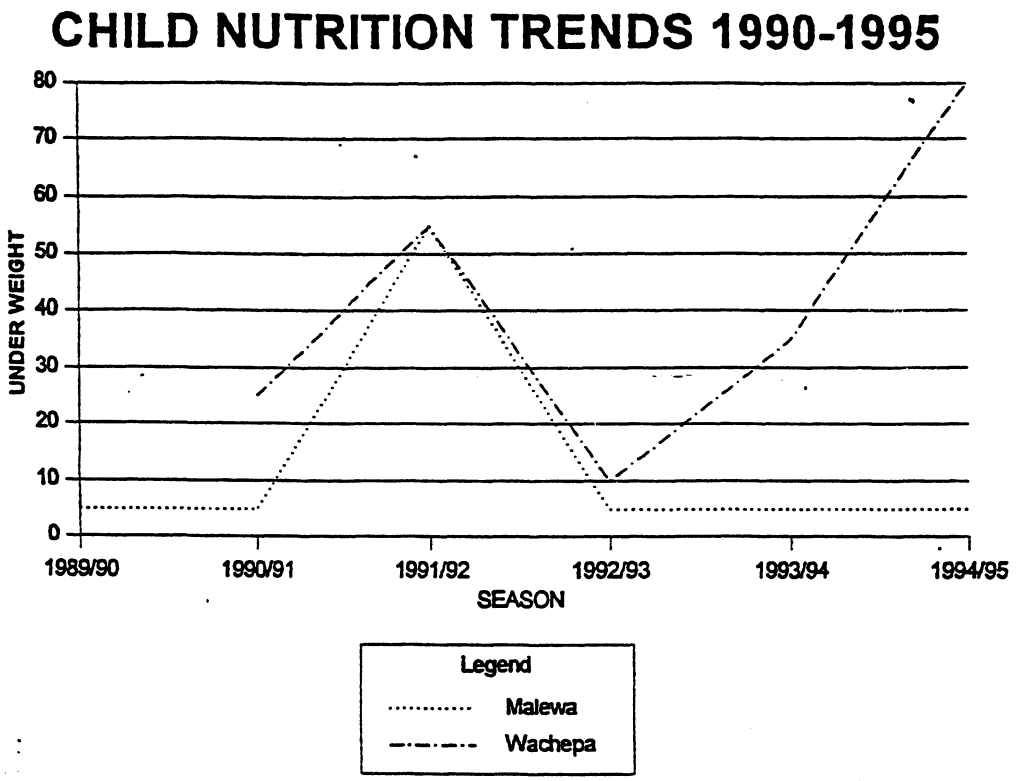


Child Nutrition Trends

Farmers in Malewa village reported not having any noticeable cases of child malnutrition through out the five year period 1989–95 (see Figure 3.11.). Weight losses especially in under fives were attributed to diseases and other causes such as the quality of mealie meal in 1992/93. Due to the drought, relief maize (Jubilee) was brought into the area. As with the farmers in Wachepa, most of the people in the village, both young and old, did not appear to take to it, causing wide spread diarrhea and consequently, loss of weight in children. This relatively good nutritional status record was attributed to the sacrifices mothers in Malewa village make to ensure that their children are fed first and properly even during hard times, even at the expense of starving themselves.

In Wachepa, the graph showing child nutrition trends over the past five years was constructed with a focus on availability of maize within the village.

Figure 3.11. Child nutrition trends 1990-1995



During the 1990/91 season the rate of malnutrition amongst the children under five years of age was on the lower side. This changed drastically in the 1991/92 season. This upward trend has been attributed to the yellow maize which was brought in as relief. Most children did not take to it resulting in an increased number of diarrhea cases. In the 1992/93, as a result of favourable rainfall, compared to the previous year, there was enough maize. This significantly improved the nutritional status of the majority of the children leading to a reduction in malnutrition cases. In 1993/94, rainfall was not as favourable as the previous year. This resulted in an upward trend in malnutrition cases. This trend has since continued to rise, with 1995 seeing the worst cases of malnutrition amongst the under fives. Other crops such as groundnuts, which play an important role in child nutrition were also destroyed by pests and drought. This has probably contributed to this high rate.

Data from the clinic in Malewa is aggregated for the whole catchment area and information on Malewa alone does not exist. It was difficult to decipher information on the nutritional status of children for the village because the only information recorded is on the vaccinations given to each child. However, the average percent underweights for the whole catchment area (Mwase–Lundazi) with a total population of 25,800 people were 40% and 42.5% for 1994 and 1995 respectively.

Income sources, control and disposal

The main income source in Wachepa was cotton in the last five years, while for Malewa it was hybrid maize up to 1991 and thereafter it was sunflower and a bit of groundnuts.

Control over income from sales of the crops differs, depending on the personalities of the men or whether the household is monogamous or polygamous.

It was difficult to collect information on who controls income from cash crops amongst the different categories of women in Wachepa because very few of the farmers in the village are growing cash

crops. The only cash crop being grown at the moment is cotton (19% of the households) and only one married woman from this percentage was present during the group meeting.

The situation in Malewa was different because women cultivate several cash crops. The differences between different categories of women also came out quite clearly in Malewa.

Women in Wachepa cultivate the same fields as their husbands. In Malewa, the situation is slightly different in that women are allocated personal portions of the main field by their husbands on condition that priority be given to the main field.

When it comes to income disposal, women in Wachepa take total control of income from the crops they cultivate without the help of their husbands. This money is usually spent on food and clothes for the women themselves and their children. The money is also sometimes invested in livestock which then becomes the property of the women themselves. Where both husband and wife work together, the decisions on what the money should be spent on are made jointly. In some cases however, the men pocket all the cash and go on drinking sprees.

For women in Malewa, any decisions on income derived from their personal fields are made by the women alone. This is an advantage in itself in polygamous households because the trend for most men is to spend the income on their favourite wife leaving the other wives to fend for themselves. In some monogamous households the income is in the hands of the wife although decisions on how to spend it are made together.

Which households can benefit from when/where prices are highest
In Malewa, only women farmers were able to get good prices from the Malawi market up to 1990. Today, none of the farmers are able to benefit from prices differentials because their crops are sold to the same traders. None of them are able to keep and take advantage of price differences. They sell immediately to take care of immediate needs.

Trends in agricultural opportunities (1990–1995)
Some farmers felt that the old market system was good because now they have to look for transport to take the produce to the market place which most of them can not afford. On the other hand some farmers said that the old system was bad because there were delays in getting cash, unlike at present when the market is open and farmers can get money immediately.

In view of the farmers' low bargaining power to convince buyers to accept economic prices, farmers suggested that the Government should intervene to empower farmers to be able to negotiate for good prices and provide ready market. This will promote production. If not, another suggested option was for Government to be the last buyer at reasonable prices to store for national food reserves.

The areas under cultivation have remained the same in the absence of inputs (fertilizer and seed). Output is low due to lack of fertilizer and problems of rainfall. Prices of fertilizer should be brought down to promote production (e.g. the fact that fertilizer costs K 15,000 while the maize bag gives K 7,000 did not make sense to farmers.)

Farmers also complained that it is no longer easy to access credit as was the case in the past, especially now that fertilizer is expensive to purchase on cash basis. The current credit system which considers a group as opposed to individuals is not fair because in the event of one defaulting, the others suffer. Some felt it would be better to revert to the old system. In contrast, some farmers thought credit is binding because in the event of defaulting you loose property such as cattle.

The food situation, particularly at household level has declined and some farmers complained that some of them were not given fertilizer in the current political scenario because of being UNIP supporters.

Farmers argued that they feed the nation that is all the more reason why loans should be given to them as it was observed that these were difficult to access due to high ledger fees, high interest rates and high transport costs.

Summary of finding from the Eastern Province

- Production has drastically fallen down in both villages not only due to the inability by farmers to access loans, but also the drought situation that has hit the southern region of Africa. Farmers in both areas studied rely on rainfall for production and it is becoming increasingly difficult to time field operations with rainfall patterns.
- Farmers in both Wachepa and Malewa have not benefited adequately from the structural adjustment program as they are having problems adjusting and adapting to current agricultural policies, except for the 19% cotton growers in Wachepa. Most of the farmers are used to producing on a loan basis which is no longer easy to access now. Most of them are not able to put up with the high interest rates, ledger fees and other conditions being demanded by the lending institutions.
- In order to cope with the worsening in the livelihood situation, the people in Wachepa have increased the piece work activities and many are relying upon employment in Chipata. They are not looking for options within agriculture except for increasing their cotton production (no more arable land available for increasing acreage). On the other hand Malewa did not seem to have much in terms of options. A few farmers in Malewa have gone into dambo cultivation. This lack of options in Malewa may be due to the fact that the majority of the people in the village are elderly.
- Increased reliance on piece–work in Wachepa has resulted in decreased attention to own production. This worsens their livelihoods because labor is mainly remunerated in food (e.g. mangoes and maize). Also, there is an influx of cheaper labor coming in from Malawi.
- Nutritional status has been declining in general in both villages partly because of the unpredictable A.nd erratic rainfall and also the inability by farmers to cope with the change in agricultural policies. Women in both villages will go out of their way to make sure that the children are fed.
- Most farmers in both areas do not have the ability to hold their produce and take advantage of price fluctuations in order to sell at economic prices primarily due to low levels of production (0.5 lima to 1.5 ha) and the fact that they need the money to purchase immediate household requirements.
- Farmers in both Wachepa and Malewa have little bargaining power to determine the prices at which they should sell their produce. This is more so if they produce on loan basis.
- Buyers are competing for cotton in Wachepa whereas in Malewa, Aliboo seems to be monopolizing the market. Farmers also complained about not having alternatives. Prices are determined by the buyers rather than the producers partly because farmers are not united in setting up prices. Others sell at low prices out of desperation to meet immediate needs.
- Very few gender differences exist in both villages. This could be due to limited integration into the market economy and to the fact that it does not seem to matter who gets the loan within the household. It can be either the husband or the wife. It also appear as if there is equal level of participation in agricultural activities by both men and women.
- There are several reasons why Wachepa may have done better than the neighbouring villages in 1993. These include good leadership, successful cotton production, closeness to the road, employment in Chipata, strong family ties and support, strong women and piece work opportunities (although the value of labor is declining). Similarly Malewa may have done better than the neighbouring villages in 1993 because of the wider crop base for food consumption, relatively better

soils, access to purchased fertilizer, access to market at Mwase–Lundazi Sub–Boma, proximity to Malawi, access to oxen, dambos and manure.

3.12. PRA Case Studies

Introduction

The importance of case studies cannot be over-emphasized here. Use of case studies is considered to be important because it is a way of concentrating not upon what is necessarily common experience for the study community or group, but upon what kinds of advantages or opportunities and constraints are possible and are perceived as genuine/legitimate under the liberalized system. Case studies help in revealing some of the processes underlying changes in the agricultural sector under the Structural Adjustment Program (SAP). Therefore, they are special not because they are qualitatively different from the experiences of the majority of the people (in this case the farmers in the community), but because they often indicate experiences that are applicable to the wider society or community, and also suggest reasons for the prevailing trends of change. The names used are fictitious.

The four case studies presented below are from Mwanamungule Village, Chief Shakumbila, Mumbwa District, Central Province.

Case Study 1: Mr. EK

EK originally came from Monze District. He migrated to Mwanamungule Village in 1965 in search of agricultural land. His first marriage took place in 1968 but it ended in divorce after 2 years. He had one child with his first wife. EK remarried in 1972 to his current first wife with whom he has 2 children. He took a second wife in 1985; he has no children with her. In terms of education level, he completed standard 3.

His current first wife is from Namwala District. This is her first marriage. She completed Grade 7 level of education. The current second wife who is in her second marriage after her first one ended in a divorce, is from Lusaka Rural District. She has 6 children from her first marriage. She completed Grade I level of education because her parents did not approve of girls education which they (parents) believed turned girls into prostitutes.

Asset Ownership

The assets currently owned by EK and family are: hoes, 2 ploughs, 1 harrow, and household effects. He explained that he used to have cattle and 2 pairs of oxen but they all died from corridor disease (denkete). His first wife explained that she has one cow and one ox which are kept at her father's place. Her third ox was used to pay for her brother's marriage.

Table 3.20. Crop Production Trends

Person/Year	1989/90	1992/93	1993/94	1994/95
Mr. EK	Maize & Cotton	Maize & Cotton	Maize & Cotton	Maize & Cotton
First wife	Groundnuts	Groundnuts	Nil	Nil
Second wife	Groundnuts	Groundnuts	Nil	Nil

Their crop pattern is given in Table 3.20. It was explained that maize and cotton are grown jointly, the wives do not have separate fields except for groundnuts. However, they were both unable to plant groundnuts in 1993/94 and last season due to drought in 1992, which resulted in loss of seed. EK and his wives explained that their volume of production has declined since 1990 due to drought, lack of oxen, and lack of access to inputs. The family now concentrates on growing maize for subsistence

only. Because of lack of oxen, human beings are used to pull the ploughs; in EK words: "Tulalibopa" i.e. we yoke ourselves".

Marketing Trends and Income from Agriculture
The only years this family sold a crop was in 1990, when they sold 10 bales of cotton to LINTCO; and in 1993 when the produced a surplus of 25 bags of maize sold to the cooperatives. In comparative terms, the family reported that the cotton sold in 1990 brought them higher income than the maize sold in 1993.

Perceived Advantages and Disadvantages under the New System
EK and both his wife indicated they see no advantages under the new system. Rather, they see disadvantages identified as follows:

- no one brings inputs (seed and fertilizers) to the nearby depot;
- veterinary workers no longer come to assist farmers; and
- farmers have to transport their own crops to Lusaka for sale, and they cannot sell directly but through middlemen. They end up losing to these middlemen.

Coping Strategies

- Buy local maize variety (which does not need fertilizer).
- To plant for subsistence only.
- To obtain cotton seed and chemicals on credit from LINTCO, for this season with the hope that income from cotton will be used to purchase among other things, oxen.

Access to Resources of Production
EK was allocated about 30 acres of land by the headman for agricultural production. His wives cultivated on his land. In terms of access to credit, he explained that he obtained credit for maize in 1990; and for cotton in 1990, 1992, 1994 and 1995. With regard to access to agricultural extension services, he said (and his wives agreed with him) that he has not seen extension workers since.

Household Food Security
Taking into account years 1990, 1992, and 1994 - the family reported that they had food stored throughout the year in 1990 only. In 1992, they had absolutely no food stored in their granary. In 1994, the food ran out in October. Throughout 1992, the family either bought maize form Nangoma Mission, or worked for relief maize distributed through the same mission.

For the rest of 1994, they bought maize for food. Members also worked for relief maize, while the husband received maize as a member of the local Program Against Malnutrition (PAM) committee.

Other Sources of Income
Apart from sale of crops, the family earns money from the following sources:

- beer brewing (by wives on instructions from husband);
- selling chickens (1st wife); and
- selling mangoes (done by children).

On the question of control of money, this is done by the husband. In terms of disposal of income, money is usually spent on paying for:

- hammermill services (currently K800 per week);
- clothes for family members;
- relish; and
- maize for food and planting.

Labor Input by Gender
Husband and wives work the fields together. They reported to spend longer hours in the cultivation of cotton than maize. They all participate in clearing fields for the next planting season.

Case Study 2: Mr. and Mrs. JH
Both Josea and his wife come from Monze District, Southern Province. They got married in 1977 and have 5 children. In terms of educational background, JH completed Grade 7, his wife completed Form III. They moved to Mwanamungule Village in 1993 after the husband took early retirement from National Import and Export Corporation (NIEC).

Asset Ownership
Currently, the family have 3 cattle, 2 ploughs, 1 harrow, 2 chairs, 5 hoes, 1 sheller, 1 industrial sewing machine, and a hammermill. They also have solar panels and other household effects, including a television set.

Production Trends
They began producing maize in 1993 when they sold 6 bags. In 1994, they sold 10 bags of maize. For 19995/96, they will be planting maize and cotton in order to increase their income and fertility of the soil. They have been buying inputs by cash.

Marketing
The couple reported that they have been selling their maize to individuals buyers who come to their homestead. They feel that the price of maize has remained good because they have sold to buyers offering highest prices.

Advantages/Disadvantages of the New System
The main advantage perceived is the opportunity to negotiate the price of maize. However, the disadvantage is that private buyers cannot buy all the produce at once as the government controlled institutions used to do. Secondly, it is more difficult now for the majority of the people who can not afford to buy inputs and meet transportation costs to purchase the inputs. According to them, distribution through the nearby depot and on credit enabled the majority to obtain seed and fertilizer. However, they themselves are not adversely affected by these changes because they make a lot of money.

Asked how they have taken advantage of the new opportunities, Josea explained that he decided to take early retirement and to invest his retirement benefits into agriculture and a hammermill. The latter, he said , is the biggest income-generating venture. The market for the hammermill extends beyond the village boundary. The hammermill has helped them generate enough money which they have used to buy cattle and inputs.

JH was allocated 20 acres of land for cultivation purposes. However, he and his wife feel this is too small, especially that they now want to buy a tractor. They plan to look for larger land and move out of the village in the future. JH also indicated that he wanted to sink a borehole, but that the area counsellor, through whom he has to go, does not support the idea.

With regard to access to extension and credit/loan services, JH said they have received non since they settled in the village in 1993.

Other Sources of Income
The Hapezas also earn money from rent for a house they own in Lusaka. In 1994, the rental was K60,000 per month paid in advance. This year, it is K80,000 per month paid in advance. All the money earned is controlled by the husband and is used to buy inputs, hire tractor, hire labor, buy oxen, and other family needs.

Gender and Labor Input in Cash Cropping
The couple explained that the husband does not work in the fields, it is the wife who does. She is accompanied by hired labor whom she supervises. She said she does not have to strain herself working in the field; she knocks of at 10.00 am. By contrast, Mr. JH manages the hammermill and helps his older daughter to look after small children. The mother ensures that she cooks "cibwantu" (sweet beer) and samp (boiled maize grains in groundnuts sauce) daily for the children.

Case Study 3: MS. AN
Ms. AN was born in Zimbabwe. She is Karanga by tribe. She came to Zambia with her parents in 1959. They first settled in Chisamba area and later moved to Liteta, Kabwe Rural District. She completed only Grade 2 level of education. AN got married in 1972. She had 11 children but 5 died. Her husband deserted her in 1992 when he went back to Zimbabwe. He has never written to or communicated in other ways with her although he writes to his brother to whose household she is currently attached.

In terms of asset ownership, Agnes said she only has hoes for implements. She also explained that she expects to obtain cattle from her daughter's "lobola" (marriage payments) to be paid soon, to which she is entitled because her husband did not pay "lobola" for their marriage.

Production trends
With regard to crop production trends, Agnes gave the following details.

- 1990: She did not grow anything due to illness and death of one of her children
- 1992: She planted maize and groundnuts. However she harvested only 2 tins of grounds and no maize due to the drought.
- 1994: She planted cotton and maize. She did not harvest any maize, but harvested 3.5 bales of cotton, which she sold to Lonrho and earned K22,000 after repaying her loan obtained from them.

Other Income
Agnes makes dolls for sale. However, she does not make a lot of money. So far, cotton was the crop that earned her highest income. She keeps and control her own money, and uses it to buy basic needs (clothes, salt, sugar, etc.).

Household Food Security
Before 1990, she used to have enough food stored through the year. Since then, food runs out by about January. In 1992 when there was no harvest, she had no food throughout. She has been obtaining maize through purchase with cash (obtained from selling goats).

Access to Resources of Production
With regard to land, she explained that this was allocated to her husband when they moved to this village. However, when the husband left for Zimbabwe the headman withdrew the land from her. Since 1992, she has been "borrowing" land (fields not being cultivated by owners) from her brother-in-law (up to last season) and the headman (for this reason). She said that her brother-in-law took

back his field after she had grown cotton in it thus making it fertile. She is afraid the headman will also take back his field next season since she wants to plant cotton in it. She said she prefers to have her own land where she can practice crop rotation to keep it fertile. When asked if she has approached the headman for her own land, she said she has but he prefers to allocate it through her brother-in-law.

In terms of access to credit, Agnes has never got credit for maize. She got credit from Lonrho in 1994 for cotton. With respect to access to technology, she explained that she gets information through her brother-in-law. Agricultural extension workers have never assisted her.

Labor Input into Cash Cropping
Ms. AN works long hours through out the growing and harvesting time. In the morning she works in the maize field and in the afternoon she works in the cotton field. During the growing season, she works from 6-14 hours, while during harvest time she works from 6 A.M. and stops when it gets too hot, but returns later in the afternoon. Her eldest daughter helps her to cook food for the family and younger children.

Case Study 4: Mr. BSM (Headman)
Mr. BSM, is Lenje by tribe. He is a retired policeman who came to the village in 1987. His household consists of 11 members, including himself and his wife. They currently have twins who were very sick (looked severely malnourished) at the time of research and had to be taken to Nangoma Mission Health Centre with financial and transportation assistance from the Research Team).

Asset Ownership

- Hand hoes;
- 1 cultivator;
- Goats; and
- Chickens.

Crop Production Trends

- 1990: maize, cotton, pumpkins;
- 1992: maize (drought);
- 1994: maize, cotton; and
- 1995: maize, cotton, pumpkins.

Crop Sales
The only year the family sold maize (6 bags) locally was in 1990. With regard to cotton, the family sold 13 bales to LINTCO (1990), 4 bales to LINTCO (1992), and 11 bales to Lonrho (1994). Thus, the family has earned most of their income from cotton production for which they planted 5 acres in 1990, 2.5 acres in 1992, and 5 acres in 1994. In 1995/96, they plan to plant 7 acres of cotton because, Mr. Mungule explained, the market is readily available and it is more profitable than maize.

Household Food Security
In 1990, the family had food stored throughout the year. In 1992, they had no food in their granary. In 1994, they had food for only part of the year. In order to obtain food during "hunger" periods, they have had to sell chickens and goats for cash which is then used to buy maize. They have also used money earned from cotton sales to buy maize for consumption.

Access to Resources of Production
With regard to access to credit, Mr. Mungule explained that he has tried to obtain credit 3 times before but has not been successful due to his lack of collateral (farm implements). In terms of land, he

said he has plenty of it. On the question of access to technology, he explained that while agricultural extension workers sometimes come to hold meetings, veterinary workers do not come.

Opportunities and Constraints
Mr. Mungule indicated he only sees constraints under the new system e.g.

- lack of reliable market
- exploitation of farmers by private buyers
- having to sell through middle men at Soweto and
- thus losing opportunity to realize profit.

It should be pointed out here that Mr. Mungule does not produce surplus maize (which farmers sell at Soweto) to be in a position to say exactly how all this has affected his family's welfare. Our observation is that he has serious problems of organizing and managing food resources for his family. The whole family looked unhealthy, including himself.

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