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RURAL FOOD SECURITY IN ZAMBIA

By

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ABSTRACT

RURAL FOOD SECURITY IN ZAMBIA

By

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The purpose of this study was to provide a better understanding of food security problems in Zambia from a rural household perspective. The study specifically addresses itself to how households meet target consumption levels on a yearly basis in the face of fluctuating production, prices and household incomes. The dissertation includes a descriptive analysis of the food grain production and distribution system in Zambia, followed by an investigation of rural households' food production and disposal behavior, including the utilization of on-farm storage facilities.

The data used in the analysis were collected by the author from both primary and secondary sources. Primary data were collected from a sample of 132 rural households in Mumbwa District, between July and November 1985. Secondary data were collected from published and unpublished reports from a number of government departments, parastatal organizations and international agencies.

Maize is the major food grain produced in Zambia and is also the main staple food commodity. Besides being the most important food item among the rural households, it is also the main source of income. Over 60 percent of the maize produced is used for home consumption, the rest is sold to the monopsonistic grain marketing board or cooperative unions that operate in each Zambian province. The government policy of

pan-territorial and pan-seasonal pricing has made it unprofitable to store food crops on farms and has encouraged farmers to sell the grain following the harvest. This has made rural food deficit households more vulnerable to food insecurity.

The public sector grain marketing system operates to move grain from rural areas to urban centers but have largely neglected the back-flow of grain. Grain deficit households in rural areas mainly depend on other rural households for supplemental food supplies.

The investigations also revealed that households undertake various actions to guard against poor food harvests. These include storing more grain than what is required in a single season, undertaking other agricultural activities that can raise income, such as growing vegetables and other cash crops, practicing mixed cropping or selling animals, beer and fish. Beer selling was particularly common among the low income households.

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ABBREVIATIONS AND MEASUREMENTS

BZ	=	Bank of Zambia
CSB	=	Cold Storage Board
CSO	=	Central Statistical Office
GDP	=	Gross Domestic Product
GNP	=	Gross National Product
IBRD	=	International Bank for Reconstruction and Development
LINTCO	=	Lint Company of Zambia
GMB	=	Grain Marketing Board
RMR	=	Rural Marketing Board
MAWD	=	Ministry of Agriculture and Water Development
NAMBOARD	=	National Agricultural Marketing board
NMC	=	National Milling Corporation]
CPCMU	=	Central Province Cooperative Marketing Union
IFAD	=	International Fund for Agricultural Development
ILO	=	International Labor Organization
WB	=	World Bank
NIEO	=	New International Ecoonomic Order
ZADL	=	Zambia Agricultural Development Limited
INDECO	=	Industrial Development Corporation
CH	=	Contract Hanlage
K	=	Zambian Kwacha (currency unit)
UNDP	=	United Nations Development Program

Weights and Measures

1 meter (m) = 3.3 feet

1 kilometer (km) = 0.62 miles

1 square kilometer (km^2) = 0.39 square miles

1 kilogram (kg) = 2.2 pounds (lb)

1 metric ton (ton) = 100 kg = 2,204 lb

1 hectare (ha) = 2.47 acres

CHAPTER 1

INTRODUCTION

Food Security in Developing Countries

As the extensive literature on the subject attests, world hunger still remains as one of the serious problems of our time. About a quarter of the world's population -- that is, more than 800 million people living mostly in the Indian subcontinent, Southeast Asia, Africa south of the Sahara, Middle East and in parts of Latin American, are afflicted by hunger and malnutrition (Chisholm and Tyers, 1982). Studies on food production and population trends reveal that mankind will continue to struggle to feed itself. Pervasive poverty and consequent low effective demand for food are the primary causes of the widespread hunger and nutritional deficiencies.

In Africa, the food situation is serious, even precarious, despite the current world food surpluses. Within less than a decade, Africa could be facing another severe food crisis (Lele, 1984). According to a recent World Bank report (1984), one in every five Africans is wasting away through hunger and malnutrition. The report further points out that half the children under the age of five in countries like Tanzania, Sudan, and Burundi are malnourished, which means that, even if they survive, they are likely to be physically and

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mentally impaired for life. United Nations (1984) studies estimate that more than 35 million people in the drought-ravaged parts of Africa are desperately in need of food. Consequently, many food analysts have warned that the continent will suffer a "nightmare" of famine and economic collapse, at least for the rest of the century, unless urgent action is taken.

The irony of the current food situation in Africa is that, prior to the early 1970s, several countries in Africa were net exporters of most basic food commodities. But, going into the 1980s and the third decade of their independence, domestic food production in most of these countries has fallen behind population growth rates. A USDA report (1981), points out that Africa south of the Sahara was the only region in the world where per capita food production declined over the past two decades. Although data, particulary for subsistence production, is too poor to permit precise estimates, production (which during the 1960s grew at 2.3 percent per year) registered only 1.3 percent annual growth in the 1980s, -- less than half the rate of growth of population during the same period. As a result, per capita food production, which fell by 7 percent during the 1960s, declined by 15 percent in the 1970s (World Bank, 1981). Table 1.1 presents comparative growth rates of food and non-food products for selected African countries to illustrate these trends.

Because Africa has lost the ability to feed itself (as shown by comparative food self-sufficiency ratios in selected sub-Saharan countries in Table 1.2), food imports have become essential to meet production shortfalls. For example, it is estimated that food imports

Table 1.1

Comparative Growth of Agriculture in Selected African Counties

Country	Average Annual Growth Rate of Volume of Production			Average Annual Growth Rate of Total Production per Capita		
	1969-71 to 1977-79			1969-71 to 1977-79		
	Food	Non-Food	Total	Food	Non-Food	Total
Zambia	3.0	0.9	2.8	0.0	-3.9	-0.2
Tanzania	1.9	-0.5	1.4	-1.5	-3.9	-2.0
Uganda	1.7	-8.3	-0.5	-1.3	-11.3	-3.5
Botswana	1.1	2.0	1.1	-1.1	-0.2	-1.1
Kenya	2.9	7.5	4.0	-0.5	4.1	0.6
Malawi	3.1	8.6	4.0	0.3	5.8	1.2
Zimbabwe	2.6	3.8	2.9	-0.7	0.5	-0.4
Swaziland	3.7	14.6	4.6	1.2	12.1	2.1
Lesotho	2.4	-7.0	1.4	0.1	-9.3	-0.9

Source:World Bank, _Accelerated Development in Sub-Saharan Africa_, 1981.

While per capita food production has declined in many African countries, population growth rates have, in contrast, increased. Eicher (1984) contends that Africa's population will likely double within the next 20-25 years, should the estimated 3 percent plus annual population growth rate be sustained.

Because Africa has lost the ability to feed itself (as shown by comparative food self-sufficiency ratios in selected sub-Saharan countries in Table 1.2), food imports have become essential to meet production shortfalls. For example, it is estimated that food imports

doubled between 1975 and 1980 to about 24 million tons in the latter year. This resulted in the continent's cereal imports increasing tenfold during the 1970s, reaching $5.6 billion in 1981 (World Bank, 1981).

Table 1.2

Food Self-Sufficiency Ratios in Selected Sub-Saharan Countries

(Average Percentages)

Country	1964-66	1979-80	% change
Zambia	97	79	-16
Tanzania	96	93	- 3
Uganda	98	99	1
Botswana	25	37	12
Kenya	97	96	- 1
Malawi	101	97	- 4
Zimbabwe	96	113	17
Swaziland	86	85	- 1
Lesotho	93	77	-16

Self-Sufficiency = Production of Cereals
                   ─────────────────────────────────────
                   Production & Imports - Exports of Cereals

Source: Adapted from the World Bank, Zambia Policy Options and Strategies for Agricultural Growth, (Report No. 4764-ZA), (1984).

The World Bank's Agenda for Action, estimates that in the past decade food imports in the sub-Saharan countries grew more than three times as

fast as the population, not accounting for the substantial food aid. What is of concern is not so much the volume of the food imports, but their costs which have become large in relation to the export earning capacities of these countries.

To deal with the problem, most African countries are undertaking broad efforts to improve their food situation. These efforts are based on the recognition that the rate of investment in physical and human capital must be increased in order to raise their agricultural and industrial productivity. Hence, increased food production and attainment of <u>food security</u> have become central policy goals for economic development. The ultimate (long-term) objective is to achieve a satisfactory degree of self-sufficiency in the production of major staple food commodities by replacing imports with local production.

The Concept of Food Security

The concept of food security became widely used during the world food crisis of the middle-early 1970s, when a confluence of droughts and high food prices caused widespread hunger and human misery. Caldwell, 1975, for example, estimated that the drought that plagued the Sahelian countries in West Africa during the 1968-74 period reduced total food production by a third or more and was directly responsible for the deaths of up to 100,000 people.

Responding to the crisis, the United Nations convened the World Food Conference in Rome in 1974. The major concern of the delegates at the conference was how to abate the threat of mass starvation in many low-income Asian and African countries, which had become a distinct

possibility (Eicher, 1984). Debates at the conference centered around the concept of food security. Since that time, the concept of food security has gained wide usage in the development literature.

The concept of food security and the means of its attainment have many interpretations. For instance, at the World Food Conference, attainment of food security referred to the assurance of adequate food supplies. In recent years, however, the concept of food security has acquired a broader meaning. The broadest definition of food security, which constitutes the various elements discussed in the literature, is summarized as the ability of a country, regions, or households to meet target consumption levels on a yearly basis in the face of fluctuating production, prices and incomes (Siamwalla and Valdes, 1984, Reutlinger, 1984 and Chisholm and Tyers, 1982).

According to this definition, the meaning of food security has been broadened in the sense that it also stresses the need to maintain consumption of essential foods at acceptable levels by all population sectors (Roumasset, 1982). Thus, the current meaning of food security incorporates both supply and demand. In addition, this definition helps to classify sources of food insecurity according to whether they affect the price, the household's production, or the household's income (Chisholm and Tyers, 1982).

In all, the literature discusses the following sources of food insecurity:

1. **Village or household level**

    - ability to grow food constrained by technical exigencies
      such as unfavorable climatic conditions, disease and
      insect attacks, etc.;
    - inadequate rural income and inability to purchase food;
      and
    - inadequate market and transport systems to move food
      from surplus to deficit areas within the country.

2. **National Level**

    - population growth outstripping production increases;
    - inequities of supply-distribution between urban and
      rural areas;
    - inadequacy of distribution facilities;
    - development priorities do not include food production
      and distribution;
    - fluctuations in food import bill due to production
      fluctuations;
    - international debt and balance of payment problems;
    - national budget deficits; and
    - reliance on food aid and creating tastes for imported
      grains.

3. **International level**

    - imbalance of food production (e.g. domination of North
      America and Australia in wheat exports);

- lack of commodity or effective fora for price stability
(e.g. the collapse of the Wheat Agreement talks in 1979);

- lack of coordination of national and international stocks for world grain stabilization;`

- lack of financial assistance to ameliorate/fluctuating import bills;

- and trade barriers.

It can be seen from the lists of variables presented above that food security issues are a function of, and depend upon, the general level of development of a country at all levels.

A number of approaches have been suggested to cope with food security problems in developing countries. In the long-run, the goal of achieving food security can be attained by developing agricultural and industrial productivity. Improved productivity should increase food production and lead to widespread increases in incomes, particularly among the poor. Higher incomes will have to come primarily from increased productivity and profitability of agriculture, from the development of industry, from employment in construction and public works and from the generation of the diverse services that will be in demand as rural areas become prosperous.

In the short-run, food security can be attained through managing food supplies, including imports and food aid. The major approaches that are often mentioned to alleviate short-term food security problems at the national level include: 1) stockpiling of food grains at

national and international levels; 2) financial food facilities; 3) food aid; 4) improving trade policies, and 5) intervention in the capital market and the pricing and distribution of food for vulnerable groups.

Food Security in Zambia

With a land area of 752,614 square kilometers, the Republic of Zambia has an estimated population of 6.2 million people (WB, 1984). Table 1.3 presents the population distribution by provinces for the period 1963-1980. Once almost a rural society, Zambia is now one of the most urbanized countries in black Africa. About 43 percent of the people live in a highly industrialized and well developed agricultural zone which lies in the central region of the country and along the railway line (Livingston-Lusaka-Ndola). The remaining 57 percent of the people reside in thinly populated rural areas (estimated at 2 persons per square kilometer scattered about all over the country (see Figure 1.1).

Table 1.3

Zambia – Population by Province, 1963, 1969, 1980 and
Inter-Censal Growth Rate

Province	1963 Census	1969 Census	1980 Census	Average 1963-69	Annual Growth 1969-80
Central	309,407	358,655	513,835	2.5	3.3
Copperbelt	543,465	816,309	1,248,888	7.0	3.9
Lusaka	195,755	353,975	693,878	1.4	6.3
Luapula	357,018	355,584	412,798	-1.0	1.9
Northern	563,995	545,096	677,894	-0.6	2.0
Northwestern	211,189	231,733	301,677	1.6	2.4
Eastern	479,866	509,515	656,381	1.0	2.3
Western	362,480	410,087	487,988	2.1	1.6
Southern	466,327	496,041	686,469	1.0	3.0
Total Zambia	3,489,504	4,056,995	5,679,808	2.5	3.1

Source: Central Statistical Office (COS) Monthly Digest, 1982.

Because of the demographic characteristics and the duality in the economic structure, the social structure is highly stratified into the relatively urban rich and rural poor. Urban areas are characterized by a notable spatial concentration of wealth, which yields a standard of living that is prosperous even by world standards (IFAD, 1982).

On the other hand, rural areas are economically depressed and receive meager social-class welfare facilities. Rural Zambians generally are dependent on government and, for most of them, the source of livelihood is the production of food or other crops or husbandry of livestock, and adapted to local soils and climatic conditions. In most cases, the productivity of these crops and animals is abysmally low. The few economic policies appear to have gained prosperity derived from the production and marketing of the agricultural products [...] relatively poorer than they were in the 60s and [...] About [...] of the rural households [...] the official wages so that malnutrition and [...] is [...] a fearful and present reality" (Gran, 1979). [...] estimates for traditional [...] suggest that cash earnings [...] about half the [...] Annual Cash [...] of farm workers. Such income differentials, cause traditional farmers [...] to become farm workers, and [...] other farm workers [...] seek wage work in urban areas. Therefore, the demographic composition of the periphery [...] markedly different from that of the modern industrial and commercial sector, because of sustained out-migration (ILO, Vol. 1 pp. 12). In rural provinces such as Northern, Northwestern, and Western, for example, there is a high proportion of

FIGURE 1.1 ADMINISTRATIVE DIVISIONS

LINE OF RAIL ZONE (REGIONS)
DISTRIBUTION OF URBAN CENTRES
Population
250,000
100,000
25,000
5,000

SOURCE: Zambia Policy Options and Strategies for Agricultural Growth, (Report No. 4764 ZA)
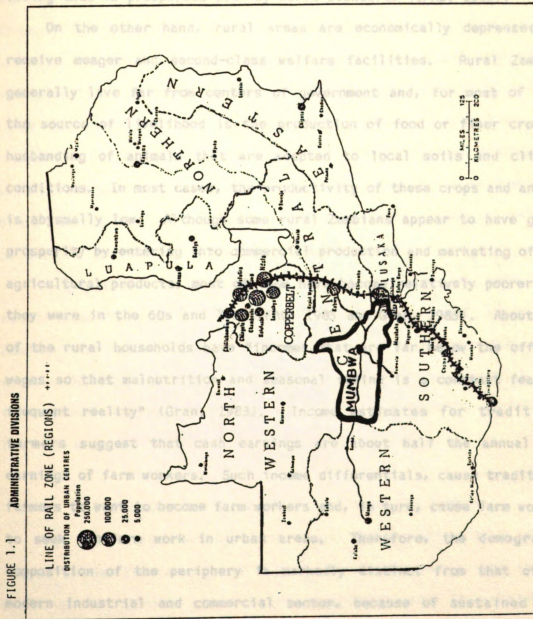
Because of the demographic characteristics and the duality in the economic structure, the social structure is highly stratified into the relatively urban rich and rural poor. Urban areas are characterized by a notable spatial concentration of wealth, which yields a standard of living that is prosperous even by world standards (IFAD, 1983).

On the other hand, rural areas are economically depressed and receive meager and second-class welfare facilities. Rural Zambians generally live far from centers of government and, for most of them, the source of livelihood is the production of food or fiber crops or husbanding of animals that are adapted to local soils and climatic conditions. In most cases, the productivity of these crops and animals is abysmally low. Although some rural Zambians appear to have gained prosperity by entering into commercial production and marketing of some agricultural products, most of them have become relatively poorer than they were in the 60s and 70s (IFAD, 1983 and Gran, 1983). About half of the rural households have "incomes that are far below the official wages so that malnutrition and seasonal famine is a constant fear and frequent reality" (Gran, 1983). Income estimates for traditional farmers suggest that cash earnings are about half the annual cash earnings of farm workers. Such income differentials, cause traditional farmers to want to become farm workers and, in turn, cause farm workers to seek non-farm work in urban areas. Therefore, the demographic composition of the periphery is markedly distinct from that of the modern industrial and commercial sector, because of sustained out-migration (ILO, Vol. 1 pp. 12). In rural provinces such as Northern, Northwestern, and Western, for example, there is a high proportion of

households that are headed by females due to migration of males to urban areas.

The Zambian economy is predominantly export oriented, with copper and other metals (zinc, lead and cobalt) earning about 95 percent of the nation's foreign exchange. Fluctuations on the world metal markets strongly influence the economy. Today, Zambia is facing financial and economic difficulties. These difficulties started in 1975 when copper prices declined sharply. By 1984, copper prices were almost 60 percent lower than they were in 1974. Zambia's economic difficulties were exacerbated by long liberation wars in southern Africa, rising oil prices, failure by the international community to agree on practical steps towards the New International Economic Order (NIEO), as well as by the poor performance of its agricultural sector.

In an attempt to revitalize the sagging economy and reduce the socio-economic disparities between the urban and rural areas, the Zambian Government has tried to restructure the economy away from mineral dependence. Agriculture was recognized as an essential base for national economic restructuring. Since the mid-1970s, agriculture has been accorded "priority of priorities".

Performance of the Agricultural Sector in Zambia

The recognition that Agriculture must replace mining as a leading sector of the Zambian economy has led the Government to take various measures to improve agricultural policies and institutional performance. However, despite the steps that have been taken and the high priority that it has been accorded, the performance of the

agricultural sector is still far below its potential. For example, agriculture only accounts for about 12 to 15 percent of the gross domestic product (GDP) (see Table 1.4).

Table 1.4

Sectoral Shares in Gross Domestic Product

(Percent of GDP, period averages)

Sector	1970-74	1975-79	1980-82	1983
Agriculture	12	15	14	14
Mining	30	15	14	15
Other Industries	21	25	24	23
Services	37	45	48	48
GDP, Market Prices	100	100	100	100

Source: CSO, Monthly Digest of Statistics (1983)

Estimates by the World Bank (1984) indicate that real overall growth in agriculture averaged 2.8 percent per annum during 1970-78, which although high by east African countries' standards, was below potential. Much of the registered growth came from the commercial sub-sector which was responding to improved price and tax incentives introduced by the Government. Growth in the traditional sub-sector was virtually stagnant, about 0.4 percent per year over the same period (see Table 1.5). Since 1979, however, the situation deteriorated, due to poor rains (1979 to 1982).

Table 1.5

Growth of Agriculture Production in Zambia

(percent per annum)

	1970-78	1978-83
Food	3.0	NA
Non-Food	0.9	NA
Subsistence	1.7	-0.8
Commercial	4.8	2.4
Total Production	2.8	0.4

NA = Not Available

Source: World Bank, Accelerated Development in Sub-Saharan Africa, 1981.

Faced with the deteriorating food situation (see Table 2.2) under conditions of rapid population growth (estimated at 3.0 percent per year IFAD, 1983), Zambia is faced with the challenge of how to provide adequate and reliable food supplies to all sectors of the population. Consequently, attainment of self-sufficiency in food production has become a clearly enunciated and major policy goal of the Zambian Government (World Bank, 1984).

Zambia has two major geographical disadvantages. First, the country is land locked with a long distance (1,500 to 2,000 km) of communication lines to the coast. Second, there is a large internal regional imbalance between a well developed industrial and agricultural zone which lies in the central region of the country and along the railway line, and the periphery north and south of the central region.

Like in many other African countries, the Zambian Government has linked the goal of achieving food security to the goal of food self-sufficiency. The ultimate objective, is to be self-sufficient in the production of major food crops, such as maize and wheat, so that incremental food demand can be met by domestic production. The belief that food self-sufficiency can improve Zambia's food security is based on the argument that Zambia, with its enormous agricultural potential (physical resources base), is susceptible to fluctuations in international trade and that susceptibility can be reduced by decreasing food imports (IFAD, 1983).

In an attempt to attain food security, a variety of programs were adopted by the Government. However, most of these programs have had limited impacts on achieving the intended objective.

For urban Zambians, who are well linked to the food distribution system, fluctuations in food prices have been the major source of food insecurity. Nevertheless, fluctuations in food supplies have been reduced by various government food policy actions. As an example, almost all domestic or national food reserves are located in urban centers, thus assuring availability of supplies to urban population. Furthermore, the fixing of prices on controlled food stuffs such as maize, and the allocation of government subsidies for food security purposes, have been based on "fairness to the consumer" and "political acceptability" considerations. For these reasons, it can be argued that food security policies in Zambia have been framed in terms of meeting urban food demand.

For rural Zambians, who live in relatively isolated communities, the food insecurity problem has an additional dimension. Generally, each family or household has to produce its present food requirements plus an additional quantity of food and other agricultural products to provide cash to meet other family needs. A reduction in food supply (availability), for example, may cause some families to have little to eat, and even lead to widespread human suffering. Such short-falls in food availability are usually accompanied by reductions in family incomes. The problem is even greater for non-farm rural households. Fluctuations in farm output affect their employment or sales opportunities, which in turn, affect their incomes.

Despite the importance of food security in Zambia, very few relevant empirical studies have been conducted on the subject. The few studies that have been done have concentrated mainly on analyzing aggregate, national data. Worse still, their published results are not easily accessible to those who need them or can use them. Village or household food security studies have largely been ignored.

Although macro-level data analysis may be useful, in a country like Zambia, it does not always provide sufficient information on which to base more efficient national food security policies.

The need for micro-level studies in Zambia arises for two main reasons: First, the dualistic agricultural sector consisting of a relatively small, but well developed, large-scale commercial sub-sector and a much larger traditional subsistence sub-sector, means that only the commercial sub-sector is well linked to the market economy. Linkages of the traditional sub-sector to the market economy are

limited and even where they exist they are weak. Hence, it is important to know how rural households manage their food supplies between harvests.

Second, lack of rural food-handling infrastructure means that food surpluses produced in these areas have to be moved to urban centers where they can be processed and stored. The irony of this situation is that, when there are food shortages in rural areas, there are no distributional facilities where food from national food reserves located in urban areas can be moved into. Consequently, it has been argued that there are always pockets of food shortages in rural areas-- even in good crop years.

Focus of this Study

Food security problems in Zambia can be analyzed within two time frames. First, there is the chronic problem of persistent malnutrition caused by low productive capacity and secular problems of abject poverty. This is a long term problem that can only be overcome by improving agricultural and industrial productivity through an improved technological base and widespread increases in family incomes.

Second, and the main focus of this study, is the short-term (transitory) problem of variability of entitlement of consumers to food. Food insecurity of this nature stems from temporary fluctuations in real income of the consumer, which in turn, affects the ability of these people to purchase food.

In view of the fact that most studies that have been conducted on this subject have concentrated on analyzing aggregate, national data,

this study attempts to evaluate socio-economic parameters associated with food security from a rural household and rural community perspective.

Because of the distributional constraints in rural areas, rural food security is largely a question of food self-sufficiency. Therefore, this study concentrates on examining strategies and mechanisms that are used or could be used to "insulate" (protect) households from short-term food security problems. An additional focus is to investigate the nature and the extent of the marketing system's involvement in rural food security concerns.

Significance of the Study

In Zambia, to ensure access to a sufficient and continuous food supply to all sectors of the population involves more than just expanding food production. It also involves increasing family incomes, particularly among the poor, as well as developing a well coordinated food distribution system that can channel excess production from the producer to the final consumer at the right time, place, and form.

For rural Zambians, who are more exposed to high food prices and to low food entitlement, attainment of food security even goes beyond self-sufficiency in food production and increasing family incomes, it also entails managing stocks between harvests.

If research is to contribute to the understanding of food security problems in Zambia and even other African countries with similar problems, it must do more than just analyzing aggregate, national level data. It should also investigate problems at village or household

levels. It is only when one has a better understanding of the problem from both the micro and macro perspective that one can suggest solutions.

Simple observations and enquiries suggest that food crop supply in Zambia is no longer secure despite the increase in imports. This could be attributed to constraints originating from the following: (a) high rate of rural to urban migration, (b) shortage of foreign exchange, (c) structural deficiencies of food storage facilities, and (d) transport bottlenecks for the marketed produce. Lack of food handling infrastructure, for example, means that food surpluses produced in the periphery have to be moved to urban centers where they can be processed and stored. As a result, much of the value added is lost to the periphery and there are always pockets of food shortages in rural areas even in good crop years. Although food deficit areas are known to exist, their location is not known and the extent of the shortfalls can only be guessed at best. Knowledge of deficit areas and the extent of the shortages is particulary important to planners and policy makers because it can enable them determine the exact quantities of food to be delivered to the affected areas. Furthermore, such information can help policy makers formulate better and more efficient food security policies, as well as determine types of food handling infrastructure required in these areas.

The need to study food security at the village or household level in Zambia is important for two more reasons. First, the study comes at a time when the Zambian Government is in the process of embarking on an ambitious program of building large-scale strategic food grain

reserves. Since food security systems based on public food distribution have inadequately solved problems of rural households in the past, there is even greater need to search for more appropriate approaches to cope with village-level food insecurity problems. Second, the need to investigate rural food security is not only strengthened by the fact that famines are a rural phenomenon, but because food insecurity is also a rural phenomenon. In a country where more than 50 percent of the people still live in rural areas, and where a large section of the rural dwellers are still dependent on agriculture for their livelihood, it almost becomes morally imperative to analyze the nature and the extent of the problem.

Study Objectives

As already indicated, rural food security in Zambia is not only a matter of lack of income to purchase food, it is also a matter of a general shortfall in food supply. Therefore, for any food security study to be realistic, it should consider both income effects of food policies as well as supply effects.

A number of constraints directly limit attainment of food security at the village or household level in Zambia. A single study cannot effectively investigate all constraints at the same time. The overall objective of this study is to provide a better understanding of food security problems from a rural household and village perspective.

This study is exploratory in nature and had the following specific objectives:

(1) To describe the food grain production and distribution system in Zambia.

(2) To examine the impacts of the grain distribution system on rural food security.

(3) To identify and describe the characteristics of the rural households in the study area and the specific problems they face in their efforts to attain secure food supplies.

(4) To examine on-farm food storage practices and their impact on household food security.

(5) To provide suggestions for further research and policy recommendations for improving rural household food security.

Research Procedure

As already pointed out, the general objective of this study was to increase the understanding of the rural food security problems in Zambia. This overall objective was accomplished through studying the food production and distribution system in Zambia, rural households' food production and disposal behavior, farmers' utilization of on-farm storage facilities and other social economic characteristics of households that affect their food security. The field survey draws on both primary and secondary data that bear recognizable relationship to the study objectives.

Information used for the first two study objectives were obtained from published and unpublished government, private and international agencies' reports.

Information used to accomplish objectives 3 and 4 were obtained from a sample of rural households selected for the study. The following were the specific objectives of the field survey:

1. To obtain information on important social economic characteristics of the households surveyed. It was hoped that this type of information would provide insights of the important variables that influence rural households' food security.

2. To obtain information on food production levels and identify food deficit or surplus zones within the study area.

3. To gather information on households' food disposal patterns to help in the understanding of how households manage food supplies between harvests.

4. To collect information that could help identify strategies and mechanisms that rural households use to translate fluctuating prices and incomes into a "smooth" consumption stream. Stated in another way, an attempt was made to identify methods that rural households use to meet food consumption targets in the face of fluctuating prices and

incomes. The assumption is that any strategy that can minimize these fluctuations has the potential for preserving household security and, as such, is worth investigating. Information obtained could be incorporated in formulating national food security policies.

5. To collect information on farmers' utilization of on-farm storage. Food storage is perhaps one of the most direct mechanisms used in managing food supplies among rural households. In Zambia, the main role of on-farm storage is to overcome the problem of seasonality by smoothing out food supply between one harvest and the next (Adams and Harman, 1977). To the extent that losses occur, this flow is disrupted. It is important to understand the role of small on-farm storage facilities versus the more centralized national food storage facilities for two main reasons. First, the food produced in rural areas is sold to the parastatal marketing organizations that move it to urban areas where it is stored. This is mainly due to lack of storage and processing facilities in rural areas. However, the processed maize is rarely returned to the periphery. For this reason, rural households have to store their own food supplies. Second, the majority of the rural households consume much of what they produce. During bad crop years, not only do they not have enough to consume from their own production, but may also not have the income to buy the food.

Therefore, if on-farm storage facilities are utilized, then deficit households can be able to obtain supplies from neighbors.

For whatever reasons -- be they buffer stock management, price controls or urban food security, the Zambian Government seems to be directing efforts towards establishing large grain storage facilities. Such schemes may not benefit rural people. As Lele and Candler (1984) have observed, "rural food security in East Africa can only be achieved through increased research on production of drought-resistant crops, such as sorghum, millet and cassava; improving communication networks; produce marketing and an effective farm household storage".

Selection of the Study Area

A number of factors were considered in selecting the location of the study area. They included: (1) the geographic location of the area; (2) the physical characteristics of the area; (3) food grain production and production potential; and (4) the transportation infrastructure. Each is discussed briefly below.

Geographic Location

Because the overall objective of this study was to examine food security at the rural household or village level, it was important to conduct the field research in area that is outside the railway line

zone. As discussed in Chapters 2 and 3, the areas along the railway line are well served with a market infrastructure that food can easily be moved from one place to another.

Because of sporadic shortages of fuel in the country at the time of the field survey, it was decided that the research be conducted in a district not far from Lusaka (the capital city) where fuel supplies were better than in most other areas in the country. Furthermore, we wanted to conduct the research in a district that has linkages with the developed zone. This was considered to be important to this study because it could help in the examination of the back-flow of grains to rural areas.

Physical Characteristics of the Area

The climatic and soil conditions of an area are the main determinants of the physical environment and the land use potential. It was therefore, considered to be important to select a study area which has the physical potential to increase its food production which, in turn, can reduce food insecurity of the local residents.

Food Grain Production and Production Potential

Maize is the main staple food item among the rural people in Zambia. Consequently, for rural food security analysis to be realistic, production, distribution and/or consumption of maize should always be taken into consideration. Therefore, only maize producing districts were considered in this study.

Internal Transport Infrastructure

The internal transport infrastructure in Zambia is relatively well developed by the African standards. According to a recent World Bank report, the transport network includes more than 35,000 kilometers of roads of various standards; about 3,000 kilometers of railways; 120 airfields of various types; and a few inland navigation facilities. To facilitate the research process, we were looking for a rural area which could easily be accessible.

Organization of the Study

This study is organized into six chapters. Chapters 2 and 3 provide a description of the production and distribution system of food grains in Zambia. Chapter 3 also describes the linkages that exists between the producer and the consumer (urban-rural, and rural-rural linkages).

Chapter 4, discusses the different aspects of the research procedure that were followed during the field work. In particular, the chapter discusses the physical characteristics of the study area, the study design, the organization of the field research, the drawing of the sample and types of data collected.

Chapter 5, utilizes the information obtained during the survey and analyzes food grain production and disposal behavior of households in the study villages. It also attempts to identify the various strategies households use to ensure a sufficient and continuous food supply between harvests.

Chapter 6 reviews and summarizes the major findings of the study and provides policy recommendations for improving rural food security. Furthermore, future research needs are suggested in this chapter.

FARM LEVEL FOOD GRAIN PRODUCTION IN ZAMBIA

To be able to have a clear understanding of the strengths and weaknesses of the food production and distribution system in Zambia requires a review of the colonial as well as the present development of the economy. The historical review of the Zambian economy presented here will not be exhaustive, but should provide the reader with insights into the important characteristics of the economy that influenced the formation of the present structure of the food production system.

Review of the Development of the Agricultural Sector

When Zambia attained its independence, it inherited an economic structure that comes close to a typical model of acute dualism (MS, 1984; IFAD, 1985; Kinsey, 1978; Dodge, 1977 and Baldwin, 1976). Under acute dualism, an economy is characterized by the existence of two sectors -- namely, the "growth" sector and the "backward" sector (de Janvry, 1982). The growth sector focuses on a narrow, geographic region and caters to a specific socio-economic group. Development in this sector is generated by industrial and commercial investment and consumer demand of the socio-economic group it encompasses.

CHAPTER 2

FARM LEVEL FOOD GRAIN PRODUCTION IN ZAMBIA

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On the other hand, the backward sector exists in virtual economic isolation from the growth sector. Except for occasional marketable surpluses that move into the monetized sector of the economy, the backward sector has no economic linkages with the growth sector (de Janvry, 1982 and Yotopoulos and Nugent, 1976). In the section that follows, a brief account of how the present structure of the agricultural sector in Zambia developed is presented.

The Colonial Period

The development of the present structure of the Zambian agricultural sector, can be traced back to the colonial period. The discussion that follows draws heavily from Doris Dodge's account of the agricultural policy and performance in Zambia (Dodge, 1977).

The colonial period began in 1890 when trading companies began moving into the territory from the south and east, and lasted until October 24, 1964 when the colonial government handed over the responsibilities of governing the territory to an African government. As we shall see, it was during this period that the present dualistic structure of the food production and distribution system developed.

During the early- and mid-1900s, mineral deposits (zinc, lead and copper) were discovered in Kabwe and in an area known in Zambia as the "Copperbelt" (see Figure 1.1). The discovery of these mineral deposits subsequently led to the development of mines in these areas. It was the development of the mines that had far-reaching impacts on the present structure of the economy and the food system.

The development of the mines led to two other major developments in the Zambian economy. First, it spurred the construction of a railway line that connected the southern, central, and northern parts of the country (Kinsey, 1978). The railway line (hereafter referred to as the line-of-rail), was built mainly to transport the mineral ore to coastal ports, in route to western industrial markets.

Second, the development of the mining industry led to a proliferation of urban centers in the Copperbelt and along the line-of-rail (see Figure 1.1). As a recent report by the International Fund for Agricultural Development (IFAD) put it, "Zambia which less than a century ago was covered by forests, is now a country full of cities of 100,000 or more people, and these cities contain more than 40 percent of the country's population." Associated with the growth of towns, was the rapid growth of an urbanized wage labor force. The urbanized wage earning labor force in turn, created the expansion of market demand for agricultural commodities (Kinsey, 1977 and Baldwin, 1976).

In order to provide the mine workers with adequate, low cost food requirements, both the colonial government and mining companies, encouraged the establishment of large-scale farms in the areas along the line-of-rail. Both the government and mining companies felt that the function of providing mine workers with reliable and low cost food requirements could best be fulfilled by encouraging immigration of European farmers and establishing commercial agriculture in the areas along the line-of-rail (Dodge, 1977).

As Bates (1976) points out, the development of large scale farms in the areas along the railway line was not accidental. He argues that

it was orchestrated by the colonial government and mining companies, who recognized that agricultural production could most profitably be undertaken only in the areas along the line-of-rail, and that Africans in the territory used primitive techniques to produce their subsistence requirements and, as such, showed little promise of being able to provide sufficient surplus to meet the newly expanded market demand. Therefore, the primary objective of the colonial government was to reserve commercial agriculture primarily for white settlers along the line-of-rail. At the same time, the primary objective of the colonial government towards African agriculture was one of maintaining the status quo (Dodge, 1977).

To promote commercial agriculture and to encourage permanent white settlement in the areas along the line-of-rail, the colonial government adopted a number of policy measures. For example, in the late 1920s, "native reserves" were set up in areas along the line-of-rail where there was a problem of Europeans and Africans wanting to use the same land. The land adjacent to the line-of-rail was retained exclusively for European use and the free-hold land tenure system was introduced in these white occupied areas. Under free-hold tenurial arrangements, the government provided security for commercial agricultural investment and assured markets for agricultural inputs and output. On the other hand, in the area outside the European occupied zone (known as the traditional periphery), traditional or customary land tenure systems were left intact.

Land tenure arrangements are important to agricultural development for three main reasons. They determine: (a) people's access to land

as a resource, and hence, their income earning opportunities; (b) in part, the type and extent of investments in agriculture by farmers and; (c) whether land can form adequate security for borrowed funds. Hence, land tenure can facilitate or hinder the administration of agricultural credit in a country (WB, 1984).

The introduction of government controlled agricultural marketing was another powerful instrument used by the colonial government to implement the policy of encouraging European commercial agriculture along the line-of-rail areas. To attain this objective, a statutory marketing board was established. The Board was given the power to buy and sell maize at fixed prices in the areas along the line-of-rail. While the pan-territorial (uniform) pricing policy was introduced in the depots along the line-of-rail, prices in the traditional periphery were set low to reflect transport costs. The objective of this policy was two-fold; one was to promote European farms in the "favored" zone, the other was to ensure that African production did not take up an increasing share of the market. This type of price policy had a depressing effect on the growth of traditional farmers' cash sales (Dodge, 1977).

Government monopoly in the marketing of the country's major crops seriously impeded the development of private marketing since it prevented the spreading of overhead costs and the generation of sufficient volume to make the marketing of other crops economical.

The short-lived federation (1953-63) between Zimbabwe (then Southern Rhodesia), Malawi (then Nyansaland) and Zambia (then Northern Rhodesia), did little to improve conditions of the African farmer. The

federation carried over the policies of the previous government. For instance, marketing of commercial agricultural products still remained the sole responsibility of the government. In addition, the concept of uniform pricing and the policy of subsidizing food for urban consumers was also adopted by the federal government.

As commercial farming thrived in the areas along the line-of-rail, traditional (African) agriculture in the periphery was untouched by the technological innovations that made European agriculture profitable. It was in this way that the acutely dualistic structure of the agricultural sector in Zambia was formed.

Present Structure of the Agricultural Sector

As already indicated, at independence, the Republic of Zambia inherited an economic structure that was dualistic in many ways. Basically, there were two widely divergent agricultural systems: the European and the African, caused by the colonial government's policy of separate and unequal treatment.

The agricultural system that exists today is still dualistic, with a relatively small but well developed large-scale commercial farms, in the areas along the line-of-rail and in parts of the Eastern Province; and a much larger traditional (subsistence) subsector scattered over the country, a characteristic of the colonial legacy. Although the dualism is still present, it has become less marked with the emergence of an increasing group of small-scale commercial farmers (WB, 1984).

As alluded to in Chapter 1, the overall performance of the agriculture sector in Zambia is still very sluggish. To illustrate

this point, the average annual growth rate in the commercial subsector was 5.9 percent for the 1965-82 period, while growth in the traditional subsector only registered 0.4 percent per year over the same period (IFAD, 1983).

The contribution of commercial agriculture to the sectorial output increased from 19 percent in 1965 to 41 percent in 1982. According to the World Bank report (1984), a combination of weather and dramatic improvements in the producer prices, especially during 1979-80 season, was responsible for the increase in commercial agriculture production. On the other hand, the contribution of the traditional subsector to the sectorial output; decline from 81 percent in 1964 to only 59 percent in 1982.

Crop Production

The crops grown in Zambia can be grouped broadly into four major categories: (a) food grains, comprising of maize, wheat, sorghum and millet; (b) vegetable oil seeds, which consists of cotton, soybean, sunflower and ground nuts; (c) beverage crops comprising coffee, sugar and tea; and (d) minor crops that include cassava, fruits and vegetables. In the remaining sections of this chapter, attention is focused on the production of major food crops in Zambia with special emphasis on maize, the country's main staple food grain.

A discussion of food production in Zambia must start with a description of the natural environment. Zambia, as indicated in chapter one, is a large country with a land mass of 752,614 square kilometers. There is only one rainy season a year, during the months

of November through March. The country is characterized by four major ecological zones. These zones are described in the World Bank report (Zambia Policy Options and Strategies for Agricultural Growth, Report No. 4764-ZA), they are summarized in Table 2.1 below and shown in Figure 2.2.

Table 2.1

Major Ecological Zones in Zambia

Zones	Area (000)km^2	Rural Population (000) a]	Population Density (per sq km^2)
The Northern High Rainfall Zone	350	1,562	4.40
The Western Arid Plaute	208	640	3.10
The Central, Southern and Eastern Plateaux	94	1,037	11.00
The Luanguea - Zambezi Rift Valley	101	295	2.90
Total	753	3,534	4.70

a] Based on World Bank estimates (1982)

Source: World Bank (1984), Zambia Policy Options and Strategies for Agricultural Growth, (Report No. 4764-ZA)

The Northern High Rainfall Zone, comprises major parts of Northern, Luapula, Copperbelt Northwestern Provinces, and is characterized by highly leached, relatively infertile ferralitic soils. The zone which occupies about 46 percent of Zambia is really only suitable for the production of perennial tree-crops under extensive cultivation systems as exemplified by the traditional Chitemene (shifting cultivation system). Very carefully managed farming systems

would be essential if a more intensive settled agricultural
community were to be supported or if reasonable surpluses
were to be produced requiring increased use of fertilizers.
The Zone has limited potential for the production of cotton,
tobacco, maize, sorghum, millet, groundnuts, beans, cassava
and rice.

The Western Semi-Arid Plains Zone, includes most of Western
Province and Zambezi District of North-western and is
characterized by the low rainfall, large diurnal fluctuations
in temperatures and acid soils. The zone which covers 28
percent of Zambia is most suited for extensive cattle
production and is generally tsetse-free. There is restricted
potential for seasonal cultivation on alluvial soils along
the fringes of the river valley and varying systems of semi-
permanent hoe cultivation are utilized. The current
population density of the zone is very low at 3 persons per
square kilometer.

The Central, Southern and Eastern Platauex generally contain
the most fertile soils in Zambia and have highest population
density, currently averaging 11 persons per square kilometer.
The zone constitutes only 12 percent of the country and is
characterized by a moderate seasonal rainfall of 800 to 1000
millimeters and large areas of relative fertile ferro solic
soils. Permanent, settled systems of agriculture are
feasible and potentially high yields of maize, tobacco,
cotton, sunflower and other annual arable crops are possible.
There is also a high potential for beef production.

The Luangwa-Zambezi Rift Valley Zone, covers 14 percent of
Zambia and is characterized by the steep sides of the rift
system, which are useless for agriculture and by the
solonetzic soils of the valleys. The soils, which are very
hard and impenetrable when dry and have low permeability when
wet are also notoriously difficult to manage and require a
high input of draft and labor to realize their potential.
Although the average rainfall is less that 800 millimeters,
the zone is hot and humid on account of its low altitude and
the population is relatively sparse at 2.9 persons per square
kilometer. Suitable crops are sorghum and millet, together
with cotton. Limited cultivation of rice is also possible.

FIGURE 2.2   MAP OF THE REPUBLIC OF ZAMBIA
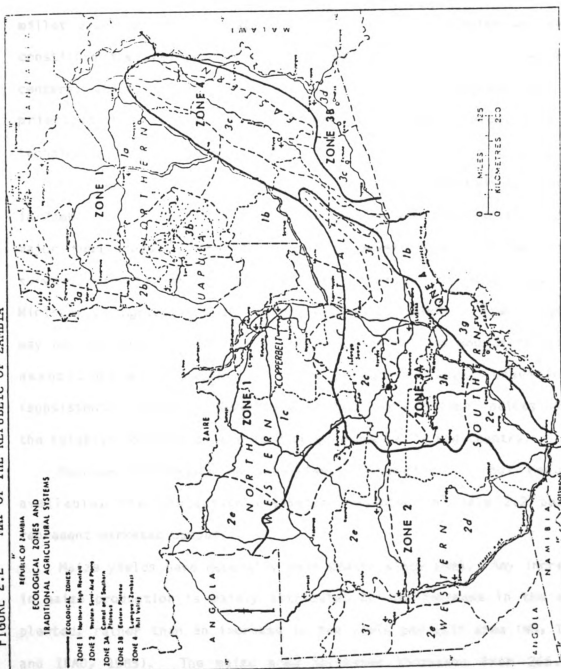
SOURCE: Zambia Policy Options and Strategies for Agricultural Growth, (Report No. 4764 - ZA)

Food Grain Production

The major food crops in Zambia are maize, wheat, sorghum and millet and, to a lesser extent, rice and cassava. Maize and wheat constitute the preferred cereals in Zambia, particularly in the urban centers, while sorghum and millet, together with cassava, are the principle food crops in rural areas where maize production is technically less suitable (WB, 1984).

One good way of highlighting the status of food grain production in Zambia is by presenting production tonnage and the area planted to major food crops. These estimates are usually based on the annual surveys conducted by the Central Statistical Office (CSO) and the Ministry of Agriculture and Water Development (MAWD). These figures may not be very accurate due to sampling limitations and difficulties associated with estimating crop production among traditional (subsistence) farmers. Nevertheless, they provide some indication of the relative position of the food crops produced in the country.

Because information on subsistence production is not readily available, the production estimates presented in Table 2.2 below, represent marketed output.

Maize yields have generally been static since 1965. Any increase in maize production is mainly attributed to the increase in the area planted, rather than an increase in the yield per unit area (WB, 1984 and IFAD, 1983). The maize area harvested increased from 266,000 hectares in 1965 to 540,000 hectares in 1980. Most analysts have attributed this dramatic increase to price incentives that were

introduced by the Zambian Government, which resulted in a relatively large number of small-scale farmers entering into maize production.

Table 2.2

Hectarage and Marketed Output of Food Grain, Zambia

Crop		Hectarage and Marketed Output (000tons) 5 Year Annual Moving Averages			Average Annual Growth Rates (%)	
		1965-70	1970-75	1975-82	1965-75	1978-82
Maizel	Hectarage	266,000	266,000	540,000		
Marketed	Output	288	508	492	12.00	-0.5
Wheatl	Hectarage	---	1,700	4,500		
Marketed	Output	0.16	0.30	12.00	14.00	64.6
Sorghuml	Hectarage	---	---	---	---	---
Marketed	Output	1.42	0.20	0.27	-14.5	3.5
Milletl	Hectarage	---	---	---	---	---
Marketed	Output	---	---	0.10	---	---

Source: 1. CSO Monthly Digest of Statistics
2. Bank of Zambia Annual Reports and Statements of Accounts
3. National Milling Corporation, 1983

Wheat, which ranks second to maize in the marketed tonnage and which is produced by commercial farmers, is consumed mainly by the urban population. Table 2.2 show that wheat has registered impressive production growth rates since independence, averaging about 65 percent per year during 1975-82 period, from 14.0 percent per year during 1965-75 period (CSO, 1983 and National Milling Corporation, 1983).

According to a World Bank report, the increase in production is a result of both the improvement in yields and the increase in area cultivated.

Data on production and marketed output of sorghum and millet is not reliable because only small quantities of these crops are traded. The limited information that is available shows that the marketed tonnage of sorghum has declined from 1,420 tons per year during 1965-70 period, to 200 tons during 1970-82 period.

Given the population growth rate of about 3.1 percent per year, the production of major food crops in Zambia (except wheat) have fared very poorly. The main cause of the poor performance of the food production system has been the static or the declining yields due to lack of appropriate new technologies; irregular and inadequate supply of production inputs; and ineffective and high cost market institutions (World Bank, 1984, and 1982; IFAD, 1983, Eicher, 1984, and Dodge, 1979).

Food Production Systems

In Zambia, food producers can broadly be grouped into four main categories: traditional (subsistence) farmers, emergent (semi-commercial) farmers, commercial farmers and state farms (including parastatal farms) (see Table 2.3).

Traditional Farms

Traditional farm households also known as small holder farmers are estimated to be about 500,000 or 80 percent of the farm households in

Table 2.3

Structure and Characteristics of Farm Households, About 1985

Type of farmer	Farm size (hectare)	Number of Farms		Chief characteristics
		Absolute[a]	Percent	
Traditional	Less than 5	500,000	83.3	Cultivates using family labor and simple hand tools and produces primarily for his own consumption with occasional marketable surpluses.
Emergent	5 - 20	94,000	15.7	Sources vary as to number; estimates are 60,000-120,000. Uses family labor, oxen, or hired tractors and purchases some inputs. Produces for his own consumption and for market.
Medium-scale	21 - 40	5,300	0.9	Produces predominantly or wholly for the market; uses oxen and tractors.
Large-scale	Greater than 40	700	0.1	Produces predominantly or wholly for the market; uses oxen and tractors.
Total		600,000	100.0	

[a] Very approximate

Source: Doris J. Jansen, A Comparative Study of the Political Economy of Agricultural Pricing Policies in Zambia, June 1986.

Zambia (WB, 1984 and IFAD, 1983). It is estimated that they cultivate an average of two hectares per farm household, using family labor and simple hand tools. Lack of regular cash incomes, appropriate technological packages and irregular supply of farm inputs preclude the use of purchased inputs among these farmers.

Land among traditional farmers is generally held in common with inherited usufruct rights. Stated in other words, land tenure arrangements under traditional agricultural systems are still under customary law which puts emphasis on access to land for all to grow food for one's family.

Traditional farmers are said to be cultivating about 1.6 million hectares of land per year (WB, 1984 and IFAD, 1983).

Maize, sorghum and millet are the principle food crops produced by traditional farmers. However, sorghum and millet, are mostly produced in areas where maize production is less suitable. When major food crops are produced among traditional farmers, they are often considered as men's crops, and the husband or an adult male in the family will control the field and its product.

The existence of such a large traditional subsector, most of which is yet to produce for the market, represents a huge albeit potential, which if mobilized with appropriate technological packages, can increase food production in the country, which in turn can improve Zambia's food security.

Small-Scale or Emergent Farms

Sources vary on the exact number of emergent or small scale farms in Zambia. The World Bank puts the number to be between 60,000 to 120,000, which is about 10 to 20 percent of the farm households in Zambia.

It is estimated that emergent farmers cultivate 5 to 20 hectares of land, producing both for subsistence and for the market, using family labor, oxen or hired tractors and some purchased inputs. It is estimated that emergent farmers produce about 60 percent of the volume of the marketed maize and 45 percent of the other marketed crops in Zambia.

According to the analysis of maize production costs and margins by farm types (see Table 2.4), under the existing technical packages and price of inputs and output, these farmers are the most profitable maize producers in the country in terms of financial margins (WB, 1984).

Table 2.4

Maize Production Costs and Margins by Farming Type 1982/83

Production Costs	Subsistence	Small-holder	Emergent	Commercial
	Zambian Kwada			
Seed	4.00	20.80	20.80	26.00
Fertilizers	-	116.12	116.12	222.80
Herbicides	-	-	-	91.20
Labour (Hired	-	-	22.50	53.15
Machinery Operating	-	-	-	202.95
Transport	-	17.00	17.00	32.00
Combine	-	-	-	38.65
Semi-skilled	-	-	-	30.45
Skilled Labour	-	-	-	16.35
Ox-Cultivation	-	-	40.00	-
Farm Tools	12.0	12.00	5.00	-
Repairs and Maintenance	-	4.00	4.00	43.70
Insurance & Interest	-	4.14	19.83	67.80
Sundries	-	5.25	29.40	43.50
Depreciation	1.20	1.20	4.50	24.16
Total Cost	17.20	180.51	279.15	862.71
Yield kg/ha	1,000.00	2,000.00	3,150.00	4,500.00
Producer Price m/t	203.33	203.33	203.33	203.33
Revenue/ha	203.33	406.63	640.50	915.00
Gross Margin	186.13	226.12	361.35	52.29
Family Labor	0.75	90.00	53.00	-
Net Margin/manday	2.48	2.51	6.82	-

Source: WB, 1984 Zambia Policy Options and Strategies on Agricultural Growth, (Report No. 4764-ZA).

Commercial Producers

Commercial farmers, number about 6,000 or 1 percent of all the farm households in Zambia, but produce about 40 percent of the volume of the maize that is marketed and about 55 percent of the other marketed farm produce. They constitute 5,300 semi-commercial farmers, cultivating 20 to 40 hectares of land, using oxen and tractors and

about 700 large-scale, highly mechanized farmers, who cultivate up to 600 hectares of land per year (WB, 1984 and IFAD, 1983).

Commercial farmers and some of the emergent farmers are located in the areas along the line-of-rail and in parts of the Eastern Province (see Figure 1.1). Because they are favorably placed in terms of the infrastructural and marketing facilities, especially commercial farmers, the large-scale farmers, have been the principle beneficiaries of the agricultural support services, public investments and policies and imported agricultural inputs, a characteristic of the colonial legacy (WB, 1984, IFAD, 1983, and Gran, 1982).

State Farms

There are two types of state farms, depending whether they are wholely owned and operated by the state. Those that are entirely owned and managed by the government are known in Zambia as "state farms" and those that are partly managed or partly owned by the state are known as "parastatal farms".

Besides the proposed 18 state farms of which only two are currently operating, at present, there are 23 primary production units operated on behalf of the Government. Most of these parastatal farms are operated by the Zambia Agricultural Development Limited (ZADL). They produce both crops and livestock. Due to a number of operational problems, the contribution of these farms to the national volume of output, has been very limited. Following the recognition of the importance of obtaining national food security, the Government in 1981 proclaimed a program to establish state farms. The objective

underlying this program was to establish a total of 18 state farms (two in each province), as a measure to solve the country's food and balance of payments problems (Government Economic Report, 1981). These farms of varying sizes (depending on existing local conditions), are registered under the Companies Act. This implies that they should be operated on sound commercial principles and practices, as stipulated in the Act.

Maize Production Trends

Maize, being the main staple food for both Zambia's urban population and about 70 percent of the rural people, is the most important crop grown in Zambia. The Food-Strategy Study, 1982, estimates that maize constitutes about 80 percent of the per capita intake of all cereals.

Because of its importance as the main national food staple, crop production policies in Zambia have been dominated by programs that are aimed at achieving self-sufficiency in maize production. A variety of programs, some of which have included direct government involvement in production, have been undertaken to promote maize production in all parts of the country. For example, production has been promoted through price incentives; a multiplicity of production schemes; and to a lesser extent through applied research and extension, which are aimed at developing high yielding maize varieties and improving farmers' husbandry practices (Food Strategy Study, 1982). For these reasons, maize is practically produced everywhere in the country.

Price fixing on the basis of the cost of production; input subsidy on fertilizer and farm machinery; pan-territorial pricing of maize; and subsidies to cover maize marketing and processing costs have been, the major mechanisms used by the Zambian Government to promote maize production in the country. These policies, have lead to a considerable bias in maize production, and in turn, have caused the dominance of maize culture within Zambian agriculture, even in areas which are only marginal for its production.

As already pointed out, the area planted to maize during the early post-independence years (1965-74), generally remained static, increasing only at a rate of 3 percent per year. However, after 1977, disregarding the annual variations, the area planted to maize has increased at an average rate of 10 percent per year. Estimates of the land planted to maize presented in Table 2.2, show that maize hectarage was relatively constant at about 266,000 hectares per year during 1965-74 period, and then increased markedly to about 540,000 hectares a year, reaching an all-time high of 595,000 hectares in 1978.

While the land area planted to maize has increased over the last 10 years, land productivity in terms of yield per hectare, has remained static since independence. The overall increase in the production tonnage can be attributed to the increase in the area cultivated, rather than an increase in yields per hectare. As already explained, the increase in the area planted to maize is largely attributed to the number of farmers entering into maize production because of the production incentives introduced by the Government.

Should the present favorable producer price incentives continue, the area cultivated to maize may continue increasing and therefore production tonnage should continue to increase (Table 2.5)

Table 2.5

Commercial Production of Maize

(1965-1982)

Crop Year	Maize
	000 Tons
1965	263
1966	385
1967	383
1968	264
1969	274
1970	132
1971	384
1972	589
1973	339
1974	588
1975	559
1976	750
1977	696
1978	582
1979	336
1980	382
1981	693
1982	508

Source: 1. CSO: Annual Agricultural Statistical Bulletin, 1981 (November 1982) - data for 1970-1982
2. CSO: Monthly Digest of Statistics (October/December 1981) - data for 1965-1969

Although maize is produced almost everywhere in Zambia, almost 95 percent of the marketed output comes from three provinces, Southern, Central and Eastern Provinces (Table 2.6). The presence of large-scale farmers and favorable climatic conditions contribute to the high maize output in these provinces.

Table 2.6

Marketed Production of Maize by Province (200 lb/90 Kg Bags)[a]

Year	Central[c]	Copperbelt	Eastern	Luapula	Northern	Northwestern	Southern	Western
1965	1,889,000	4,000	80,000	7,000	33,000	4,000	989,000	1,000
1966	2,330,000	11,000	154,000	14,000	26,000	7,000	1,704,000	2,000
1967	2,326,266	20,000	89,000	16,000	68,000	10,000	1,679,461	11,800
1968	1,590,763	15,651	177,301	22,000	93,000	14,600	1,030,504	20,000
1969	1,322,200	27,600	26,100	36,700	113,800	28,300	1,443,600	21,900
1970	903,200	6,700	15,600	19,600	56,800	15,200	461,400	11,800
1971	2,604,400	33,000	152,000	25,400	63,800	33,100	1,504,200	27,800
1972	4,200,000	30,000	330,000	27,000	69,000	39,000	2,300,000	19,000
1973	2,535,266	132,647	505,937	29,196	58,984	25,504	1,346,395	14,750
1974	3,920,995	24,530	612,161	15,518	61,997	30,881	1,946,710	30,123
1975	2,844,008	33,330	769,713	17,664	111,333	28,867	2,335,657	74,418
1976	3,950,024	71,592	628,516	25,535	183,607	38,091	3,047,071	80,332
1977	3,319,701	71,585	952,337	31,793	192,721	40,054	2,961,935	85,753
1978	2,422,990	51,308	761,558	34,286	181,332	34,651	2,913,919	39,436
1979	1,424,631	41,790	515,187	18,407	112,726	31,551	1,530,441	33,605
1980	1,720,314	35,188	738,727	17,955	117,951	15,541	2,756,538	13,611
1981[b]	3,928,369	56,438	552,953	39,787	157,599	39,593	2,756,538	40,610
1982[b]	3,905,825	56,114	549,780	39,559	156,965	39,366	2,740,419	40,377

[a] From 1971 onwards maize was purchased in bags of 90 kg instead of 200 lbs.
[b] Estimates
[c] Estimates also include marketed production for Lusaka Province.

Source: 1. Dept. of Agriculture, Ministry of Rural Development, Annual Report of the Extension Branch (various issues), Lusaka, Zambia.

2. NAMBOARD, Annual Report and Accounts (1979-1980).

Maize production prospects in Zambia will remain favorable since population increases, particularly for the urban population which is growing at 6.0 percent per year, will continue expanding market demand. (Table 2.7 below, shows the projected demands for maize and other food grains up to the end of this century.)

Table 2.7

Zambia: Projected Demand for Maize (000 tons)

Category	1976-82	1987	1992	1995
Urban population (million)	2.40	3.00	3.75	4.69
Maize Food	468	576	720	900
Maize Stockfeed	47	58	72	90
Maize Beer	70	86	108	136
Total Demand	585	720	900	1,126

Source: World Bank 1984, Zambia Policy Options and Strategies on Agricultural Growth, Report No. 4764-ZA.

Wheat Production Trends

Wheat which is consumed mainly by urban population, is largely an imported crop, although domestic production has increased in the past few years (Table 2.8).

Table 2.8

Wheat Production and Prices in Zambia

Year	Area (1,000 ha)	Production (1,000 Metric tons)	Productivity (Metric ton/ha)	Line-of-Rail Price (K/90 kg)
1965	-	-	-	5.70
1966	0.041	0.031	1.980	5.70
1967	0.120	0.203	1.692	6.20
1968	0.150	0.204	1.360	6.20
1969	0.100	0.224	2.240	7.50
1970	0.100	0.103	1.030	7.50
1971	0.100	0.102	1.020	7.50
1972	0.100	0.101	1.010	7.50
1973	0.100	0.102	1.020	7.50
1974	0.200	0.204	1.020	7.50
1975	1.000	1.018	1.018	14.00
1976	3.000	4.072	1.357	16.00
1977	1.700	5.419	3.188	16.00
1978	1.585	6.515	4.110	20.00
1979	2.100	7.250	3.450	20.00
1980	2.400	11.836	4.431	24.00
1981	3.200	14.130	4.415	26.00
1982(est)	4.500	20.322	4.516	32.00

Source: (1) National Milling Corporation
(2) Economic Report, 1982.

All the wheat produced in Zambia is grown under irrigation and in rotation with soybeans. Therefore, wheat production is almost exclusively undertaken by large-scale commercial farmers.

To reduce the wheat import bill, the Zambian Government, has in recent years provided wheat farmers production incentives to stimulate domestic output (Table 2.8). The production incentives have resulted in an increase in the area cultivated as well as in the improvement yield per hectare. The area cultivated increased from 1,700 hectares in 1977 to about 4,500 hectares in 1982, with yields varying from 5,000 tons to 20,300 tons during the same period (CSO, 1984). Yields

increased from 200 kilograms (2 tons) per hectare in 1977 to about 4,500 kilograms (4.5 tons) per hectare in 1982.

Production prospects for wheat have also been favorable. On the basis of efficiency considerations, in terms of low production costs and high yields per hectare, Zambia has no competitive advantage in domestic wheat production, but will continue to be encouraged by the government.

Sorghum and Millet Production Trends

Practically all sorghum and millet is produced by traditional (subsistence) farmers with the exception of very limited plantings of hybrid sorghum by a few commercial farmers.

Both sorghum and millet are produced in rural areas where the production of maize is less suitable. Therefore, these two crops form the principle staple foods in areas where maize is not produced. Sorghum and millet are frequently intercropped with a variety of crops, such as beans, ground nuts, okra, sweet potatoes and pumpkins.

As already mentioned, data on area planted to sorghum and millet is very unreliable due to the fact that the crops are mainly produced for subsistence. However, some area estimates indicate that up to 80,000 hectares of sorghum was grown in 1977, but thereafter declined and may have been as low as 20,000 hectares in 1982 (WB, 1984). It is further estimated that an average farm household cultivates between 0.25 to 1.5 hectares of these crops, with no fertilizers or other purchased inputs, using hoe or ox plow cultivation methods.

Statistics on production figures are also unreliable, as only a very small proportions of the crops are traded through official channels. The Food Strategy Study (1982) estimated sorghum and millet production to be 182,000 metric tons, which may be unrealistic due to low land productivity in the traditional sector. Table 2.9 presents the estimated marketed production of sorghum and millet, with their respective official prices.

Table 2.9

Officially Marketed Production and Producer Price of
Sorghum and Millet, Zambia

| Harvest Year | Sorghum | | Millet | |
	Production (mt)	Producer Price 1/ K/90kg	Production (mt)	Producer Price K/90kg
1964	39	n.a.	22	n.a.
1965	1	n.a.	51	n.a.
1966	3	n.a.	48	n.a.
1967	nil	4.70	60	n.a.
1968	1	4.70	44	n.a.
1969	1,120	4.70	11	n.a
1970	530	4.70	33	n.a.
1971	102	4.70	5	n.a.
1972	221	4.70	3	n.a.
1973	35	4.70	nil	n.a.
1974	325	5.00	nil	n.a.
1975	92	6.00	nil	n.a.
1976	106	6.00	3	n.a.
1977	799	6.00	1	n.a.
1978	818	6.00	nil	6.00
1979	149	6.00	nil	6.00
1980	93	6.00	238	6.00
1981	12	9.00	220	6.00
1982	18	9.00	52	6.00
1983	n.a.	16.00	n.a.	29.00

Source: Annual Agricultural Statistical Bulletin, Government of Zambia, November 1982.

1/Grade A only.

Production projections for sorghum and millet have received mixed reviews. Some reports indicate that the future is favorable since both crops do well in poor leached soils and areas of uneven rainfall.

Summary

The purpose of this chapter was to describe the characteristics of the food production system in Zambia. It was noted that Zambian agriculture was acutely dualistic prior to and immediately after independence with a relatively small large-scale commercial (market-oriented) farming subsector and a large traditional subsistence subsector. Although this dualism is still present it has become less marked due to the increase in the number of small-scale commercial farmers.

Four major types of food production systems were identified—namely, traditional farmers, emergent farmers, large- and medium-scale farmers and state farms. There are literally hundreds of variations in each pattern of production. These variations may include the size of the fields cultivated, resource endowment, type of food crops produced, land tenure arrangements, access to purchased inputs, family size, specific sex roles in production, public or private control, etc.

Maize is by far the most important food crop produced in Zambia. In nutritional terms it is the staple of the Zambian diet. In terms of value of crops marketed through official channels, it accounts for over 70 percent of marketed value of agricultural commodities.

Being the main staple food commodity, crop production policies have been dominated by maize. Domestic producer price incentives and

inputs subsidies for production have been given to maize by the Zambian Government more than to other crops. Consequently, this has led to the production of maize even in areas that are less suitable for its production, replacing other food grains such as sorghum and millet.

CHAPTER 3

THE ORGANIZATION OF THE FOOD GRAIN DISTRIBUTION

SYSTEM IN ZAMBIA: A DESCRIPTION

The objective of this chapter is to examine the food distribution system in Zambia by presenting a brief description of each stage in the marketing channel and the functions of the various participants.

As previously discussed, to ensure a sufficient and continuous food supply to all sectors of the population in Zambia involves more than just expanding food production, it also involves increasing household income as well as developing a well-coordinated food distribution system that can channel excess production from the producer to the final consumer at the right time, place, and form. In this context, knowledge of food distribution arrangements becomes crucial to this study not only because distribution arrangements affect food security at all levels, but because they also affect the pace of economic development.

The Food Grain Distribution System

The food grain distribution system in Zambia is comprised of various participants and numerous exchange points where physical functions of marketing such as assembly, transportation,

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standardization, storage, and processing are performed. This chapter will attempt to describe the stages of the food grain marketing process.

The food grain marketing process in Zambia ranges from the simple exchange between households at the village level, to the movement of the grain from rural areas to urban areas. The characteristics of the grain marketing process are highly dependent upon the structure of production. Production of food grain takes place in varying amounts depending on the type and size of the farm. These food grain producers are scattered over large areas all over the country. For this reason, the marketing of these food grains involves a large number of transactions and participants. Generally, the marketing system should assemble the marketable surpluses produced all over the country, and move them to nearest markets which serve as outlets to local, as well as urban, communities. When these crops are moved, a number of market intermediaries are involved. This usually results in a lengthy marketing chain. To facilitate the description, the distribution system is broken down into various successive stages of economic activity -- namely production, assembly, storage, processing and retailing. Literature review and the author's personal knowledge are the basis of this general description of the organization of the food grain distribution system in Zambia.

Maize and wheat, as already mentioned, are the major food crops in Zambia, particularly in urban areas where they constitute the preferred cereals, while sorghum and millet are the principal food crops in rural areas where maize production is technically less suitable. Therefore,

the following account of the organization of the food grain distribution system in Zambia will be restricted to these four food crops. Furthermore, because of the differences in the structure of production of these crops, the distribution of each crop will be discussed separately.

Figure 3.1 depicts a generalized model of the food grain production and distribution system in Zambia. It shows the various stages of economic activity by which food grains are moved from producers to final consumers. The diagram also shows the different groups of participants that are involved in the marketing process.

The left side of the diagram represents the physical functions of marketing that are performed as the food moves from producers to consumers. Thus, the left side of Figure 3.1 represents the successive stages of economic activity by which food grains are assembled, stored, processed, distributed and finally consumed. The labelled boxes represent the different groups of participants, such as public organizations, private firms and individuals, that are involved in the food grain distribution system. The arrows link the various marketing functions or the successive stages of economic activity with participants.

In general, there are two basic ways of marketing food grains in Zambia. First, the grain can move through official channels, normally through monopsonistic parastatal agencies. These are semi-autonomous public sector entities, working through several official agents.

Second, food grains can move through unofficial private market channels.

Figure 3.1

The Food Grain Distribution System in Zambia

— — — — Government Sanctioned Transactions

▬▬▬▬▬▬ Non-Government Sanctioned Transactions
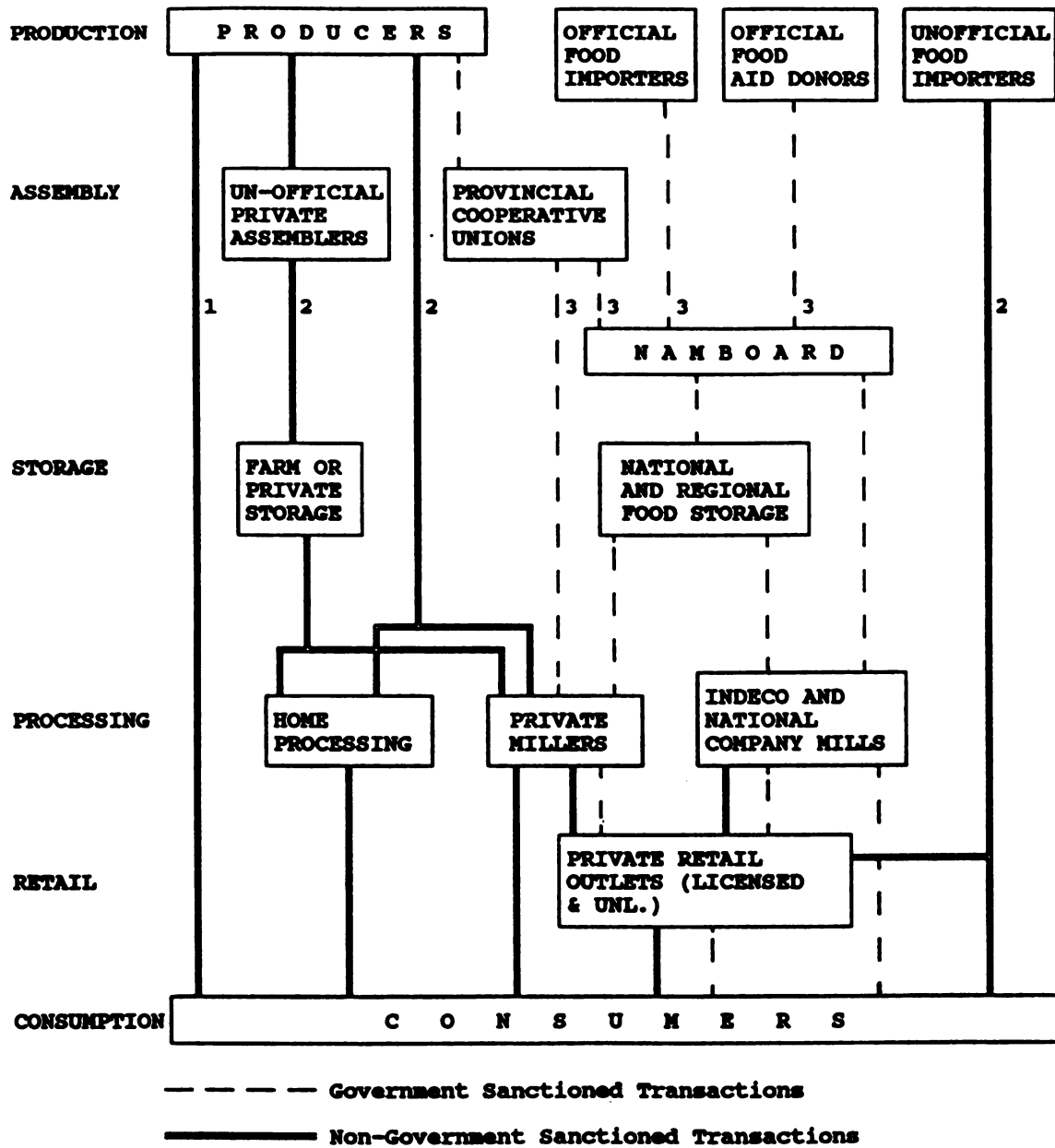
1) Channel-1
2) Channel-2
3) Channel-3

In the literature, the distinction between "official" and "unofficial" market channels is not that clear. However, for the purpose of this study, the following definitions of the two terms are adopted. The official market channel will include all the public organizations, private sector firms and individuals who are authorized to engage in marketing food grains and who trade in conformity with the official price structure. In this regard, official trade involves authorization or licensing, and conformity with official prices, if any. In Figure 3.1, official trade is denoted by dotted arrows.

On the other hand, an "unofficial" market includes private merchants who operate without government authorization or official marketing licenses as well as some private sector firms and individuals who are licensed to operate as part of the official market channel, but who purposely do not conform to the official price structure. In other words, in an unofficial market (referred to by Michael Morris, 1986 as a parallel market) trading is by unauthorized (unlicensed) partners, or trading at non-official prices. The unofficial market channel in Figure 3.1 is depicted by bold arrows.

Four dominant food grain production systems were identified in chapter 2 as: (1) small holder farmer production system; (2) emergent farmer production system; (3) commercial farmer production system; and (4) corporate farm production system.

In general, corporate and commercial food grain production systems find it easier to sell through the official channels, immediately after harvest or out of storage, due to their large size of operations and their better accessibility to information and other market

infrastructural services. For this reason, their decisions clearly affect urban, more than the rural consumption. On the other hand, traditional food grain production systems, theoretically, have both public and private sector sales options. They can also enter into some barter trading, as well as keeping some grain for self-consumption. The decision to barter depends in part on the total amount of production, the consumption substitutability of the good involved in the transaction, and the relative terms of the exchange. Thus, the decision on how much to retain for home consumption affects household food security.

The development of the official food distribution system in Zambia can be traced back to the colonial period. Historically, the end of colonialism left behind a large bureaucratic apparatus and a heritage of numerous institutions aimed at solving national problems. To some extent, this led to a syndrome of dependency toward the state in terms of free (or subsidized) services and goods (such as marketing, input delivery, mealie meal, and fertilizer) with major post-independence consequences (WB, 1984).

Following independence, the state offered the best instrument for achieving the socio-political goals of economic freedom and control over the nation's destiny as well as the individual desires for material gain through rapid career advances in an expanding public sector. The tendency to view the state as the primary instrument of development was, no doubt, strengthened by not only the inheritance of a weak indigenous private sector, but also by the political struggle for control of the economy (WB, 1984 and IFAD, 1983). The fact that

the colonial government had played a highly interventionist role in some sectors such as agriculture and transport gave impetus to the new government's interventionistic tendencies in the post-independence period. The major form of such intervention was the establishment of public or state owned enterprises or parastatals (WB, 1984).

At the institutional level, Government objectives for creating parastatals were: (a) to provide a market guarantee to farmers; (b) to maintain reasonably stable farm incomes through providing stable prices; (c) to provide input delivery services to farmers; and (d) to generate financial surplus for reinvestment in agriculture or elsewhere in the economy.

It is now estimated that there are 47 parastatals and government supported Provincial Cooperative Unions operating in the agricultural sector alone (see Appendix A). However, when these parastatals are evaluated on the basis of these objectives, their performance has been unsatisfactory (WB, 1984).

In agricultural marketing, Zambia has developed a rather complex distribution and pricing system in which twelve parastatal organizations and nine government supported Provincial Cooperative Unions play a dominant, and in some cases, an exclusive role. In the process of evolving this complex marketing system, it has become apparent the Government, with good intention, has tended to emphasize institutional creation and changes (IFAD, 1983).

The creation of the Grain Marketing Board (GMB) (1964-69), which was charged with the responsibility of implementing a government administered price system, serves as an illustration of the

government's preference for public institutional intervention. Under the administered price system, purchase and selling prices for different grains were determined for the Board by the Ministry responsible for agriculture, around a "price stabilization fund" for each controlled commodity. Over the same period (1964-69), another parastatal (the Rural Marketing Board) was created. It had similar functions like the GMB, but operated in remote districts and provinces away from the line-of-rail. Both of these organizations experienced financial problems which made them increasingly ineffective. In 1969, the two Boards were amalgamated into the National Agricultural Marketing Board (NAMBOARD). Although the new Board acquired a different name, it continued to operate under the same government rules which continued to influence production by increasing producer prices and at the same time maintaining low food prices (WB, 1984). Consequently, NAMBOARD has also been plagued with heavy financial losses and has relied on government subsidies since its inception.

At present Provincial Cooperative Unions and NAMBOARD have monopoly rights to trade in maize. The nine Provincial Cooperative Unions controlled by the Ministry of Cooperatives, are responsible for intra-provincial trade. Before the creation of the cooperative unions NAMBOARD was responsible for both intra-and inter- provincial maize trade. However, its function has been reduced to cover only international and inter-provincial trade. Both NAMBOARD and the nine Provincial Cooperative Unions critically depend upon government subsidies, largely due to internal inconsistency of the administered pricing policy (WB, 1984).

Types of Food Grain Markets

Shepherd (1958), defined a market as a group of buyers and sellers with facilities for trading with each other. In this context, the most simple form of marketing takes place between households at the village level and is referred to as "house trade" (Hill, 1969). This form of trade is usually conducted between producers and residents of the same village or neighboring villages. As already pointed out, the decision to trade with neighbors depends on the producer's total production, family needs and the relative terms of exchange.

The trend common in Zambia today is the closing of many rural shops and the emptiness of those which remain (ILO, 1981). As a result, "house trade" is increasingly playing a large role in the everyday life of rural households. However, even though, house trading has become important among rural households in Zambia, it still does not usually result in significant amount of grains reaching the outside communities. For example, Adams and Harman (1977), in their study on the evaluation of losses in maize stored in Zambia, found out that where sales were made other than to the National Agricultural Marketing Board (NAMBOARD), (i.e. to local traders or fellow farmers), the quantities involved were smaller, and no farmer had sold more than 20 bags in this way.

The other form of marketing occurs where buyers and sellers meet in some organized manner periodically to buy and sell commodities. This is probably the most common form of grain exchange in Zambia and has resulted in the establishment of numerous rural marketing depots and urban food markets. In both cases, the official organization of

these markets is entrusted in individuals or organizations that oversee or perform certain market functions.

Rural Markets

Rural markets in Zambia are mostly located in district administrative centers (known as Bomas) and serve local communities, including surrounding villages. Because they are located in administrative centers, rural markets are usually on or near major roads. Hence, they are generally easily accessible.

Rural markets consist of private and parastatal retail shops and open markets. They normally serve as outlets for processed food grains such as mealie meal (maize meal), flour, sugar and many other food commodities. In addition, they also serve as focal points for assembling grains to be moved to major consumption areas, (mostly large cities). Because of easy accessibility by trucks and other modes of transport, these markets link the rural producers to the outside world.

Because of the closure of many rural shops, households that want to buy basic goods (such as mealie meal), the country's staple food commodity have to bear a high cost in time, energy and cash to travel to rural markets at district centers. In most cases, the district centers are themselves inadequately supplied. For example, when goods arrive in the shops or the open markets, they are quickly bought by those on the spot. Consequently, very little in terms of basic food commodities moves back into rural areas.

A survey of nine parastatal retail stores, seven open markets, and five private stores in six districts and rural centers in Zambia

(conducted at intervals over a year and a half) (1979-80) illustrates the irregularity of supply and availability. Mealie meal, was found only six times (five times in open markets, only once in a parastatal retail store) (ILO, 1981, p. 22). Such shortages and absences of important food items mean that when they become available, they are priced high by the traders.

Urban Markets

Urban markets are those found in larger towns and cities. Characteristics of urban markets are similar to markets found in district centers. They are comprised of private and parastatal retail outlets and open markets. The only difference between the two is that in urban areas, there could be more than one open market and parastatal retail shops in the same city as opposed to only one of each found in rural district centers. In addition, urban markets are better stocked than rural markets.

Like rural markets, urban markets operate daily and sell both processed and unprocessed food stuffs.

The grain that is sold in urban markets is bought from traditional farmers scattered all over the country as well as from commercial farmers concentrated mostly in areas along the line-of-rail. Thus, the grain that moves into urban markets comes from rural markets and directly from farms that are near by.

Once the grain reaches the urban markets, it is disposed of in one of the following three ways. First, part of the grain is sold to private millers and parastatal milling companies who process it into

flour or meal. The second portion is taken into storage for national food security purposes. The third portion is sold directly to consumers, in the open markets. However, because of government control on "essential" food commodities such as maize and wheat, the amounts of food grains that are disposed of in this way are not substantial.

Furthermore, when the country produces more than what is domestically required, a portion of the grain that moves in urban areas is exported to other countries to get the much needed foreign exchange.

The processed food grains are sold to private and government controlled wholesalers and retailers. In general, retailers in Zambia consist of private retail stores, parastatal retail shops and private individuals, all of whom sell to final consumers.

Food Grain Distribution

The movement of food grains from producers to final consumers usually involves one or more market intermediaries. The number of these intermediaries depends on the type of grain being distributed and on the structure of production. Since production structures of the food grains are different, the distribution system of each food grain is described separately.

Maize Distribution

As discussed in Chapter 1, achieving food security has become a fundamental objective of government policy in Zambia. Strategies for attaining this objective have revolved around the expansion of domestically produced food supplies, particularly maize, the country's

main staple food. Consequently, over the years, crop production, marketing and pricing policies in Zambia have been dominated by maize. The importance of maize to the Zambian economy is three-fold. First, a short fall in maize supply affects the economy generally because it requires foreign exchange for maize imports. Second, when maize has to be imported, at higher prices, it requires subsidy, which in turn, becomes an added burden on the national treasury. Third, when there is a maize shortage, it is often the poorer maize consumers, especially those who are less accessible, who are likely to suffer most (ILO, 1981).

As already pointed out, maize produced in Zambia can be disposed off in one of the following three ways. One portion of the harvest is retained by the producer for home consumption. This practice is common among traditional farmers who produce mainly for household consumption. The maize retained by the producer can be used in many different ways which include personal consumption (i.e. food and beer making), gifts to friends and relatives, ceremonies and religious purposes, such as tithe.

The second portion of the maize harvest is disposed of by farmers through trade among households within the same village or neighboring villages. Terms of trade in this case can either be through the barter system, or the monetary exchange system. Maize disposed off in this manner is technically non-authorized, hence official prices may or may not be adhered to by trading parties.

The third and last portion of the harvest is disposed off through official marketing channels. This is the most important maize marketing channel in Zambia.

Channels of Distribution

The distribution system in Zambia consists of three possible channels through which maize can move from producers to consumers. These distribution channels are designated as channels 1, 2 and 3 in Figure 3.1. Each channel results in maize reaching the final consumer.

The flow of maize from producers to consumers can involve more than one distribution channel. Therefore, this means that the process of marketing maize is not a simple unidirectional flow.

Channel One

Channel one involves direct sale or exchange of maize between producers and consumers at the household level. It is the most simple form of marketing. This distribution channel is shown as channel 1 in Figure 3.1.

This type of trade usually occurs between surplus and deficit households, with limited access to rural and urban food markets. The extent of house trading depends on local production and the degree of shortfalls among food deficit households. When maize trade is between local residents, they enter into monetary or barter negotiations.

As indicated earlier in the chapter, it is difficult to estimate the amount of maize that flows through this channel because transactions are not recorded or reported.

Channel Two

Channel two involves the movement of maize from producers to consumers through the open markets that are found in district centers and urban areas. This form of trade is shown as channel 2 in Figure 3.1.

The main characteristic of this form of maize marketing is that it is undertaken by unofficial private traders. These generally include different types of private business persons such as millers, shopkeepers, fisherman and even farmers themselves.

Usually traders go to farms and buy the maize, and then transport it (in bags) either to temporary storage facilities or take it directly to markets where it is sold to consumers. Alternatively, the purchased maize can be taken to private millers (in rural or urban areas) to be processed into mealie meal before it is sold to consumers. When farmers themselves undertake this type of trade, they normally deliver their own marketable surpluses to the market, where they sell it to consumers or other traders.

In recent years, there has been a marked increase in the flow of maize and maize meal through this marketing channel to some neighboring food deficit countries. However, this trade (commonly known in Zambia as smuggling) is prohibited by the government.

As previously mentioned, maize is one of the controlled products in Zambia. It is therefore, supposed to be exclusively marketed by public marketing agencies. Consequently, quantities of maize that flow through the non-official marketing channel are not substantial when

compared to the amount that goes through the official marketing channel.

The importance of this type of trade lies mostly in the marketing services it provides both to producers and consumers. For example, many private traders buy from farm gates and pay the farmers on the spot. In such cases, farmers do not have to bear transport costs. In addition, private traders can buy and sell maize in units of measure (such as tins and buckets) which are smaller that official units of measure which provides flexibility to the farmer. Furthermore, it has been reported that some private traders provide production and consumption credit to their customers. Such services provide convenience to customers.

Channel Three

Distribution channel three is the most important form of maize marketing in Zambia. It involves moving maize from producers, who are scattered all over the country, to major areas of consumption, through the official marketing channel (see channel 3 in Figure 3.1.)

Before we describe the flow of maize through this channel, it may be necessary to trace the historical development of the official food distribution system in Zambia.

In general, each cluster of villages or groups of farms in an area has a maize assembly point (depot) managed by either a cooperative union or NAMBOARD. Farmers with marketable surpluses shell their maize and put it in 90 kilogram bags. (Usually the bags are furnished by the marketing organization.) The bagged maize is then delivered by the

farmers (at their own expense) to the nearest depot. Modes of transportation vary among farmers. For example, most commercial farmers contract truckers to deliver their maize, while others use their own trucks or tractor-trailers. Traditional farmers on the other hand, use ox-carts and tractor-trailers to deliver their maize, although the use of hired private trucks is also common.

Once maize is delivered to a depot, it is weighed and graded by a representative of the purchasing agency (cooperative unions or NAMBOARD). There are three grades by which maize is classified. These are grades A, B and C. Grade A being the best. Grading is done on the basis of damage and contamination.

After the maize is weighed and graded, the price is determined. Maize prices are set by the government. The price differentials between grades are not significantly different. Once the price is determined on the basis of the weight and grade, the farmer is given an invoice stating the number of bags delivered, the grades, the price(s) and the total amount to be paid. In the past, payments to farmers were made within few weeks after delivery. In recent years, however, because of the financial constraints the cooperative unions and NAMBOARD are experiencing, it can take months before farmers are paid. In fact, it is very common these days for farmers to make several trips to NAMBOARD or union districts or provincial offices pursuing payment (Good, 1986).

The purchased maize is temporarily stored at the receiving depots, awaiting for transportation to better and more permanent storage facilities which are usually located at district and provincial

headquarters and in major urban centers. Maize from temporary storage is loaded on to trucks, under contract to cooperative unions or NAMBOARD and shipped to permanent storage facilities.

As previously shown in Table 2.7 the number of maize bags that were marketed through the official marketing channel during the period 1965-1982.

The framework of crop pricing policy in Zambia still has not changed from that of the colonial period. Prices for controlled commodities (maize, wheat, cotton, sunflower, etc.) are still being administered by the government. Thus, farmers all over the country still receive the same payment for producing, say, a bag of maize. Price fixing is done by the Cabinet Office based on recommendations from the Ministry of Agriculture and Water Development (MAWD). The government has advanced a number of reasons for maintaining the administered price system. Prominent among these are "fair return to the producers," and "fairness to consumers".

Economists have analyzed the effects of administered pricing (both panterritorial and panseasonal). According to Elliot Berg (1985), the studies have yielded the following results. Uniform (panterritorial) national pricing was not only found to be costly, but found to be a stimulant of undesirable economic behavior, such as high consumption and production costs and even encourages illegal trade. On the other hand, maintaining a single price over the course of the year (panseasonal pricing), discourages private storage and shifts storage costs to the national budget, considering the fact that the marketing agencies are supported by the government.

In Zambia, the policy of uniform pricing (whereby location of production and seasonal and location-specific supply and demand conditions are disregarded) has had the following consequences on food production and distribution. First, it has made it unprofitable for farmers to store food crops on their farms, and thus, has encouraged a tendency by farmers to sell marketable surplus immediately following harvest. The tendency to get rid of all the marketable surplus after harvest has in turn, overtaxed the buying, transport and storage facilities of both cooperative unions and NAMBOARD, particularly during good crop seasons. Second, panterritorial and panseasonal pricing have made it impossible for private transporters to operate, except as contract carriers for cooperative unions or NAMBOARD and since both do not normally offer adequate incentives, the movement of food crops has often been handicapped by inadequate transport, resulting in much spoilage and waste. Third, uniform pricing has resulted in inefficient allocation of resources. As an example, it has encouraged the production of maize in almost every district in the country including some which are far from main centers of consumption and even in areas where maize production is technically less suitable. Fourth, because the government has encouraged maize production through the uniform pricing policy, maize has now replaced production of traditional crops, such as sorghum and millet for which some areas are most suited (WB, 1984 and IFAD, 1983).

In Chapter 2, it was pointed out that maize producers in Zambia have over the years enjoyed high price protection. However, a quick glance at available data reveals that actual nominal producer prices

have been below world prices. It is only in the last few years that this situation has reversed itself (see Table 3.1). Therefore, although domestic production of maize has been promoted by various marketing and pricing policies at the expense of traditional crops, administered prices have until 1978, been below world prices.

Maize Exports and Imports

Beside being responsible for inter-provincial maize marketing, NAMBOARD is also responsible for exporting and importing maize. Figures in Table 3.2 show that Zambia exported maize to neighboring countries (Zaire, Tanzania, Angola and Mozambique) between 1971 and 1974; though the exports were mainly part of annual surpluses which could not be stored due to inadequate storage facilities. Since 1975 however, Zambia has consistently imported maize, with the net import volume rising from only 22,000 tons in 1975 to 376,000 tons in 1977 and 220 tons in 1982 (WB, 1984). With such perennial shortfalls, the role of NAMBOARD in maize marketing has steadily shifted from an interprovincial buyer to an importer.

Table 3.1

Nominal Protection in Maize Production (1966-1982)
(K/Ton)

Crop Season	World Price Equivalent (c.i.f.)	(K/ton) Actual Producer Price	NPR[1] (%)
1966/67	40.3	34.4	-15
1967/68	33.3	32.2	-03
1968/69	65.6	35.6	-46
1969/70	90.7	38.9	-57
1970/71	90.7	44.4	-51
1971/72	77.1	47.8	-14
1972/73	42.0	47.8	-37
1973/74	75.8	47.8	-37
1974/75	75.8	55.6	-27
1975/76	83.6	70.0	-16
1976/77	89.1	70.0	-21
1977/78	89.1	75.5	-15
1978/79	92.4	100.0	08
1979/80	100.2	130.0	30
1980/81	92.8	150.0	63
1981/82	112.5	177.8	58

[1]Nominal Protection in Maize Production

Sources: D.J. Dodge, Zambia Agricultural Pricing Study, 1979 for 1966-1977 Mission estimates to 1979-82.

Table 3.2

Maize Imports and Exports (000 Tons)

Year	Imports	Exports	Net Imports Exports
1970		0.01	0.01
1971		8.06	8.06
1972		1.09	1.09
1973		50.01	50.01
1974		110.04	110.04
1975	39.00	16.06	(22.04)
1976	25.00	8.08	(16.02)
1977	401.06	25.06	(376.00)
1978	22.00	60.09	38.09
1979	71.00	0.00	(71.00)
1980	237.08	0.00	(237.08)
1981	98.04	0.00	(98.04)
1982	220.01	0.00	(220.01)

Sources: 1. NAMBOARD and MAWD.
          2. Bank of Zambia, Quarterly Financial and Statistical
              Review.

Transportation

Zambia's internal transport infrastructure is relatively well developed by the African standards (WB, 1984). Road transport is most important for moving maize from producers to major areas of consumption. The road network includes 4,000 kilometers of paved roads and 8,000 kilometers of gravel all-weather roads. Due to the prolonged dry period (6 months) during and after harvesting, transport could not have been a serious constraint on maize marketing in most parts of the country if it had not been for the limited number of small trucks

(within the national vehicle fleet) that are appropriate for use on rural roads.

As already discussed, maize is transported from farms to cooperative union or NAMBOARD rural depots on ox-carts, tractor-trailers or hired trucks. From the depots to storage facilities, maize is transported by carriers on contract with the cooperative unions. Before the creation of the nine Provincial Cooperative Unions, most of the intra- and inter-provincial maize trade was done by NAMBOARD and maize was transported from rural depots by Contract Haulage (CH) (a parastatal transport organization).

With the introduction of the uniform maize producer price (1972) for the whole country, and throughout the marketing season, there has been a tendency by farmers to sell immediately following the harvest. This overtaxed CH by making it unprofitable for private transporters to get involved in maize haulage. In this connection, the Bank of Zambia, in its Report and Statements of Accounts for the Year Ended December 31, 1977 (p. 19) made the following plea: "There should be some incentives in the form of rates paid to private transporters by marketing organizations. Such a policy will eliminate the current waste of produce brought about by lack of transport especially in the (remote) rural areas." The actual cost of transporting maize from the rural depots to union storage depots amounted to K 7.00 per ton in 1983.

Storage

In Zambia, maize is stored either by farmers who produce it or by the marketing organization that buys it.

Most of the maize stored by farm households is for non-commercial uses. Because it is the subsistence producer who retains a large proportion of his production for home consumption, most of the maize stored at the farm level is stored by traditional farmers. M. Newman (1977) pointed out that on-farm storage covers an interface between production and ultimate use, allowing lagged allocative decisions or intentional savings. He identified alternative purposes for which on-farm storage facilities can be used. These include:

1. As short run security in consumption, assuring food availability between harvests;

2. As a store of value, because stored grain can be used in sale, barter or transfer for obtaining other goods not produced at home;

3. As a way of providing social status, satisfying customary obligations;

4. As a means of avoiding risk (of a bad harvest, for example); and

5. For speculation, on the ability to reap gains bigger than storage costs and take advantage of price fluctuations.

Reasons for storing grain on the farm after harvest are influenced by existing differences in income, productivity and consumption patterns of households. For example, while low income households might be able to store grain for security in consumption, the relatively

small amount that they produce would be a constraint for storing grain for other purposes.

The maize marketed through channel 2 (private trade) is stored mostly in bags kept in houses of the traders or in market stalls. Because the amount of maize that flows through this channel is not substantial, only small quantities are stored by those engaged in this trade.

NAMBOARD and cooperative unions are responsible for storing the maize they buy for national food security purposes or until it is sold to millers or exported to other countries. The cooperative unions as already explained, buy maize from farmers and temporarily store it in their rural maize depots before transporting it to better storage facilities. The maintenance of panterritorial and panseasonal prices, have made it unprofitable for commercial farmers to store maize on the farms, thus shifting the entire burden of storing the marketed and marketable surpluses to the marketing agencies.

The Food Strategy Study (1983), which evaluated rural storage capacity in Zambia in detail, concluded that storage capacity is generally adequate, except in Luapula, North-western and Copperbelt provinces, where additional storage capacity is required if losses and transport costs were to be minimized. The study also pointed out that additional storage facilities will be required in the future at the district level, if maize production expands above present levels (WB, 1984). At present, there are several food storage projects underway that are to augment the existing storage facilities. Table 3.3 presents the available maize storage capacity in Zambia by province and

Table 3.3

Existing Maize Storage Facilities in Zambia (tons)

Southern	Silo	Covered Shed	Hardstanding
Livingston		3,600	56,000
Monze	15,000	27,000	33,000
Senkobo			2,250
Mayoba			2,250
Kaloma	(R)700		5,400
Taro			5,400
Choma	(R)700	2,100	45,000
Pemba		2,700	18,000
Koleya			28,000
Mazabuka		2,200	26,000
	16,400	42,600	221,300

Total Southern = 280,300 tons

Central	Silo	Covered Shed	Hardstanding
Kayubwe			28,000
Kapuysa			19,000
Chisamba	23,000	11,000	45,000
Natuseko	23,000		32,000
Kapiri Mposhi		3,600	30,000
Kabwe		7,200	12,000
Chambraba			5,500
Kakulu			13,000
Masansa	(R)700		
Mkushi	(R)700		13,000
Chillikwela			
	47,400	21,800	197,500

Total Central = 266,700 Tons

Lusaka	Silo	Covered Shed	Hardstanding
Lusaka	16,000	27,000	60,000
Chipongwe			2,700
	16,000	27,000	62,700

Total Lusaka = 105,700 Tons

Copperbelt	Silo	Covered Shed	Hardstanding
Chambeshi	15,000		55,000
Kitwe	23,000		52,000
Owena Mkubwa			107,000
	38,000		

Total Copperbelt = 145,000 Tons

Northern	Silo	Covered Shed	Hardstanding
	(R) 700		9,000

Total Northern = 9,700 Tons

Eastern	Silo	Covered Shed	Hardstanding
			19,000

Total Eastern = 19,000 Tons

North-Western	Silo	Covered Shed	Hardstanding
		6,000	4,000

Total North-Western = 10,000 Tons

Luapula	Silo	Covered Shed	Hardstanding
	(R) 700		15,000

Total Luapula = 15,700 Tons
5,400

Western	Silo	Covered Shed	Hardstanding
			16,000

Total Western = 21,400 Tons

Totals-Zambia	Silo	Covered Shed	Hardstanding
	119,200	102,800	651,500

National Total = 873,500 Tons

Source: NAMBOARD, 1985

by type of storage facilities. As can be seen from Table 3.3, large storage facilities are found in line-of-rail provinces. Table 3.5 is a district level analysis of the existing storage capacity for maize (in metric tons) in the Central Province, which includes Mumbwa the study district.

Table 3.4

Storage Capacity for Maize Central Province

Metric Tons

Storage Type		Hardstanding
District		
Kabwe - Main		30,960
Kabwe - Rural		-
	Sub-Total	30,960
Mkushi - Main		16,650
Mkushi - Rural		-
	Sub-Total	16,650
Mumbwa - Main		6,750
Mumbwa - Rural		-
	Sub-Total	6,750
Serenje - Main		1,800
Serenje - Rural		-
	Sub-Total	1,800
Total		56,160

Source: MAWD, 1984

Processing

Maize assembled through the official channels (cooperative unions and NAMBOARD) is sold either to private millers,[1] cooperative mills and

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[1]All the private milling companies were nationalized by the government following the December 1986, food riots (Times of Zambia, Dec. 25, 1986).

to public millers (National Milling Corporation and Industrial Development Corporation mills). The National Milling Corporation (NMC) and Industrial Development Corporation (INDECO) mills process the maize into mealie meal and animal feeds. World Bank estimates indicate that of the maize that is processed by NMC and INDECO, 86 percent is processed into mealie meal, 6 percent into animal feeds, 7 percent is sold to breweries for production of local beer (Chibuku) and the rest to other users. The bulk of the mealie meal processed by these organizations is consumed in urban centers as the major staple food. Table 3.5 shows the estimated flow of maize products from processing industry to consumers in the nine provinces in Zambia, while Table 3.6 presents a summary of maize allocations to millers among the nine Zambian provinces.

Maize that is processed through private millers is either processed by small plants owned and operated by private entrepreneurs competing with NMC and INDECO or by small hammer mills in rural areas. In some remote districts, maize, (like sorghum and millet), is still processed at the household level in the traditional way, that is, by hand pounding or grinding.

Table 3.5

Estimated Flow of Maize Products from Processing Industry to Consumers[3],
(Including Maize Meal, Beer and Feed)

FROM \ TO	Total Demand in Maize Equivalent (Bags x 1000)										Processing Industry[1]				NAM-[2] BOARD SALES
	SO	EA	NO	LUA	CE	LUS	CO	WE	NW	TOT	Un-used Capacity	Avail-able Capacity	Processed quantities Bags	% of Total	
Southern	737										160	897	737	12	14
Eastern		278										278	278	4	3
Northern			198								-	198	198	3	2
Luapula				233								233	233	4	4
Central					785							785	785	12	12
Lusaka			84	14	147	1,142		145			108	1,542	1,434	22	22
Copperbelt							2,062		9		566	2,735	2,169	35	38
Western								358				358	358	5	3
N. Western									174			174	174	3	2
Total	737	278	282	247	932	1,142	2,062	503	183	6,366	834	7,200	6,366	100	100

Notes: 1) Processing capacity available (including flour mills, breweries and feed processors) estimated on the basis of allocation of maize bags by NAMBOARD for 1981.

2) For comparison with the percentage of processed quantities in the various provinces, the distribution of NAMBOARD sales 1980 is given in percentage of the total sales.

3) Demand figures are given for 1977.

Source: NAMD, Food Strategy Study, Annex Storage, 1981.

Table 3.6

Maize Allocations to Millers by Cooperative Unions and NAMBOARD

Province	1981 Yearly Allocations	1983 Yearly Allocations
	(in 90 kg bags)	
Southern	1,010,400	1,087,200
Lusaka	1,935,024	2,046,240
Central	1,187,520	929,040
Copperbelt	4,087,400	3,509,040
Eastern	330,240	272,640
Luapula	33,720	233,520
Northern/ Western	166,752	268,320
Western	440,880	357,840
Northern	179,760	298,560
TOTAL	9,668,736	9,002,400

Source: National Agricultural Marketing Board, Grains Marketing Division, Planning and Stocks Control Department

Retailing

Mealie meal is distributed through licensed private and parastatal retail stores. These retail outlets obtain the maize meal either directly from NMC, INDECO, private millers, or parastatal wholesale agencies.

In general, milling companies deliver the processed maize to the retail outlets, using their own trucks. If the retailers obtain maize meal through a wholesaler, the latter are responsible for the

transport. Licensed private and parastatal stores or retail outlets sell the _mealie meal_ to consumers at a government fixed price, (which is uniform through out the country).

Farm households normally take maize from storage to grinding mills to have it processed into _mealie meal_. Non-farm rural households on the other hand, will either buy maize from neighbors, which they take to millers for processing or will travel to the nearest district center or urban area to buy _mealie meal_.

Costs

The cost of handling maize through the official marketing channel is high. The World Bank (1984) estimates that cooperative unions spend about K 41.36 per ton, while it costs NAMBOARD K 46.46 per ton for handling maize (Appendix B). A number of studies have revealed that these costs could be reduced by about 30 percent through better management of resources and reduction of stock losses (WB, 1984 and Food Strategy Study, 1983).

National Milling Corporation (NMC) costs for maize processing are equally high, amounting to K 48.14 per ton of maize in 1983 (WB, 1984).

In general most researchers that have evaluated the performance of these parastatal organizations, have concluded that both the marketing and processing of maize are costly operations and pose a serious constraint to future development of the crop (WB, 1984).

Distribution of Wheat

Wheat consumption is estimated at 200,000 tons per year, of which 90 percent is imported. The bulk of the wheat or its products is consumed by urban population.

The major problems facing domestic wheat production are: lack of well-tested technical packages (especially suitable variety), high production costs due to dependence on irrigation, high capital and management intensity. Because of these constraints, wheat is currently produced only by commercial farmers and state farms, using irrigation. The National Milling Corporation (NMC) is responsible for import and domestic purchase of wheat as well as for most of the milling.

The wheat flour processed by NMC is sold either to private and parastatal retail stores or to private and parastatal bakeries. Bakeries also sell their products to the private and parastatal retail outlets.

Distribution of Sorghum and Millet

Millet and sorghum are basically traditional crops, consequently only small quantities are traded. The little trade that takes place is in beer made from millet and sorghum. Provincial cooperative unions handle the small quantities of grain that are marketed through official channels, some other traded quantities are probably purchased direct by Chibuku Brewers.

Summary

This Chapter has examined the food grain distribution arrangements in Zambia by presenting a brief description of each stage in the marketing channel and the functions of the various participants.

Two basic ways of marketing food grains were identified. First, the grain can move through the official distribution channel, and second, food grains can be marketed through the unofficial distribution channel. However, the official food distribution channel was identified as the most important form of food grain marketing in Zambia. This distribution channel involves moving grain (mostly maize, the country's main staple food commodity) from producers, who are scattered all over the country, to major areas of consumption (concentrated along the line-of-rail).

Because of lack of an entrepreneurial class and the desire to eliminate what has been perceived as exploitation and profiteering activities by a few private traders, the Zambian Government has played a highly interventionistic role in food grain marketing. The major form of such intervention has been the establishment of state owned enterprises or parastatal organizations.

The Government takes steps to ensure that there is adequate infrastructure for food grain marketing. Thus, the aim has been to attain national food security through the provision of marketing infrastructure and product pricing. The costs incurred in maize and wheat handling and transport by marketing agencies (NAMBOARD and cooperative unions) are borne by the Government in the form of

subsidies. Thus the marketing agencies have always been dependent on Government subsidies as their major source of operating revenue.

Maize accounts for over 99 percent of all marketed food crops and it is marketed through the monopsonistic marketing channel consisting of cooperative unions (responsible for inter-provincial marketing) and NAMBOARD (responsible for inter-provincial marketing). The cooperative unions and NAMBOARD buy maize at a uniform price that is fixed by Cabinet Office after recommendations from the Ministry of Agriculture and Water Development (MAWD).

The Cooperative unions sell grain to private (private and cooperative mills) and public millers (National Milling Corporation and Industrial Development Corporation Mills) which produce meal and flour.

The coordination of this marketing channel has shortcomings caused by short supply of working capital, mismanagement, and the demanding control that must be applied in order to reduce losses. Government intervention in the food marketing system has eliminated private traders, consequently has introduced some monopolistic tendencies by the organizations that are allowed to operate.

The official food distribution channel is geared to move food grains out of the rural areas (the periphery) to urban centers, and in spite of their shortcomings, are more effective in doing so then coordinating the back-flow of grain to rural consumers. The highly dispersed rural population and the deterioration of the already poor road infrastructure during the rainy season partially accounts for an ineffective back-flow of food grains.

Maintenance of uniform prices for maize and wheat throughout the cropping season continues to create distortion in the food grain marketing system in Zambia. For example, rural maize producers are encouraged by the producer prices that do not reflect transportation and storage costs, and consumer prices that remain subsidized to market their maize which they otherwise would retain and repurchase for their own consumption.

In general, the present food distribution arrangements in Zambia are mainly geared to satisfy urban food security at the expense of rural households. For example, most of the marketed surpluses from rural areas are moved to urban areas following harvests, where there are more permanent storage facilities. When there are food shortages in rural areas, there are no facilities in which food can be moved into from storage facilities located in urban areas.

This chapter, like Chapter 2, constitutes a backdrop against which food security at the rural household or village level is analyzed in Chapter 5.

CHAPTER 4

RESEARCH METHODOLOGY

The purpose of this chapter is two fold: one is to describe the factors that influenced the selection of the study site; the other is to present the methods of collection and the limitations of the data that support the study.

Selection of the Study Site

Mumbwa, a rural district in the Central Province in Zambia was selected to be the study site (see Figure 4.1).   As discussed in Chapter 1, several factors influenced the selection of the study location.   These include: (1) physical characteristics of the district; (2) its food grain production;   (3) its population characteristics; (4) its transportation infrastructure; (5) language(s) spoken; (6) local institutions; and (7) its geographic location.   Each is discussed in detail below.

Physical Characteristics of the Area

Agro-ecologically, Mumbwa belongs to the Central, Southern and Eastern Plateau zone (see Figure 2.2).   This zone, generally contains some of the most fertile soils in the country, and is characterized by

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a moderate rainfall of 800 to 1,000 millimeters (with rains beginning in early to mid November and extending until the end of March). However, it should be noted that the rainfall exhibits a high degree of variability.

As discussed in Chapter 1, the climatic and soil conditions of an area are the main determinants of the physical environment and the land use potential. Therefore, going by the above climatic and soil conditions, most parts of Mumbwa district can be considered to be suitable for both food crop and livestock production. Because of the good agro-climatic conditions found in the district, permanent systems of agriculture are feasible and potentially high yields of maize, sunflower, tobacco and other annual arable crops are possible (WB, 1984).

In view of the fact that Mumbwa district has the physical potential to increase its food production which, in turn, can reduce food insecurity, it was considered to be a good site for this study.

Overall, because of the good climatic conditions in Mumbwa district with good production and marketing policy Mumbwa can help Zambia overcome some of its food security problems.

Food Grain Production

Maize being the main staple food item among the rural people in Mumbwa district, is not only the major food crop produced, but it is also the major agricultural activity in the district (see Table 4.1). (In Zambia the term food crops, refers to the major crops of maize, wheat, sorghum and millet). As already alluded to, for rural food

security analysis to be realistic in Zambia, production, distribution and/or consumption of maize should always be taken into consideration.

Table 4.1

Production and Consumption of Food Crops in Mumbwa District

1980 and 1981

Crop	1980		1981	
	Production	Consumption	Production	Consumption
Maize (90kg bags)	321,206	220,418	470,199	245,022
Wheat	-	-	-	-
Sorghum (80kg bags)	13,671	10,279	N.A.	N.A.

N.A. = Not Available

Source: Ministry of Agriculture and Water Development, Lusaka, 1983.

FIGURE 4.1   MUMBWA DISTRICT
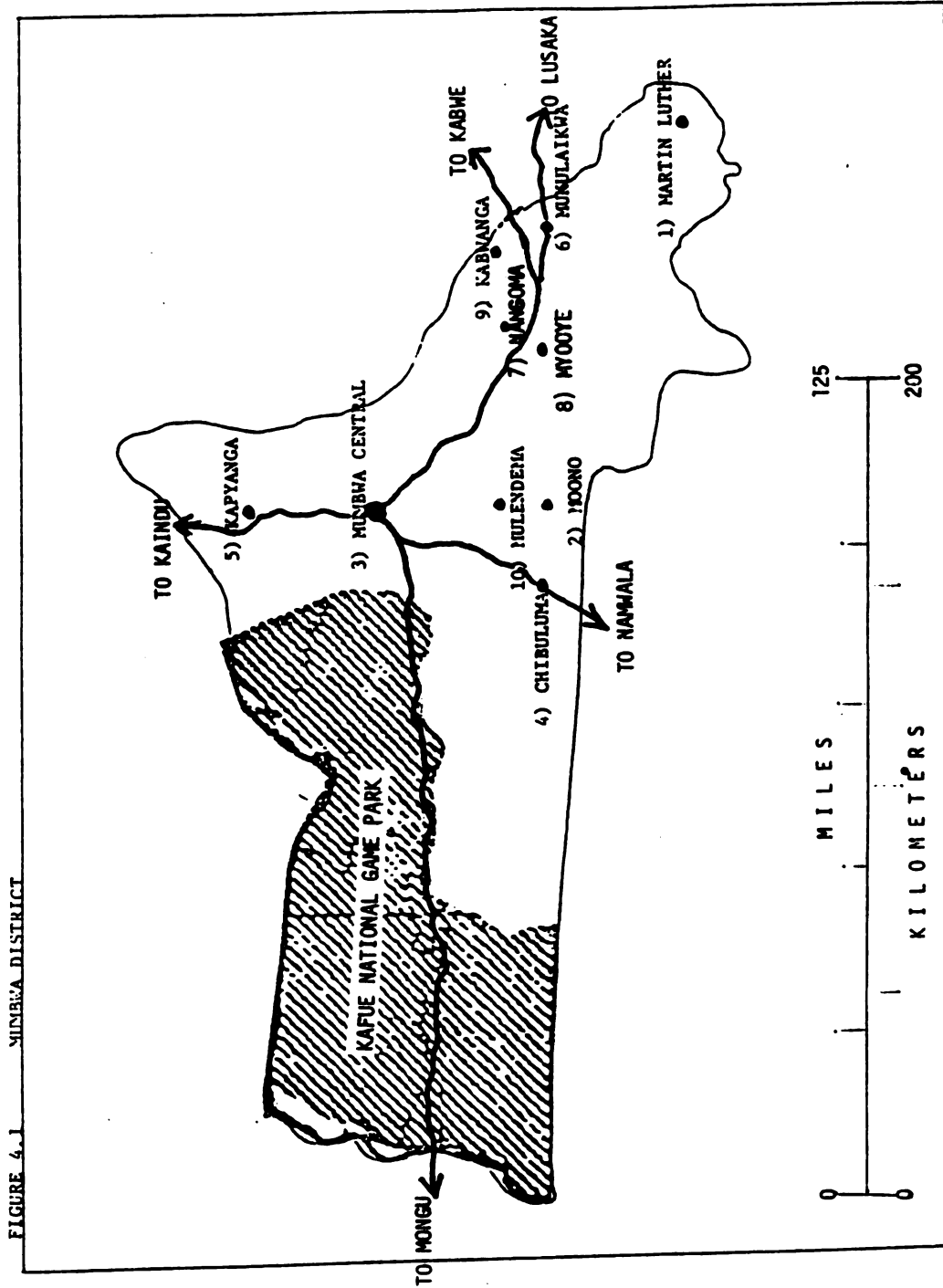
SOURCE: Adopted from the World Bank, Zambia Policy Options and Strategies for Agricultural Growth.
(Report No. 4764 - ZA)

Table 4.2

Central Province: Population Distribution by District

1963, 1969 and 1980

District	1980 Census	Average Annual Growth Rate(%) 1969-80	1982 Census	Average Annual Growth Rate(%) 1963-69	1963 Census
Mumbwa	81,976	2.9	60,138	1.9	53,848
Mkushi	71,949	2.1	56,992	0.9	53,973
Serenje	73,752	3.1	52,981	-1.0	56,181
Kabwe Rural	142,523	1.4	122,570	5.8	87,255
Kabwe Urban	143,635	7.3	65,974	2.1	58,150
C. Province	513,835	3.3	358,655	2.5	309,407

Source: CSO, 1980 and Population Census, 1981.

Population and Population Distribution

Mumbwa district had an estimated population of 81,976 people in 1980, which represented about 15 percent of the population in the province (Table 4.2).   Out of the 81,976 people in the district, 87 percent lived in rural areas and the remaining 13 percent live in Mumbwa Township, which is the district headquarters and the only urban township in the district.

The population density in the study area can be described in terms of the population distribution in the country.   The most densely populated area in Zambia is the area along the line-of-rail, with over 40 percent of the total population in the country living within 40

kilometers of the railway line. In this well developed industrial and agricultural zone, are located all sizeable urban centers in the country, with an estimated population density of 35 persons per square kilometer (see Figure 1.1). The area outside this zone (known as the periphery) is relatively sparsely populated, with population densities varying from 2 to 11 persons per square kilometer (CSO, 1981).

Mumbwa district belongs to the periphery and has an uneven population distribution. Eastern parts of the district are more populated than areas in the west. The plausible explanation for this is the fact that some areas in the west are infested with the tsetse fly, which causes sleeping sickness and some other trypanosome infections in man and domestic animals.

Villages in the study area, had relatively high population densities, when compared with some remote rural districts. This made it easier to draw study samples within a small geographic area. One of the empirical issues addressed in this study was the determination of linkages that exist between food deficit and food surplus zones within the study district. To be able to study such an empirical issue, it was important to have surplus production in some zones of the district, as well as sufficient demand within the study area.

Internal Transport Infrastructure

In Mumbwa district, the only form of transportation is by road. The road network includes; the Lusaka-Mogu road, which almost bisects the district and is the only tarred road in the area (see Figure 4.1). The rest of the road network includes gravel (all-weather) and paved

roads. Although the research was carried out with limited resources, the relatively well developed internal transport infrastructure in Mumbwa, facilitated the research activity. Furthermore, because of the relatively well developed internal transport infrastructure, food can easily be moved from food surplus households to food deficit households within the zone or other zones within the district. However, this requires the development of a well coordinated food distribution system.

Local Language

The majority of the people in Mumbwa rural cannot read or write English, which is the official language of Zambia. For this reason, knowledge of a major local language becomes an important asset to the researcher, especially when research subjects have to be interviewed.

Ciilenje and Ciitonga, which are closely related, are the two main languages spoken in the study area. The researcher can speak these two languages and this was one of the reasons for selecting the district as a study site.

Geographic Location

Even though Mumbwa district belongs to an area known in Zambia as the periphery, it has an advantage over most remote rural districts because of its proximity to Lusaka, the capital city. Agricultural products and inputs can easily be moved in and out of the district. If the food distribution system was well coordinated, the flow of food from permanent food storage facilities located in urban areas to food

deficit households could be faster than in most other rural districts. This probably could reduce the amount of grain that is stored on the farms. Therefore, the location of Mumbwa district with respect to the line-of-rail zone was an important factor that was taken into consideration because it enabled us to examine market linkages that exist between the periphery and the modern enclave sector.

Another factor considered in the selection of Mumbwa district as the study site was its physical location with respect to other rural districts. Mumbwa district links the Western Province of Zambia to the provinces along the line-of-rail. Parts of the Western province are known to have chronic food shortages. Therefore, Mumbwa district was selected to help us determine if there were any market linkages between rural areas.

As mentioned in Chapter 1, at the time the field research was being conducted, there were sporadic fuel shortages in the country. To facilitate the research process, it was important to conduct the research in an area close to Lusaka where fuel shortages were less serious than in most other places in the country.

Relevant Institutional Arrangements

If useful information is to be obtained during a research activity, the researcher has to establish good rapport not only with research participants, but also with traditional and local government authorities. In this selection we present a brief discussion of the local institutions that played important roles during the field survey:

Office of the District Governor - The District Governor appointed by the President is the head of the district. His or her role is to coordinate all political and economic development efforts in the district on behalf of the national government. Under his command are various public and semi-public institutions. As discussed later in the chapter, the office of the District Governor made it possible for the survey team to obtain assistance from various departments and individuals in the district. For example, the Office of the District Governor contacted the District Agricultural Officer, who in turn, contacted his field officers to prepare the list of households in their respective agricultural campus and also made arrangements for our accommodation. Furthermore, the office of the District Governor authorized the Mechanical Services Department (MSD), which falls under its jurisdiction, to service and repair the vehicle, without paying for labor costs.

Department of Agriculture - The Department of Agriculture is controlled by the Ministry of Agriculture and Water Development. This department concentrates most of its efforts on agricultural extension in the district. For this purpose, the district is divided into numerous administrative zones, known as agricultural camps. Each camp in turn, comprises of a cluster of villages, and is supervised by an agricultural extension officer based at a camp station. As discussed later, the sampling procedure used in selecting study units, was based on these pre-existing agricultural administrative arrangements.

Research Design and Instruments

The research procedure included collection of both primary and secondary data, and a review of literature pertinent to rural food security in developing countries. As discussed elsewhere in the Chapter, two distinct groups were involved in the study. The first group, consists of both farm and non-farm rural households. It is this social group that is the main unit of analysis in this study. The main thrust of this study was to examine individual households' food production and disposition behavior in relation to food security of these families. It was hoped that from this study we could learn or determine those strategies and mechanisms households use in minimize short run food security problems.

The second group consists of private traders and food grain marketing organization(s) that operate in the study area. This group was included in the study simply because it plays an important role in household food security, in the sense that private and public marketing channels are responsible for moving the food from the producer to the final consumer, supposedly at the right place and form.

In order to be able to generalize the findings of this study to all households in the study area, a scientific approach was used in selecting the study group. The instruments used to obtain a representative sample of the study population are discussed in detail in the sections that follow.

Data Collection Methods

Spencer (1973) recognized four basic methods that could be used in collecting micro-level data from farmers and/or rural households in developing countries. Only two that are relevant to this study are discussed here:

Cost-Route or Cost Accounting Method - This method involves conducting repeated interviews with respondents once or twice a week for a given period of time. The idea is to obtain precise information, regarding resource use and various decisions research subjects making in their socio-economic activities. Because this method calls for repeated interviews over long periods of time, it is expensive.

Farm or Household Business Survey - This method of collecting primary data is generally used for agricultural and other economic surveys where relatively simple information has to be generated over relatively large areas in a short period of time. This method tends to be cheap, though observational errors might be large due to fewer farm or household visits.

Because this study analyzes socio-economic variables, the cost-route method could have been more appropriate had it not been for limited funds. Consequently, the farm or household business survey method was employed in collecting data.

Survey Period

As many writers have pointed out, one of the most common problems researchers in developing countries face is lack of data. Either official sources do not have the data or the data they may have, may

not be accurate (Ejiga, 1977). For these reasons, researchers in most cases, have to collect primary data themselves. If accurate and reliable data are to be collected, timing of the research process becomes extremely important. Fiedlier (1978), identified two kinds of time that should be taken into consideration when conducting research. These are occurrence and duration. Occurrence refers to the chronological time, hours, and dates. In this case, the field work began towards the end of harvesting period (July). This time of the year was chosen because it permitted us to observe respondents' food grain disposal activities.

Duration refers to the actual length of time occupied by the research task and the preparatory time needed to set up the work. Planning and data collection for this study took almost a year to complete. The actual field survey was conducted between June and November 1985.

Data Collection

Data for this study was collected from primary and secondary sources. Primary data was mainly collected from selected rural households. National, provincial and district information on population and population distribution, food production estimates, and marketed output was obtained from various publications of the Bank of Zambia, Central Statistical Office (CSO), National Agricultural Marketing Board (NAMBOARD), World Bank, Mumbwa Township and Rural Councils, and the Ministry of Agriculture and Water Development (MAWD). Data regarding food grain marketing in Mumbwa and Lusaka food markets,

such as retail prices, transport costs and market charges, were obtained from traders and monthly council reports. Data on official maize prices, which was collected to compare with the information that was obtained from farmers was collected from the Central Province Cooperative Marketing Union (CPCMU).

Units of Study

The study units comprised of both farm and non-farm rural households, food traders and food grain marketing organization(s) operating in the study area. Basically, these study units were composed of individuals and organization(s) that are involved in the rural food grain production, distribution and consumption system.

Household Unit

In Zambia, like in many other African countries, the traditional concept of family, implies that the consumption unit is also the production unit. That is, people who live together, work together to produce the food. Norman (1973) and Spencer (1972), both using it in a West-African context, defined a family household as all people who eat from the same pot.

Because of the strong link between farm family and rural household among Zambian rural communities, the two terms have come to be used interchangeably in Zambia's rural development literature.

Marketing Organizations

As outlined above, secondary data used in this study was obtained from official reports of public organizations that are directly or indirectly involved in food grain marketing in the study area. Data regarding levels of food grain production and marketed tonnage was obtained through reports issued by various government departments. Specifically, information on national, provincial and district production levels were obtained from NAMBOARD, CPCMU, Bank of Zambia and the Central Statistical Office (CSO) reports. Information on maize producer prices and the number of maize producers in Zambia as a whole was obtained from the World Bank and International Fund for Agricultural Development reports.

The Survey Process

As already mentioned, if useful information has to be obtained during a research process, it is important for the researcher to establish good rapport not only with research subjects, but also with traditional and local government authorities. To accomplish this, a number of traditional and government leaders were contacted before the actual survey was conducted. Meetings were arranged with the local leaders, at which the purpose of the study was explained.

Notable among these were:

(a) The District Governor, who in his official capacity as the head of government for the district, sanctioned the research. He also provided the research team with an introductory

letter, which was carried around throughout the survey period.

(b) The District Agricultural Officer, who provided the research team with a list of agricultural camps in the district. He also assigned one of his officers to travel with the research team. The assigned officer proved to be useful in the sense that he knew how to get to different places in the study area. He also gave a brief account of the various social and economic activities of the selected study regions and taught us about the appropriate etiquette for visiting rural families and interviewing them.

(c) Three traditional chiefs living close to agricultural stations were approached to obtain permission to carry out the survey in their respective areas.

After visiting with local leaders, a random selection of study units was carried out. A detailed description of the sampling process is given later in the chapter.

Selection and Training of Enumerators

As already pointed out, rural studies in developing countries, and Zambia is no exception, involve dealing with a populous which is largely illiterate. Because most rural people cannot read and write, they do not keep records on their farming activities (Spencer, 1973).

Consequently, researchers seeking information on socio-economic activities of these people, have to conduct interviews themselves or use enumerators to collect the data. When enumerators are used, they become an important link between the researcher and the research subjects. Thus, their importance cannot be overemphasized.

In this study, two high school graduates were hired to assist in collecting data. Their selection was based on the following criteria:

(a) Their ability to speak and write at least one major language spoken in the study district.

(b) Their knowledge about local customs and traditions.

(c) Their willingness to bear physical hardships prevalent in many rural areas.

Before the actual survey was conducted, a one-week intensive training program was organized for the enumerators. The training program was designed to accomplish the following: (1) introduce the enumerators to the background and objectives of the study; (2) describe and give instructions on the tasks to be accomplished during the survey; (3) explain some technical concepts used during the survey; and (4) expose enumerators to "role playing" as a way of espousing active participation. For example, "mock" interviews, where one enumerator played the respondent while the other played the interviewer, were

repeatedly conducted. At the end of each simulated interview, performance of the interviewer was evaluated and weak points corrected.

During the training period, the interview schedule was also translated from English into Tonga and then back into English. According to Hershfield et al. (1976), back translation serves several purposes. Relevant to this study are: (1) it helps enumerators to develop knowledge and understanding of the interview schedule which they would never have obtained by merely reading it in the original language; and (2) it is supposed to allow the researcher to identify local colloquialisms.

Pretesting and Validation of Interview Schedule

The interview schedule was pretested by the researcher with the help of the two enumerators and an agricultural extension officer in Lusaka rural and Mumbwa Central. The pretesting that was done in Lusaka rural was conducted at the time when enumerators were being trained.

The pretesting was done to ensure the clarity and ease in collecting data using the instrument. Feedbacks were obtained from the respondents and the agricultural extension officer with respect to their understanding of the questions. It was on the basis of the feedbacks that the final interview schedule was constructed.

Field Data Collection Method

As indicated elsewhere, the data was collected by the researcher and the two enumerators. During the first week of the survey,

enumerators took turns in conducting interviews in the presence of the researcher. In the evenings, meetings were held to critique performance of each enumerator and suggestions given for improvement. This was done to ensure that the right type of information was collected. All information missed or doubtful were checked with respondents first thing in the morning.

The survey team stayed at agricultural stations in selected camps. From each station, the team would drive into villages selected for study to interview households. Once all selected households were interviewed, the research team would move to another agricultural camp.

Sample Design

To minimize the risk of sampling bias, and to be able to draw inferences from a sample about the population from which the sample was drawn, probability sampling was used in selecting the households. Dillon and Hardaker (1980), define probability sampling as a term used in describing the various ways of drawing a sample such that every member of population has an equal probability of being selected for the sample and that probability can be estimated with reasonable precision.

Although a number of sampling procedures are available, the multistage procedure was found to be more appropriate for drawing the sample for this study. Multistage sampling is a process of selecting a sample in two or more successive, contingent stages. In other words, multistage sampling is a special case of cluster sampling, which normally is a two or more stage procedure in which the target population is first divided into groups or cluster from which a sample

of clusters is drawn by random or systematic sampling (Dillon and Hardaker, 1980). Two major factors influenced the adoption of this procedure. First, information on location and distribution of households in the study villages was lacking and, therefore, it became necessary to divide the target population into large clusters of agricultural camps as primary sampling units, then into medium cluster elements (villages) as secondary sampling units, and finally selecting a large number of households to represent all the study subjects in study area.

Second, because transport costs, particularly costs of fuel and vehicle spare parts were so prohibitive, the survey could only be conducted in a relatively small geographic area.

Three basic steps were followed in drawing the sample for this study:

(a) From a cluster of 21 agricultural camps, ten were randomly selected for study. As already pointed out, selection of few camps was necessary to reduce time and costs involved in travel, which at the same time, allowed for greater quality control of the interviews.

(b) The second stage involved drawing a list of villages in each selected camp and then sub-sampling villages to be studied. A total of 26 villages were randomly selected for study in the 10 agricultural camps.

(c) The final stage of the sampling process involved taking a census of the number of households in the selected villages. Because distances involved between households could not be estimated before hand, it became necessary to sketch maps showing approximate location of households while the census was being carried out. Only households that were physically located in the villages continuously, regardless of how brief a time they have been there, were included in the household census. To identify a household, a survey definition developed by Gucelioglu (1973), was adopted. Gucelioglu defined a household as one person or group of persons with or without family relationship who live in the same house or a set of houses, who share meals, earnings and expenditures and take part in the management of the household and who render services to it.

From completed household census lists, a sample of 194 households was drawn using random numbers. Household sampling was based on the principle of proportions. That is, if a village contained say, 6 percent of the total number of households censured in all selected agricultural camps, then 6 percent of the sample members would come from that village.

Sample Size

A number of factors influenced the size of the sample. First, the number of interviews each enumerator could most effectively conduct in

a single day was important. Due to the length of the interview schedule (Appendix C) it was determined during the pre-test period that one enumerator could complete two interviews in a single day. In fact, because of the length of the interview schedule some interview sessions had to be split into two after some respondents, particularly farmers with many farming activities, had complained of getting tired half way through the interview. Second, dispersion of households was important. In Mumbwa, although villages have relatively high population densities (consequently, high degrees of land occupation), familiarization tours showed that agricultural production is spread out over very large areas. Thus, some households in the same village could live as far as 15 kilometers apart. Third there was limited resources. At the time the survey was being conducted the Zambian Government announced new economic austerity measures which caused most commodity prices to double. The most affected were fuel prices which increased more than threefold. Finally, there were fuel shortages. Besides the increase in fuel prices during the survey period, there was also a general shortage of fuel due to foreign exchange problems the country was experiencing at the time.

These constraints led us to limit the geographical area covered by the survey and to restricting the sample size. The selection of the study sample was done in a manner that the derived results would represent the broader audience of elements. Hence, an attempt was made to choose the most appropriate sample size.

There are several statistical methods that are available for determining the appropriate sample size. However, in the African

condition, the determination of the sample size in relation to the required sampling error is a pious aim rather than a practical possibility. Hence, the size of the sample for this study was guided more by the constraints faced in the field rather than a statistical formula, which would have required making a number of unrealistic assumptions.

As already discussed, when we arrived in the district we did not find prepared household lists nor any information about the number of households in Mumbwa rural. Because of the resource constraints and also because fuel was only available on sporadic and limited basis throughout the country, it was not possible for us to go out and conduct a census of all the households in the study villages. For this reason, a census was conducted only in 10 out of the 21 regions in the district. This process took almost one month to accomplish. From the prepared household list we sampled 20 percent of the households; and the sample size turned out to be 132. We recognize that this may not be the best way of conducting a scientific research, but under the circumstance we had no other choice.

To obtain 132 completed interviews, more than that number of households would be required. Pre-test experience taught us that some respondents would not be available for interview even after making several appointments. While some would fail to keep interview appointments, other would simply refused to cooperate during the interview. To take account of the dropouts and other related contingencies, household selection target was increased to 194.

The selection of the number of households to be interviewed was determined by using an equation developed by Warwick and Lininger (1975)[1]. According to this equation, a target of 132 completed interviews can be determined by estimating the rates of occupancy and completion of interviews. In this study, 80 percent rate of occupancy (i.e. dwelling use rate) and 85 percent rate of interview completion were assumed. With these rates, the number of households to be selected turned out to be 194. The calculations are shown in the footnote 1, while Table 4.3 shows the distribution of the 132 respondents actually interviewed.

Table 4.3

Distribution of Samples in Study Regions

| | Study Units | | |
Region	Farmers	Non-Farmers	Households
Martin Luther	11	0	11
Myooye	13	0	13
Mumbwa Central	16	2	18
Chibuluma	6	0	6
Kapyanga	15	1	16
Mukulaikwa	21	1	22
Nangoma	14	0	14
Moono	8	0	8
Kabwanga	8	0	8
Mulendema	16	0	16
Total	128	4	132

Source: Author's Rural Food Security Study Data, 1985.

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$$\frac{\text{Completed}}{\text{Interviews}} = \frac{\text{Completed inter-}}{\text{view rate}} \times \frac{\text{Dwelling}}{\text{use rate}} \times \frac{\text{Households to}}{\text{be selected}}$$
$$132 \qquad (.85) \qquad (.80) \qquad (H)$$

$$(H) = \frac{132}{(.85)(.8)} = \frac{132}{(.68)} = 194$$

Types of Data Collected by the Survey

The general aim of the field survey was to gather quantitative as well as qualitative data on food grain production and disposition activities of rural households in Mumbwa district. Given the fact that most households generally engage in many farming and other economic activities, a wide variety of data was collected.

As already indicated, both primary and secondary data were collected during the survey. Primary data was collected from a randomly selected sample of households, while secondary data was collected from the several public organizations that are involved in food grain marketing. These include the Ministry of Agriculture and Water Development, NAMBOARD and the district councils.

Household Data - Cross sectional data (that is data taken at a fixed point in time) was collected from households. Accuracy of cross-sectional data depends mainly on the ability of the respondent to remember information requested. It was therefore, decided that only information covering two cropping seasons (that is, 1983-84 and 1984-85) be collected. A two season period was chosen because we recognize the fact that memory recall is likely to be poor due to events being relatively old or unimportant in the daily activities of a respondent.

The overall objective of this study is to provide a better understanding of rural household food security problems in Zambia. Therefore, the interview schedule was structured such that relevant, but simple food production and disposal information was collected.

The household background information was obtained in the first section of the interview schedule. The information collected included

household demographic data. This information is important to this study because it influences the amount of food produced, marketed and consumed by individual family households.

The second section of the survey instrument was used to collect data concerning the size of the farm operations, type of crops cultivated and farm assets and structures. This information provided statistics on the households' agricultural production and income levels, which affect household food security. The last section of the interview schedule collected information on households' food grain production and on-farm storage facilities. As discussed in Chapter 5, this information was collected because it provides a general picture of the ways by which farm households in rural areas allocated their food supplies to different uses between harvests. Knowledge of how farm households dispose of their food grains in turn, provide a general indication of rural food security.

The data collected included the following:

- Household characteristics (family size, family composition, household income, etc.);

- Acreage and production of food grains;

- Storage and sales of food grains;

- Food grain uses;

- Food grain flows;

- Food grain price information;

- Food grain distribution arrangements;

- On-farm storage Information (such as storage structures, storage capacity, storage costs, storage losses);

- Measures households take to guard against poor food harvests;

- Sources of information on food supply and demand

- Household food grain requirements.

Data Preparation and Analysis

The interview schedule was coded and cleaned while in the survey area. This was aimed at checking and immediate action of verification.

The coded information was punched onto cards and stored on tape with the use of minicomputer - Data General MV 4000 in Lusaka. Unfortunately the tape could not be read by the mainframe computer at Michigan State University. Therefore, the data had to be re-coded and put on tape again. With the help of a computer analyst in the Department of Agricultural Economics, the data was retrieved and processed using SPSS-X.

Data Limitations

The sources of information referred to above provided a large data base, but in many respects they also presented some limitations that are addressed in the chapter that follows. The following comments are meant to serve as an overview.

The household data is in most cases, a single or a two year cross-sectional set and as such, presents limitations as to the representativeness of the household behavior that can be derived. In addition, the fact that the respondents were mainly heads of households

introduces some bias in the data. This is because the heads of the households may have good memory of the activities they performed, but their recollection of the activities of other members of the household may not be as good as their own. This was not an oversight on the part of the research design; but was rather, imposed upon by the fact that in most Zambian rural communities, other members of the households, especially women, are reluctant to answer questions without permission of the head of the household (husband).

Another problem of the household data is that although the survey covers a two seasonal period (1983-84 and 1984-85), some market activities from the 1984-85 season had not yet been performed during the survey. For this reason, households were asked to estimate some of the data, such as the expected number of maize bags to be sold. This partial coverage of the market season, prevented us from following all the disposal activities of food grains from one harvest period to another. Consequently, this puts a restriction on the analysis.

A further short-coming of the information used in this study is that data collected from secondary sources such as monthly reports of township councils and government agencies had a number of gaps in them.

CHAPTER 5

FOOD SECURITY AT RURAL HOUSEHOLD AND VILLAGE LEVEL

Introduction

This chapter utilizes the information that was obtained during the field survey to analyze the food grain production and disposal patterns at the household level. Unlike Chapter 2 and 3 where attention was focused on food grain production and disposition at the national level, in this chapter, attention is focused on individual households at the village level. Thus, attention is shifted from macro level analysis to micro level analysis.

It may be recalled from Chapter 1 that food security was defined as the ability to meet target consumption levels on a yearly basis in the face of fluctuating production, prices and incomes. This definition clearly focuses on both the ability to acquire as well as the availability of food. At the village household level, these two concepts (i.e., ability to acquire and availability) are influenced by households' production and disposal behavior and ability to buy. Therefore, the examination of households' food production and disposal patterns is important to this study, because they affect individuals households' access to adequate and reliable food supplies.

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Food security has a chronic as well as transitory dimension. Chronic food insecurity (i.e. the continuous inadequate access to food) is a problem which affects households that chronically lack sufficient purchasing power. Transitory food insecurity on the other hand, is a problem that concerns fluctuations in household income, food consumption and the unavailability of food at national as well as village level. In this connection, transitory food insecurity is concerned with temporary lack of access to sufficient food supply. This study focuses its main attention on the transitory food insecurity at the village level and attempts to identify some of the strategies and mechanisms households use to alleviate this form of food insecurity.

Specifically, this chapter will attempt to answer the following questions:

(1) Are households self-sufficient in food grain production and if yes, to what extent?

(2) Are there surplus food producing regions in the study area?

(3) What exchange arrangements exist between food surplus producers and food deficit households?

(4) Do farm households that sell food grains also buy it back?

(5) Do food deficits rural households have access to urban food markets?

(6) What strategies and mechanisms do rural households employ to minimize food insecurity between seasons.

To be able to answer these questions, the following were investigated: (1) food production and disposal patterns of households, such as types of food grains produced, area planted, and quantity harvested; (2) timing of sales or purchases of grain; and (3) utilization of on-farm storage.

To be able to analyze food security at the rural household or village level it is important to examine some of the characteristics of the households that influence their security in consumption.

Household Characteristics

As already mentioned, rural households were the main research subjects of this study. In Chapter 4, a rural household was identified as one person or group of persons with or without family relationships, who live in one house or set of houses that are in the same geographic location, who share meals, earnings and expenditures and who take part in the management of the households and render services to it. Hence, a rural household is a basic production and consumption unit, which is responsible for making various farming decisions. Therefore, knowledge of the household characteristics that influence food production and disposal becomes important to this study because they directly or indirectly affect household food security.

Size of Households

A household in Mumbwa rural generally consists of a family or group of families living together and is commonly referred to as a

munshi in Lenje or munzi in Tonga.[1] The composition of a munshi (or munzi) normally includes one or two male adults with their wives and children. Since a munshi (or munzi) is both a production and consumption unit, members (or some members) of a household are responsible for making farming and other socio-economic decisions.

During the field survey, respondents were asked to provide information on the size of their family households. This type of information is important to this study in two ways: First, the number of persons per household determines, to large extent, the amount of food that household can produce. Second, the size of a family household also determines the amount of food made available for sale. In turn, the amount of food rural farm households sell affects the food security of food deficit rural households.

Reutlinger (1984) observed that in many developing countries, household food insecurity arises for two main reasons: enough food may simply not be available from production and storage. On the other hand, some family households may not be able to acquire or purchase food despite its availability among other farm households or in the local markets. In both cases, the size of the households plays an important part. In the first situation (i.e. where enough food is not produced or stored), the main cause, can be attributed to shortages of family labor. This was confirmed by Housbaum (1964) who observed that among sedentary farm households in sub-saharan countries who practice

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[1]The Lenje and to a lesser the Tonga are the two main groups of people found in Mumbwa rural.

slash and burn-hoe or ox-drawn plow system of agriculture, labor was the most scarce commodity or input.

In the situation when households are unable to acquire or purchase food, Reutlinger attributed this inability to the decline in family incomes or increases in food prices, combined with the exhaustion of family reserves. In such a case, it is obvious that large family households are affected more by fluctuations in income and prices. As already mentioned, most rural households in Zambia, produce much of what they eat. It is possible, therefore, that some households may not have enough to eat simply because they may not have enough hands to produce it or may not have the money to buy it.

Table 5.1 shows the distribution of the average size of the households in the survey regions.

Table 5.1

Characteristics of the Households in the Study Sample

Information	Regions									
	1	2	3	4	5	6	7	8	9	10
No. of Households	11	13	18	6	16	22	14	8	8	16
Average Family Size										
Small	6.3	6.7	6.9	6.4	5.8	6.2	7.0	6.0	7.1	6.7
Large	12.3	9.8	11.7	13.9	10.8	13.4	12.8	10.7	9.9	12.6
Average No. People Fed 1984										
Adults	5.6	6.7	5.8	7.1	6.4	5.3	7.0	5.2	6.6	5.9
Children	7.6	6.8	10.9	6.9	8.9	9.8	8.7	7.8	9.7	8.6
Household Heads										
Male	10	11	16	6	13	21	12	7	6	16
Female	1	2	2	0	3	1	1	1	2	1
Education Level										
None	4	4	6	2	5	7	5	3	3	5
Primary	6	8	10	3	9	13	8	5	5	10
Secondary	1	1	2	1	2	1	1	0	0	1
College	0	0	0	0	0	1	0	0	0	0

Source: Author's Rural Food Security Study Data, 1985.

Where: Region 1 = Martin Luther   6 = Mukulaikwa
2 = Myooye   7 = Nangoma
3 = Mumbwa Central   8 = Moono
4 = Chibuluma   9 = Kabwanga
5 = Kapyanga   10 = Mulendema

The results presented in Table 5.1 show that the average size of the households in the survey regions varied from 6.5 persons for small households to 11.8 persons for large households. Although 11.8 is shown as the average size of large family households, there were several households with more than 15 family members. The statistic

obtained is relatively small because of a relatively large number of households that reported having 10 to 13 family members. Another important point worth noting about large households is the fact that most of them are polygamous. The belief among the respondents with polygamous families is that they are more food secure than small family households. This stems from the argument that a man with several wives and children has a distinct advantage in food production because he calls upon all his family members during the most labor demanding farming activities, such as weeding and harvesting.

Number of People Fed Per Household

One of the main food security goals is to ensure access of individual household members to a nutritionally adequate diet (Eicher and Staatz, 1985). Unfortunately, as Reutlinger has pointed out, still too many people in developing countries (estimated to be 350 to 750 million), have incomes that are too low to allow them to acquire adequate amounts food.

In order to have some notion of the number of people each household was feeding and the composition of family labor for each household, respondents were asked to indicate the number of adults and children they fed during the 1984-85 season.

The results obtained are given in Table 5.1. According to these results, the average family household was feeding 6.2 adults and 8.6 children during the 1984-85 season.

Distribution of Heads of Households

It is said that in most Zambian rural communities, food production and consumption decisions are made by heads of households. Furthermore, heads of households are said to be the determinant of the technological packages that may be required to improve crop production. These decision-making processes are important to this study because they affect household food security. Thus, during the field survey, information on the distribution of the heads of households between males and females in the study sample was obtained.

The results are given in Table 5.1, and show that out of the 132 respondents interviewed, 118 were males and only 14 were females. Stated in another way, about 89 percent of the households in the study sample were headed by males and 11 percent were headed by females. These results are consistent with general conclusions found in the literature which assert that most rural households in Zambia are headed by males. This is particularly true in most of the nine provinces except in some regions of the Northern and Northwestern provinces where the number of female headed households has been increasing in recent years due to out migration of males to urban areas (WB, 1984).

The survey results also show that all the 14 women that were interviewed were either widowed or divorced. Further inquiries with local opinion leaders in Mumbwa rural revealed that a household is never headed by a female who has never experienced marriage.

Level of Education

Education is an important element of human and economic development. In order to have a general idea about the level of education of the people in the study area, respondents were asked to indicate the highest level of education they had attained. For this study, respondents were asked to select the most appropriate level of education they had acquired from the following four categories:

     (a)   No formal education acquired

     (b)   Attained primary education

     (c)   Attained secondary education

     (d)   Attained college education

The distribution of the answers given by the respondents is presented in Table 5.1. The results indicate that about 33 percent of the heads of households interviewed had no formal education, 58 percent had some primary school education, 8 percent had attained some secondary school education and less than 1 percent had college education. These results are consistent with the generalization made in Chapter 4 that most rural people in Zambia have little or no education.

Respondents with primary school education were asked if they can still read and write. The results are rather interesting because over 80 percent said that they had forgotten how to read and write. A number of studies that have examined this problem have attributed it to the village environment which they say is not conducive to learning or reading (ILO, 1981).

The low percentages of people with secondary and college education can be attributed to the out migration of individuals with these qualifications, caused by lack of job opportunities in rural areas.

Household Income

The problems associated with obtaining estimates of the income of individual rural households in Zambia, as in much of Africa, are well known. It will be more helpful, therefore, if we first look at the various sources of incomes in the district as a whole, before an attempt is made to estimate the income of the households in the study sample.

Outside the Boma (i.e., the district headquarters), the only people who earn wages are the primary school teachers, agricultural extension officers, local court employees, and workers employed by the Central Province Cooperative Marketing Union (CPCMU) and Lint Company of Zambia (LINTCO). Other than these people, the only other group of persons that earns wages are a few casual laborers employed, from time to time, by prosperous (in local terms) farmers and local businessmen. In general, therefore, wage labor is a negligible source of income among residents in Mumbwa rural. The most important sources of income include: crop sales, beer making, cattle sales, fishing, remittances from friends and relatives and to a lesser extent the sale of game meat.

Crop sales in the main source of income of individual households in Mumbwa rural. Table 4.1, presents the marketed production of major crops in the district (see Table 4.1).

While most major crops are marketed through the official channels, there is also some buying and selling of maize and minor food crops; (such as sorghum, millet, groundnuts, green vegetables and sweet potatoes) among the villagers. However, this type of trade is more the selling of surpluses that happen to be produced in the course of production basically geared for home consumption than production specifically for sale. This trade, moreover, circulates money within the villages rather than bringing money into them.

The second source of income in the study area is the occasional sale of cattle. However, it should be noted that most households do not depend on cattle sales as a regular source of income. This is mainly because cattle are regarded as a stock of wealth, thus, a farmer who owns a large herd is well respected and is considered to be rich by the local community. Generally, farmers only sell their cattle to raise cash when there is no other way of raising it. At present, private cattle buyers compete with the Cold Storage Board (CSB) to buy cattle in the district. Therefore, it is not difficult for farmers to sell their animals when they need to raise money this way.

Occasionally some households take one or two goats, or a few chickens to the Boma market to sell. However, only small sums of money are raised from these sales.

Beer is perhaps the major income generator among low income peasant households. Local beer (mutete) is one commodity for which there is always a local demand and can be produced virtually by everyone. Although it is the women who brew the beer, if a man provides the grain, it is he who gets the profit. What normally

happens is that when a family needs cash to buy some commodity, the women will make the beer, which is then sold to raise the required cash. Usually, it takes 3 to 5 days to make the beer. Once it is ready, signs (normally small piles of stones) are placed by the road or path side to inform people who pass by of the availability of the commodity.

Another important source of income (but a source that is difficult to quantify) is that of remittances from relatives working in urban areas. What seems to happen is that when a family household wants a fairly small sum of money to buy incidentals like soap, sugar or salt, for example, they either sell a chicken, a tin of maize or beer, but when they need large sums of money, (for example, to buy food or farm inputs), they will appeal to their relatives working in town for assistance.

Fishing is another source of income among some households in Mumbwa rural. The fishermen go to the river (Kafue or Namwala) on bicycles or by private transport and buy fresh or dried fish. The fish is usually packed in bundles, approximately the largest size that can be carried comfortably on a bicycle. Most of the fish is sold at the open market at the Boma, and a few among rural households. But again, fish sales only generate very little income.

In areas close to the Kafue National Park, selling game meat has become a regular source of income among the households. Men with guns or spears regularly kill game (often illegally) which they sell locally. It is estimated that a good size buck can fetch up to K 40.

The distribution of income in the district is skewed. There is a small number of households (mostly migrants from the Southern Province and Zimbabwe) who in local terms, are relatively well off. But cash incomes of most of the households are very low and people find it difficult to raise cash to purchase manufactured goods (soap, clothing, cooking oil, etc.) that they need.

Turning to households in the study sample, the only people (respondents) who were wage earners are a night watchman at one of the maize depots managed by CPCMU and a clerk at a local court. The combined income of these two wage earners did not exceed K 2,000 per year.

Crop Sales

The most important source of income among the households studied was from crop sales. The income estimates generated from crop sales for these households are given in Appendix D. These estimates should however be used carefully for two reasons. First, they indicate aggregate or total earnings that are generated and do not tell us much about the distribution of income among the households. Second, these estimates are in nominal values, hence do not take into consideration the rates of inflation, which during the 1983-85 period were estimated to be between 17 to 25 percent.

As results in Appendix D show, crop sales in the study regions are dominated by maize followed by cotton. Most of the maize crop is sold to CPCMU, while all the cotton is sold to LINTCO.

Out of the 128 farm households studied, 48 percent sold maize and 29 percent sold cotton. During that period, a total of 2,902 bags of maize were sold at an average price of k 24.75 per bag, while cotton sales amounted to k 23,099.00

In 1985, which was relatively a good year in terms of crop harvests, the marketed production of both maize and cotton increased remarkably compared to the previous season. Unfortunately, at the time the survey was being conducted the majority of the maize producers had not sold their maize due to a critical shortage of maize bags. However, study estimates indicate that about 59 percent of the farm households sold a total of 4214 bags at an average price of k 28.32 per bag. The number of farm households that sold cotton increased from 38 in the previous marketing season to 66 during the 1984-85 season.

Cattle Sales

About 62 percent of the farm households studied owned cattle. However, only 17 percent of the households owned more than 15 head. In 1984, out of a cattle population of 1,407, only 33 were sold, which generated a total sum of about k 22,275.00. In 1985, only 13 were sold which raised a total of k 13,600.00.

As already alluded to, most rural farm households in Zambia regard cattle as a symbol or stock of wealth. Consequently, cattle sales are only made when there are no other sources of income to turn to, or when an animal is too old to work or produce.

Beer Sales

The survey results show that 68 percent out of the 132 households in the study sample indicated that they brew beer to raise cash. Because of the large number of households that were involved in the beer trade, we were interested to know the reasons why the other 42 were not selling beer. Of the 42 households, 37 said that they did not make beer for religious reasons; the remaining 5 said that they make enough money from other sources.

Respondents who sold beer during 1984-85 season were asked to indicate how much they made from the sales during 1984-85 season and how many times in the season they sold beer. The average amount of money made per brewing varied from k 15 to k 35 while the average number of time a households brewed beer in a season varied between 2 and 6 times.

As can be seen from Appendix D, the total earnings from beer sale are very small. A further scrutiny of the households that sell beer, reveals that most of them are peasant households with low incomes.

Remittances

The importance of this source of income to food security is easy to overlook for two reasons. First, relatives do not remit money on regular basis. Second, the receipts are almost impossible to quantify because they are received in different forms (such as grain, mealie meal, clothing, soap, cooking oil, fertilizer, cash, etc.).

From the information collected during the survey, a total of 27 households received assistance from their relatives working in town

during 1983/84 season and 19 during the 1984/85 seasons. The largest amount of money received in 1985 was k 300.00 remitted by a son to help his parents purchase fertilizer. An equally large remittance received was a two season supply of _mealie meal_ from a daughter to parents who were too old to work.

Generally, most of the households that receive assistance from relatives told us that they used the receipts mainly for buying farm inputs (such as maize seed and fertilizer). The majority of the households that receive remittances from relatives are those whose cash earnings are very low.

Fish Sales

The research results show that only 10 respondents were engaged in the fish trade. Out of these 10 households, 2 were full-time and 8 were part-time fish traders. As already indicated, the fishermen go to Kafue river or Namwala river where they buy fresh or dried fish, which they sell at the open market at Mumbwa Boma. Some of the fish is sold within the villages mostly for exchange with maize.

The full-time fishermen estimated that, in an average year, they make between k 600 to k 1,800 from fish sales. On the other hand, part-time fishermen indicated that they only sell fish when they need money to buy food for their families or when they need to raise cash for other specific purposes. The earnings reported by the 8 part-time fishermen varied from k80 to k 600 per year.

Considering the number of fishermen in the survey regions and the amount of money the trade generates, the total earnings are very small.

Game Meat Sales

Although no income estimates for the sales of game meat were obtained, the activity was very common in some parts of Chibuluma, Mulendema, and Moono areas. Because selling game meat is illegal, respondents were not willing to discuss the trade with us. However, the camp agricultural extension officers estimated that about 40 percent of the households in the areas mentioned above were involved in the trade and make between k 180 to k 200 per year.

Crop Production

The range of crops grown by farm households in the survey regions is shown in Table 5.2 below. This was similar throughout the region surveyed.

Table 5.2

Crop Production
(1983-84 and 1984-85)

Crop	No. of Households Growing Each Crop Per Region										Percent
	1	2	3	4	5	6	7	8	9	10	(%)[a]
1983-84											
FOOD											
Maize	11	12	16	6	15	22	13	4	8	16	96
Sorg/Millet	0	0	0	2	0	0	0	0	1	0	2
Groundnuts	6	5	10	3	10	10	9	2	5	12	56
NON-FOOD											
Cotton	5	4	3	1	3	10	4	2	3	3	30
Sunflower	2	3	2	1	3	5	1	2	3	4	20
1984-85											
FOOD											
Maize	10	13	15	5	16	22	14	8	7	15	98
Sorg/Millet	0	1	0	2	0	0	0	0	0	1	3
Groundnuts	8	8	8	3	13	10	8	7	5	8	61
NON-FOOD											
Cotton	6	8	0	1	10	13	8	5	6	9	52
Sunflower	4	5	4	0	6	8	7	6	0	8	38

[a] Percentage of total number of farm households surveyed.

Source: Author's Rural Food Security Study Data 1985.

Cash Crop Production

Cotton and sunflower are the two major cash crops produced in the study area. They are usually planted at the beginning of the rainy season, which normally starts towards the end of November, and are harvested during the same period with maize (May to July). Consequently, these crops compete with maize for the available arable land as well as the available family labor supply.

During the field research, data was collected on the hectarage and production of cotton and sunflower for 1984 and 1985 crop years. According to the figures obtained, each farm household on average, planted 1.6 hectares of cotton and 0.5 hectares of sunflower in 1984. The average production was 69.8 kilograms of cotton and 7.3 (50 kilogram) bags of sunflower per household. The statistics on production show little interseasonal variation. However, more farmers entered into cotton and sunflower production. The increase in the number of farm households entering into cotton and sunflower production was attributed to the improved production and marketing incentives offered by the government.

Food Crop Production

Maize, groundnuts, sorghum and millet are the food crops produced in Mumbwa district. However, only limited production of groundnuts, sorghum and millet takes place. For this reason, the discussion on food crop production in the study area will be restricted to maize and groundnuts. Since groundnuts are not considered as a strategic food security crop, only a brief discussion on production will be presented. Hence, the rest of the analysis in the chapter will be focused on maize, the most important food crop in the study area.

(a) **Groundnuts Production**

In general, groundnuts are considered to be a women's crop, consequently, women control its production.

Groundnuts are usually planted towards the end of December. They have a shorter growing period than most other field crops. For this reason, they are generally harvested earlier than most other field crops, starting in April when the moisture content in the soil is still high. Usually, women dig or pull out the groundnut plants from the soil and then remove the nuts from the roots. This is a laborious process, which restrict the size of the fields grown to groundnuts. The average size of the field among the farm household studied during the 1984 crop year was 0.6 hectares.

According to the survey data, more than 55 percent of the farm households produced groundnuts during the 1984 crop year. However, only 4 households sold small amounts of groundnuts in 1984. Therefore, most of the groundnuts that were produced in the study regions were for home consumption.

Groundnuts are used as a substitute for cooking oil in the preparation of relish, that is eaten together with nshima (a thick porridge made from maize, sorghum, millet or cassava).

The usual eating pattern among the people in the study area, as in much of Zambia, is to have just one main meal during the day, which is eaten at about sunset. The meal will, in most cases, consist of nshima and relish. The nshima provides the bland bulk of the meal, and the relish the tasty element of the meal. However, the relish (which can be meat, fish, vegetables etc.) consumed particulary by children is often very small. As a result, people get most of the calories and proteins from nshima rather than from relish (ILO, 1981).

(b) **Maize Production**

As indicated elsewhere, maize is the most common staple food commodity among the rural households in Mumbwa district and it is also the most important agricultural activity in the area. In this connection, maize is a strategic food security commodity as well as an important cash crop among rural households in the study area. This study is an attempt to understand the production and disposal behavior of maize among rural households. Knowledge of the households' maize production and disposal behavior is important to a food security study in two ways: First, it can provide an understanding of how behavior is likely to affect individuals' or households' access to adequate and reliable food supplies. Second, knowledge of households' production and distribution behavior can help policy makers formulate better and more effective food security policies.

Among the farm households visited during the field survey, maize is often seen as a men's crop and as a result, the husband or a group of brothers in a household will normally control the field and its product. It is from this maize that the husband feeds his family between harvests.

The single maize crop is usually planted, with or without a basal fertilizer dressing, in late November after about 50 millimeters of rain has fallen.

The division of labor in maize production is often as follows:

(a) **Land clearing** is usually done by both men and young boys (depending on the size of the field) during the dry season

(August to October). Among traditional subsistence farm households, when trees are cut, they are usually burned to provided some fertility to the soil.

(b) <u>Plowing and Planting</u>: The method used in plowing and planting depends on the type of the farm household. In general, farm households that cultivated small plots of land, using hand hoeing, the men make the holes and the women throw in the seed. For emergent and other small holder farmers who use ox-drawn plows, both men and women hold the plow while planting is usually done by the women. In farm households that have tractors, both plowing and planting is done by men.

(c) <u>Weeding</u>: Weeding and harvesting are the most labor demanding activities in maize production. In most cases, all the available persons in the family are used in weeding. For the households that use cultivators (pulled either by tractor or oxen) men drive the tractor or hold the ox-drawn cultivator. The women with hoes will follow the cultivator to remove the weeds left behind. Weeding among large farm units is usually only done once. Small farm households on the other hand, weed their crop two or more times. This difference is mainly due to the area planted. The amount of weeding has an effect on the amount of maize harvested.

(d) <u>Harvesting</u>:   Like weeding, every person available will tend
to be used.

Maize cobs or ears are formed in January and February, and
normally begin to mature in late February as hours of sunshine increase
(Das, 1973).   Cobs are harvested by hand from late April onwards,
sometimes left to dry in the field, but more often being placed on
special drying platforms, known as <u>hisanza</u> (see Figure 5.1).   Once the
maize is at home it is put in different facilities depending on the
use.   Normally, the dry maize that is set aside for family consumption
is put into storage and should last until the next harvest.   When a
household produces more than what is required for family consumption,
that portion of the maize is placed on the special drying platforms
until it is sold or disposed of.   The data collected on maize acreage
and production for 1984 and 1985 are given in Appendix E and in Table
5.3.

The results obtained show that small farm units cultivated on
average 1.3 hectares of maize in 1984 and 1.3 hectares in 1985.   The
average production per farm household in this farm category was 23.6
(90 kg) bags in 1984 and 27.8 bags in 1985.

The large farm household units on the other hand, cultivated an
average of 5.0 hectares of maize in 1984 and 5.5 hectares in 1985.
Their average production was 50.6 bags in 1984 and 56.4 bags in 1985.
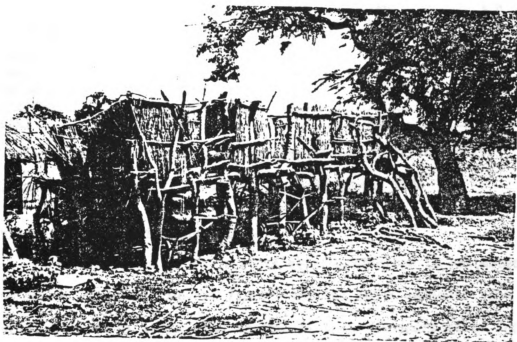
Figure 5.1 Maize Drying Platform

Source: Adams and Harman, 1977.

Table 5.3

Production Estimates for Maize
in All the Survey Regions
(1984 and 1985 Crop Years)

Region		1984 Output (90kg bags)	Percent of Total	1985 Output (90kg bags)	Percentage of Total Product
Martin Luther	(1)	429	6.7	395	8.0
Myooye	(2)	557	10.4	444	9.0
Mumbwa Central	(3)	512	12.5	520	10.5
Chibuluma	(4)	154	3.8	186	3.8
Kapyanga	(5)	523	12.8	596	12.1
Lukulaikwa	(6)	900	22.0	938	19.0
Nangoma	(7)	497	12.1	574	11.6
Moono	(8)	122	3.0	294	6.0
Kabwanga	(9)	192	4.7	401	8.1
Mulendema	(10)	494	12.0	590	11.9
Total		4,380[a]		4,938	

[a]Difference in total output was mainly due to good rains in 1985.

Source: Author's Rural Food Security Study Data, 1985

Methods Used in Estimating Output

There are several ways in which maize production is estimated. In the survey regions, however, farmers use two basic methods. The first method is used by those farm households that transport maize from the fields on ox-carts. The other method is used mainly by farm households that carry the output in baskets or sacs. In the first situation, farmers will fill the ox-cart or tractor trailer with maize cobs in the field and then take it to the dwellings. The farmer through experience, knows how many 90 kilogram bags of shelled maize come out of each ox-cart full of maize cobs. Generally, a full ox-cart could carry as many as 6 bags of shelled maize. Thus, during the survey, farmers were asked the number of ox-carts they hauled from the field in a given year and whether the maize cobs were brought with or without

husks. Usually, farmers tended to stick to one pattern of collecting their maize from the field.

The second method used in estimating maize production is one that is used by traditional subsistence farm households that mainly cultivate small plots of land. In general, these farmers carried their maize in bags, tins or baskets. In either case, when the maize reached home it was shelled and stored in bags or storage facility. Farmers estimated that 4 tins of maize cobs without husks yield about 15 kilograms of grain and six tins of maize grain can fill a 90 kg bag.

It should be pointed out that the data presented in Table 5.3 depended on the accuracy of the information provided by the farmer, which in turn, is depended on the ability of the farmer to remember the data requested.

Decision Making in Maize Production

In general, the husband and his wife have reciprocal obligation to provide one another and their children with food and certain other things needed by the family. For this reason, individual family members are responsible for making certain decisions pertaining to food production and disposal activities. During the survey, it was decided to determine the person or persons who decide on how much maize to produce. This type of information is necessary for this kind of study because the decision on the amount of maize to be produced affects household's food security in the sense that it determines the amount of food available to family members.

In order to determine the individual(s) who decide(s) on the amount of maize to be produced in a household, respondents were asked to choose the most appropriate answer from following list:

    a)   Head of Household (respondent)

    b)   Respondent's Spouse

    c)   Joint (respondent and spouse)

    d)   Other (children and relatives)

Table 5.4

Percentage Distribution of the Person Who Decides How Much Maize
to Produce in the Survey Regions (1985)

Survey Region		No. of Maize Producers	Household Head	Decision Maker		
				Spouse	Joint	Other
Martin Luther	(1)	10	81.2	---	18.8	---
Myooye	(2)	13	91.7	---	8.3	---
Mumbwa Central	(3)	15	81.3	6.2	12.5	---
Chibuluma	(4)	6	100.0	---	---	---
Kapyanga	(5)	16	80.0	---	20.0	---
Lukulaikwa	(6)	22	82.0	---	13.6	4.5
Nangoma	(7)	14	85.0	---	15.0	---
Moono	(8)	7	100.0	---	---	---
Kabwanga	(9)	8	87.5	---	12.5	---
Mulendema	(10)	15	93.8	---	6.2,4	---

Source: Author's Rural Food Security Study Data, 1985.

The results given in Table 5.4 show that on average, in about 88 percent of the farm households studied, production decisions are made by the heads of the households. Because the majority of the households that were studied are headed by males (see Table. 5.1) it can be concluded that men are largely responsible for making maize production

decisions. This result is consistent with the observation made earlier in this chapter that in Mumbwa, as in much of rural Zambia, maize is seen as a men's crop, and that its production is controlled by men. In this regard, men are always expected to provide their families with maize between harvests.

Reasons for Growing Maize

Farm households in the study sample were asked to give reasons for growing maize. They were asked to select the most appropriate reason from the following list.

     a)   Because of good price

     b)   To raise money

     c)   To provide food for the family

     d)   Other reasons (specify)

The distribution of the responses obtained from the households studied in the 10 survey regions is given in Table 5.5. Apart from the exceptions noted under the Table, respondents whenever they cited "other reasons" specified "for barter" as their reason for growing maize.

Table 5.5

Percentage Distribution of Reasons Given by Farm Households
For Producing Maize in the Survey Regions Averaged
For 1984 and 1985 Crop Years

						Regions				
Reasons	1	2	3	4	5	6	7	8	9	10
Good Price	0	0	12.5	0	0	0	0	0	0	6.3
Raise cash	0	15.4	6.2	0	0	9.1	0	0	12.5	0
Family Food	71.2	53.8	75.0	83.3	68.9	77.3	64.3	75.0	87.5	81.2
Other reasons	0	0	0	16.7	0	9.1	0	0	0	0
A and C	0	15.4	0	0	0	0	0	0	0	0
B and C	28.8	15.4	6.2	0	31.1	4.5	0	0	0	0
C and D	0	0	0	0	0	0	0	25.0	0	0
A, C and D	0	0	0	0	0	0	14.3	0	0	0
B, C and D	0	0	0	0	0	0	21.4	0	0	0
No. of Maize Producers	11	13	16	6	16	22	14	6	8	16

[1] One of the two respondents citing "d" specified "custom" or "tradition" as a reason for growing maize.

[2] One of the two farmers citing "d" specified "way of life" as the reason for growing maize.

[3] One of the two farmers citing "d" specified "need to repay credits" as the reason for growing maize.

[4] One of the three farmers citing "d" specified "lack of availability" in local shops as the reason for producing maize.

Source: Author's Rural Food Security Study Data, 1985.

As the results in Table 5.5 show, the most common reason given by the farm households studied for growing maize was "to provide food for the family," followed by the need "to raise money."

What is interest about the findings is that the households did not regard "because of good price" as an important reason for growing maize, despite the fact that maize generates more income than any other crop in the area. Farmers distinguished between "to raise money" which

was the second most frequently mentioned reason for growing maize, and "because of good price" which was one of the options they would have selected. This fine distinction between these two closely related reasons is very important to this study in two ways. First, the distinction can be interpreted to mean that farm households are not moved to grow more maize by a relatively high price. Thus, the attraction of the crop comes from its salability and not necessarily because it commands a relatively high price. Ejiga (1977) also found similar results among cowpea producers in Northern Nigeria. This can be attributed to the fact, that farmers are aware of the uncertainty in prices and do not wish to use that as a criteria. Therefore, among the households studied, the price tends to play a minor role in determining the amount of maize produced.

Another point that is worth noting is that since maize is priced pan-seasonally and pan-territorially, farmers may not find it attractive to use price as a prominent factor in deciding the amount of maize to produce.

Maize Varieties Grown

The variety of maize grown has an influence on the amount produced. The amount of maize produced in turn, affects housholds' food security. In order to determine whether farm households take into consideration this important production variable, we asked them to indicate the variety or varieties they grew during the 1985 crop year.

In general, farmers in Mumbwa district, like most farmers in the country, grow varieties of maize which can be grouped into three broad

categories. The first category consists of the hybrid varieties such as SR52 and ZR1. The second maize category consists of all the hybrids that were once grown. The third and last category consists of local varieties. For the purpose of this study, farm household units that grew maize in 1985 crop year were asked to choose the category that best describes the maize variety they produced from the three broad categories identified above.

The results presented in Table 5.6 below show that out of the 125 farm household units that grew maize, 35 percent planted hybrid maize varieties, 54 percent planted the hybrids-once-grown and 40 percent used the local maize varieties. The results in Table 5.6 show that no single variety is dominant. This can be explained by the fact that most farmers tend to use the variety that is easily available. Gleaning through Table 5.6, one can see that the hybrids-once-grown varieties are the relatively the most grown varieties by the farmers, followed by the local varieties. This could be attributed to two main factors. First, most of the seed planted is taken from farmers' on-farm storage. Second, because most of the farm households studied are traditional farmers, they have limited access to purchased inputs such as fertilizers and hybrid seed, due to lack of capital and access to credit. For this reason, they tend to use the varieties that they can easily obtain either from neighbors or from their own-storage.

Table 5.6

Percentage Distribution of Farmers Who Grew
Each Maize Variety in 1985 Crop Year

Region		Maize Producers	Variety of Maize Grown		
			Hybrid[a]	Hybrid[a] (Once Grown)	Local[a]
Martin Luther	(1)	10	40.0	70.0	40.0
Myooye	(2)	13	38.5	46.2	46.2
Mumbwa Central	(3)	15	33.3	53.3	46.7
Chibuluma	(4)	5	40.0	60.0	60.0
Kapyanga	(5)	16	37.5	50.0	43.8
Lukulaikwa	(6)	22	36.4	63.6	31.8
Nangoma	(7)	14	35.7	35.7	42.9
Moono	(8)	7	42.9	57.1	42.9
Kabwanga	(9)	8	25.0	62.5	37.5
Mulendema	(10)	15	26.7	53.3	33.3

[a]) Percentage of total number of farm households surveyed

Source: Author's Rural Food Security Study Data, 1985.

The figures in Table 5.6 sum to more than the total number of maize producers interviewed because most of them grew more than one maize variety. All the farmers that grew the hybrid variety, said that they used new seed which they had purchased or obtained on credit from CPCMU. The other varieties of maize seed grown (i.e. hybrids-once-grown and local) were either, taken from household storage or obtained from neighbors.

In order to find out why farmers grew a particular maize variety or varieties, we asked them to select the most important reason or reasons for growing the variety or varieties. The list was:

a)   Because variety is high yielding

b)   Because variety is easily available

c)   Because variety is cheap

d)   Because variety stores well

e)   Other (specify)

The distribution of the responses obtained from the farmers in the survey regions is given in Table 5.7.

As the results in Table 5.7 show, availability was the single most important factor farm households used in deciding the maize variety to grow. These results are consistent with the findings presented in Table 5.6, which show that the two non-hybrid maize varieties were the most grown. These findings may not be surprising considering the fact that over 50 percent of the households in the study sample are traditional subsistence producers, with limited resources to purchase inputs.

In the literature, there is an extensive debate about the magnitude of post-harvest food losses in developing countries. Part of these losses have been attributed the variety of grain that is produced and then stored. Such losses affect household food security because they reduce the amount of food available. During the field survey, it was decided to investigate whether farmers make conscious decisions with respect to post-harvest losses when they decide on the variety of maize to grow. The results in Table 5.7 show that only few farmers consider storability as a factor when deciding on the variety of maize to grow.

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Table 5.7

Percentage Distribution of Reasons Given for Growing
A Variety of Maize by Farm Households in the
Survey Region (1985)

Reasons	Regions									
	1	2	3	4	5	6	7	8	9	10
High Yielding (a)	9.1	8.3	12.5	0	6.7	27.3	23.1	0	0	18.8
Availability (b)	46.0	33.3	31.3	83.3	26.7	40.8	30.8	75.0	50.0	37.5
Low Price (c)	0	0	12.5	0	13.3	0	15.4	0	0	25.0
Storability (d)	0	16.6	6.3	0	13.3	0	15.4	0	0	0
Other (specify)	0	0	0	0	0	4.5	0	0	0	7.8
A and B	18.3	16.8	0	16.7	20.0	0	15.3	25.0	0	10.9
A and C	0	0	18.8	0	0	0	0	0	25.0	0
B and D	26.6	0	18.6	0	20.0	27.4	0	0	0	0
B and E	0	25.0	0	0	0	0	0	0	25.0	0
No. of Farms Households	10	13	15	5	16	22	14	7	8	15

[a] One of the three farmers citing "e" specified "good taste" as the reason for choosing a maize variety to grow.

[b] One farmer citing "e" specified "resistance to disease attack" as the reason for selecting a maize variety to grow.

[c] One of the two farm households citing "e" specified "resistance to lodging" as the reason for choosing a maize variety to grow.

Source: Author's Rural Food Security Study Data, 1985.

Crop Mixtures

It is commonly known that in most developing countries, including Zambia, many subsistence farm households inter-plant food crops with other crops. A number of reasons which include household food security have been advanced for this seemingly widespread farming practice. Norman (1972a, p. 70 and 90) for example, noted that farmers in Zaria (Northern Nigeria) grow crops in mixtures to make maximum use of land and enable the maximum return to labor invested in land preparation or because of the beneficial effect of legumes on other crops.

In the study area, it is also common to find households that grow maize together with other crops (pumpkins, green beans, okra, cucumbers, watermelons and even groundnuts). During the field research an attempt was made to determine the percentage of the farm households that grow maize together with other crops and the reasons for doing it.

Table 5.8 presents the distribution of the farm households that grew maize with other crops during the 1984-85 crop year. To shed more light on the importance of this farming practice among maize producers in the survey regions, the number of fields that were grown to maize with other crops is also given in Table 5.8.

Table 5.8

Distribution of Farm Households that Inter-planted Maize
With Other Crops (1985)

Information	Regions										% of Total
	1	2	3	4	5	6	7	8	9	10	
No. of Maize Producers	10	13	15	5	16	22	14	8	7	15	95
No. of Farmers That Grew Maize with other crops	5	7	6	3	7	9	8	2	0	9	47
No. of Maize Fields	37	41	48	16	34	61	38	17	14	32	100
No. of Maize Fields with Other Crops	14	24	19	7	10	25	17	9	8	18	45

Source: Author's Rural Food Security Study Data, 1985.

As the results presented in Table 5.8 show, out of the 95 percent of the farm households in the 10 survey regions that produced maize during the 1984-85 season, 47 percent indicated that they grew it with other crops.

To determine why farm households studied produced maize together with other crops, we asked them to give not more than three important reasons for carrying out such a practice. From the responses obtained, it was surprising that over 72 percent said that they practice mixed cropping to safeguard their families against food shortages should a single crop fail. The other prominent reasons given include: (1) to control weeds in the maize fields; (2) to provide fertility to the soil; and (3) to make maximum use of land. Therefore, it can be concluded that mixed cropping is viewed by some farm households as a strategy for guarding against maize failure. Thus, growing maize with

other crops can, from a rural household perspective, be considered as a food security strategy.

Producers' Disposal Patterns

The present section will examine the households' maize disposal behavior. The analysis is important to this study because producers' disposal behavior affects the amount of food retained for family consumption after satisfying all other uses.

Several studies by anthropologists and economists have attempted similar analysis mainly by estimating grain disposal, but few have examined the behavior in relation to rural household food security.

In order to be able to examine households' maize disposal patterns in the study area, it is important to define some relevant concepts and operational definitions.

Conceptual and Operational Definitions

(a) Grain Flow Statement

The grain flow statement is derived from three, closely related concepts -- namely, the conservation of flow principle; the cash flow statement and the balance sheet.

The conservation of flow principle asserts that what flows into the household system either flows out or adds to stocks.

The conservation of flow principle can be expressed as follows:

$$\text{Stock Change} = \text{Output} - \text{Input} \qquad (5.1)$$

Where

Output includes all possible households uses of grain.

Change in stock being the difference between the beginning and the ending stock.

The concept of grain flows is also closely related to the cash flow statement which is generated in farm management analysis. There are two types of grain flows that are related to the cash flow statement. These are the annual grain flow and the seasonal grain flow. The annual grain flow examines the total availability and use of food grain by the household unit, while the seasonal grain flow examines how the variability of the sources and uses of food grains might lead to seasonal (short-term) food shortages. In this regard, both annual and seasonal food grain flow statements are useful in the sense that they can be used to identify food supply problems that might not be apparent otherwise (Ouedrago, 1983).

The grain flow statement is closely related to the food balance sheet, food budget or food matrix popularized by FAO (Smith et al., 1981). The food balance sheets were devised to measure food flows for entire countries or regions of the world. Their main purpose is to estimate food supply available for consumption by accounting for export-import, industrial use, and waste. At present, there is a general consensus among food analysts that these balance sheets could also be applied to food flows at the household or village level (micro level version).

From the general cash flow statement, the grain flow statement has been expressed as flows:

Total Sources of Grain = Total Uses of Grain   (5.2)

In order to be able to use the identity in analyzing households maize disposal behavior for the 1984-85 season, all the possible sources and uses of maize in the survey regions were identified.

The following were some of the sources of maize that were identified during the field survey:

1) Beginning stock — carry over stock from the previous harvest, gifts and purchases

2) Production - 1984 harvest

3) Purchases - including maize re-purchased:

    a) for household uses - such as family consumption, seed and animal feed

    b) for processing and sale of other food stuffs such as beer (mutete, tobwa and "seven days").

    c) for purposes of later resale

4) Gifts received

5) Maize borrowed

6) Maize received as payments for loans extended (in cash or in kind)

7) Maize received as payment for work or services rendered.

The uses of maize by households in the survey regions were identified as follows:

1) Household consumption

2) Seed and animal feed

3) Sales: including

    a) of own production and stock

    b) of maize previously bought for resale

    c) of processed maize or grains for beer making

4) Gifts given

5) Loans extended

6) Maize given away as payment for borrowing (in cash or in kind)

7) Maize given in hired labor or payment

8) Losses

9) Trading stock as of June, 1985

To simplify the presentation of the grain flow statement the sources and uses of maize identified above were grouped into four broad categories -- namely; production, exchange, household disappearance and stock. By production we mean all the maize that was harvested by the household during the 1984 crop year. Exchange on the other hand, refers to all-purpose purchases and sales, gifts, credit and labor transactions. Household disappearance includes household consumption and farm uses (seed, and feed) as well as losses. Stock refers to the beginning and ending inventories.

For further simplification, exchange is divided into barter transactions (i.e., gifts, credit, and labor transactions) and purchases.

Using these broad categories we can then define the following identities.

Exchange Inflow = Purchase + Barter Inflow (5.3)

Exchange Outflow = Sales + Barter Outflows (5.4)

Therefore,

Net Exchange Outflow = Exchange Outflow - Exchange Inflow (5.5)

Change in Stock = Ending Stock - Beginning Stock (5.6)

Using the identities presented above, we can rewrite the grain flow statement (identity 5.2) as follows:

Beginning Stock + Production + Exchange Inflow = Consumption + Losses + Exchange Outflow + Ending Stock + Farm Use (seed & feed) (5.7)

From this general grain flow identity (5.7), we can obtain other measures of food grain flows such as grain disposal, food availability, marketed and marketable surplus, all of which can be used to evaluate households' behavior with respect to their grains.

For example, written in terms of the above grain flow statement, grain disposed of by the household can be computed as follows:

Disposal = Sales + Barter Outflow + Consumption + Farm Uses + Losses (5.8)

and food available to the family can be derived as:

Food Available = Production - Net Exchange Outflow - Farm Uses - Losses
(5.9)

While identity (5.7) allows an explicit, yet compact, representation of the grain flow statement, the measures derived from it have some pitfalls and hidden assumptions which may obscure the meaning of these measures. For example, in many studies and consultant reports, one finds that their is a tendency to assume a 4 percent seed use at the household level and a 5 percent grain loss when computing available food supply to the households. Another frequently used assumption is that the change in stock between harvests is zero. This assumption may represent more of the long-run than the short-run situation. That is, it is more safe to assume a zero change in stock in the long-run (using time series data) because production fluctuations over time tend to even out so that, on average, the beginning stock will equal ending stock. But using one year's data, it may not be realistic to assume the same beginning and ending stocks to be zero (Simmons and Poleman, 1974).

The grain flow statement of the farm households studied is given in Appendix F.

(b) <u>Marketed and Marketable Surplus</u>

In the literature, there are various interpretations of the concept of marketed and marketable surplus. For this reason there is an ongoing debate on: (1) how to approach the concept (i.e., through direct observation or as a residual); and (2) the empirical issue of how to handle the sign of the regression coefficients derived from econometric supply functions (Behrman, 1968). In developing countries, the results of the techniques that have been developed to measure marketed and marketable surplus are very difficult to interpret in a policy context because the quality of data is generally poor.

For the purpose of this study, marketed surplus will be considered as that portion of production which actually enters the market. In this context, marketed surplus represents what actually flows out of the farm household unit, which can serve as an indicator of the degree of monetarization, and also of the total amount of food available to consumers outside the farm family. Marketed surplus can be presented as follows:

Marketed Surplus = Net Market Sales = Total Sales - Total Purchases (5.11)

Marketable surplus on the other hand, includes marketed surplus as well as current production in storage, gifts, in kind transfers, any amount of grain carried over from other years, less any repurchase. The stock component of this definition has been interpreted in two

different ways. First, some people treat it as a residual stock, (i.e. the what remains after securing grain for home use).

Second, change in stock can be considered in terms of the potential amount of food that can be made available for sale. The assumption here is that there is always a planned level of beginning stock so that an amount above it is available for sale. Marketable surplus can be derived as follows:

(a) Marketable Surplus = Net Exchange Outflow + Change in Stock (5.12)

or

(b) Marketable Surplus = Production - Net Exchange Outflow- Consumption - Farm - Use - Losses (5.13)

Maize Disposal Activities

In Chapter 3 it was discussed that farmers in Zambia can dispose of their maize in one of the three following ways. One portion of the harvest is retained by the producer for family use (i.e. food, seed and feed). The second portion is disposed of through "house trade." The third and last portion of the harvest is disposed of through private and official marketing channels. In this section, we wish to examine the producers' maize disposal behavior in relation to household food security.

Table 5.9 shows that producers retained (for home use) over 60 percent of maize they produced during the 1983-84 season. The stored

maize was then used for food, brewing beer, gifts, barter, seed, sale, and feeding animals. These aspects of maize disposal as practiced by the farm households in the study sample are discussed below.

Table 5.9

Producers' Maize Disposal Patterns for
1983-84 Season (90 kg bags)

Region		Average Sales	% of Total Sold	Average Retained For Home	% of Total Retained	% of Sales at Harvest	
						At Harvest After First 4 Months	6 mths Before Next Harvest
Martin Luther	(1)	38.7	16.2	20.3	5.9	98.0	2.0
Myooye	(2)	42.3	17.4	33.9	9.8	93.1	6.9
Mumbwa Central	(3)	22.6	9.5	37.2	10.8	98.2	1.8
Chibuluma	(4)	0	0	40.0	11.6	0	0
Kapyanga	(5)	0	0	41.4	12.0	0	0
Lukulaikwa	(6)	32.9	13.8	28.0	8.1	97.6	2.4
Nangoma	(7)	33.0	13.8	18.2	5.3	98.0	2.0
Moono	(8)	54.3	22.8	26.8	7.8	100	0
Kabwanga	(9)	0	0	61.0	17.7	0	0
Mulendema	(10)	14.6	6.1	38.0	11.0	99.0	1.0

Source: Author's Rural Food Security Study Data 1985.

(a) Decision Making in Maize Disposal

The allocation of maize to different uses is an important aspect of the farm decision making process. It is important because it affects the amount of food available to farm families and also to non-farm families. In order to find out the person in the household who is

responsible for making maize disposal decisions we asked respondents to choose the most appropriate answer from the following list:

a) Respondent

b) Respondent's spouse

c) Respondent and spouse

d) Other (children and/or relatives)

The answers obtained indicate that in more than 85 percent of the households studied, maize disposal decisions are made by the head of the household. In 14 percent of the households in the study sample, maize dispose decisions are made by the husband and his wife or wives (joint). In the remaining 1 percent, children and spouses controlled the decision-making of maize disposal. In general therefore, husbands decide how to dispose of the maize produced. What happens is that once family and group obligations are met, maize is either stored or sold as a cash crop.

Out of the 96 small farm households in the study sample that produced maize during the 1983-84 season, only 41 sold some maize, and 20 out of 27 large farm households sold some of their maize during the 1984 marketing season.

During the same season, all the 123 farm households that produced maize retained some maize for home use. On average, a small household unit retained about 74 percent of its total maize production, while the large farm household unit retained about 62 percent of its total maize production.

Table 5.9 also shows that about 98 percent of the maize is sold during the period just after harvest. This is partly explained by the maize pricing policy in the country. Producers prices are set at uniform levels for the entire cropping season. As discussed elsewhere, such a policy has made it unprofitable for farmers to store the marketable surplus. This type of a pricing policy has encouraged a tendency to sell immediately following the harvest.

Only 10 farm households out of the 123 that produced maize during the 1984 crop year reported having sold their maize during the post-marketing period (6 months before the next harvest). Because this study did not include an examination of farmers' expenditure patterns, only general indications can be made as to the plausible causes of the delay in the selling of maize. What we observed was that there were two periods when households' cash needs in the study are generally thought to be great. One such period is the period between October and November. The main reason for the great cash need during period is the need to buy farm inputs (seed, fertilizer and farming implements) before the onset of the rainy season (which starts towards the end of November). Therefore, some farm households that did not keep money from crop sales (if any) during the regular marketing season or do not have seed to plant in the following season, tend to sell some of their maize during this period to raise cash to buy the required inputs.

The second period when households' cash need is great is early in the new year, at the beginning of the academic year. During this period, parents have to raise cash for their school-going children. We asked the farmers to give reasons why they sold their maize during this

period. Out of the 10 interviewed, 6 said that they needed money to buy some items required by the family. Four told us that they were unable to sell during the regular marketing season because of illnesses and funerals in the family.

All the maize that was sold after the regular marketing period was sold to neighbors. In addition the quantities involved were small and no farmer had sold more than 8 bags in this way.

(b) **Marketing in the Study Regions**

Each cluster of villages in Mumbwa district has a grain marketing depot operated by the Central Province Cooperative Marketing Union (CPCMU). As discussed in Chapter 3, at the depot maize is weighed and the grade determined. The price is determined based on a standard 90 kg bag and on the grade of the grain. The price of each bag of maize is then determined by the representative of the cooperative union.

During the survey, an attempt was made to establish the distance farmers have to travel to deliver their maize. The distribution of the average distance covered by farmers delivering maize to the nearest depot in regions surveyed is given in Table 5.10. However, these distances should be used cautiously because there are no formal roads between the depots and the farmers' dwellings, and also because respondents had little knowledge about the concept of kilometers, which was introduced with the rest of the metric system a few years ago.

Table 5.10

Distribution of Average distances to Maize and Food
Markets (in kilometers)

Information	1	2	3	4	5	6	7	8	9	10
Number of Households	11	13	18	6	16	22	14	8	8	16
Average Distance to Maize Depot	3.0	4.2	2.8	3.1	2.9	4.9	3.2	2.6	4.2	4.5
Average Distance to Food Market	15.4	23.1	4.3	32.5	5.7	4.0	26.0	14.0	10.0	15.0
Average Distance to Grinding Mill	5.2	6.7	2.8	8.9	4.9	6.1	2.7	3.0	5.6	6.2

Source: Author's Rural Food Security Study Data, 1985.

The data in Table 5.10 show that CPCMU buying depots are well distributed in the study area. On average within a radius of 3.5 kilometers from every household that was studied there was a maize depot. By any standard, one can say that these households are well served with grain marketing outlets. However, there are some other problems that farmers face when selling their maize. For example, because roads are poorly maintained, private truckers have stopped serving rural areas. Furthermore, in the past three years, Zambia has been plagued with a critical shortage of maize bags and sporadic shortages of fuel. These problems made it difficult for rural farmers to market their maize. In addition, the absence of alternative maize marketing outlets serves as a major constraint to rural farmers because they are forced to sell their produce under monopsony conditions under which they wield no bargaining power.

(c) **Maize Sellers**

Both small and large farm household units sell maize. As the survey data shows, small farm households sold a relatively smaller proportion of their production than large farm households.

During the 1984 crop year, 41 small households and 20 large farm households sold maize to CPCMU totaling 2,902 bags.

Small household farm units sold about 26 percent of their 1984 maize harvest, while large household farm units sold about 32 percent of their total production.

Further examination of the information obtained on the characteristics of the maize sellers, reveals that over 45 percent of the large farm household units that sold maize are migrants from the Southern Province or from Zimbabwe. These farmers tend have more resources than their local counterparts and as a result are able to acquire purchased production inputs.

(d) **Maize Buyers**

A common proposition found in the literature asserts that in most developing countries producers sell food crops at low prices at harvest and repurchase at higher prices during the hungry period. This was one of the empirical issues we investigated during the field survey. Our findings reveal that because of the present food marketing arrangements, most farmers, sell their marketable surpluses within 4 months following the harvest. However, there was no evidence to suggest that those farmers who sold maize during the months of May through September, (the official marketing period) bought it back later

in the season. The main reason for this is the fact that there is only one maize marketing agency that operates in the survey region which receives maize from farmers only during the official marketing period. After this period a farmer who has not sold his maize has to find his own sales outlet. Because private maize trade is restricted by Government, farmers are forced to sell most of their marketable surpluses during the official marketing season. This is confirmed by the data in Table 5.10 which show that 98 percent of the maize that was during was sold during the first 4 months following the harvest.

After establishing the time of the year farmers sold their maize, we asked them to tell us the period when they bought back some of the maize. Out of all the 61 farmers that had sold some maize in 1984, only one farmer bought back some grain. What seems to happen is that before farmers decide if they are going to sell some maize, they will retain sufficient quantities to last them until the next harvest. The farmer who repurchased grain told us be did so after his stored maize was destroyed by fire. The plausible reason why farmers hold grain stocks instead of cash balances is because of the problem of availability. As we mentioned earlier, once the cooperative union buys the maize from farmers, it transports it to urban centers where there are permanent storage facilities. Once the maize is taken to urban areas, it rarely comes back to rural areas because there are no established institutional arrangements for moving food back in rural areas.

The research results show that all the households that bought maize during the 1984-85 season were those who had poor harvests or

those who did not grow maize that season. The most affected group among these households are the small farm households that have limited resources. Out of the 17 households that purchased maize during the 1984-85 season, 14 were small farm households and only 3 were large farm households (see Table 5.11).

The findings presented above suggest that only food deficit households tend to buy grain during the "hungry" period. This means that most of the households will only buy grain when they have a poor harvest.

Rural-Rural Market Linkages

As pointed out elsewhere, there are no village sales outlets in Mumbwa district. The only established food market is at the Boma. Because there are no rural food markets in the district, 15 of 17 households in the study sample that purchased maize during the 1984-85 season, obtained it through "house trade". The other two bought their maize from the Boma market.

To determine whether there was maize trade between regions, we asked the households that obtained their supplies from other households to indicate the region they had bought the maize from. The results obtained indicated that all of the 15 households had obtained the maize within the region of residence. In fact, 12 of the 15 households indicated that they had bought the maize from other households in the same village and the other 3 obtained it from nearby villages.

The results in Table 5.11 show that the average number of maize bags purchased by food deficit households during the 1984-85 season was 8.1 bags.

Table 5.11

Distribution of Rural Households in the Survey
Regions who bought Maize During 1984-85 Season

Information	Regions									
	1	2	3	4	5	6	7	8	9	10
Total no. of households	11	13	18	6	16	22	14	8	8	16
No. who bought maize	2	1	4	3	3	2	0	1	0	1
Ave. no. of maize bags bought	10.2	6.5	13.5	14.0	17.0	8.5	0	7.0	0	4.5
Ave. distance (km) traveled to point of purchase	1.5	1.2	2.1	1.0	3.5	1.4	0	1.0	0	0.5

Source: Author's Rural Food Security Study, 1985.

The price paid for a bag of maize by those food deficit households that paid cash was k 6.00 a tin (i.e., k 36.00 per 90 kg bag). Households were asked how the price was arrived at between the two trading parties. The most common response given was that this was the price charged by the private traders at the Boma market. This price was bout k7.00 more than the official price (k 28.32).

Households who purchased maize using cash were asked to indicate how they had raised the money. Four of the 12 said they sold fish, two households said that they received money from their relatives working in town and the remaining six had brewed beer which they sold and

raised some money to buy the maize. As we indicated earlier in this chapter, generally the incomes generated from fish and beer sales are very small, and it is mainly the small households that are involved in this type of business.

The other 3 households out of the 15 who bought maize for family consumption during the 1984-85 season used other goods or services to obtain the maize. One respondent told us that he had to build an ox-cart for another farmer in exchange for 15 bags of maize. The other two bartered chickens, roots used in making chibwantu, and green vegetables for maize.

To summarize, the results of the analysis in this section indicate that there is little evidence of inter-regional maize trade in rural areas of the study district. Consequently, food deficit households have to depend on other households or to travel to urban markets. However, "house trade" was more important than buying from urban markets.

Farm Households' Storage Facilities and Practices

Farm households have special facilities in which they store maize after harvest. In Mumbwa district, maize storage facilities are of two broad types: the traditional "cob type" and the "kimberley type".

The traditional cob type maize storage facility as determined by Adams and Harman (1977), all have conical grass roofs. There are two types of traditional storage facilities, both consisting of a cylindrical "basket" on a raised platform which is usually made of tree branches supported by "Y" shaped strong posts. The basket itself may

be made of more branches placed vertically like bars (see Figure 5.2) or it may be a "woven" cylinder of intertwined twigs which is tied on the platform (see Figure 5.3). The woven baskets are sometimes made by specialists within the village(s) and bought by local farmers who may roll them home. These maize storage facilities usually have an aperture cut in the top of the wall from which the maize cobs can be removed from the store without removing the roof. Regular repairs which are generally done before the new stock is put in the storage, consists of re-roofing, cleaning out, and replacement of any broken or termite infested poles, although farmers normally use termite resistant wood.

The other type of maize storage facility found among the farming community in Mumbwa district is the kimberley brick cob store (see Figure 5.4). This is generally a longer lasting type of a maize storage structure with an estimated useful life of 20 to 30 years. It was introduced in the area by farm households that migrated from Zimbabwe. The kimberley brick cob structure usually has a mud brick base, covered by a thin layer of cement. The a cylindrical body of this structure is built with ventilation gaps between bricks. However, there are some kimberly storage structures without the ventilation gaps.

The kimberley brick storage facility usually has a conical grass thatched roof with an access aperture just below it. Providing the foundation (for those not supported by stones) does not subside and crack, its life is considerably longer than that of the traditional timber storage structures. As already indicated the life expectancy

Figure 5.2 Timber Pole Type Maize (Cob) Store

Source: Adams and Harman, 1977.

Figure 5.3 Woven Basket Type of Maize (Cob) Store

Source: Adams and Harman, 1977.
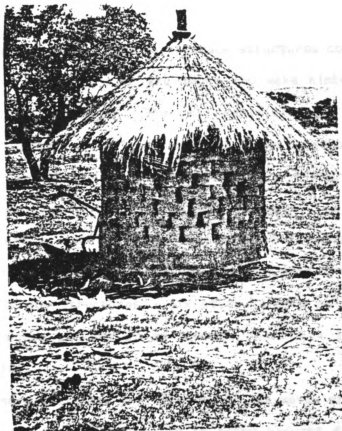
Figure 5.4 Kimberley Brick Type of Cob
Store With Cement Base

Source: Adams and Harman, 1977.

of the kimberley brick cob store among the farm households in the survey regions was 20 to 30 years, while that of the vertical timber poles was 5-20 years and for the woven baske was 2 to 10 years. The kimberley brick store is generally easier to clean out between seasons but, when the water table is high, it may be prone to moisture in the base, if the thin layer of cement which acts as a moisture barrier is absent.

Farmers who built traditional storage structures collected most of their materials from the bush and those who make kimberley structure mold the bricks at home. The only material that was bought for building maize storage facilities among the farm households studied was cement, used in making the foundation of the kimberley brick type storage and some baskets bought from other farmers. To be exact, 5 of the farm households studied bought at total of 5 packets of 25 kg of cement (one per household) which they used to make the foundation of their brick storage structures. Six other farmers said that they had bought their woven baskets at an average cost of k 10.00 each from other households.

Most farmers indicated that they build new maize stores during the months of May and June as the maize is being brought from the fields. The adult males usually build the storage facilities and they usually do it in the afternoons after they have come from harvesting in the fields.

The time taken to collect the materials from the bush or molding the bricks and then build the storage structure was difficult to estimate because farmers did not continuously work on it. Survey

estimates indicate that it can take 6 to 8 days to collect building materials and build the vertical pole storage structure, 10 to 13 days for a woven basket and 2 to 3 weeks for a brick storage structure. When the basket forming the woven type of store is bought, the time taken to build the structure can be reduced to 2 to 3 days.

Table 5.12 below presents the distribution of the three types of maize storage structures among the 10 survey regions. It should be noted that in all the regions surveyed, the number of the maize storage facilities were slightly higher than the number of farm households. This is because some households had more than one storage facility. However, no farm household had more than 2 stores.

Table 5.12

Distribution of Maize Storage Facilities Among the
Farm Households in the Survey Regions (1984)

| Information | Regions | | | | | | | | | | |
	1	2	3	4	5	6	7	8	9	10	Total
No. of farm households	11	13	16	6	15	22	14	8	8	16	129
Total No. of Farm Households with Stores	11	11	16	6	14	22	14	8	8	16	126
No. of each store type											
vertical poles	3	6	9	3	8	11	5	4	2	10	61
kimberley brick	2	3	5	3	5	7	4	2	1	3	35
woven basket	9	5	11	0	12	13	9	6	6	7	78
Ave. No. of Stores/Household	1.3	1.2	1.6	1.0	1.8	1.4	1.4	1.5	1.1	1.3	
No. of Farmers Storing in Rooms	0	1	0	0	1	0	0	0	0	0	2

Source: Author's Rural Food Security Study Data, 1985

In general, farm households that had more that one maize storage facility were polygamous. What seems to happen is that the husband will build one large storage structure in which maize used for food is stored and a smaller facility in which maize for other uses such as brewing beer, gifts, seed, etc is kept. Some farmers with two wives built each wife her own maize storage structure. However, there were only a few families with this type of arrangement.

Capacities of Maize Storage Facilities

Generally, the capacity of the maize storage facility was determined by the size of the household. Therefore, large farm

households had bigger storage facilities because of the number of the family members fed.

Table 5.13 presents the distribution of the capacities of the maize stores in the survey regions.

Table 5.13

Distribution of the Total Maize Storage Capacity Per
Survey Region by Type of Facility (1984) (in 90kg bags)

Region		Type of Storage Facility			Total Capacity
		Vertical Pole	Woven Basket	Kimberley Brick	
Martin Luther	(1)	100.0	80.7	25.4	205.9
Myooye	(2)	135.1	121.0	64.8	320.9
Mumbwa Central	(3)	126.2	152.8	69.8	348.8
Chibuluma	(4)	62.0	0	55.8	117.8
Kapyanga	(5)	124.0	188.6	72.7	385.3
Mukulackwa	(6)	220.9	272.4	138.6	631.9
Nangoma	(7)	97.2	170.1	77.4	344.7
Moono	(8)	30.6	50.1	15.0	95.7
Kwabwanga	(9)	31.6	98.8	18.6	159.0
Mulendema	(10)	169.0	118.3	54.8	342.1

Source: Author's Rural Food Security Study Data, 1985.

Maize Storage Practices

Very little time usually elapses between the harvesting of the maize and its movement into store. The maize that was put into storage during the 1984 storage season by farm households that were studied was done between May and July. A similar situation was observed for the 1985 season.

All of the 123 farmers except 10 that we visited during the survey, stored their maize on the cob with husks. The other six stored

their maize on the cob but without husks and the remaining 4 stored shelled grain.

It was discussed earlier that the farm households that were visited during the survey produced three broad categories of maize varieties -- namely; pure hybrids, hybrids-once-grown and local varieties. An attempt was made to determine the variety of maize farm households stored during the 1983-84 storage season. It was not possible to obtain reliable data because most of the households stored more than one variety. Even through farm households stored more than one maize variety, however, over 60 percent of the farmers interviewed were of the opinion that the local variety stores best.

Table 5.14 shows the quantities of maize farm households that were visited put into store.

During the field survey farmers were asked whether they had considered changing their methods of storing maize. Although 11 had made changes from the traditional type store to the kimberley brick storage type facility, the majority were satisfied with their existing techniques. The surprising thing about the results obtained is that no migrant farmer from Zimbabwe interviewed had changed from the brick storage facility to any of the two local traditional stores. The main reason given by these farmers for not adopting any of the local storage type facility was the fact that the kimberley brick store lasts longer.

Usage of Stored Maize

In general, the women are responsible for managing the stored maize supplies. In cases where the farmer has more than one wife, and

Table 5.14

Quantities of Maize Stored in the
Survey Regions 1983-84

Information	Regions										Total
	1	2	3	4	5	6	7	8	9	10	
Total No. of Farm Households	11	13	16	6	15	22	14	8	8	16	129
No. of Households Who Stored Maize	11	12	16	6	15	22	13	4	8	16	123
Small	9	8	10	4	11	13	9	2	6	11	84
Large	2	4	6	2	4	9	4	2	1	5	39
Quantities Stored (90 kg bags)											
Small Farm	139.1	159.8	170.2	56.2	203.5	259.7	193.1	26.6	102.1	195.4	1505.7
Large Farm	52.1	131.4	174.8	48.4	153.8	340.4	146.3	53.3	34.1	142.6	1277.2
Total Amount Stored	192.0	291.2	345.0	104.6	357.3	600.1	339.4	79.9	136.2	338.0	2782.9

Source: Author's Rural Food Security Study Data, 1985

his harvest is sufficient, the normal pattern is for the women to take out the maize once a week or once in two weeks, shell it, and then take it for grinding. When each spouse manages her own maize store, the general pattern is for the woman to take the maize from her store, have it processed into *mealie meal* which she uses for cooking *nshima* when it is her turn to cook. In either case, the maize should last until the next harvest plus an additional number of bags that are added as a security stock. On average, we found out that farmers who had a good harvest added 5 to 7 bags more to their seasonal requirements.

Maize is removed from the store using the aperture that is left at the top of the cylindrical part of the maize store. Most of the farm households visited took out regular amounts of maize ranging from a bucket or tin to a bag weekly or fortnightly depend to the rate of use.

Because maize tends to lose its taste if it is stored for more than two seasons, farmers who had left-over stocks from last season's crop, dispose of the maize once the new crop comes in. About 85 percent of the farm households visited said that they started using their stored maize in June. This means that most of the farm households start using their stored maize as soon as it gets into storage. The time when maize is first removed from storage is generally determined by the amount produced. Households with poor harvest may not even put their maize in storage but consume it as it comes from the field.

One hundred and six farm households reported that their maize stocks lasted until May when the new crop came in. The reason for this

is probably because the quantity stored should last until the following harvest.

Table 5.15 shows the purposes for which farm households use their stored maize.

Table 5.15

Usage of Stored Maize by Number of Farm
Households (1984-85)

Information	Regions										% of Total
	1	2	3	4	5	6	7	8	9	10	
No. Households That Stored Maize	11	12	16	6	15	22	13	4	8	16	100
Usage											
Food	11	12	16	6	15	22	13	4	8	16	100
Brewing beer	7	8	11	4	10	15	9	3	5	11	67
Gifts	4	5	7	3	8	10	8	2	3	10	49
Barter	0	2	0	1	0	1	0	0	0	0	3
Seed	5	9	11	4	9	10	9	2	7	13	64
Sale	0	3	2	1	2	3	4	0	0	2	12
Feeding Animals	0	0	2	1	2	1	4	2	1	0	11

a) Percentage of farm households that stored maize in the survey regions.

Source: Author's Rural Food Security Study Data, 1985.

The results in Table 5.14 show that all the households in the study sample that grew maize during 1983-84 season stored it and used some portion of it for food.

Although some farmers in the survey regions mentioned using their stored maize to feed animals, the amounts were very small because it is mostly the cores of the shelled cobs and the husks that they feed their cattle. Small quantities of damaged grains are fed to chickens when women are shelling grains from the cobs.

To shed more light on the usage of stored maize, farm households were asked for an estimate of the amount of their maize they used for each purpose. The results obtained are given in Table 5.16 below.

As the results in Table 5.16 show, a large proportion of the maize stored by farm households' was used for food.

Even though 67 percent of the households that stored maize during the 1984-85 season used some maize for making beer, the total amount used was only 20 bags.

Maize given as gifts was the third most important use of stored maize among farmers. The large proportion of maize made out as a gift was given to relatives with food shortages, followed by maize given to neighboring households.

Farm households that sold their maize from storage sold it to neighbors. Sales made from the store usually consist of only a few bags and no farmer sold more than 8 bags this way.

Over 70 percent of the farm households that store maize during the 1984-85 season used some of the maize for seed. The use of stored maize for seed is common among the small farm households who generally can not afford to buy certified seed. The amounts used for seed per household varied from 1 tin to 1.5 bags. Because of the large number of households that use their stored maize for seed, it could be the reason why there was a large number of farm households that produced the hybrids-once-grown and the local varieties.

Table 5.16

Use of Stored Maize by Percentage of Total Stored (1984-85)
(Number of Households)

					Regions					
Use Percentage	1	2	3	4	5	6	7	8	9	10
Food										
up to 80	1	2	3	0	2	5	2	1	3	6
81 - 90	8	9	10	5	10	16	9	2	2	9
91 - 100	2	1	3	1	3	1	2	1	3	1
Total	11	12	16	6	15	22	13	4	8	16
Beer Making										
1 - 5	2	4	6	2	7	10	4	1	4	7
6 - 10	0	3	2	1	2	4	1	1	0	0
11 and over	0	0	0	0	0	0	0	0	0	0
Not known	0	0	2	0	0	0	0	0	0	0
Total	2	7	10	3	9	14	5	2	4	7
Gifts										
1 - 5	2	1	5	0	2	5	4	0	1	3
6 - 10	0	0	0	0	2	2	0	0	0	0
11 and over	0	0	0	0	0	0	0	0	0	0
Not known	0	0	0	1	0	0	1	0	0	0
Total	2	1	5	1	4	7	5	0	1	3
Sale										
Up to 5	1	5	1	4	2	4	2	0	2	3
6 and over	0	0	0	0	2	1	1	0	0	0
Total	1	5	1	4	4	5	3	0	2	3
Seed										
1 - 2	6	10	16	6	11	13	7	2	2	3
3 and over	2	1	0	0	1	3	2	1	2	3
Total	8	11	16	6	12	16	9	3	4	6
Barter										
up to 1	1	0	2	0	1	0	2	1	0	0
1 and over	0	0	1	0	0	0	0	0	0	0
Total	1	0	3	0	1	0	2	1	0	0

Source: Author's Rural Food Security Study Data, 1985.

The common objective of barter among the households studied was to obtain a commodity that they needed from the neighbor? Three percent of the farm households reported that they used some portion of the maize stored to obtain fish, meat and herbs used in making non-intoxicating beer (chibwantu). The amount of maize exchanged this way was no more than 23 bags. Households that engaged in barter trade generally were those with some amounts of maize to spare.

In general, most of the maize that is put into storage is used for food. A households will normally buy maize from other households when their own production is insufficient.

Maize Storage Losses

About 95 percent of the heads of farm households we interviewed indicated that their maize had shown no signs of damage during the 1984-85 storage season. Some farmers attributed this to the treatment of maize with Blue Cross insecticide (Malathion).

Only 2 of the 6 farmers who reported some damage to their stored maize were able to give estimates of the extent of the damage. One farmer reported losing 2.5 bags of maize and the other farmer said that he only lost one bag. The two farmers also used some of the damaged maize for food, brewing beer, and feeding animals.

Most farmers found it difficult to estimate the extent of the damage to their stored maize for two main reasons. First, it is the women who take out the maize from storage. When the extent of the changes is considered not to be substantial, then it is not reported to the husbands. Second, only small quantities of maize are taken out

from storage at a time. As the women shell the grain from the cob cores, if they notice any damaged grain they usually throw it to the chickens.

Storage Costs

Other than the initial overhead cost incurred when building the storage facility (such as buying the cement or the woven basket from other farmers), there are no major costs involved in storing maize. All the 28 farm households that reported using Malathion to treat their maize during the 1984-85 storage season, none had spent more than k 1.70 in purchasing it.

Decision Making in Maize Storage

Farmers were asked to indicate the person or persons who decide on how much maize to store. Over 80 percent of the respondents said that the husband was responsible for making storage decisions. Other than the households that were headed by females, the remaining 20 percent of the households reported that the decision on how much maize to store is jointly made by the respondent and his spouse.

Strategies and Measures to Guard Against Hunger

In order to determine the methods rural households use to guard against short-term food fluctuations such as those caused by short falls in food production, we asked the respondents to choose the most appropriate method(s) they use from the following:

1. Store more food

2. Sell animals

3. Obtain help from relatives

4. Do part-time (off farm) jobs or business

5. Wait for the Government to help

6. Put money in a bank

The most common answer given by the households (86 percent) was "to store more food." This response probably confirms why most farm households with sufficient maize supply tend to store 6 to 8 bags above their seasonal requirements.

The sale of animals was the second most common reason given by the farm households studied. However, although farm households indicated that they could sell cattle to buy food, only one farmer sold a cow during the 1984-85 season for this purpose. As we indicated earlier, most farmers regard cattle as a status symbol. For this reason, a farmer will try all other means to raise cash before he would think of selling cattle.

Four out of the 132 households said they could seek help from their children working in town. Seventeen farm households said that they would start selling fish and other commodities in order to raise the money to buy food. Though not surprising, no respondent said that they could wait for the government to help feed their family when they experience food shortages.

The general conclusion is that households seemed to be more concerned with having physical supplies rather than money to purchase

the food. This is not surprising considering the fact that there are no reliable market sources of food in rural areas.

Sources of Market Information

During the survey, households were asked to indicate the most reliable source of market information from the following list that was provided to them.

1. Agricultural Extension Officers

2. Marketing Agencies

3. Radio

4. Newspapers

5. Friends and Relatives

The survey results show that although the majority of the households indicated that they would go to the agricultural extension officer if they needed information, they also said that they did not have a single source of market information they regarded to be most reliable.

Large farm households had more access to market information than small farm households probably because they are more frequently visited by the extension officers.

Only 16 out of the 132 households studied said that they obtained market information through the radio. However, even though Radio

Zambia carries many agricultural programs and announcements through out the day, very few households had radio sets.

CHAPTER 6

SUMMARY AND CONCLUSIONS

This study arose out of concerns about the deteriorating food security situation in Zambia.

The overall objective of this study was to provide a better understanding of the food security situation from a rural household and village level perspective. Specifically, the objectives for this study were:

(1) To describe the food grain production and distribution system in Zambia.

(2) To examine the impacts of the grain distribution system on rural food security.

(3) To identify and describe the characteristics of the rural households in the study area and the specific problems they face in their efforts to attain secure food supplies.

(4) To examine on-farm food storage practices and their impact on household food security.

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(5) To provide suggestions for further research and policy recommendations for improving rural household food security.

This study is based on primary and secondary data collected from various sources. Primary data were collected from a sample of rural households in Zambia. The term "rural" refers to all areas outside the highly industrialized and well developed agricultural zone which lies in the central region of the country and along the line-of-rail (see Figure 1.1). In this case, Mumbwa a rural district in the Central Province was selected to be the study site. A number of factors influenced the selection of this study location. However, its proximity to Lusaka the capital city was the most important factor that led to the selection of Mumbwa district. Its proximity to Lusaka was important for two reasons. First, at the time the field research for this study was conducted, there were sporadic fuel shortages in the country. Consequently, it was important to conduct the research in an area not far from Lusaka where fuel shortages were less severe than in most other areas of the country. Second, because we wanted to examine whether the food that moves into urban areas from rural areas flows back to rural households, the proximity of Mumbwa district to the city of Lusaka offered this opportunity.

The field research collected primary data from a sample of 132 rural households selected randomly from 10 agricultural administrative regions in Mumbwa district. Data were collected through structured interviews with heads of households using an interview schedule that was designed specifically for this study (see Appendix C). The data

collected included a wide variety of questions concerning households' food production, storage, distribution and consumption patterns.

Secondary data were obtained from a number of local as well as international reports. The data collected from secondary sources was used in describing the food production and distribution system in Zambia.

Due to limited resources and the short period of time in which the field survey was conducted (July to November), this research did not collect more in-depth data. This imposed limitations on the use of statistical techniques in the analysis of the data collected. Therefore, this study should be treated to be exploratory and concentrates on describing what was observed using frequency distribution tables.

Major Findings

The major findings are discussed in relation to the study objectives: 1) the description of the food grain production system in Zambia (see Chapter 2); 2) the characteristics of the food grain distribution system in Zambia and its impact on rural food security (see Chapter 3); 3) the characteristics of the rural households and the identification of the specific problems they face in securing food supplies (see Chapters 4 and 5); 4) the examination of farmers' utilization of on-farm storage facilities and its impact on household food security (see Chapter 5); and 5) the presentation of suggestions for further research and policy recommendations for improving rural household food security.

The Food Production System in Zambia

The food production system in Zambia was acutely dualistic prior to and immediately after independence with a relatively small but well developed large-scale commercial (market oriented) farming subsector and a much larger traditional (subsistence) subsector.

Food production in Zambia is still dominated by small farmers who constitute a high proportion of the population and are still among the poorer segments of the society. Consequently, small farmers tend to be more afflicted by the transitory food insecurity problem than large and medium sized farm households. Surveys of rural small farm households (1976) indicate that farm production is constrained by shortages of labor draft power and finance. Availability of land preparation capacity is also an important constraint due to limitations posed by hand hoeing, availability of family labor and the relative inefficiency of the national tractor fleet.

Most of the emergent and virtually all the medium- and large-scale farmers in Zambia are situated near or along the old line-of-rail. The commercial farmers in general and the large-scale farms in particular have been the principal beneficiaries of the various agricultural support services, public investments and policies and imported agricultural inputs. They have been the most reliable source of food supply for the urban dwellers.

By the classification given in Chapter 2, there were no medium- and large-scale farmers in the study area. The farm households referred to as large farm units in Chapter 5 cultivated an average of less than 10 hectares of land. The majority of the large farm

households in the survey regions are migrants from the Southern Province and Zimbabwe. The migration from the Southern Province was a response to a relatively low population/farming density in Mumbwa district. Migrants from Zimbabwe moved into the district mostly after the unilateral declaration of independence (UDI) by Ian Smith in November 1965. As indicated in Chapter 5, there is a marked difference in food output between the two types of farm households. For example, one farm in the Nagoma area sold more bags of maize than 12 other farmers combined.

The Food Distribution System

In Zambia, most of the purchasing, transportation, storage and more recently the processing of food grains, as with many other agricultural functions, is in the hands of the state.

The development of the present food marketing system can be traced back to the colonial period. During this period, the responsibility for marketing both European and African agricultural output was given to the state controlled marketing boards.

After Zambia attained its independence in 1964, the marketing of maize, the country's main staple and other crops designated as "essential" (such as cotton, sugar and wheat) continued along state-regulated and state-run lines, for reasons which were in varying degrees both practical (lack of entrepreneurial class) and ideological (the desire to eliminate what was perceived as exploitative and profiteering activities).

The marketing parastatal organizations created during the colonial period were handed over to the new government and their names were changed to reflect the transfer of political power from the white minority government to the majority African government. In the maize subsector, the Grain Marketing Board (GMB) and the Rural Marketing Board (RMB) were "created" in 1964, charged with the responsibility of implementing government administered maize prices. In 1969, the two maize marketing boards were amalgamated to form the Agricultural Marketing Board (NAMBOARD) which is still operating today. NAMBOARD like its predecessors, was plagued with heavy financial losses and has relied on government subsidies since its inception and has been riddled with corruption and inefficiencies.

In an attempt to improve maize marketing, the Zambian Government has tried numerous measures. In 1981, it created nine quasi-parastatal, provincial cooperative marketing unions. These unions were given increased responsibility for procuring fertilizer for rural areas and intra-provincial maize trade. The responsibility for inter-provincial and international maize trade and fertilizer procurement remained under the control of NAMBOARD. Although having different institutional names, NAMBOARD and the provincial cooperative unions operate under the same basic government rules and controls. In January 1985, the roles of NAMBOARD and the cooperative unions were changed, with the responsibility for all maize marketing reverting to NAMBOARD with cooperative unions acting as marketing agents. These marketing institutions are plagued with heavy losses. For example, provincial co-operatives seldom make purchases from farmers from their own

financial resources, but rather from government grants or through bank-guaranteed overdrafts, or by a combination of both.

Throughout the post independence period, administered producer prices, consumer and producer subsidies have been the major policy instruments used to achieve food security objectives. Producer prices, consumer prices and subsidies are decided by the Cabinet after consideration of recommendations made by the Ministry of Agriculture and Water Development (MAWD)

The major and most striking features of the existing administered price system in Zambia can be summarized as follows: (1) marketing boards and cooperatives are constrained to operate in a system where both producer and consumer/user prices are fixed; (2) the costs incurred by marketing boards and cooperatives in connection with transport, handling, storage and management overheads are virtually covered by government subsidies; and (3) pan-territorial prices for commodities and inputs are maintained throughout the crop year regardless of the cost of storage (World Bank, 1984).

The government has a number of reasons for maintaining the administered price system. Prominent among these are; "fair return to producers", "fairness to consumers", and other equity considerations. However, on a priori economic grounds, the administered price system raises a number of issues which will be crucial to the development of the sector, particularly if agriculture were to play a leading rather than supplementary role in future economic growth. The administered price system has three policy aspects with important implications to national food security. These are: marketing and farm subsidies,

uniform pricing and producer price incentives. (World Bank, 1984 and IFAD 1983).

The policy of uniform pricing is an important aspect of the public administered price system. Prior to 1971 there were regional differences in producer prices which mainly reflected transport cost differentials. However, during the 1972 maize marketing season, prices were set at a uniform level for the whole country and for the entire cropping season; other controlled crops subsequently followed. Fertilizer was also pan-territorially priced. Again equity considerations were given as the underlying rationale for this policy and the adoption of uniform prices has had certain unfortunate, but predictable consequences. First, maintenance of uniform producer and selling prices throughout the entire marketing season have made it unprofitable to store food crops on the farm and have encouraged farmers to sell immediately following the harvest, thus overtaxing the buying, transport and storage facilities of both the cooperatives and NAMBOARD, particularly during a good harvest. Second, uniform countrywide pricing has made it virtually impossible for private transporters to function except as contract carriers for NAMBOARD or cooperative unions, and since both frequently do not offer adequate inducements, the movement of crops has often been handicapped by inadequate transport.

Thirdly, uniform pricing has resulted in inefficient allocation of resources. It has, for example, encouraged the production of maize in almost every district in the country, including some remote areas away from principal centers of consumption, at the expense of traditional

food crops (e.g. sorghum and cassava) for which such areas are more suited. This has consequently compounded the problem of high transport costs since such maize frequently has to be transported long distances to major consumption centers.

In the last 2-3 years, official producer prices have been increased relatively more that the rest of the post-independence era, and have been announced as important incentives to all farmers. But such changes by themselves chiefly represent higher potential incomes for large-scale farmers, for without extensive improvements in the whole marketing system - far better roads, good credit facilities, efficient marketing agencies, etc. - traditional farmers cannot begin to take advantage of higher prices paid by the parastatal organization.

The state's manifest marketing inefficiencies have many negative consequences for national food production: the costly smuggling of commodities out of the country, notably maize, groundnuts, and cooking oil; the widespread practice of 'retained production' through which farmers effectively boycott state-marketing agencies and divert their produce elsewhere. Even though this practice was not apparent among Mumbwa farm households, it is estimated that out of the 1.6 million bags of maize produced by farmers in the Southern Province in 1984, only 1 million were sold to the Provincial Cooperative Union the rest were sold through private market channels. In the same year, out of the 10,400 (90 kg) bags of wheat they produced, farmers only sold 1,117 to the cooperative union (Zambia Daily Mail, December 28, 1984).

In general, the major participants in the food distribution system in Zambia are the provincial cooperative unions and NAMBOARD who are required to operate under government fixed prices.

Survey Results

One hundred and thirty two rural households were surveyed. The average size of the family household for which the respondent was responsible for feeding was 6.8 persons for small families and 13.8 for large families. The family household (munshi) generally consisted of an adult male, his wife or wives and his children.

Most of the respondents had received primary education (1 to 7 years) although the majority had forgotten how to read and write.

Out of the 132 respondents that were studied, only two had part time "wage paying employment" other than farming. Thus, more than 95 percent of the rural households that were studied, regarded farming as their main occupation. However, a number of farm households were engaged in other income generating activities such as brick making, brewing beer and selling fish or game meat. Most of these activities are undertaken when agricultural work is slack. The major economic activity is the production of crops. The crops produced include maize, cotton, sunflower and groundnuts, and to a lesser extent sorghum and millet.

Maize is not only the most important food commodity among the households studied, but it is also the main agricultural activity. The domination of maize culture was manifest in both the area cultivated and the value of crops sold.

Small farm household units retained about 74 percent of the maize they produced for house use, while large farm household units retained about 62 percent of their production. These statistics suggest that food production among the households studied is still in the subsistence framework where much of what is produced is for self consumption.

Maize has several uses at the household level. About 80 to 90 percent of the maize retained for family use is used for food. The food of the household usually consists of nshima (a thick white paste made from mealie meal) which is eaten together with relish. The other 10 to 20 percent of the maize is divided among the other family uses such as beer making, seed, sales, loan repayment, gifts and feeding animals. Beer brewing was common among the low income small households. Besides being a recreational commodity among the households, beer is used to raise cash for buying goods that families need (soap, cooking oil, sugar and even maize). About 80 percent of the small households made beer during the 1983-85 period. The small farm household units mainly obtain their seed from the maize retained for family use.

About 62 percent of the households in the study sample owned 1,407 heads of cattle (cows, oxen, bulls and calves). The oxen are used for plowing while the cows and the bulls are mainly used for breeding. The animal that are past their useful life are either sold or slaughtered at ceremonies such as funerals and weddings. The farmers that kept cattle did not regard them as a source of food, even though 24 said they milked their cows. Furthermore, only a few farmers regarded

cattle as a source of income mainly because cattle are considered as a stock of wealth.

Maize is grown both as a single crop or is inter-planted with other crops. The families that practice mixed cropping gave three main reasons for doing this. These were: (1) to diversify, thus guard against maize failure, (2) to provide some fertility to the soil; and (3) to make maximum use of the available land. Generally, it was the small household farm unit that practiced mixed cropping.

The most important factor that influences the amount of maize produced by a household was the family size. The main purpose for producing the maize was to feed the family. The second important factor mentioned by farmers for producing maize was the possibility of sale. The interesting thing about the results on this issue was the fact that farmers did not regard higher price as an important factor that could affect the amount of maize they produced.

The husband or the adult male in a family is responsible for making decisions on how much maize to produce and retain for home consumption. Implicitly this means that the husband is responsible for providing food to his family as well as to decide the amount of maize that can be sold.

Three broad categories of maize varieties are grown in the study area (hybrids such as SR52, ZR1 etc., hybrids-once-grown and local). The factor determining the variety grown among the farmers interviewed was availability, even though small farm households tended to use more of the hybrids-once-grown and local varieties. This can be explained by the fact that most of these farmers lack capital to purchase the

hybrid varieties. The question on the variety of maize grown was raised for two reasons. First, we thought that farmers were concerned with yield when selecting the type of maize to plant. Second, we assumed that farmers take into consideration the storability of the variety they grow. However, as the results show only 10 farmers were concerned with the yield and 4 with storability out of the 123 that grew maize during the 1983-84 season.

Another interesting result about the type of maize grown, is that over 50 percent of the maize producers grew more than one variety. This could be explained by seed availability and the ability to purchase.

The pattern of marketing maize in the survey regions is the same as in the rest of the country. The cooperative marketing union (CPCMU), a quasi-parastatal organization, buys all the maize in the district on behalf of NAMBOARD.

Farmers deliver their maize to the nearest CPCMU depot, where it is weighed, graded and prices determined.

After the cooperative union buys the maize, it is temporarily stored at these depots before it is hauled to Mumbwa Boma on its way to permanent storage facilities in Lusaka 150 kilometers away.

The cooperative union buys maize only during the official marketing season, which normally begins in May and continues through late September. The price of maize offered by the cooperative union is seasonally fixed by the government.

Because of the financial problems CPCMU was facing, 32 of the 61 farmers that sold maize during the 1984 marketing period were paid 3 1/2 months after they had made their deliveries.

From the description of the food grain marketing system presented earlier and the results obtained from the survey information, the development of the private marketing channels in the study district, as in much of Zambia, is hampered by the administered pricing system of pan-seasonal and pan-territorial pricing, and the government's general mistrust of private traders.

The existing public marketing network is geared to move the maize outside the rural areas and is less effectively structured at serving food deficit rural households. For example, within a radius of 3.5 kilometers from each household there is a maize depot which is open during and immediately after harvest to receive maize from the farmers. But as the rains are about to come, these depots close and households without food have to travel long distances to town to obtain their supplies or have to rely on neighbors through house trade. Consequently, the majority of the rural households depend on their own stocks. Thus, the most reliable source of food in rural areas during the "hungry" period is the "house trade" which distributes local maize surplus among the village households.

The evidence on timing of sales reveals four other important results pertaining to maize marketing among the rural households in Mumbwa district. (1) More than 90 percent of the marketed maize is sold during the first 4 months following the harvest. (2) Farm households that do not sell some portion of their harvest are generally

those with poor harvests. (3) For the period studied, very few farmers sold maize during the "hungry" period. (4) Sales made after the official marketing season are generally unplanned. Households use these sales to raise cash for other family requirements or to obtain other commodities through barter.

Roads in the villages have not been maintained properly in the last few years due to lack of funds. As a result, very few vehicles go into these villages. Most farmers depend on ox-carts to deliver their maize to the depots. Rural households that need to buy mealie meal travel by bicycles or wait for private vehicles that occasionally pass through these villages to take them to town. There are no buses that go into the villages.

Two methods are used to process maize by households in the study area. The first method is the old method by which maize is pounded using a mortar. The second method is where maize is processed using grinding mills. Generally, households did not find it difficult to process the maize into mealie meal.

All of the 128 farm households that were studied during the field research said that they store maize. During the 1984 crop year, only 4 out of the 123 did not store maize because they had a poor harvest.

Very little time usually elapsed between the harvesting of the maize and its movement into the farm store, both normally taking place within the period of May to July. This means that farmers allocate their maize to different uses shortly after bringing it home from the fields.

The husband, (in about 80 percent of households studied), decided on the amount of maize to be stored.

The proportion of farm households storing different types of maize was similar in all the 10 survey regions. However, about 60 percent of the farmers who were interviewed think that the local variety stores better than the other two varieties.

About 80 to 90 percent of the maize put into storage was used for food. Large farm household units tend to store more than small farm household units.

The average number of bags stored per small household units was 20, while for large household units was 45 bags.

About 64 percent of the households stored their maize on cobs with husks, 33 percent stored on cobs without husks and the remaining 3 percent stored shelled grain. Research findings reveal that farmers who migrated from the Southern Province of Zambia tended to store their maize on cobs with husks, while migrants from Zimbabwe store theirs on cobs without husks or store shelled grain.

Three main types of storage facilities were recognized: vertical timber poles made from branches plus a thatched roof; a woven basket with a thatched roof; and a kimberley brick thatched structure. The useful life for the first store type varied between 5 and 15 years, 2-10 for the second and 20-30 years for the third.

On average each farm family had one or two storage facilities of varying capacities. The capacity of the storage facility was

determined by the size of the household and the average level of production.

The type of the storage facility determines the method of storing maize.

Losses from maize stores were very difficult to estimate. As one farmer quipped "how do you expect us to know the amount of maize we lose when we do not use the stored maize at once." Our crude estimates indicate that about 2-5 percent of the total maize put into storage is damaged.

Sales from storage were very limited. Those reported were conducted through "house trade."

To conclude, most of the maize that is put into storage is for household consumption. The amount of maize stored usually lasts until the next harvest, but when the new harvest comes in, the carry over stocks, if any, are removed and sold to neighbors or used for brewing beer and feeding animals.

The following is a summary of what may be regarded to be the most important findings concerning the utilization of on-farm storage in the study area:

(1) Because the public grain marketing agency and the few private traders that operate in the district supply urban consumption, rural households are left without any other alternatives except to store food between harvests.

(2) Because of the limited real market opportunities available to
     farmers due to the pan-territorial and pan-seasonal pricing
     policy, they are forced to store maize that lasts until the
     next harvest.

(3) Small farm household units store a higher proportion of the
     harvest than large farm household units. However, large farm
     household units store a larger volume per household than
     small household units.

(4) Even though no scientific method was used to estimate losses
     from storage, the estimates obtained during the survey
     indicate that only about 2-5 percent of the maize put into
     farm-storage is lost.

(5) The shortage of land in the Southern Province and migration
     from Zimbabwe due to a repressive regime in the mid 1960s,
     into Mumbwa district partly explains the presence of three
     basic maize storage practices and types of farm storage
     facilities in the study area.

(6) Men are responsible for deciding how much maize to be stored.
     However, because the women prepare the meals, they are
     responsible for managing the stocks.

(7)   The majority of the respondents were of the opinion that the
local maize varieties store better than other varieties and
do not lose taste even when stored over long periods.

(8)   There was no evidence to suggest that farmers think that one
type of a farm storage facility is better than the other.

(9)   Farm households that sell maize from storage sell it through
"house trade" and usually these sales are unplanned.

(10) In general, food surplus households did not sell their maize
from storage to repurchase later because there are no
established village market outlets.

There are several methods or strategies households in the study
area use to minimize the probability of not having enough to eat.
These include; crop production and storage, as well as additional
sources of income, such as selling fish and brewing beer.

The information obtained during the survey indicates that most
farm households regard farm production and on-farm food storage as the
most important strategy for assuring adequate food supplies between
harvests.

Mixed cropping is another alternative farm households use in their
attempt to attain food security.   Research findings however, suggest
that this practice was common mostly among the small farm household
units that cultivate only small plots.

The contribution of livestock sales to household income is another potentially important method used by households to reduce the food insecurity problem. However, its contribution to household income is more complex than it appears on the surface. Cattle sales are made when all other sources of income have failed. Cattle sales appear to have an appreciable effect on income of households when they are made. However, cattle sales need to be considered over a longer time period than a single year to assess their significance to household food security.

Beer brewing and fish sales is another method households use to raise cash to buy food during "hungry" periods. As indicated in the Chapter 5, cash transactions involved in this type of business are very small. In the survey regions it was mainly the small farm household units, particularly those headed by women that are more involved in this type of business.

Information is so basic to efficient decisions making that the role it plays is difficult to overlook in any research effort. Better information reduces risks; allows food to be distributed effectively and working capital to be turned over quickly; and encourages entrepreneurial initiatives.

Research findings reveal that the majority of the farm households received marketing information from two main sources: (1) the field agricultural extension officers; and (2) from friends or relatives. However, it was the large farmer who was in more contact with the extension officer than the small farmer.

An alternative strategy in the dissemination of market and extension information system has to be devised or the existing one improved. The present system of individual contact between extension worker and farmer fails to cover a large proportion of the households and would continue to fail even if transport was provided to the field officer.

Conclusions

A variety of issues/topics that are associated with rural household food security in Zambia have been covered in this study. This section is devoted to presenting some of the major conclusions that can be drawn from this study.

Chapters 2 and 3 have provided an overview of the food production and distribution system in Zambia. Chapter 2 was a review of the historical development of the present food production system. Chapter 3 presented the strengths and weaknesses of the present food distribution system.

Chapter 2, brings out the fact that food production among the majority of the rural households in Zambia is still in the framework of the traditional subsistence economy. People produce much of what they eat, and occasional sale of marketable surplus to the modern enclave sector and social obligations provide much of the other family requirements. Production fluctuations expose most of these people to food insecurity.

Chapter 3 has brought out a number of important impacts that the present setup of the Zambian food grain distribution system has had on

rural food security. (1) The monopsonistic food grain marketing system makes rural households more vulnerable to food insecurity because it moves food grains from rural areas to urban centers. Therefore, food deficit households some times have to travel long distances to urban areas to obtain supplies. (2) The public food grain marketing system has hindered the development of private trade, as a result, farmers are forced to sell to these government agencies. Because the government agencies operate under monopsonistic conditions, farmers sell their surpluses under the agencies terms. For example, farmers sell at government fixed prices.

The survey data presented in Chapter 5 showed that there were no important differences among rural households in their food production and disposal behavior. The general pattern is that food production is dominated by maize, the main food commodity. The maize disposal pattern is that the large-portion of the harvest is retained for home consumption and the surplus, if any, is sold following the harvest.

The maize storage behavior is based on the need to have an adequate supply between harvests. The only considerable differences among the rural households the research data brings out, is in ownership and access to resources, particularly labor, farming equipment and income. These differences make some households more vulnerable to food insecurity.

The strategies and mechanisms rural households use to insulate themselves against food insecurity are mainly those that involve production, storage and selling of agricultural products (cash crops and animals), and beer.

Lessons and Implications

This section presents, in a summary form, some of the lessons and implications of this study.

1. The low productivity, particularly among small-holder farmers is a major constraint to increased food production and income. Achievement of a reliable food surplus is a fundamental pre-requisite for the attainment of food security among rural households. Since research results indicate that the bulk of food produced by rural households is retained for family consumption, it is imperative that increasing productivity of these households becomes a top priority of the government.

2. The present set up of the food grain distribution system in Zambia, which moves food grains out of rural areas suggests that it is both the policy and physical environment which increases the vulnerability of rural households to food insecurity.

3. Due to lack of established village markets outlets, rural households tend to have no reliable sources of food grains during "hungry" periods. The establishment of public rural food storage facilities could help in alleviating this problem.

4.   The interventionistic attitude by the Zambian Government in food grain marketing has prevented the development of an entrepreneurial class in food grain distribution to serve rural households.

5.   Lack of non-agricultural income generating opportunities in rural areas has forced most young men to move to urban areas to seek employment. Large farm household units have been the main beneficiaries of the agricultural extension and market information systems. The alleviation of food insecurity among rural people could be attained by the transfer of appropriate technologies in food production and a better flow of market information on supply and demand conditions among all farm households including small holder farmers, who constitute a high proportion of the population and are among the poorer segments of the Zambian society.

Limitations of Study

This research was constrained by three major factors: (1) the time available for research was not sufficient to permit a more detailed analysis of the households food production and disposal behavior. For example, although one of the research objectives was to observe the farmers' food grain disposal activities, the research period was over before the farmers had sold all of their maize. (2) Resources for carrying out the research were limited so that only a small number of households were studied. Furthermore, because of the

limited resources we were unable to carry out a more comprehensive examination of the operation of the private food traders. (3) Because of the wide variety of data collected, most of it lacked in-depth detail in any of the activities studied. (4) Due to lack of information about the population, the selection of the sample size for this study was not based upon statistical sampling procedures. Therefore, this restricts the extent to which the results obtained can be generalized to broader situations.

In future research a more sophisticated form of cluster sampling that is used in large sampling projects known as probability proportionate to size (PPS) will be used. As the name suggests each cluster is given a chance for selection proportionate to its size. The mathematical formulas that can be applied in determining the appropriate sample size is given in Babbie (1986).

Further Research Needs

This research, though exploratory in nature, has increased the understanding of the food grain production and disposal behavior among the rural households in the study area. It has also provided some insights into the major characteristics of the food production and distribution system in Zambia. It is hoped that this understanding will be useful for more in-depth data gathering, and narrowly focused research. For example, better estimates of rural household grain flow patterns are required for household food security analysis.

Further detailed information is needed in the food storage area, particular now that the government has introduced a limited liberalized policy in crop marketing.

Further detailed information is needed also in the area of non-agricultural activities that are of considerable importance particularly to small family households. Among these households, brewing beer, fishing and small cottage type industrial activities were common.

More detailed research on how to improve the flow of market, extension and credit information may be necessary. This is crucial if farm households are to make better production and marketing decisions.

Further research is needed in the area of nutrition among rural households. This study implicitly assumed that food is evenly distributed among household members.

Further research should also examine the importance of vegetable gardening to household food security. It appears that almost all the households that were studied were involved in vegetable production.

Another important research topic that would be worthy investigating in future food security studies is the role women play in food grain production and disposal. This is important considering the fact that women are involved in all the food production, distribution and consumption activities.

Recommendations

Policy actions are recommended in some areas, on the basis of an improved understanding of the households' food production and disposal

behavior in Mumbwa rural, as well as the improved understanding of the food marketing system, under the assumption of continued government involvement in maize marketing.

The food security prospects for the majority of the households in Mumbwa district will remain precarious so long as they are unable to increase their incomes. Thus, the first and the fundamental step that is needed among the rural households in Mumbwa district is to try to improve their incomes. This can only be attained by improving their income earning opportunities. This is a long-term solution and requires improvements in agricultural productivity and providing other income earning opportunities in the rural areas. In this study, the problems examined are short-term and therefore the recommendations provided may be used to alleviate short-term problems.

Because the rural poor produce all or most of the food they consume, they generally do not benefit from reduced food prices like those recently announced by the Zambian Government after the December 1986 food riots. In this case, we suggest that small, low income farm households be provided with subsidies on inputs such as fertilizer and seed which would provide them with an immediate augmentation of incomes. What is being suggested here is some kind of a discriminatory subsidy in favor of small farmers but against large farmers. However, this might be difficult to implement in the first few years, but the extent to which food production can be increased among the rural small farm households has over the years been limited among other things by lack of capital to enable these farmers have access to purchased inputs.

For this recommendation, to be beneficial to the target group requires other supportive institutional and research services. These include improvement of the physical infrastructure, the liberalization of the food trade, and improving performance of the existing marketing, extension and credit systems.

Reform in agricultural marketing and pricing policy should be aimed at improving efficiency (i.e. producing a unit output at the least cost), providing adequate incentives to all participants in the sector and putting in place flexible and responsible marketing and pricing systems which will enable farmers to respond to changes in domestic and external markets. Efficiency in resource use should be fostered through a gradual introduction of competition in both agricultural procurement and input delivery systems. Existing institutions (mainly parastatals and cooperatives) should be allowed to compete with one another and free entry by private enterprises or individuals should be permitted and encouraged.

If maize prices were permitted to adjust seasonally there would be greater incentives for holding storage stocks in the rural communities thus ensuring greater food securities among rural households.

Given the poor conditions of distributional rural infrastructures, there is no doubt that better roads and food handling facilities will improve the performance of the food distribution system by improving access to markets and by reducing transport costs. What seems to be urgent in Zambia is the need to keep the vehicles rolling by allocating more foreign exchange to purchase spare parts. Competition in transport services should also be permitted.

Improved research, particularly for maize and sorghum/millet, should be given high priority, to improve productivity without increasing the foreign exchange requirements.

APPENDICIES

APPENDIX A

Nature and Degree of Parastatal Involvement in Agriculture

Parastatal	Number	Commodity Handled	Brief Description of Functions	Major Problems Experienced by Parastatal					Financial Status		Market Structure	
				Mgmt.	Liquidity	Capitalization	Foreign Exchange	Capacity Utilization	Profitable	Loss-Making	Monopoly	Compet.
1. Lint Company of Zambia	1	Seed Cotton	Sole buyer and ginner of cotton, supplier of cotton lintdale					low				
2. National Marketing Board	1	Fertilizer, Maize	Importation of fertilizers & maize, interprovincial trade thereof									
3. Zambia Horticultural Company	1	Horticultural Products(HP)	Export & Processing (canning) of HP					low				
4. Cold Storage Board		Beef	Cattle purchasing & processing, storage					low				
5. Dairy Produce Board		Dairy Products	Milk prod. purchasing, importation & processing					low				
6. Tobacco Board		Tobacco	Operation auction floors, storage					very low				
7. National Milling Company		Maize - maizheads	Miller of grains, sole stockfeed manufacturer, storage					adequate				
8. Zambia Seed Company	10	Seeds	Producer, importer & distributor of seeds, storage									
9. State Farms		Crops	Production of specific crops					low				
10. Zambia Pork Products		Pork products	Purchasing & Processing of pork products					low				
11. Zambia Agricultural Development		Crops and cattle	Operator of crop farms & cattle ranches					low				
12. Provincial Cooperative Unions	9	Crops, farm inputs	Crop purchase, credit administration & distribution of farm inputs									
13. RIZON Industries	1	Coffee	Coffee production & processing									
14. Rural Development Corporation	1	Crops, livestock & credit	Holding company of a number of agricultural parastatals									
15. Zambia Agricultural Development Bank	1	Credit	Provision of agricultural credit									
16. Zambia Finance Company		Credit	Provision of agricultural credit									
17. Cattle Finance Company		Credit	Provision of credit to livestock subsector									
18. Poultry Development Company		Poultry	Purchasing & processing of poultry									
19. Nanzabe Tea Company		Tea	Production of tea									
20. Agricultural Funding Equipment		Farm equipment	Importation & distribution of farm machinery					low				
21. Rural Air Services	1	Aerial spraying, services	Provision of aerial spraying, services					very low				
22. Refined Oil Products		Vegetable oils & Cakes	Processing oilseeds into oils & cakes									
TOTAL PARASTATALS 42												

1/ With GRZ participation in financing and management.
2/ These are not yet operational but have been registered as companies.

Source: World Bank (June 1984)

APPENDIX B

Zambia Marketing and Processing Cost Structure for Maize (K/Ton), 1983

Costs	Financial	Economic	Foreign	Local	Financial	Economic	Foreign	Local	Financial[2]	Economic	Foreign	Local
Cost of Maize	203.33	112.49	112.49	-	244.69	140.91	140.91	-	291.15	173.45	-	-
Costs:												
Deposit/Processing Costs	7.66	6.20	1.24	4.96	0.38	0.31	0.08	0.23	16.52	13.38	10.84	2.54
Head Office Overheads	7.92	4.91	0.98	3.93	7.06	4.38	0.88	3.50	4.18	2.59	1.04	1.55
Stock Losses	1.50	-	-	-	2.56	-	-	-	3.56	-	-	-
Society Levy [1]	10.15	6.29	6.29	-	-	-	-	-	-	-	-	-
Transport	6.68	5.08	4.06	1.02	23.44	17.81	14.25	3.56	5.88	4.47	3.58	0.89
Bagging & Rebagging	1.00	0.96	0.58	0.38	0.31	0.30	0.18	0.12	9.89	9.49	5.69	3.80
Bank Charges & Insurance	4.25	2.98	0.45	2.53	8.71	6.10	0.92	5.18	4.55	3.18	0.48	2.70
Depreciation	2.20	2.00	1.50	0.50	4.00	3.64	2.73	0.91	3.56	3.24	2.43	0.81
Total	41.36	28.42	8.81	19.61	46.46	32.54	19.04	13.50	48.14	36.55	24.06	12.29

1 at 5% of purchase price
2 based on extraction rate of 0.89

Implicit Farm Gate Price Per Ton (1983):

c.i.f. Lusaka	k210.00
Less Crop Costs	28.42
Less NAMBOARD	32.54
Less NMC Costs	36.55
Farmgate Price	112.49

Implicit Financial Maize Flour Price (ex-NMC) at cost 339.29 ÷ 0.89 = K 381.22 per ton
Implicit Economic Maize Flour Price (ex-NMC) at cost 210.00 ÷ 0.89 = K235.95 per ton

Source: World Bank (June 1984) Zambia Policy Options and Strategies for Agricultural Growth Supplementary Volume on Methodology and Commodity Analyses

APPENDIX C

RURAL FOOD SECURITY STUDY IN ZAMBIA-----QUESTIONNAIRE

Respondent's identification number _____

Name of interviewer _____

Date of interview _____

Respondent's place of residence:

      Region_____

      Village _____

Place of interview: Home _____ Field _____ Other,(specify)_____

Please note: All information in this survey is strictly confidential. None of
the responses should be associated with or attributed to any particular
individual or organization.

_____

SECTION A----------GENERAL INFORMATION ON RESPONDENT (HEAD OF HOUSEHOLD)

1. Name _____(optional)

2. Present age: (1) 20 and under

             (2) 21-40

             (3) 41-60

             (4) OVER 60

3. Sex: (1) MALE   (2) FEMALE

4. (a) Current marital status: (1) SINGLE

                          (2) MARRIED

                          (3) DIVORCED

                          (4) WIDOWED

  (b) If married male, number of wives? _____

5. (a) Total number of living children? _____

(b) Number and ages of children permanently resident on farm:

Ages	Number of children
1 0-15 YEARS	_____
2 OVER 16 YEARS	_____

6. How many people were you feeding regularly last year (1984)

    1 WIVES   _____

    2 CHILDREN   _____

    3 RELATIVES   _____

    4 RELATIVES' CHILDREN   _____

    5 HELPERS WHO LIVE ON THE FARM   _____

7. Which is the highest level of education that you have completed?

    (1) NEVER ATTANDED SCHOOL

    (2) PRIMARY (1 to 7 years)

    (3) SECONDARY (1 to 5 years)

    (4) COLLEGE

8. How far do you live from the nearest:

    1 Town market   _____ Km

    2 Rural market   _____ Km

    3 Rural depot   _____ Km

    4 Grinding mill   _____ Km

SECTION B --------INFORMATION ON OFF-FARM EARNINGS

1. (a) Do you do any other work other than farming? (e.g a full or part-time job off-farm or running a business, such as a shop,selling fish etc.)

    (1)YES   (2) NO   (If no, go to No.2a)

(b) If yes, what kind of work? _____

(c) Do you regard this work to be your main occupation?

    (1) YES   (2) NO

(c) Do you earn from this work?   (1) YES   (2) NO   (If no, go to No.2a)

(d) If yes,(i) Approximately how much did you earn or get from this work:

        1 Last year (1984) (MONEY)_____KWACHA

            (KIND PAYMENT specify)_____

        2 This year (1985) (MONEY)_____KWACHA

            (KIND PAYMENT,specify)_____

2. (a) Did you receive any kind of help from your children, relatives or other

household members who work off-farm this season (1984/85)?

         (1) YES   (2) NO   (If no, go to No.3a)

(b) If yes, (i) How much help did you get?

        1 (FINANCIAL HELP)_____KWACHA

        2 (OTHER TYPES OF HELP, specify)_____

3. (a) Do you own any farm animals?   (1) YES   (2) NO   (IF no, go to No.4a)

(b) If yes, (i) How many: 1 CATTLE   _____

                 2 GOATS   _____

                 3 PIGS   _____

(ii) How many of your farm animals did you sell:

        (A) Last year (1984)?

           1 CATTLE   _____

           2 GOATS   _____

           3 PIGS   _____

        (B) This year (1985)?

           1 CATTLE   _____

           2 GOATS   _____

           3 PIGS   _____

(C) How much did you get? (if receipts were in other

forms other than money, specify form and quantity)

		1984	1985
1	FROM CATTLE SALES	_____	_____
2	FROM SALE OF GOATS	_____	_____
3	FROM SALE OF PIGS	_____	_____

4. (a) How many of the following do you own?

1	TRACTOR	_____
2	LORRY/PICK-UP	_____
3	PLOUGHS	_____
4	SCOTCH CART	_____

(b) Do you rent out any of the items or equipment in 4 (a)?

(1) YES   (2) NO   (If no, go to No.5a)

(c) If yes, (i) Which equipment or items do you rent?_____

(ii) How much money did you make from renting last year (1984)

for every item or equipment? _____

(If receipts were in other form other than money, specify

amount and form) _____

5. (a) Do you own a grinding mill?

(1) YES   (2) NO   (If no, go to No. 1a Section C)

(b) If yes, (i) How many bags of maize can it grind per day?_____BAGS

(ii) Approximately how many bags of maize did you grind per day

last year (1984)? _____BAGS/DAY

(iii) How much did you charge your customers per bag? _____

If the respondent does not produce crops, go to Section G page 15 No.1a

SECTION C------------------CROP PRODUCTION (Maize and other crops)

1. (a) How many acres of the crops below did you grow last and this season

CROP   SEASON

                          1983/84   1984/85

1 MAIZE   _____   _____

2 SORGHUM/MILLET   _____   _____

3 GROUNDNUTS   _____   _____

4 COTTON   _____   _____

5 OTHER,specify _____ _____   _____

(b) What was the yield of the crops you produced last and this season

(specify unit)

CROP   SEASON

                          1983/84   1984/85

1 MAIZE   _____   _____

2 SORGHUM/MILLET   _____   _____

3 GROUNDNUTS   _____   _____

4 COTTON   _____   _____

5 OTHER,specify _____ _____   _____

The following questions refer only to maize production:

2. Who makes decisions on how much maize to produce? (Tick as many as apply)

(1) RESPONDENT

(2) RESPONDENT'S SPOUSE

(3) RESPONDENT'S CHILDREN

(4) RESPONDENT'S RELATIVES

(5) WORKER/HELPER

3. Listed below are some factors that might influence your decision on how much maize to produce. To what extent do you feel each factor contributed to your decision on how much maize to produce this season (1984/85)?

How do you feel?

(Circle ONE number for each factor)

FACTOR	Strong Influence	Some Influence	No Influence
1 FAMILY SIZE	1	2	3
2 GOOD PRICE	1	2	3
3 AVAILABILITY OF MARKET	1	2	3
4 AVAILABILITY OF CREDIT	1	2	3
5 AVAILABILITY OF STORAGE	1	2	3
6 AVAILABILITY OF INPUTS	1	2	3
7 TRADITION (CUSTOM)	1	2	3
8 AVAILABILITY OF LABOR	1	2	3

4. (a) What maize varieties do you grow? (Tick as may apply)

    1 LOCAL   (1) YES   (2) NO

    2 HYBRID   (1) YES   (2) NO

    3 HYBRID ONCE GROWN (1) YES   (2) NO

4. (b) Indicate the extent the factors below influence your decision on

what maize variety or varieties to grow.

How do you feel?

(Circle ONE number for each factor)

Factor	Strong influence	Some influence	No influence
1 AVAILABILITY	1	2	3
2 HIGH YIELDING	1	2	3
3 STORABILITY	1	2	3
4 CHEAP	1	2	3
5 TASTE	1	2	3
6 OTHER,specify _____	1	2	3

5.(a) From whom did you obtain your maize seed during 1984/85 season ?

(Tick as many as apply)

        1 NAMBOARD   (1) YES   (2) NO

        2 COOPERATIVE UNION (1) YES   (2) NO

        3 PRIVATE SELLERS   (1) YES   (2) NO

        4 OTHER FARMERS   (1) YES   (2) NO

        5 TAKEN FROM OWN-STORAGE (1) YES (2) NO

(b) If maize seed was purchased:

        (i) What quantity did you buy?(specify unit)_____

(c) Did you sell any maize seed during the 1984/85 season?

        (1) YES   (2) NO   (If no, go to No.6)

(d) If yes, (i) What quantity did you sell? (specify unit)_____

        (ii) What price did you received? (per unit) _____

6. From whom did you obtain other seasonal inputs (e.g fertilizers, herbicides
   etc.) this season (1984/85)? (Tick as many as apply)

           1 NAMBOARD   (1) YES (2) NO

           2 COOPERATIVE UNION   (1) YES (2) NO

           3 PRIVATE SELLERS   (1) YES (2) NO

           4 OTHER FARMERS   (1) YES (2) NO

7. What major prolems do you face in producing sufficient maize to feed your
   family? (e.g lack of inputs such as seed, fertilizer, credit, etc.)

   1 _____   2 _____

   2 _____   4 _____

8. Are there any actions you take to guard against bad maize harvests?
   (e.g mixed-cropping, off-farm employment, storing more maize etc.)

   1 _____   2 _____

   3 _____   4 _____

9. In what way should the Government help, so that you can produce enough
   maize to feed your family?

   1 _____   2 _____

   3 _____   4 _____

SECTION D ------------STORAGE OF MAIZE

1.Do you store your maize? (1) YES (2) NO (If no,go to Section F page13 No.1)

2. Who makes decisions on how much maize to store? (Tick as many as apply)

    1 RESPONDENT   (1) YES   (2) NO

    2 RESPONDENT'S SPOUSE(S)   (1) YES   (2) NO

    3 RESPONDENT'S CHILDREN   (1) YES   (2) NO

    4 RELATVE/HELPER/WORKER   (1) YES   (2) NO

3. (a) What variety of maize do you store? (Tick as many as apply)

    (1) LOCAL

    (2) HYBRID

    (3) HYBRID ONCE GROWN

  (b) What variety of maize do you think stores better?

    (1) LOCAL

    (2) HYBRID

    (3) HYBRID ONCE GROWN

  (c) In what form do you store your maize for family consumption?

    (1) COBS WITH HUSKS

    (2) COBS WITHOUT HUSKS

    (3) SHELLED GRAIN

4. What quantity of maize did you store: (specify unit in both cases)

    (i) Last season (1983/84))   _____

    (ii) This season (1984/85)   _____

5. (a) Did you sell any maize from your strorage last season(1983/84)?

    (1) YES   (2) NO   (If no, go to No.5c)

  (b) If yes (i) To whom did you sell? (Tick as many as apply)

    1 NAMBOARD   (1) YES   (2) NO

    2 COOPERATIVE UNION   (1) YES   (2) NO

    3 PRIVATE TRADERQ   (1) YES   (2) NO

    4 OTHER FARMERS   (1) YES   (2) NO

(b) (ii) During which month(s) did you sell your stored maize? _____

    (iii) What quantity did you sell (specify unit) _____

    (iv) What price did you receive? _____KWACHA/_____

(c) Did you give away any of your stored maize this season (1984/85)?

        (1) YES   (2) NO   **(If no, go to No.6)**

(d) If yes,(i) Who did you give it to? (Tick as many as apply)

       1 CHILDREN LIVING OFF-FARM   (1) YES (2) NO

       2 RELATIVES LIVING OFF-FARM   (1) YES (2) NO

       3 FRIENDS   (1) YES (2) NO

       4 OTHER, (specify) _____ (1) YES (2) NO

    (ii) How much did you give (specify unit) _____

6. Do the following factors influence your decision on how much maize to store

                      What do you think?

               (Circle ONE number for each factor)

FACTOR	Strong Influence	Some Influence	No Influence
1 FAMILY SIZE.	1	2	3
2 AVAILABILITY .	1	2	3
3 GOOD PRICE LATER IN THE SEASON	1	2	3
4 AVAILABILITY OF ON-FARM STORAGE	1	2	3
5 POSSIBILITY OF NEXT YEARS' BAD HARVEST.	1	2	3
6 AVAILABILITY OF CREDIT	1	2	3

7. For what purposes do you use your stored maize? (Tick as many as apply)

    1 FOR FOOD   (1) YES   (2) NO

    2 FOR SALE AT A LATER DATE   (1) YES   (2) NO

    3 FOR SEED   (1) YES   (2) NO

    4 FOR LOAN REPAYMENT   (1) YES   (2) NO

    5 FOR BEERMAKING   (1) YES   (2) NO

    6 FOR BARTER   (1) YES   (2) NO

    7 FOR PAYING WORKERS (WAGES)   (1) YES   (2) NO

    8 OTHER USES, specify _____ (1) YES   (2) NO

8. (a) About what month(s) in a year do you start using your stored maize?

    _____

    (b) During what month(s) does your stored maize usually finish?

    _____

9. (a) Was any of your stored maize damaged this season (1984/85)?

       (1) YES   (2) NO   (If no, go to No.1a Section E)

    (b) If yes, what quantity was damaged last season (1983/84)? _____

    (c) What did you do with your damaged maize? (Tick as many as apply)

        1 THREW IT AWAY   (1) YES   (2) NO

        2 SOLD IT   (1) YES   (2) NO

        3 USED IT FOR FOOD   (1) YES   (2) NO

        4 FED IT TO ANIMALS   (1) YES   (2) NO

        5 OTHER,(specify) _____ (1) YES   (2) NO

    (d) If you sold your damaged maize from storage:

        (i) What quantity did you sell? (specify unit) _____

        (ii) What price did you receive? _____KWACHA/_____

10. (a) Have you ever considered changing your maize storage methods?

       (1) YES (2) NO (If no, go to Section E No.1a)

11. (b) If yes, what methods have you considered?

1 _____   2 _____

3 _____   4 _____

(c) What prevents from changing to the "new" methods (e.g lack of funds)

1 _____   2 _____

3 _____   4 _____

SECTION E --------------------------MAIZE STORAGE FACILITIES

1.(a) How many maize storage facilities do you have? _____

(Please, have a look at the facilities)

(b) How many years or seasons have you had these storage facilities?

Storage #1 _____   Storage #2 _____   Storage #3 _____

(c) Of what materials and structures are they made of?

Storage #1 _____

Storage #2 _____

Storage #3 _____

(d) How many more years or seasons do you expect to use them?

Storage #1 _____   Storage #2 _____   Storage #3 _____

(e) How many bags of maize can each hold?

Storage #1 _____BAGS

Storage #2 _____BAGS

Storage #3 _____BAGS

(f) During the following seasons, were your maize stores full, half-full, or empty after you harvested all your maize fields?

(i) Last season(1983/84)   (ii) This season(1984/85)

Storage #1 _____   Storage #1 _____

Storage #2 _____   Storage #2 _____

Storage #3 _____   Storage 3# _____

2. (a) Besides cleaning,did you do anything else to your maize store(s) before filling? (such as repairs)

      (1) YES   (2) NO   **(If no, go to No.3a)**

  (b) If yes, (i) What else did you do?

        1 Last year (1984) _____

        2 This year (1985) _____

    (ii) How much did it cost you?

        1 Last year (1984) _____KWACHA

        2 This year (1985) _____KWACHA

3. (a) Did you treat your maize that you stored last year and this year?

Last year (1984)	This year (1985)
(1) YES	(1) YES
(2) NO	(2) NO

  (b) If yes, (i) With what kind of treatment?

        1 Last year (1984) _____

        2 This year (1985) _____

    (ii) How much did it cost you:1 Last year (1984)_____KWACHA

                         2 This year (1985)_____KWACHA

SECTION F------------------MARKETING

1. Who buys agricultural crops in your area? (Tick as many as apply)

      1 NAMBOARD   (1) YES   (2) NO

      2 COOPERATIVE UNION   (1) YES   (2) NO

      3 PRIVATE BUYERS   (1) YES   (2) NO

      4 OTHER,specify _____ (1) YES (2) NO

2. What _quantity_ of each of your crops did you sell last season(1983/84) and this season(1984/85) and what _price_ did you receive per unit? (specify unit in each case)

| Crop | Season | | | |
| | Last season(1983/84) | | This season(1984/85) | |
	Quantity	Price	Quantity	Price
1 SORGHUM/MILLET	_____	____	_____	____
2 GROUNDNUTS	_____	____	_____	____
3 COTTON	_____	____	_____	____
4 SUNFLOWER	_____	____	_____	____
5 OTHER,specify _____	____	____	_____	____

3. Who makes decisions on how much _maize to sell?_ (Tick as many as apply)

1 RESPONDENT	(1) YES	(2) NO
2 RESPONDENT'S SPOUSE(S)	(1) YES	(2) NO
3 RESPONDENT'S CHILDREN LIVING ON FARM	(1) YES	(2) NO
4 RELATIVES/HELPERS/WORKERS LIVING ON FARM	(1) YES	(2) NO

4.(a) What _quantity of maize did you sell_ to the following buyers and what _price did you receive?_ (specify unit)

| Buyer | Last season(1983/84) | | This season(1984/85) | |
	Quantity	Price	Quantity	Price
1 NAMBOARD	_____	____	_____	____
2 COOPERATIVE UNION	_____	____	_____	____
3 PRIVATE BUYERS	_____	____	_____	____
4 OTHER,specify_____	_____	____	_____	____

4. (b) During what month(s) did you sell your maize (marketable surplus)?

        1 Last year (1984) _____

        2 This year (1985) _____

(c) Do you deliver your maize to the market? (1) YES (2) NO (If no, go to 5a)

(d) If yes,(i) How far did you have to deliver:1 Last year (1984) _____Km

                                 2 This year (1985) _____Km

    (ii) What mode of transport did you use:

        1 Last year (1984) _____

        2 This year (1985) _____

    (iii) How much did it cost you to deliver your maize (per bag)

        1 Last year (1984) _____

        2 This year (1985) _____

SECTION G ------------MAIZE CONSUMPTION

1.(a) Do you **buy maize or maize-meal** for family consumption?

    (1) YES   2 NO   (If no, go to No.1a Section H)

 (b) If yes,(i) What quantity did you buy (specify form and unit):

        1 Last year (1984) _____

        2 This year (1985) _____

    (ii) What price did you pay per unit of purchase:

        1 Last year (1984) _____

        2 This year (1985)_____

    (iii) From whom did you buy the maize or maize-meal?

        1 Last year (1984) _____

        2 This year (1985) _____

    (iv) How far did you have to travel to obtain the maize or meal?

        1 Last year (1984) _____Km

        2 This year (1985) _____Km

1. (b)   (v) If you bought maize in grain form this season (1984/85):

1 How far did you have to take it for grinding? _____Km

2 How much were you charged for grinding? _____

2. What is the total quantity of maize or maize-meal that your family consumed last year (1984)? (specify unit) _____

3. What are the difficulties you face in obtaining maize or meal for your family during bad crop years? (e.g, lack of money to the food, transport problems, non availability of maize in local market, non availability of credit etc.)

1 _____   2 _____

3 _____   4 _____

5 _____   6 _____

SECTION H ----------CREDIT AND MARKET INFORMATION

1. (a) Did you get credit to assist you in operating your farm this season?

(1) YES (2) NO   (If no, go to No.2)

(b) If yes, (i) From whom did you get the credit? _____

(ii) How much did you receive? _____

(c) Did you receive any credit specifically for marketing activities (such as transportation, storage ,etc.)?

(1) YES   (2) NO   (If no, go to No.2)

(d) If yes, (i) What marketing activities? _____

(ii) How much did you get? _____

2.From whom do you obtain your credit and market information (e.g sources of
farm inputs, supply and demand of agric. products, market prices etc.)?
(Tick as many as apply)

1 RADIO   (1) YES   (2) NO

2 NEWSPAPERS   (1) YES   (2) NO

3 EXTENSION OFFICERS   (1) YES   (2) NO

4 MARKETING ORGANIZATIONS   (1) YES   (2) NO

5 PRIVATE TRADERS   (1) YES   (2) NO

6 FRIENDS   (1) YES   (2) NO

7 CHILDREN AND RELATIVES   (1) YES   (2) NO

8 OTHER, specify _____   (1) YES   (2) NO

3. Which sources of market information are most helpful to you?

1 _____   2 _____

3 _____   4 _____

PLEASE, REMIND THE RESPONDENT THAT THE INFORMATION THAT S/HE HAS PROVIDED

WILL NOT BE USED FOR ANY OTHER PURPOSE BESIDES THIS STUDY.

REMEMBER TO THANK THE RESPONDENT!

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APPENDIX D

Sources of Household Income by Region (In Kwacha)
(1983-84 and 1984-85)

Information	1	2	3	4	5	6	7	8	9	10
(1983-84)										
Crop Sales										
Maize	10,537.66	12,569.29	8,978.06	0	0	17,936.84	10,536.91	5,386.84	0	5,859.62
Cotton	4,994.39	1,872.87	624.29	0	3,745.74	4,994.39	1,872.87	1,248.58	2,497.16	2,497.16
Sunflower	3,456.80	3,469.12	2,789.13	598.12	3,141.17	4,891.12	3,971.60	3,711.61	2,141.46	2,718.16
Cattle	2,025	3,375	4,050.00	2,025	2,700.00	2,025	2,700.00	2,025	0	1,350
Remittances	45.00	200.00	0	350.00	700.00	0	0	675.00	0	0
Fish Sales	0	600	0	0	1,700.60	0	0	0	0	0
TOTAL	11,558.85	22,087.03	16,441.48	2,623.12	12,787.51	33,276.00	9,601.18	13,047.03	4,638.62	12,424.94
(1984-85)										
Crop Sales										
Maize	13,656.12	9,754.37	7,803.49	3,901.75	17,557.87	23,410.69	15,606.99	5,852.62	9,754.37	11,705.25
Cotton	22,640.81	22,660.89	8,470.60	8,490.30	28,301.00	39,621.40	19,810.70	11,320.40	13,150.60	1,515.50
Sunflower	7,601.01	6,417.00	0	4,612.09	8,921.40	10,121.30	3,914.17	3,451.20	0	1,764.72
Cattle	2,518.00	0	2,142.00	1,480.85	800.00	3,410.00	1,567.00	0	1,682.15	0
Beer Sales	198.00	276.00	395.25	116.00	258.57	199.72	225.00	132.91	181.93	366.72
Remittances	131.00	262.00	624.00	213	340	0	169.00	201.00	0	417.00
Fish Sales	0	1,200.00	0	0	800.60	0	200	0	300.00	0
TOTAL	46,744.94	43,945.26	18,811.34	18,621.99	56,978.84	76,762.91	41,492.86	10,770.86	25,069.05	15,769.20

Source: Author's Rural Food Security Study Data, 1985.

APPENDIX E

Maize Hectarage and Production Averaged per
Farm Household in the Survey Regions
(1984 and 1985 crop years)

Information	1	2	3	4	5	6	7	8	9	10	Total
No. of Maize Producers											
(1984)	11	12	16	6	15	22	13	4	8	16	123
Small Farm Unit[a]	9	8	13	5	12	16	10	2	8	13	96
Large Farm Unit	2	4	3	1	3	5	3	2	0	3	27
Average Hectarage											
(1984)											
Small Farm Unit	1.2	1.4	0.9	1.3	1.2	1.8	1.1	1.4	1.6	1.2	
Large Farm Unit	5.6	5.3	4.0	4.2	5.1	5.7	5.4	5.0	4.7	4.8	
Average Production											
(1984) (90 kg bags)											
Small Farm Unit	21	27	23	19	25	27	29	18	23	24	
Large Farm Unit	42	51	47	39	62	62	59	43	55	46	
Average No. of Maize											
Fields (1984)	2.8	2.7	2.5	2.3	3.9	2.4	3.0	2.7	2.1	3.0	
No. of Maize											
Producers (1985)	10	13	15	5	16	22	14	7	8	15	125
Small Farm Unit	8	8	14	5	12	14	12	6	8	14	101
Large Farm Unit	2	5	1	0	4	8	2	1	0	1	24
Average Hectarage											
(1985)											
Small Farm Unit	1.1	1.3	1.3	1.6	0.8	1.5	1.1	1.3	1.2	1.3	
Large Farm Unit	5.7	4.9	4.1	5.3	6.1	6.9	5.7	6.1	5.2	5.3	
Average Production											
(1985) (90 kg bags)											
Small Farm Unit	29	26	28	26	30	31	26	27	28	28	
Large Farm Unit	48	49	48	54	59	63	61	62	59	62	
Average No. of											
Maize Fields	3.3	3.6	3.0	2.6	2.6	2.9	3.0	2.5	2.1	2.0	

[a] The size of the farm household was based on the number of hectares grown to maize.
Those producing less than 2 hectares were regarded as small farm units and those
cultivating more than 2 as large farm units.

Source: Author's Rural Food Security Study Data, 1985.

APPENDIX F

Annual Maize Flow and Performance Measures

by Region (1984)

Flow Item (Average 90 kg bags by Household)										
Sources of Maize [a]										
Household Purchases	10.2	6.5	13.0	14.0	17.0	8.5	0	7.0	0	4.5	7.4
Trade Purchases	0	0	14.0	0	0	0	0	0	0	0	1.4
Total Purchases	10.2	6.5	13.5	14.0	17.0	8.5	0	7.0	0	4.5	8.12
Gifts Received	0.2	0.16	0.32	0.16	0.48	0.16	0.32	0.8	0.16	0.32	0.29
Borrowing	0	0	0	0	0	0	0	0	0	0	0
Loan Repayment	0	0	0	0	0	0	0	0	0	0	0
Wages	0	0	0	0	17.0	0	0	0	0	0	1.7
Total Barter Inflow [b]	0	0	0	0	17.0	0	0	0	0	0	1.7
Total Exchange Inflow [c]	10.4	6.16	13.82	14.16	17.0	8.66	0.32	7.8	0.16	4.82	8.33
Production	38.97	46.41	32.0	25.7	34.87	40.91	38.23	55.4	24.0	30.88	36.74
Total Sources	49.37	52.57	45.82	39.86	51.87	49.57	38.55	36.2	24.16	35.70	45.07
Use of Maize [d]										
Farm Sales	10.2	6.5	13.5	14.0	17.0	8.5	0	7.0	0	4.5	8.12
Trade Sales	38.7	42.3	22.6	0	0	32.9	33.0	54.3	0	14.6	19.60
Total Sales	48.9	48.8	35.6	14.0	17.0	41.4	33.0	61.3	0	19.1	27.00
Gifts Given	0.32	1.48	3.40	2.32	0.15	6.0	0.8	2.0	4.48	1.32	2.23
Loans Extended	0	0	0	0	0	0	0	0	0	0	0
Total Barter Outflow [e]	0.2	0.16	0.32	0.16	17.48	0.16	0.32	0.8	0.16	0.32	2.00
Total Exchange Outflow [f]	10.2	6.5	13.5	14.0	34.0	8.5	0	7.0	0	4.5	9.82
Seed	0.48	0.8	0.8	0.96	0.78	0.86	0.96	0.68	0.34	0.86	0.61
Feed	0	0	0	0	0	0	0	0	0	0	0
Total Farm Use [g]	0.17	0.2	0.12	0.4	0.8	0.12	0.4	0.16	0.5	0.7	0.4
Consumption (estimated)	19.65	32.9	36.28	38.64	39.82	27.0	17.0	25.96	60.16	36.44	35.49
Farm-family Use	20.3	33.9	37.2	40.0	41.4	28.0	18.2	26.8	61.0	38.0	34.48
Total Uses	69.52	84.18	76.2	56.32	58.55	75.4	52.0	90.1	65.48	58.42	63.7
Stock Change (residual) [h]	-20.15	-31.61	-30.38	-16.46	-6.68	-25.83	-13.45	-26.9	-41.32	-22.72	-18.63
Performance Measure (%)										
Farm Sales/Household Purchases	1.0	1.0	1.0	1.0	1.0	1.0	0	1.0	0	1.0	1.0
Total Sales/Total Purchases	4.9	7.51	2.64	1.0	1.0	4.87	0	8.8	0	4.2	3.33
Barter Inflow/Household Purchases	0	0	0	0	1.0	0	0	0	0	0	0.23
Barter Inflow/Total Source	0	0	0	0	0.3	0	0	0	0	0	0.18
Exchange Inflow/Total	0.21	0.12	0.30	0.36	0.33	0.17	0.01	0.12	0.01	0.14	0.18
Farm Sales/Production	0.26	0.14	0.42	0.54	0.49	0.21	0	0.13	0	0.14	0.22
Farm-family Use/Production	0.52	0.73	1.16	1.56	1.19	0.68	0.48	0.48	2.54	1.23	0.94
Barter Outflow/Farm Sales	0.02	0.008	0.008	0.011	1.02	0.004	0.009	0.013	0	0.016	0.074
Total Sales/Exchange Outflow	4.8	7.5	2.6	1.0	0.5	4.9	0	8.8	0	59.7	13.5
Exchange Outflow/Total Uses	0.15	0.08	0.18	0.25	0.58	0.11	0	0.08	0	0.08	0.15

Source: Rural Food Security Study, 1985.

[a] Beginning stock is not observed
[b] Barter inflow = gifts received + borrowing + loan repayment + wages (in kind)
[c] Exchange outflow = total barter inflow + total purchases
[d] Ending stock is not observed
[e] See b and c
[f] See b and c
[g] Total farm use = seed + feed
[h] Stock change = total source - total uses. It is equivalent to ending stock - beginning stock

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