IMPACT OF AGRICULTURAL MARKET REFORMS

ON SMALLHOLDER FARMERS IN BENIN AND MALAWI

Project Number 97.7860.6-001.00

IFPRI Collaborative Research Project

FINAL REPORT

VOLUME 1

by

Mylène Kherallah
Nicholas Minot
Richard Kachule
Bio Goura Soule
Philippe Berry

Submitted to the Deutsche Gesellschaft Für Technische Zussammenarbeit (GTZ)

February 2001

A Collaborative Research Project between
the International Food Policy Research Institute, the University of Hohenheim,
and Collaborating African Institutions

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TABLE OF CONTENTS

CHAPTER 1 - INTRODUCTION 1
1.1 Backgrounds and Objectives 1
1.2 Project Research Activities 2
1.3 Organization of the report 3
CHAPTER 2: POLICY BACKGROUND FOR BENIN 5
2.1 Introduction 5
2.2 Background on Benin 6
2.3 Evolution of Economic Policy 7
2.3.1 Early post-colonial period (1960- 1974) 7
2.3.3 Structural adjustment (1989 – present) 10
2.3.4 Agricultural performance since 1990 14
2.4 Review of Previous Research on Benin 16
CHAPTER 3 – BACKGROUND AND HISTORY OF ECONOMIC POLICY REFORMS IN MALAWI 23
3.1 Introduction and Background to the Economy 23
3.2 Historic Perspective of Agricultural Market Reforms in Malawi 24
3.3 Recent Agricultural Strategies and Safety Net Interventions 26
CHAPTER 4: RESULTS OF THE BÉNIN SMALL FARMER, COMMUNITY, AND GROUPEMENT VILLAGEOIS SURVEYS 33
4.1: Results of the Benin Small Farmer Survey 33
4.1.1 Survey methods 33
4.1.2 General characteristics of farm households 35
4.1.3 Land use 44
4.1.4 Allocation of time 47
4.1.5 Use of agricultural inputs 50
4.1.6 Agricultural production 69
4.1.7 Agricultural marketing and storage 73
4.1.8 Expenditure 86
4.1.9 Household assets and housing characteristics 96

4.1.10 Sources of information 99
4.1.11 Perceived changes in well-being 102
4.2: Results of the Bénin Community Survey 105
4.2.1 Introduction 105
4.2.2 Transportation infrastructure 106
4.2.3 Agricultural markets 107
4.2.4 Activities of *groupements villageois* and *groupements feminins* 110
4.2.5 Credit 112
4.2.6 Extension services 112
4.2.7 Agricultural production and marketing 113
4.3: Results of the Bénin Survey of *Groupements Villageois* 117
4.3.1 Introduction 117
4.3.2 Survey methods 119
4.3.3 Basic characteristics 119
4.3.4 Human capital 120
4.3.5 Assets 122
4.3.6 Commercial activities of the GV 122
4.3.7 Budgets 126
4.3.8 Problems and perceptions of GVs 127
CHAPTER 5 – RESULTS FROM THE MALAWI SMALLHOLDER FARMER AND COMMUNITY SURVEYS 231
5.1: Results from the Smallholder Farmer Survey 231
5.1.1 Survey methods 231
5.1.2 Farm household characteristics and income sources 233
5.1.3 Land use 237
5.1.4 Time allocation 239
5.1.5 Use of agricultural inputs and assets 239
5.1.6 Changes in labor and inputs since 1995 247
5.1.7 Crop production 250
5.1.8 Crop storage 251
5.1.9 Agricultural marketing 253

5.1.10 Expenditure patterns 257
5.1.11 Household assets and housing characteristics..... 264
5.1.12 Sources of information and access to extension services 265
5.1.13 Farmers' perceptions about the reforms 266
5.2 Results from the Malawi Community Survey 269
5.2.1 Survey and questionnaire..... 269
5.2.2 General information..... 270
5.2.3 Agricultural Production Information 270
5.2.4 Road Infrastructure 271
5.2.5 Transportation Services 272
5.2.6 Availability and Access to Input and Output Markets..... 272
5.2.7 Starter Pack Initiative (SPS) 273
5.2.8 Agricultural Productivity Investment Program (APIP) 273
5.2.9 Farmers' Associations and Clubs..... 274
5.2.10 Formal and Informal Credit Services..... 274
5.2.11 Storage Facilities..... 275
5.2.12 Extension and Communication Services 275
CHAPTER 6 – SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS 323
6.1 Summary of Results for Benin..... 323
6.2 Conclusions for Benin..... 332
6.3 Policy implications for Benin 335
6.4 Summary of Results for Malawi..... 337
6.5 Conclusions for Malawi..... 342
6.6 Policy Implications for Malawi 346
REFERENCES 349

TABLES & FIGURES

Tables Chapter 2
Sections 2.1-2.2..... 20-21
Tables Chapter 3
Sections 3.1-3.2..... 30-31

Tables Chapter 4
Sections 4.1-4.3 131-230
Tables Chapter 5
Sections 5.1-5.2 276-318
Figures Chapter 5 319-321

CHAPTER 1 - INTRODUCTION

1.1 Backgrounds and Objectives

This report summarizes the findings of a project entitled "Impact of Agricultural Market Reforms on Smallholder Farmers in Benin and Malawi." The project was funded by the Bundesministerium für Wirtschaflitche Zusammenarbeit und Entwicklung (BMZ) and implemented by the International Food Policy Research Institute (IFPRI) in collaboration with several other research institutions, including the Laboratoire d'Analyse Régionale et d'Expertise Sociale (LARES) in Benin, the Agricultural Policy Research Unit (APRU) of the Bunda College of Agriculture in Malawi, the University of Hohenheim in Germany, and the Center for the Study of African Economies (CSAE) of Oxford University in the United Kingdom. The project activities started in June 1998 and ended in February 2001. The final workshop, to be held in both Benin and Malawi, is scheduled for April 2001.

Through surveys of smallholder farmers, input and output traders, and local markets and communities, this project is intended to help understand the impacts of recent reforms in the agricultural sector on traders' marketing activities, and on the technology adoption, productivity and income levels of smallholder farmers. According to the original proposal, the project's specific objectives are: i) to study the impact of adjustment in input distribution and output delivery systems on technology adoption and production activities of smallholder farmers in Benin and Malawi; and ii) to analyze the farm household level impact of alternative scenarios of reforming and promoting local marketing systems.

Both Benin and Malawi undertook extensive reforms of their economy starting in the early to mid 1990s. These reforms have included exchange rate devaluation, elimination of subsidies and price controls on crops and agricultural inputs, reduction of the role of the government in agricultural marketing, and promotion of greater participation by the private sector in agricultural production and trading activities.

Key questions have emerged since the reforms were implemented. These include: (1) What has been the impact of the reforms on smallholder farmers' use of inputs, productivity levels, access to markets, production patterns, and overall income? (2) How have input and output private traders responded to the reforms? (3) Have markets become more competitive and has market performance improved (in terms of lower marketing costs and better services)? (4) What are the major

constraints that farmers and traders face in their production and marketing activities? (5) What factors and policy changes are still needed to move the reforms forward and make them more beneficial for small farmers and traders? and (6) What is the appropriate role of the government in a new liberalized market environment?

Many researchers have investigated the impact of the reforms and recent policy changes in Benin and Malawi. The most recent research on Malawi includes work by the National Economic Council (1998), Chilowa (1998), Masters et al. (2000), Kambewa and Kachule (1999), Munyemana and von-Oppen (1999), O&M Associates (1999), Kleih, Jumbe and Tchale (1999), Westlake (1995), Peters (1996), and N'gon'gola (1996). For Benin, the reforms and their impact on agriculture have been the topic of research by Lutz et al (1995), Soulé (1996), Igue and Soulé (1992), Galtier and Tassou (1998), Senahoun et al (2000), Ahoyo Adjovia and Heidhues (1997), Senahoun et al (1999), UNDP (1998), and Republic of Benin (1997) (Chapter 2 reviews these studies). Using primary survery data, this research project represents the most comprehensive attempt to understand the impact of the reforms on small farmers and traders in both Benin and Malawi.

1.2 Project Research Activities

The project survey activities were divided into several components that are enumerated below.

a) A smallholder farmer survey based on a nationally representative sample of about 800-900 small farm households. This survey was conducted during the period August – November 1998 in both countries.

b) A survey of the communities that included the villages where the small farmers selected for the Small Farmers Survey lived. This included 40 communities in Malawi and 90 in Benin. The community survey was conducted from November 1999 to February 2000.

c) An input and output trader survey comprising about 650-750 private traders and implemented during the period May to December 1999 in Benin and August 1999 to February 2000 in Malawi.

d) A survey of the main agricultural markets in Benin and Malawi (41 in Malawi and 21 in Benin) implemented during the same period as the traders' survey.

e) In Benin, it was determined that a survey of village-level farmer organization (*groupements*

villageois, (GV)) was needed as these groups handle 90 percent of input distribution in Benin and all of the cotton marketing. Accordingly, an additional survey of 189 GVs was designed and launched there during the period June to December 1999.

Data collection in all surveys were implemented by the collaborating institutions, LARES in Benin and APRU in Malawi. In Malawi, the interviews were conducted by a team of eight enumerators, under the supervision of Mr. Richard Kachule of APRU. In Benin, the survey team was comprised of 10 enumerators supervised by Dr. Bio Goura Soulé. Data entry was also conducted in both countries by some of the senior enumerators who had participated in the surveys. Data cleaning was done jointly between IFPRI and all its collaborators. More details about the survey methodologies, sampling, questionnaire design, and data collection are presented in the appropriate chapters of this report.

Following survey data collection and cleaning, analysis of survey data was conducted at IFPRI. Descriptive statistics from each of the surveys were generated and tabulated. This report's findings are based on the interpretation of these descriptive statistics. Regression analysis was also used to understand the factors that influence four key variables in the smallholder farm sector. First, a Heckman two-stage regression analysis was used to identify the factors that affect the decision to use fertilizer and the amount of fertilizer used. Second, regression analysis was conducted to examine the determinants of marketed surplus, defined as the percentage of the value of crop production that is marketed. Third, regression analysis was used to examine the factors associated with poverty. And finally, an ordered probit regression analysis was used to determine the characteristics of households that consider themselves better or worse off compared to several years ago (1992 in Benin and 1995 in Malawi).

1.3 Organization of the report

The report consists of two volumes. Volume 1, the present volume, presents the results of the surveys of farmers, farmer organizations, and villages. Volume 2 focuses on the results of the trader and market surveys.

Volume 1 is organized in six chapters. After this introductory chapter, Chapter 2 provides background on the Republic of Benin, focusing on the evolution of policy affecting agriculture, the performance of the sector in the reform period (since 1990), and a review of previous research on the agricultural economy of Benin. Chapter 3 describes the backgrounds and evolution of policy in

Malawi, focusing on the reforms that have been implemented since the mid-1980s. Chapter 4 describes the results of the three Benin surveys: the farmer survey, the community survey, and the survey of *groupements villageois*. Chapter 5 presents the results of the surveys of farmers and communities in Malawi. Chapter 6 summarizes the results from both countries, draws some conclusions about the impact of the reforms on small farmers, and derives a number of policy implications for Benin and Malawi.

CHAPTER 2: POLICY BACKGROUND FOR BENIN

2.1 Introduction

Since the 1980s, Benin, like many other African countries, has begun a series of reforms designed to introduce a new dynamism into its economy. Tentative initially and limited to the agricultural sector, these reforms grew to constitute the principle development strategy of the country starting in August 1989 when the first Structural Adjustment Program (PAS) was negotiated with the international financial institutions. Benin is currently implementing the third PAS. The main objective of these reforms has been to restart the economy by adopting market-oriented policies in which the private sector plays a central role. The results of these reforms have been quite satisfactory from a macroeconomic point of view:

- The growth rate of the economy has increased from –3 percent in 1989 to 5.7 percent in 1997.
- The rate of inflation has fallen from 54 percent in 1994 after the devaluation of the CFA franc to around 5 percent in 1996.
- The financial sector has recovered from the collapse of the state-owned banks in 1988-89.

The social impact of the reforms remain a cause for concern and a threat to their political sustainability. Unemployment and poverty remain stubbornly high, and there is a widespread perception that the reforms have adversely affected the lives of the poor in Benin. Although macro-economic data are available on the impact of the reform on gross domestic product, investment, and international trade, less information is available on their impact at the household level, particularly their impact on poor and vulnerable groups in society. Since agricultural households represent some 60 percent of the population of Benin and contain a disproportionate number of the poor, an understanding of the impact of the reforms on farmers is a key component of any overall evaluation of the reforms.

This report is based on research funded by BMZ under the name "Impact of Reforms on Small Farmers in Benin and Malawi." The study was carried out by the International Food Policy Research Institute (IFPRI) in collaboration with the researchers from the University of Hohenheim, Oxford University, Purdue University, and research organizations in each country. In Benin, IFPRI collaborated closely with researchers with the Laboratoire d'Analyse Regional et d'Expertise Sociale (LARES), which implemented the surveys and participated in the analysis of the results.

This chapter provides a brief description of the evolution of economic policy in Benin since independence, concentrating on agricultural policy since 1989. The objective is to provide some context to assist the interpretation of the results of the surveys.

2.2 Background on Benin

The Republic of Benin covers an area 112 thousand square kilometers, of which just 23 thousand km^2 (21 percent) is used for agriculture. Broadly speaking, Benin can be divided into three agro-climatic zones:

- The southern part of the country has a sub-equatorial climate with rainfall averaging 1200 to 1500 mm per year. There are two rainy seasons, the main one from March through July and the second season from September to mid-November.
- The climate in the center can be characterized as Sudano-Guinean, with average rainfall ranging from 1000 to 1200 mm per year. This region has a single rainy season lasting from April to October.
- The north has a semi-arid climate with rainfall of just 800-1000 mm per year. The rainy season in this region is between May and September, although considerable variation exists from one year to the next.

The 1998 population is estimated to be 6.0 million, implying a population density of 54 inhabitants/km^2. The population of Benin is concentrated in the south, so the density ranges from over 300 inhabitants/km^2 in Atlantique to less than 40 in Atacora and Borgou. About 40 percent of the population lives in urban areas.

The per capita gross national product is US$ 380, placing Benin among the low-income countries. However, its per capita income is higher than that of its landlocked neighbors to the north (Niger, Mali, and Burkina Faso) and somewhat higher than Togo and Nigeria, but lower than Cameroon and Cote d'Ivoire (World Bank, 2000).

The agricultural sector accounts for 38 percent of the gross domestic product and employs about 56 percent of the economically active population. The main food crops are maize, manioc, and yams, followed by sorghum/millet, groundnuts, and beans. The main cash crop, by far, is cotton, which accounts for 44 percent of the value of exports. Other agricultural exports, including oil palm, cashew nut, and pineapple, are much smaller (Republique du Benin, 1997).

2.3 Evolution of Economic Policy

2.3.1 Early post-colonial period (1960- 1974)

With independence in 1960, the new government inherited a largely agricultural and commercial economy. The main export crop was oil palm, supplemented by small quantities of cotton in the north and tobacco in the center. Through a series of five-year plans, the government attempted to incorporate food security objectives into its agricultural strategy. The strategy incorporated the following elements:

- Introduction of industrial crops in order to improve food crop production through training in modern methods of production
- Integration of crop and livestock production in order to provide manure for crop production
- Introduction and adoption of improved planting materials
- Investment in irrigation to reduce the risks associated with rainfed agriculture
- Use of fertilizer to raise yields

Economic development during this period was hampered, however, by political instability. Regional rivalries and conflicts between civilian and military leaders resulted in a series of short-lived regimes and little continuity in economic policy.

2.3.2 State-led development (1974-1989)

In October 1972, a coup marked the beginning of 17 years of military dictatorship. In 1974, the government declared that Benin would adopt a socialist development path based on Marxist-Leninist principles. In the industrial sector, this strategy led to the nationalization of medium and large enterprises and the creation of new state enterprises to carry out commercial activities in various sectors.

In the agricultural sector, farmers were assembled into various organizations including 4-D clubs, *groupements villageois*, *groupements revolutionaires de vocation cooperative*, and experimental agricultural collectives. The goal was to collectivize agricultural production and marketing under structures supervised by the state. The government also created a number of state farms, generally dedicated to producing maize. Also created were state enterprises to manage production and

marketing in specific sectors: the Societé Nationale des Fruits et Légumes, the Societé Béninoise de Palamier à Huile, the Societé Nationale de Forêts, and the Societé de Développement des Ressources Animales, and the Societé Nationale des Pêches.

The government attempted to control agricultural markets through various means, although it was only successful in the case of cotton. In 1971, the *Societé Nationale de Coton* (SONACO), a mixed enterprise, was created to manage the cotton sector, taking over the role of the *Compagnie Française de Développement de Fibres Textiles* (CFDT). SONACO maintained a monopoly on every phase of collection, processing, and marketing of cotton. As a result of the departure of CFDT and policies giving greater priority to food crop production, however, cotton output fell from 50 thousand tons in 1972 to 14 thousand tons in 1981. In 1982, the *Societé Nationale de Promotion Agricole* (SONAPRA), formed earlier to manage the distribution of inputs, was given responsibility for marketing cotton as well.

Attempts to control food markets were less effective. Neither the *Office de Commercialisation et de Crédit Agriolce du Dahomey* (OCAD), created in 1963, nor the *Societés Provinciales de Commercialisation Agricole* (SOPROCA), created in the 1970s, nor the *Office Nationale des Céréales* (ONC), created in 1983, were able to influence food markets in any significant way, much less control them. For example, the ONC was given the assignment of collecting and marketing 25 percent of the grain supply but was never able to capture more than 5 percent of the total. Although official prices were announced every year for oil palm, seed cotton, and staple foods, the official food prices were largely irrelevant, with actual prices being set according to supply and demand (Soulé, 1996).

The government was more successful in controlling the distribution of fertilizer and pesticides because they were imported. Input policy was characterized by the following elements:

- Agricultural inputs (fertilizer and pesticide) for the cotton sector could be imported duty-free, while inputs for other crops were subject to import taxes.
- Agricultural inputs for the cotton sector were sold to farmers at heavily subsidized prices, with the subsidies reaching 75 percent at the end of the 1970s.
- The inputs for the cotton sector were sold to farmers on credit, with repayment being deducted from the cotton payments at harvest time.

Under pressure from the World Bank and France, the government agreed to phase out the subsidies on agricultural inputs. Between 1983-84 and 1988-89, the subsidies on fertilizer and pesticides were reduced from around 50 percent to zero. Although this policy eliminated the fiscal burden of the state, it did not address the fundamental problems associated with central management of the agricultural sector.

The Caisse Nationale de Crédit Agricole (CNCA) was a traditional bank with branches in the rural areas, but it was unable to serve the financial needs of small farmers. As part of the widespread cooperative movement inititated in the 1970s, the government established a decentralized network of Caisses de Crédits Agricole Mutuels (CCAM). The CCAMs were successful in mobilizing savings and a large portion of these funds were deposited in the CNCA. The CNCA was, however, abused by politicians and military officers who borrowed money without repaying, resulting in heavy losses and eventual closure of the CNCA in 1988. The collapse of the CNCA caused severe liquidity problems for the CCAM and the freezing of most of the saving accounts.

Economic growth in the 1970s was stimulated by international borrowing, the oil boom in neighboring Nigeria, and the benefits of a stable convertible currency. In 1973, Benin joined five other West African nations in a monetary union. As part of this union, the member nations agreed to share a central bank, the Banque Centrale des Etats de l'Afrique de l'Ouest (BCEAO) and a common currency, the franc of the Communauté Financière Africaine (CFA). The CFA franc (FCFA) was pegged to the French franc (FF) at a rate of 50 FCFA/FF. The Banque of France guarantees the money issued by the BCEAO, which ensures convertability both within the CFA franc zone and with respect to hard currencies. This arrangement has the advantage of facilitating international trade and maintaining a relatively stable currency with low inflation. On the other hand, it is difficult to correct exchange rate misalignment.

A number of events occurred in the 1980s to threaten the economic stability of the country:

- The oil boom ended in Nigeria, causing a regional slump.
- The burden of repaying debts incurred in the 1970s began to drain foreign reserves.
- In the 1980s, the CFA franc became increasingly overvalued, reducing the incentives for export production and slowing the economy.
- In the mid-1980s, the world price of cotton declined sharply, depressing both farm income and government revenues.

- In 1988-89, the entire state-owned bank sector collapsed under the weight of bad loans and corruption.

By 1989, the economic crisis prevented the government from paying public-sector salaries. A series of strikes paralyzed the economy, leading the president to renounce Marxism-Leninism and call for a national constitutional conference.

2.3.3 Structural adjustment (1989 – present)

The first Structural Adjustment Program (PAS I) with the World Bank and the International Monetary Fund (IMF), signed in 1989, was designed to assist the government with the severe economic crisis. The implementation of the PAS I was delayed, however, by the political turmoil in the country. The *Conférence Nationale des Forces Vives,* held in 1990, called for the end of military rule and a return to democracy under a new constitution. In 1991, a newly elected president took office, marking the beginning of a period of constitutional democracy that continues to the present.

The second structural adjustment program (PAS II), covering 1991-1994, focused on restarting economic growth, restoring fiscal balance, restructuring public enterprises, and reforming the banking sector. Policy reforms included the elimination of quantitative restrictions on imports, reduction in the number of goods subject to price control, simplification of business registration, and elimination of the monopolies of state enterprises in domestic trade. It also included a *Programme de Restructuration du Secteur Agricole* (PRSA) discussed below. In addition, after years of debate and accumulated evidence of overvaluation, the CFA franc was devalued by 50 percent in January 1994. The exchange rate rose from 50 to 100 FCFA per French franc, effectively doubling the FCFA border price of all imports and exports.

The third structural adjustment program (PAS III), covering 1995-1999, continued the macro-economic reforms begun in PAS II. In addition, it attempted to develop basic infrastructure, expand the delivery of social services, improve the efficiency of public service provision, and address problems of poverty and vulnerability.

The reforms programs have had some notable success, particularly on the macroeconomic problems. Fiscal deficits have fallen from 11 percent of GDP in 1989 to 4 percent in 1996. Economic growth has increased from 1-2 percent in the late 1980s to 4-5 percent in the 1990s. The

banking system has been restored to health and opened up private-sector competition. Between 1991 and 1996, more than 100 state-owned enterprises (most of them making losses) were privatized, including the national cement company, an abbatoir, a textile company, the national brewing and bottling company, and the tobacco and cigarette industry.

In the agricultural sector, reforms were implemented in food marketing, cotton marketing, input distribution, rural finance, and agricultural services. Each is described briefly below.

Liberalization of food marketing In 1990, regulations requiring that agricultural traders register, pay annual fees, and obtain a license from the Ministry of Commerce and Industry. The new law (No. 90-005 of May 15 1990) stipulates that anyone can become a trader in agricultural commodities without prior approval from the government.

The ONC was relieved of its goal of controlling 25 percent of the food distribution in Benin and restructured as the Office Nationale d'Appui à la Sécurité Alimentaire (ONASA). ONASA is responsible for collecting and disseminating information on food security. For this purpose, it publishes a monthly newsletter with information on weather, prices, production forecasts, and international trade. In addition, ONASA is responsible for managing a strategic food security buffer stock, although funding constraints have made this a very limited activity.

In addition, the Centres d'Action Régionale pour le Développement Rural (CARDERs) have been relieved of all commercial activity. Finally, the Direction of Price and Quality Control has been reoriented toward the establishment of norms and standards, the prices of food crops being completely deregulated.

Reforms in cotton marketing The implementation of the liberalization of the cotton sector has been quite slow. SONAPRA continues to maintain a monopoly on the collection and marketing of cotton. The cotton ginning sector is the only portion of the cotton channel to be opened up. In addition to the six state-owned cotton gins managed by SONAPRA, there are now six new gins owned by private enterprises. SONAPRA allocates a portion of the seed cotton from the groupements villageois to these gins, but then takes control of the processed cotton and sells it on the world market. One private cotton gin, the Societé Aiglon, has been given provisional authority to market their cotton directly.

Two options for liberalization of the cotton sector are under consideration. In the first, SONAPRA would be partially privatized with the state retaining 35 percent ownership and the other 65 percent being distributed among various actors in the cotton sector. The second option, favored by the World Bank, would involve the complete liberalization of the cotton sector. In the meantime, the government plans to proceed by making the allocation of cotton seed to the gins more competitive through an auction system.

Two underlying problems complicate efforts to liberalize cotton marketing. First, installed cotton ginning capacity (500 thousand tons) far exceeds current production (386 thousand tons), so that full competition would probably lead to the closure of one or more gins. In addition, the elimination of the cotton marketing monopoly would jeopardize the system of providing agricultural inputs on credit. Without a marketing monopoly, it would much more difficult to enforce repayment of input credit.

Reforms in input markets As part of the first PAS signed in 1989, the distribution of inputs was to be privatized. The withdrawal of the state from input marketing has been gradual, with the number of private importer-distributors rising from 2 to 9 over the years. The share of the market allocated to these approved private firms has risen from 20 to 90 percent of the total, with SONAPRA reserving for itself 10-20 percent of the market to maintain a buffer stock. Although private firms handle the bulk of the imports, they do so under a system closely controlled and managed by the three government agencies linked to the cotton sector:

- SONAPRA issues a request for quotations to import and distribute fertilizer, selects the importers that will participate, determines the types and quantities of inputs that will be delivered, and specifies the regions that each firm will supply.
- Recherche de Coton et de Fibre (RCF), the cotton research institute, recommends the types of inputs to be imported.
- And the Office national de Stabilisation des Prix calculates the cost of importation and delivery, upon which the payment to the importers is based.

The retail price of all fertilizer and pesticides distributed by approved private firms are set by the government as part of its cotton promotion policy. These prices are uniform throughout the country, and they are the same for all types of fertilizer, for all ULV pesticides, and for all EC pesticides. The importer-distributors are paid on the basis of their calculated costs plus a 3 percent margin.

Fertilizer can be imported outside the SONAPRA cotton system by "unapproved" private firms, but the tax system makes this unprofitable. Approved importers pay only an entry tax of 0.14 percent, while non-approved importers pay the equivalent of 23.9 percent import duty. As a result, very little is imported outside the SONAPRA system.

This system, in which private importer-distributors are managed by a state enterprise, has several limitations.

- The insecurity of the approved firms, regarding whether they will be approved in the coming years, discourages long-term investment in facilities and capacity.
- Real competition among the private firms does not exist since the bid price is not the price at which they must deliver the fertilizer. This greatly reduces their incentive to cut costs.
- There is little government oversight of the process by which SONAPRA selects and manages its approved firms.
- The policy of unform prices across types of inputs discourages farmers from selecting those which offer the greatest effectiveness for the least cost.
- The policy of uniform prices across the country distorts the incentives of farmers by subsidizing cotton growers in remote locations at the expense of those in more central locations.

On the other hand, proponents of the system point to its success in expanding the use of fertilizer and agricultural chemicals on cotton in Benin. They argue that private firms do not have the logistical and administrative capacity to supply inputs to scattered producers.

Agricultural finance Following the collapse of the Caisse Nationale de Crédit Agricole (CNCA) in 1988, various attempts were made to relaunch the Caisses de Crédit Agricole Mutuels (CCAM). Following a successful pilot project and with assistance from donor organizations, the Caisse were restructure to provide greater independence at the local level and renamed Caisse Locale de Crédit Agricole Mutuel (CLCAM). Under the new structure, the number of depositors grew from 21 thousand in 1989 to 214 thousand in 1997. As of 1998, there were 82 CLCAMs with deposits of 17 billion FCFA and outstanding credits of 21 billion FCFA.

In addition to CLCAM, there is a growing number of small savings societies created by national and international non-governmental organizations (NGOs). These NGOs have proliferated in the wake of political and economic liberalization.

Restructuring agricultural services One of the most important components of the Structural Adjustment Program is the Programme de Restructuration des Services Agricoles (PRSA). The PRSA contains a number of elements:

- Withdraw public institutions from commercial activities that the private sector can undertake. Examples include agricultural processing, seed multiplication, veterinary services, importation of veterinary medicine.
- Improve the function of activities that the public sector must undertake through training and capacity building. These activities include agricultural research and extension, investment and maintenance of infrastructure, provision of agricultural market information, and control of contagious plant and animal disease.
- Reduce the fiscal burden of agricultural program. For example, the number of employees of the Ministere de Developpement Rural and the CARDERs will be reduced by 61 percent relative to the 1991 level.

Even though the PRSA projected an increase in the number of extension agents (agents polivalents de vulgarisation), the actual number has declined from 711 in 1993-94 to 432 in 1997-98. This trend is due to retirement and promotion of existing agents without sufficient recruitment of new agents.

2.3.4 Agricultural performance since 1990

This section briefly describes the performance of the agricultural sector since the structural adjustment programs were launched. Three areas of performance are considered: agricultural prices, crop production, and input use.

Agricultural prices Prices have been relatively stable in Benin as a result of its participation in the CFA franc zone. The 1994 devaluation, however, caused a significant increase in prices, particularly the prices of tradable goods. The consumer price index increased 30 percent from mid-1993 to mid-1994 and another 15 percent from mid-1994 to mid-1995, for a total increase of about 50 percent. These increases have eroded the purchasing power of many consumers,

particularly urban wage-earners. On the other hand, crop prices also increased substantially. Maize prices increased 58-75 percent in three major markets: Cotonou, Parakou, and Malanville (see Table 2.1). The price of local rice increased 80-100 percent, responding to the higher cost of imported rice. The prices of other food crops also increased, though to a lesser extent. In Parakou, the price of manioc flour increased 44 percent and that of white sorghum 20 percent over 1993-95. In general, real foodcrop prices are greater than or equal to the 1990 levels (see Table 2.2).

Following the devaluation, the government-determined price of inputs roughly doubled immediately. For example, fertilizer prices rose from 95 FCFA/kg in 1993 to 190 FCFA/kg in 1994. The official price of cotton also doubled, but only after several years. The price per kilogram rose from 103 FCFA in 1993 to 135 FCFA in 1994, 160 FCFA in 1995, 200 FCFA in 1996, and 225 FCFA in 1997.

Agricultural production Agricultural production has grown at a healthy rate since 1990. As shown in Table 2.3, the most dramatic increase has been in rice, which has as grown 14.6 percent per year since 1990. Almost all of this growth has occurred since the 1994 devaluation. Since over three-quarters of Benin's rice is imported, the domestic price is largely determined by world prices and the exchange rate. Thus, the 1994 devaluation stimulated domestic production by making imported rice more expensive. Cotton production grew almost as quickly: almost 11 percent per year. Cotton output has been stimulated by both improved management of the cotton system and higher prices linked to the devaluation. Manioc output has more than doubled since 1990, equivalent to a 9.2 percent growth rate. This growth has been in response to increasing commercialization and cross-border exports. Maize, sorghum, yams, and groundnuts have all grown at 4-6 percent per year.

Table 2.4 provides some rough calculations of the gross revenue at the farm-level from cotton. The figures are approximate because they do not take into consideration quality premia and bonuses that affect farm revenue. Furthermore, as gross figures, they do not incorporate the cost of growing cotton, nor the loss in income from other crops as farmers switched to cotton. The figures suggest, nonetheless, that the cotton boom has had a significant impact on farm income. The real value of gross cotton revenue increased from around 50 billion FCFA in 1993 and 1994 to 100 billion FCFA in 1996 before declining to 80 billion FCFA. This implies an additional gross income of 30 billion FCFA between 1993 and 1998, equivalent to 63 thousand FCFA per farm household in Benin (including cotton farmers and others).

Input use Fertilizer and pesticide use have grown significantly over the 1990s. Fertilizer use has increased from 11.0 thousand tons of nutrient equivalent in 1990 to 37.7 thousand tons of nutrient equivalent in 1998. This represents an annual growth rate of 17 percent. In fact, the growth in fertilizer use in Benin over the past decade is one of the highest in sub-Saharan Africa. This growth is attributed to the expansion in cotton production and continued provision of input credit to cotton farmers. It should be noted that fertilizer use grew at a markedly higher rate (17 percent) than did cotton production (11 percent). This suggests that farmers are using higher application rates on their cotton and/or farmers are using more fertilizer on other crops.

2.4 Review of Previous Research on Benin

In this section, we review the findings of recent research on agriculture, poverty, and economic reform in Benin. The review is by necessity somewhat selective, but provides an overview of the main issues of debate in Benin's agricultural and rural development.

Food markets Food markets have been the topic of several studies. Lutz et al (1995) examines the degree of integration of maize markets in southern Benin using data from the 1980s. The study applies co-integration econometric methods to data on wholesale and retail maize prices in four markets: Bohicon, Azove, Dogbo, and Dassa. The data were collected at four-day intervals (every market day) from September 1987 to September 1989. The results indicate that maize prices are integrated in the long-run, but prices in one market respond slowly to changes in prices in other markets. Within eight days, 48-89 percent of the change in wholesale prices had been transmitted to other markets. Prices in Dassa appeared to be less responsive to prices in the other markets, and the authors speculate that this may be related to barriers to entry or inadequate market information.

Jansen and Perthel (1990) examine the supply responsiveness of maize in the department of Atlantique. The authors note that the maize produced in the first season is used for subsistence. If the first harvest is small, farmers will plant maize in the second season, whereas if the first harvest is sufficient, they will plant "cash crops" such as beans and groundnuts in the second season. They test this hypothesis using time-series data on prices and production in each season. The effect of maize prices on maize production was significant only in the second season, consistent with the idea that farmer decisions are more market oriented in the second season. Furthermore, the supply of beans and groundnuts in the second season is positively and significantly influenced by maize yield in the previous main season.

Soulé (1996) describes the evolution of maize policy and analyzes a survey of maize traders. The survey reveals that 1) market information is transmitted by word of mouth, 2) that trade is self-financed with formal credit playing almost no role, and 3) that capital, information, and trader associations represent important barriers to entry. Overall, he argues that maize markets have changed little since reform because they were not effectively regulated before the reforms.

Rexportation trade is the topic of a comprehensive analysis by Igue and Soule (1992). This study covers the history, patterns, and motives of the large re-exportation business in Benin. In the 1980s, as much as 50 percent of Benin's imports were re-exported, mostly to Nigeria and mostly through informal trade. In addition to various non-food items, rice, wheat, and wheat flour were (and continue to be) re-exported. Informal re-exports to Nigeria have been motivated mainly by by Nigerian import restrictions, so the flows have changed abruptly in response to numerous policy reversals. The authors show that Benin benefits through the income of traders, even if the state is often unable to tax this informal trade.

Galtier and Tassou (1998) supply an update of the re-exportation trade. The estimate that in 1995 reexportation accounted for 25 percent of the port traffic in Cotonou and generated 6 percent of Benin's gross domestic product. They point out that, to the extent that reexportations are based on Nigerian trade restrictions, import liberalization in Nigeria will greatly reduce Benin's re-exportation business, with possible negative consequences for thousands of traders in Benin.

Alapini (1998) points out that Benin is self-sufficient in most of the main staple food crops. Nonetheless, several problems make food security in Benin an issue of concern. First, there are regional and annual variations in production that cause localized or temporary food insecurity. Second, the agricultural economy in Benin is strongly affected by events and policies in Nigeria, which can cause strong shifts in food prices and availability in Benin. Third, the consumption of animal products is low (16 kg/person/year), leading to inadequate protein intake.

Poverty The most comprehensive study of rural poverty is the *Enquête sur les Conditions de Vie des Ménages Ruraux* (ECVR). This study involved four rounds of household surveys in 1994-95, with a sample of 1040 households in the first two rounds and 1350 in the second two rounds. This study estimated a global poverty line of 56,600 FCFA/adult equivalent/year, finding 33 percent of the households below that line. Among the eight agro-ecological zones used, the poverty rate was highest (47 percent) in the cotton zone of central Benin, followed by the extreme north and the *terre de barre* zone in southern Benin. The average expenditure was 97 thousand

FCFA/adult equivalent/year, 69 percent of which was allocated to food. The study also found that 36 percent of the under-five population was malnourished and a rate of illiteracy of 73 percent. The three problems cited most often by rural households were 1) the burden of manual agricultural work, 2) declining soil fertility, and 3) the lack of agricultural credit (UNDP/MDR, 1996).

The same project also made use of the Enquête Legère aupres les Ménages Urbains (ELAM) in 1995-96 to develop an urban poverty profile. This study found that the average expenditure was 264 thousand FCFA, 2.7 times as great as the comparable figure in rural areas. Just 45 percent of the urban budget was allocated to food compared to 69 percent in rural areas. Because the poverty line was much higher for urban households, the urban poverty rate was 33 percent, similar to the rural poverty rate (UNDP/INSAE, 1996). It is debatable, however, whether the urban and rural poverty lines really represent a similar standard of living. The lower food shares in urban areas would strongly suggest that poverty is less there than in rural areas. Rural poverty rates are greater than urban poverty rates in almost all developing countries, with the exception of some middle-income Latin American countries[1].

Economic reforms Several studies have looked at the effect of devaluation and other reforms on agriculture. Senahoun et al (2000) examine the welfare impact of the 1994 devaluation of the CFA franc by combining historical price data over 1993-97 and models of household behavior. The farm models describe production decisions of different types of farmers in different regions, while a demand system is used to model consumption. They find that the devaluation had an "almost immediate positive impact" on cotton farmers and a delayed but positive impact on food crop farmers. The model also shows that the impact of the devaluation on urban households has been negative, particularly for poor households that spend a large share of their budgets on food.

Ahoyo Adjovia and Heidhues (1997) study the effect of the devaluation on the economics of rice production. They find that the higher rice prices due to devaluation raised the incomes of rice farmers more than enough to compensate for higher consumer prices. Rice has become more profitable and output has expanded significantly.

Senahoun et al (1999) simulate the impact of structural adjustment on soil erosion in northern Benin using a bio-economic model. The results indicate that the reform program "appears to have

[1] Probably different standards were used in constructing the list of "basic" consumption requirements. The UNDP/INSAE (1996) reports that the poverty line is relatively high for Cotonou because (among other factors) "the pressure to maintain a certain social standing through higher spending on clothing and other items" and the cost of university education for children.

led to a more sustainable agriculture in this cotton producing region." The reason is that the reforms stimulated cotton production and fertilizer use, which in turn contributed to greater plant cover and lower erosion.

Igue (1996) describes the policies and results associated with the structural adjustment programs. He points out that the programs have had significant success in restoring fiscal balance, reducing external deficits, relaunching the financial sector, and stimulating economic growth. But he argues that the cotton boom has displaced food production, leading to food deficits and food insecurity. Furthermore, he sees a trend in which farmers and traders attempt to restrict trade to protect themselves from the adverse effects of liberalized agricultural markets.

Gender UNDP (1998) assembles information from various sources to evaluate the status and contribution of women in Benin. The report analyzes gender differences in school attendance, formal sector employment, life span, and economic activities. It also highlights the role of women in commercial activities, small and micro-enterprises, and household production, arguing that the economic contribution of women is undercounted by standard measures such as value added. The report also cites the ELAM to show that, in urban areas, female-headed households are poorer than male-headed households (no results are provided on rural patterns).

Other Von der Luhe (1991) examines the relationship between farmers and extension agents in the department of Atlantique based on interviews carried out in 1988 and 1989. Although based on the Training and Visit System, the extension system was "a complete failure" in meeting its formal goals of regular meetings and technology transfer. Von der Luhe argues that the farmers believed that agents had little useful information to offer and sought contact with agents only in the hopes of obtaining free inputs, access to credit, or some other subsidized service offered by CARDER. Extension agents were motivated to contact farmers to impress superiors with "contact groups" and demonstration plots, to sell their services, and to obtain "rewards" from farmers by delivering subsidized inputs or services. Thus, the interaction between farmer and agent had become a "business relationship" of bartering goods and services, with the actual transfer of technology playing little or no role.

Table 2.1 – Trends in maize prices in three markets

	Nominal price (F/kg)			Price	Real price (1998 F/kg)		
	Dantokpa	Parakou	Malanville	index	Dantokpa	Parakou	Malanville
1990	77.2	63.3	58.3	99.3	155.6	127.5	117.6
1991	76.3	66.4	66.1	100.0	152.7	133.0	132.3
1992	85.7	70.8	73.3	105.3	162.9	134.7	139.4
1993	59.8	47.6	50.0	109.4	109.5	87.1	91.5
1994	86.0	66.1	56.3	142.2	121.1	93.0	79.2
1995	105.0	75.0	84.2	164.1	128.1	91.5	102.7
1996	140.8	135.0	128.8	174.7	161.4	154.7	147.5
1997	161.7	153.8	145.4	181.7	178.1	169.4	160.2
1998	144.2	148.3	133.8	200.2	144.2	148.3	133.8

Source: Nominal prices from ONASA. Price index from INSAE.

Table 2.2 – Trends in food prices in Parakou

	Nominal price (F/kg)			Price	Real price (1998 F/kg)		
	Local rice	Manioc flour	White sorghum	index	Local rice	Manioc flour	White sorghum
1990	163.6	101.9	64.4	99.3	329.8	205.4	129.8
1991	152.7	88.6	68.6	100.0	305.8	177.5	137.4
1992	147.5	84.2	93.8	105.3	280.4	160.0	178.2
1993	137.5	90.0	75.0	109.4	251.6	164.7	137.2
1994	210.5	121.7	73.6	142.2	296.3	171.3	103.7
1995	263.8	130.4	90.0	164.1	321.8	159.1	109.8
1996	280.5	167.5	147.1	174.7	321.4	191.9	168.6
1997	288.8	228.8	170.8	181.7	318.1	252.0	188.2
1998	315.8	222.5	203.3	200.2	315.8	222.5	203.3

Source: Nominal prices from ONASA. Price index from INSAE.

Table 2.3 – Trends in agricultural production (1000 tons)

	Yams	Manioc	Maize	Sorghum	Groundnuts	Rice	Cotton
1990	1,046	937	410	99	64	11	146
1991	1,178	1,046	431	115	74	10	177
1992	1,125	1,041	460	110	74	10	153
1993	1,185	1,147	483	106	74	10	272
1994	1,250	1,146	492	113	78	14	260
1995	1,286	1,238	576	108	103	17	328
1996	1,342	1,457	556	110	85	22	443
1997	1,514	1,926	728	120	107	29	383
1998	1,584	1,989	662	138	99	36	359
1999	1,628	2,063	679	142	101	37	366
Annual growth	5.0%	9.2%	5.8%	4.1%	5.3%	14.6%	10.7%

Source: FAO.

Table 2.4 – Gross farm revenue from cotton

	Production (1000 t seed cotton)	Farm-level price (FCFA/kg)	Nominal gross revenue (billion FCFA)	Real gross revenue (1998 billion)
1993	272	103	28.0	51.4
1994	260	135	35.1	49.4
1995	328	160	52.5	64.0
1996	443	200	88.6	101.3
1997	383	225	86.2	94.7
1998	359	225	80.8	80.8

Sources: Production from FAO. Cotton prices from Soulé (1999).
Real prices calculated using the consumer price index from INSAE.

CHAPTER 3 – BACKGROUND AND HISTORY OF ECONOMIC POLICY REFORMS IN MALAWI

3.1 Introduction and Background to the Economy

Malawi is a land-locked country situated in the Eastern part of Southern Africa bordering Mozambique in the South and Southeast, Zambia in the West, and Tanzania in the North and Northeast. The country's total surface area is 9,427,400 ha with a population of about 11 million people. Ranked at position 159 out of 174 countries in terms of human development, the country is one of the poorest in the world (UNDP 1999). The country's annual per capita GNP in 1999 was estimated at US$ 190 (World Bank 2000). As in many other sub-Saharan African countries, poverty is more pervasive in the rural areas. According to the 1997-1998 Malawi Integrated Household Survey, the rate of poverty in the rural areas was 67 percent compared to a rate of 55 percent in the urban areas (National Economic Council, 2000).

The agricultural sector is the mainstay of the economy. The sector contributes more than 35 per cent of the country's GDP, employs about 80 per cent of the labor force, and generates around 90 per cent of total export earnings. Historically, the agriculture sector was characterized by a dual structure composed of estate and smallholder farmers. The smallholder sub-sector comprises about 2.4 million farm families occupying around 4.55 million hectares of cultivable land under a customary land tenure system (Ministry of Agriculture and Irrigation, 1997; World Bank, 1995). Between 55 to 70 per cent of smallholder farmers cultivate less than 1 hectare of land (World Bank 1995, National Economic Council, 1998). The main food crops grown by smallholder farmers are maize, cassava, sorghum, rice, beans, and groundnuts. The smallholder sub-sector produces over 80 per cent of the country's food products. Export and cash crops cultivated by the smallholder sub-sector include tobacco, cotton, chillies, coffee, soybeans, and sunflower.

The estate sector mainly produces flue-cured and burley tobacco, tea, sugar and coffee. A considerable amount of maize is also produced by the estate sector. The estate sector has easy access to credit and security of land tenure which motivates higher levels of investment and input use (World Bank, 1995). The estate sector comes second to the smallholder sector in terms of employment with tea and tobacco estates accounting for about 75 per cent of the estate sub-sectoral employment. As of 1992, there were about 26,000 estates occupying an area of about 1.2 million hectares (World Bank 1995).

Malawi's economy is heavily dependent on maize as a subsistence food crop and tobacco as a major source of earnings. Maize occupies between 60 and 70 percent of the total cultivated land area and 80 to 90 percent of the area devoted to food crops (see Tables 3.1 and 3.2). Tobacco, on the other hand, provides over 60 percent of the country' export earnings. There is only one agricultural season which usually extends from November/December to April/May. Most agricultural production is rainfed, irrigation is still very limited. The country is particularly vulnerable to drought; drought conditions were experienced in 1991/92, 1993/94 and 1994/95.

3.2 Historic Perspective of Agricultural Market Reforms in Malawi

The development strategies of both the colonial and post-colonial governments in Malawi tended to favor the estate sector at the expense of the smallholder sector. Prior to economic liberalization, the government imposed several restrictions on the production and marketing of smallholder agricultural crops. Such restrictions included: (i) fixing smallholder export prices below export parity levels; (ii) prohibiting smallholder farmers from producing and marketing high value crops such as burley tobacco (through the Special Crops Act); (iii) monopolizing the marketing of virtually all smallholder inputs and crops through the parastatal organization, the Agricultural Development and Marketing Corporation (ADMARC) (the ADMARC distributed inputs to small farmers at subsidized prices and purchased their output at guaranteed fixed prices); and (iv) barring smallholder access to agricultural credit from commercial banks.

In 1981, in response to severe external shocks and macro-economic imbalances, Malawi embarked on a series of structural adjustment and macro-economic stabilization programs supported by the World Bank and the International Monetary Fund (IMF). Measures to meet the conditionalities of the structural adjustment programs included the adoption of a flexible exchange rate regime, restructuring of parastatal organizations, and liberalization of pricing and marketing policies, especially in the agricultural sector. These economic reforms were meant to stimulate private sector participation in various economic activities of the country. The intended reforms, however, were rarely fully implemented and policy reversals were very common.

Following inadequate and late supply of fertilizers by ADMARC in 1983, the Smallholder Fertilizer Revolving Fund (SFRF) was established to procure and distribute fertilizer to smallholder farmers. In 1988, the SFRF was transformed into a trust fund called the Smallholder Farmer Fertilizer Revolving Fund of Malawi (SFFRFM). The SFFRFM distributes fertilizer through ADMARC's large network of depots.

In 1986, Malawi's economy deteriorated due to falling tobacco and tea export prices, severe droughts, and the cut-off of transport routes through Mozambique. A new series of World Bank programs and loans were initiated in 1987. In the agricultural sector, this meant freeing smallholder output markets for all crops except for cotton and tobacco. However, although private trading was allowed, producer prices for commodities such as maize were still fixed by the government. In 1990, smallholder farmers were allowed to grow burley tobacco under a quota system. Cotton production and marketing were liberalized in 1991. In May 1993, a policy was announced to open up both importation and distribution of smallholder fertilizers to the private sector. Fertilizer subsidies were gradually reduced from an 11 percent subsidy level in 1994 to 5 percent in 1994/95. Production and marketing of hybrid maize seed was liberalized in 1994/95 while complete elimination of fertilizer subsidies was effected in 1995/96. Tobacco marketing was freed up in 1994 to allow the access of smallholder farmers to the country's tobacco auction floors. The smallholder tobacco production quota system was repealed in 1997/98.

Before the reforms, the main access of small farmers to agricultural credit was through the Smallholder Agricultural Credit Administration (SACA). The SACA was established in 1988 to provide inputs on credit (fertilizers and seeds) to smallholders through farmers clubs or associations. The loan repayment rates were among the highest in the third world (about 90 percent), mainly because the government did not extend a new loan to any group which did not pay back in full the previous year. However, loan recovery rates dropped drastically during the 1991-92 to 1993-94 period because of political instability. The introduction of the multi-party system in 1993 caused uncertainty and confusion among farmers causing massive loan default (N'gon'gola, 1997). The SACA collapsed soon there-after and was replaced in 1994 by the Malawi Rural Financial Corporation (MRFC). However, unlike SACA which subsidized loan interest rates to small farmers, the MRFC operates like a commercial bank and charges market interest rates which were above 50 percent in the period 1995/96. To insure loan recovery, the MRFC extends loans mainly to tobacco farmers clubs and cash crop growers.

Until 1999, a maize price band was still in effect, whereby ADMARC established a maize floor price for smallholders and a ceiling price for consumers. Private traders were allowed to trade freely within the price band and ADMARC acted as buyer of last resort for staple food crops as well as manager of strategic reserves. Since the liberalization, ADMARC has been implementing a divestiture program and has been closing uneconomic market locations. It nevertheless is still a major player in agricultural marketing. The irony in ADMARC's restructuring program has been

the reduction of its operations in areas with low trading activities and poor infrastructure, particularly roads. It has therefore been difficult for the private sector to penetrate and operate in these areas for the same reasons that ADMARC withdrew from them. In certain areas, due to the deterioration of agricultural market operations, ADMARC has been forced to reopen its markets. Since 1999, there has been on-going negotiations to privatize ADMARC. However, no concrete measures towards this end have been taken so far.

Starting again in 1998, the macroeconomic situation of the country deteriorated; Malawi's fiscal discipline weakened and its external debt situation worsened. The inflation rate increased as well during this period, hovering between 20 and 40 percent in 1998 and 1999. The Malawian currency, the Kwacha (MK) was devalued twice in 1998. Within that year, the official exchange rate had increased from about MK/$ 15 to MK/$ 42. As of January 2001, the exchange rate was at MK/$ 47. Malawi qualified as a Highly Indebted Poor Country (HIPC) and was therefore eligible for debt forgiveness by the IMF and the World Bank. At the end of 2000, it was approved for an external debt relief of about $ 1.1 billion.

3.3 Recent Agricultural Strategies and Safety Net Interventions

A combination of economic liberalization, favorable external circumstances, and other government/donor initiatives have provided a boost to the agricultural sector in the last decade. According to FAO data, the Agricultural Production Index per capita for Malawi (base year 1989-91) grew from less than 100 in 1990 to about 125 in the year 2000. Growth in agricultural production has been fuelled mainly by the smallholder sector. As Table 3.2 indicates, the production of maize, cassava, groundnuts, rice, potatoes, and pulses has increased substantially since the early 1990s. Depending on the crop, this has been due to area expansion and/or improvements in yield. Since the liberalization of burley tobacco marketing by small farmers, the number of smallholder farmers growing tobacco has also increased. The smallholder production area allocated to tobacco swelled from 33,000 ha in 1990/91 to about 100,000 ha in 1996/97. The production of smallholder burley tobacco increased from 1.6 thousand mt in 1990/91 to 66 thousand mt in 1996/97. Smallholder production of burley tobacco accounts now for more than 50 percent of total burley production in the country.

Despite these positive changes for the smallholder sector, food insecurity and persistent poverty remain an important concern for policymakers in Malawi. A number of indicators which include

high population growth (about 2.4 percent in 1999), declining per capita landholding size[2], low agricultural productivity, declining soil fertility, and widespread rural and urban poverty suggest that these issues will remain a priority in the near future. Anecdotal evidence also suggests that female-headed households remain poorer than male-headed households; a reflection of their limited access to land, tighter labor constraints, and fewer productive assets.

Starting in 1995-96, concerns about declining agricultural productivity and food security prompted several donors to launch programs to stimulate input use. The Drought Recovery Inputs Program (1995/96) distributed free inputs mainly to smallholders hit by the drought in 1994-95. The Agricultural Productivity Investment Project (APIP) provided input on interest-free credit. The Starter Pack Scheme (SPS) distributed small amounts of free fertilizers and seeds to all smallholders to use on about 0.10 ha of land. Supported by donor organizations, the government has also been pursuing an agricultural production diversification strategy. The diversification strategy, the APIP and the SPS are briefly discussed below.

Diversification

Over the last few years, there has been an increasing emphasis on agricultural diversification in the small-holder sector of Malawi. In the food sector, this has entailed a shift from traditionally dominant crops such as maize to other crops such as cassava, pulses, groundnuts, and potatoes. Following the severe 1993/1994 drought in Malawi, the diversification campaign has focused especially on cassava because of its resistance to drought. Area allocated to cassava has increased from about 72 thousand ha in 1990/91 to about 166 thousand ha in 2000. Within the cash crop sector, fear of declining world demand for tobacco has encouraged small farmer groups to increase production of other cash crops such as cotton, coffee, chillies, soybeans, and nuts.

Despite this progress, diversification away from maize and tobacco is still slow. The dependency on maize is associated with the taste preferences of the Malawian population and the deep-rooted traditional belief that maize production is synonymous with food security. This is exacerbated by the lack of developed markets in certain areas which forces most smallholders to rely mainly on food crop production as a means of sustenance. Relying on markets to sell their cash crops or buy their food crops is still considered a risky activity since in many rural areas of Malawi access to well-functioning agricultural markets is not a given. Moving away from tobacco into other export

[2] Malawi has one of the highest population densities in Africa and practically, almost all her arable land is under cultivation.

crops is also difficult because tobacco is a historic crop that has developed well established markets and institutions in Malawi. Expanding new export markets for crops such as paprika will take more time to achieve.

Agricultural Productivity Investment Project (APIP)

The continuous devaluation of the Malawi currency, rising inflation, and the removal of agricultural inputs and food subsidies in 1994/95 were viewed as having had adverse impacts on agricultural production costs, fertilizer use, and food security for the poor. In order to promote smallholder productivity, halt the declining soil fertility in the country, and promote food security, the government, through donor assistance from the European Union, adopted the Agricultural Productivity Investment Project (APIP). A pilot phase was started in 1997/98, where about 15,000 mt of fertilizer were distributed to 150,000 credit-worthy farmers. The credit package (made up of 50 kg of urea, 50 kg of NPK, and 20 kg of hybrid maize), was interest free . Farmers were supposed to pay back the amount of the loan at the end of July of the year following the receipt of the credit package. Farmers could repay in cash or in kind. The program was repeated again in 1998/99 and 1999/2000, but only farmers who had not defaulted on their loans during the previous year were eligible for the continued assistance.

Starter Pack Scheme (SPS)

The SPS is a scheme funded jointly by the Malawi government, the Department for International Development (DFID), the European Commission (EU), and the World Bank. The SPS was primarily envisaged as a short term action to help small-scale farmers improve their agricultural productivity and food security. The scheme was initiated during the 1998/99 season and about 2.8 million starter packs were distributed to all smallholder farm families country-wide. The free input packs included fertilizer (about 10 kg of urea or NPK) and seeds (about 2.5 kgs of maize and legumes) for 0.1 hectare per household. While the Malawi Government was responsible for the purchase of all the fertilizer in the program, the donors were responsible for the purchase of all the seeds. The Starter Pack Scheme was repeated during the 1999/2000 season.

General Observations on the Interventions

The SPS and the APIP have been associated with bumper crops amongst the majority of the smallholder farmers in 1999 and 2000. However, the sustainability of these programs is

questionable since they are supported by donor funds and are expensive to implement. Furthermore, there is fear that these types of programs perpetuate a dependency syndrome among the smallholder farmers and that distribution of free inputs displaces the sales of private traders, thereby distorting the market. More permanent solutions are needed to improve smallholder agricultural productivity and food security in Malawi.

Table 3.1

CROP	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	AVERAGE
MAIZE	**1169402**	**1173634**	**1145102**	**1193275**	**1182415**	**1215087**	**1270822**	**1343784**	**1391878**	**1368093**	**1327038**	**1129327**	**1225580**	**1242588**	**1233538**	**1292669**	**1244015**
local		1067527	1048441	1104583	1131540	1137499	1159985	1184036	1193642	1137894	996757	920920	859143	856417	914518	912751	**1041710**
composite		26069	21477	20100	13780	18698	25072	24725	18878	13347	3873	778	2303	17465	20275	24997	**16789**
hybrid	681	89005	74935	68592	37095	58890	85765	135023	179358	216852	326408	207629	364134	368706	298745	354921	**179171**
RICE	**20309**	**21917**	**20807**	**22874**	**19076**	**22658**	**25573**	**29042**	**32841**	**18241**	**38824**	**27087**	**33308**	**41223**	**40368**	**41770**	**28495**
local	2686	3450	2912	3640	2190	2760	3496	3462	4135	3007	7638	3689	8046	3988	11562	12994	**4978**
faya	14335	14869	14204	15702	13477	16142	18123	21740	24851	11979	25710	16641	22541	30065	26458	26114	**19559**
b. bonnet*	3288	3598	3691	3532	3402	3756	2776	1096	262	121	445	0	0				**1997**
IET'4094							1178	2144	3593	2365	3142	2508	2157	2658	2336	2609	**2469**
Cert Seed														10	12	53	**25**
GROUNDNUTS	**146314**	**144935**	**135966**	**176293**	**209938**	**175819**	**139691**	**48185**	**69978**	**64386**	**61040**	**95309**	**89373**	**71586**	**100140**	**140747**	**116856**
chalimbana	143606	141406	131547	166759	198957	164607	69236	30079	37290	58896	55040	64069	55568	63073	88856	123241	**99514**
chitembana	0	0	0	1149	4788	3807	165	10		118	0	0	2283			2279	**1043**
manipinter							2075	908	1076	1168	1425	1826	1454	390	705	2807	**1383**
malimba							2191	2203	2885	1989	2784	3275	4583	6726	8914	10578	**4613**
mawanga	0	0	0	566	2226	2617	2550	1605	1905	2215	1871	2999	1529	1397	1648	1842	**1561**
TOBACCO	**27587**	**44999**	**46939**	**38045**	**33170**	**24095**	**21446**	**30823**	**33275**	**32439**	**44981**	**31733**	**52732**	**78882**	**98981**	**114051**	**47136**
nddf	22990	36197	35832	29422	27567	20186	16719	24408	26700	25608	19357	19037	23838	26259	25175	18171	**24842**
sddf	2154	2768	4117	3408	1718	1693	1175	957	835	824	1274	1260	836	1536	2578	1913	**1815**
sun-air	2443	5328	6309	4942	3633	1833	2639	4662	3716	2716	2594	2608	1815	3214	2874	2041	**3335**
oriental		706	681	273	225	354	610	610	903	1027	1682	1858	1655	1596	1807	1944	**996**
burley					27	29	167	186	1221	2444	20138	6970	24412	46277	66547	89961	**21532**
COTTON	**32597**	**51059**	**60824**	**51910**	**34504**	**43642**	**47741**	**48516**	**58691**	**58281**	**53691**	**37593**	**52237**	**79073**	**70734**	**45023**	**51632**
WHEAT	2103	1980	1126	1513	2525	2593	2211	2119	1494	1446	1608	927	2290	2686	2271	2483	**1961**
SORGHUM	**22649**	**21302**	**32725**	**32059**	**30626**	**30099**	**29828**	**30814**	**31035**	**27668**	**43873**	**54482**	**61633**	**76029**	**83859**	**67937**	**42289**
MILLET	10870	15340	17413	17424	18163	19439	17916	19583	14979	14767	24169	23958	27953	34994	38634	35165	**21923**
PULSES	**82932**	**91322**	**79971**	**113663**	**152076**	**160040**	**149088**	**215301**	**190977**	**218962**	**264736**	**266458**	**294360**	**359452**	**412676**	**433092**	**217819**
beans				71329	86626	91345	93506	96499	116268	126969	132879	106238	112208	128317	172197	171663	**115850**
peas				37977	60612	62256	48380	113941	69814	67838	62756	135915	155132	172982	180460	123088	**99319**
grams				4357	4858	6439	7202	4861	5465	1145	836	1216	955	1316	1677	1990	**3255**
SOYA BEANS						760	1671	5901	16255	22163	15842	18433	23274	53611	39604	40829	**21668**
dolichus beans															4751		**4751**
velvet beans															6381		**6381**
GROUND BEAN						291	959	953	787	750	855	3128	2791	3226	5696	8617	**2550**
GUAR BEANS	**3300**	**3000**	**3000**	**2300**	**2000**	**2457**	**3000**	**3242**	**5176**	**1610**	**3200**	**705**	**1443**	**1868**	**2013**	**2761**	**2567**
CASHEW	53	12	12	6546	24031	27302	32951	41349	54820	53683	53956	53646	43963	42887	53493	44104	**33301**
MACADAMIA						**0**	**1188**	**0**	**1188**	**1188**	**1288**	**1288**	**13**	**1293**	**13768**	**13821**	**2920**
SESAME	25	40	43	61	93	387	420	465	545	136	262	97	599	709	122	571	**286**
SUNFLOWER	**3059**	**3074**	**3513**	**4078**	**2551**	**3000**	**4726**	**3757**	**7990**	**9649**	**10776**	**15460**	**26783**	**32146**	**10766**	**3898**	**9077**
COFFEE					**11972**			**0**			**19**	**19**	**13**	**25**	**443899***	**752454***	**1004**
PAPRIKA															**1417**		**1417**
CHILLIES	0	2			246	292	746	1988	2053	1551	1229	2596	2160	2177	6656	4307	**1625**
CASSAVA	**59351**	**81497**	**80262**	**72904**	**64875**	**61780**	**72823**	**61506**	**71619**	**63965**	**75050**	**72149**	**94731**	**116523**	**125813**	**151941**	**82924**
S. POTATOES		21340	22717	22447	28977	28517	43823	29839	48384	19886	34466	37151	60701	68804	91700	135346	**46273**
I. POTATOES					**3200**	**3080**	**3437**	**4460**	**5565**	**5855**	**6217**	**3844**	**7782**	**9042**	**10113**	**12851**	**6287**

** for 1996/97 and 1997/98 coffee area is in number of trees

Source: MOAI, National Early Warning Unit, Planning Division - Lilongwe, Malawi

Table 3.2

CROP	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/9	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	AVERAGE
MAIZE	**1369403**	**1397948**	**1355202**	**1294564**	**1201757**	**1423848**	**1509513**	**1342809**	**1589377**	**657000**	**2033957**	**818999**	**1327865**	**1793461**	**1226478**	**1534326**	**1367282**
local		1106832	1084592	1058080	1078860	1244351	1220565	963171	1041031	368282	1032173	534241	659295	864371	667156	746882	**911325**
composite		46575	37490	34755	22531	22420	44123	34616	26743	5377	6286	601	2401	25740	21168	30054	**24059**
hybrid		245391	233123	201729	100366	157077	244825	345022	521603	283341	995498	284157	666169	903350	538154	757390	**431813**
RICE	**25948**	**34886**	**34265**	**37407**	**28432**	**32311**	**45690**	**43280**	**63175**	**23798**	**65357**	**41132**	**39073**	**72629**	**65690**	**68658**	**45108**
local		5892	4295	5733	2450	3361	4488	3342	5385	1806	8007	4628	6873	6127	11706	14464	**5904**
faya		19092	20365	21772	16156	18232	27200	24241	37829	4146	38691	21246	20646	49699	43958	43114	**27092**
b. bonnet		9902	9642	9902	9826	10718	8396	3699	557	99	708						**6345**
IET'4094							5606	9298	14154	10597	15092	9923	8766	12741	9956	10773	**10691**
Cert. Seed														52	70		**61**
GROUNDNUTS				**716**	**2056**	**1825**	**69**	**5**		**12060**	**31785**	**30654**	**1390**	**40327**	**68718**	**97228**	**23903**
chalimbana							820	492	650	10008	28249	21315	498	34704	61457	84316	**24251**
chitembana							806	755	1260	17			1962			2402	**1200**
manipinter				543	1495	1980	1671	825	1382	248	815	335	811	285	573	1652	**970**
malimba										513	8225	125		4298	5156	7378	**4283**
mawanga										455	1716	1753		1040	1521	1727	**1369**
TOBACCO	**12369**	**19545**	**20515**	**16117**	**13650**	**9238**	**7934**	**14000**	**18729**	**16544**	**26924**	**15507**	**35439**	**68978**	**83566**	**94062**	**29570**
nddf		15500	16182	13178	11870	7681	6279	10966	14457	12286	7866	7361	12419	15274	13153	9608	**11605**
sddf		1600	2000	1279	625	792	509	403	367	239	896	577	545	935	1455	1001	**882**
sun-air		2050	2133	1563	1002	523	517	2022	1859	879	758	928	944	2106	2088	1142	**1368**
oriental		395	2000	97	99	178	367	285	420	515	939	826	740	877	1089	1111	**663**
burley					54	64	261	324	1627	2759	16516	5815	20659	49786	65781	81181	**20402**
COTTON	**13134**	**32600**	**46106**	**36235**	**20957**	**29286**	**35106**	**33026**	**42780**	**13632**	**45339**	**17014**	**25197**	**82591**	**45122**	**36336**	**34654**
WHEAT		1644	787	1287	1669	1869	1481	1639	877	613	1014	208	1572	2315	1339	1842	**1344**
SORGHUM	**6832**	**14271**	**22041**	**20761**	**14542**	**21776**	**20050**	**15452**	**18557**	**3957**	**21591**	**16667**	**19290**	**54710**	**39514**	**41473**	**21968**
MILLET	1621	8316	10580	9526	8666	11841	11183	10113	7766	3418	15228	9711	13259	20262	16424	19638	**11097**
PULSES	**18026**	**29479**	**28132**	**39099**	**56803**	**58157**	**50390**	**71385**	**68514**	**55849**	**70094**	**78251**	**99772**	**183094**	**179226**	**208895**	**80948**
beans				22545	28725	28071	27522	27638	38755	30341	45257	25134	30895	49574	52803	60039	**35946**
peas				14933	26311	27237	19762	42814	28808	15772	24484	43311	52601	87880	89288	79368	**42505**
grams				1621	1767	2849	3106	1945	2008	181	354	265	304	501	556	761	**1248**
SOYA BEANS						311	836	3284	13020	10965	13660	8176	15011	42374	28425	28482	**14959**
GROUND BEAN						109	417	411	382	152	391	893	961	1719	2822	5017	**1207**
GUAR BEANS		**2850**	**3600**	**2300**	**1680**	**3150**	**3300**	**1676**	**4861**		**1368**	**317**	**339**	**1238**	**1350**	**1540**	**2112**
CASHEW		40	50	58	67	107	89	7465	11723	2501	148	154	150	148	1487	153	**1623**
MACADAMIA							**4**		**3**	**4**	**4**	**5**	**5**	**5**	**131**	**241**	**45**
SESAME		18	19	27	34	139	154	143	215	7	75	11	59	291	46	219	**97**
SUNFLOWER		**1270**	**1544**	**1705**	**1182**	**1456**	**2192**	**1703**	**5211**	**4961**	**9339**	**6673**	**50353**	**17832**	**4580**	**1818**	**7455**
COFFEE					8		7		5	7	9	9	6	12	484	856	**140**
PAPRIKA																	
CHILLIES					278	331	615	1020	834	353	633	829	797	882	4132	1824	**1044**
CASSAVA	**143686**	**258693**	**209321**	**218282**	**169403**	**134785**	**154762**	**144760**	**167818**	**128827**	**216005**	**250056**	**328424**	**534549**	**713876**	**829821**	**287692**
S. POTATOES		59926	81047	80003	121195	101974	177424	94911	176999	43074	210572	165322	317714	596469	858129	1432383	**301143**
I. POTATOES					**13180**	**11400**	**11979**	**34200**	**39969**	**49144**	**47975**	**42495**	**79500**	**106422**	**116884**	**120338**	**56124**

Source: MOAI, National Early Warning Unit, Planning Division - Lilongwe, Malawi

CHAPTER 4: RESULTS OF THE BÉNIN SMALL FARMER, COMMUNITY, AND GROUPEMENT VILLAGEOIS SURVEYS

This chapter describes the results of three surveys carried out in the Republic of Bénin in 1998-1999: a survey of 899 agricultural households, a survey of 98 communities, and a survey of 189 *groupements villageois* (GVs). The GVs are village-level farmer organizations that play a central role in cotton marketing and input distribution.

4.1: Results of the Benin Small Farmer Survey

This section describes the methods and results of the IFPRI-LARES Small Farmer Survey. We begin with a brief description of the methods used in implementing the Small Farmer Survey. The results are organized into 10 section, as follows:

- General characteristics of farm households
- Land use
- Allocation of time
- Use of agricultural inputs
- Agricultural production
- Agricultural marketing and storage
- Consumption expenditure
- Household assets and housing characteristics
- Sources of information
- Perceived changes in well-being

The summary, conclusions, and policy implications are found in Chapter 6.

4.1.1 Survey methods

Questionnaire The questionnaire for the IFPRI-LARES Small Farmer Survey was developed collaboratively by IFPRI and LARES and consisted of 24 pages divided into 16 sections. These sections covered the following topics:

- Household characteristics
- Housing characteristics
- Land
- Agricultural production
- Labor use
- Input use
- Changes regarding input use
- Credit
- Crop marketing
- Storage
- Sources of information
- Food and non-food consumption
- Allocation of time
- Asset ownership
- Sources of income
- Perceptions of farmers

Sample selection The households were selected using a two-stage stratified random sample procedure based on the 1997 Pre-Census of Agriculture. In each of the six departments, villages were randomly selected, with the number of villages proportional to the volume of agricultural production, subject to a minimum of 10 villages per department. In total, one hundred villages were selected. In each village, nine households were randomly selected using listed prepared for the pre-Census. Three alternative households were selected for each village in case one or more of the nine were unavailable. In a few villages, the number of interviewed households was eight or ten, resulting in a final sample size of 899 farm households.

Calculation of weights Household weights (also called expansion factors) were calculated in order to extrapolate from the sample to the national level. Weights are calculated as the inverse of the probability of selection. Because a two-stage selection procedure was used to obtain the sample, the weights are calculated by multiplying two terms:

$$W_v = \frac{V_d}{v_d}\frac{H_v}{h_v}$$

where W_v is the weight for a household in village v

V_d is the total number of rural villages in department d

v_d is the number of rural villages selected from department d

H_v is the total number of agricultural households in village v

h_v is the number of agricultural households selected from village v

Table X-1 summarizes the distribution of the sample by department. The number of villages per department varies from 10 in Mono and Atlantique to 27 in Borgou, while the number of households per department varies from 90 to 242. The sum of the weights (W_v) represents the estimated number of agricultural households in the region. In other words, the sample selected for the IFPRI-LARES Small Farmer Survey implies that there are 475 thousand agricultural households in Bénin. Given the average household size of 8.8, this would imply an agricultural population of 4.18 million.

The weights are used to adjust for the fact that the survey intentionally over-sampled departments with large agricultural output (such as Borgou) and undersampled those with small output (such as Mono). By applying the weights in calculating all the results presented in this report, we adjust for the over- and under-sampling, generating results that are nationally representative.

Implementation The training of the enumerators, field testing of the survey, and final revisions to the questionnaire took place in June-July 1998. The IFPRI-LARES Small Farmer Survey was carried out over the period August to November 1998.

The data were entered into an MS Access database that checked for invalid responses and extreme values. The database was then converted to SPSS for cleaning and analysis. As mentioned above, weighting factors were calculated based on the sample design and were used in the generation of all the results presented in this report.

4.1.2 General characteristics of farm households

What is a farm household? For the purposes of the survey, the household was defined as "a group of persons (related or not) that eat and live together in the same dwelling for at least six months of the year." Thus, the household includes employees and visitors provided that they eat and live with the family for most of the year. This definition excludes, however, family members that live elsewhere during most of the time. A household was considered a farm household if it earns a

living from crop and livestock production. The sample was drawn from a census of agricultural households carried by the Ministry of Rural Development, but some fishing households were dropped from the survey if they had no crop or livestock production.

In this section, we describe the general characteristics of farm households in Bénin. Five topics are covered: the size and composition of farm households, education and literacy, ethnicity and religion, membership in organizations, and main economic activities.

Household size and composition

One of the most notable aspects of farm households in Bénin is their size. The average household has 8.8 members and 45 percent have more than 8 members. This is similar to the average size of rural households estimated by the 1994-95 *Enquête sur les Condition de Vie des Mengages Ruraux* (7 members), but larger than the average found in east and southern Africa of 5 or 6 members. Although the largest households are found in Borgou (11.3 members), even in the south the average household has 7-8 members. On average, a household contains 4.2 children under the age of 15, 4.3 adults between the ages of 15 and 65, and just 0.2 members over 65 (see Table 4.1.2).

The dependency ratio is the number of members under 15 or over 65 as a percentage of the total number of household members. The dependency ratio is 48 percent for the whole country, and it does not vary much from one department to another (see Table 4.1.2).

A second notable characteristic of farm households in Bénin is the small proportion of female-headed households, just 5 percent. In many African countries, the proportion is in the range of 15-30 percent. In Bénin, the percentage is highest in Zou (12 percent) and Atlantique (7 percent) and lowest in Atacora, where our sample did not record a single female-headed household. This means that our sample of female-headed households is relatively small (39), so that any figures given for this type of household must be interpreted with some caution.

The proportion of farm households that are polygamous is just over one-third (36 percent). The highest rates are in Zou (45 percent) and Atlantique (42 percent).

Female-headed households tend to be somewhat smaller than male-headed households (6.4 compared to 8.9 members). In addition, female heads of household tend to be older than male

heads. This suggests that some of the female-headed households are widows. On the other hand, the dependency ratios are almost the same for male- and female-headed households (see Table 4.1.3).

How does the household composition vary between rich and poor households[3]? First, poor households tend to have more members than richer households. Households have around 10 members in the poorest two categories, compared to 7-8 members in the richest two categories. Second, , the dependency ratio is higher for poor households (55 percent in the first category) than for richer households (44 percent in the fifth category). The difference in dependency ratios is largely due to the fact that poor households have more children (see Table 4.1.4).

The proportion of female-headed households does not appear to vary with expenditure category. This finding is somewhat surprising given the common belief that female-headed households are poorer and disadvantaged. The relatively small sample of female-headed households, however, makes this finding somewhat tentative. The results also show that polygamy is found in equal numbers across all income groups in rural areas, contradicting the view that only richer men can support a polygamous household (see Table 4.1.4).

Education

Education and literacy levels are relatively low among farm households of Bénin. The average adult (15 years and older) has 1.4 years of education and less than one in five is literate, defined as being able to read and/or write. These figures show significant regional variation. The departments of Ouémé and Mono have the highest literacy rates (33 and 25 percent, respectively) and the average number of years of schooling is two or more. In contrast, the adult literacy rate is around 10 percent in Borgou and Atacora (see Table 4.1.5).

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[3] We use the value of per capita consumption expenditure to measure the standard of living of households. Consumption expenditure is defined as the sum of four components: cash expenditures on food, cash expenditure on non-food goods and services, the estimated value of food produced by the household for its own consumption, and the rental equivalent of owner-occupied housing. We define five expenditure categories based on the quintiles of per capita consumption expenditure. Thus, the first category contains the poorest 20 percent of the farm households, the second contains the next-poorest 20 percent, and so on. Expenditure is considered a better measure of the standard of living than income because it is less variable over time and because it measures more directly the material well-being of the household.

If we focus our attention on the heads of household, the situation is only slightly more favorable. Twenty-seven percent are literate and the average amount of schooling is 2.1 years. Once again, those in Ouémé and Mono have the highest levels of literacy and schooling. For example, 48 percent of the heads of household in Ouémé are literate, as are 38 percent of those in Mono (see Table 4.1.6).

Male-headed households are both more educated and more likely to be literate than female-headed households. For example, the literacy rate is 28 percent among male heads but just 6 percent among female heads.

The schooling and literacy of the head of household are strongly correlated with per capita expenditure. For example, literacy is just 20 percent among the heads of households in the poorest expenditure category, but it rises to almost twice that figure (38 percent) among heads of households in the richest category (see Table 4.1.7). This is partly because literacy and education increase income-earning potential, but it is also due to the fact that both variables (education and income) are positively influenced by the income and education of one's parents.

Are education and literacy levels improving over time? The survey results suggest that the new generations are significantly more likely to be educated than the older ones. For example, 43 percent of children between 6 and 10 years old are attending school and 46 percent of those between 11 and 15 are. This implies that rural children are often more educated than their parents and that the average levels of literacy and education will rise as these children become adults. Furthermore, the rates of attendance do not seem to vary between male- and female-headed households (see Table 4.1.8).

On the other hand, educational disparities persist among school-aged children:

- School attendance is significantly higher in the south (Ouémé, Atlantique, and Mono) than in the north (Atacora and Borgou) (see Table 4.1.9)

- School attendance is markedly higher among higher-income households than among the poor (see Table 4.1.10).

- And school attendance is much higher among boys than girls. The attendance rates of boys are 50 percent higher than those of girls among 6-10 year-olds, 80 percent higher among 11-15 year-olds, and three times as high among 16-20 year-olds (see Table 4.1.11).

Ethnicity and religion

The IFPRI-LARES Small Farmer Survey confirms that there are many ethnic groups, none of which represents a large share of the national population but some of which are dominant within individual regions. The largest ethnic group, the Fon, represent just 23 percent of the heads of farm households in Bénin. Only two other groups, the Adja and the Nago, account for more than 10 percent of the total. And 38 percent of all heads of household do not consider themselves members of any of the ten largest ethnic groups (see Table 4.1.12).

Although none of the ethnic groups forms a national majority, some of them account for a large share of the farm households in particular regions. For example, 63 percent of the heads of farm households in Zou are Fon, half of those in Mono are Adja, and half of those in Borgou are Bariba (see Table 4.1.12).

Ethnicity is also correlated to some degree with household well-being. Although most ethnic groups can be found in all five expenditure categories, the Fon are somewhat more common in the higher expenditure categories, while the Adja, Otamari, and Yom tend to be concentrated in the lower expenditure categories (see Table 4.1.13). This pattern may reflect the agro-ecological potential of the region where each group lives, the effect of language and social barriers, cultural differences, and/or the advantages of being a member of a larger group.

The geographic distribution of households by religious affiliation also shows well-known patterns. Muslim households are most common in Borgou (58 percent), followed by Atacora (33 percent). In Mono and Atlantique, animist households represent the majority, while Christian households are a majority in Ouémé. In Zou, Christians and animists each represent about 45 percent of the farm households (see Table 4.1.14).

Membership in organizations

Farm households were asked whether they belonged to either a cooperative or a *groupement villageois* (GV). Overall, 42 percent reporting being a member of a GV and 21 percent

reported being a cooperative member. Forty-five percent said they were not members of either type of organization. GV membership was highest in Borgou (69 percent), Zou (65 percent), and Atacora (49 percent). Very few farm households in Atlantique are GV members (3 percent). This geographic pattern reflects the distribution of cotton production in Bénin, since the main function of GVs is to supply inputs to cotton farmers and market cotton.

Cooperative membership follows a similar pattern. In the south and center of Bénin, 15-20 percent of farm households are cooperative members, but in Borgou and Atacora, the percentage is close to 35 percent (see Table 4.1.15).

Over half of the farm households in Bénin (57 percent) are members of a credit club (*tontine)*. Credit clubs are most common in Atlantique, where 92 percent are members, followed by Ouémé, Zou, and Mono. They are least common in Atacora, where just 21 percent report being a member (see Table 4.1.16).

When we examine the patterns of membership by household category, several patterns are evident:

- Poor households are just as likely to be members of GVs and cooperatives as are richer farm households.
- In contrast, credit clubs are more common among higher-income households than low-income households.
- Male-headed households are more likely to be members of a GV or cooperative compared to female-headed households (56 compared to 46 percent).
- Male- and female-headed households are equally likely to be members of credit clubs.

Economic activities

The respondents were asked about the main activity of each member of the household, where main activity is defined in terms of allocation of *time* rather than income generation. In interpreting these results, it should be kept in mind that most household members have multiple activities, and there is some subjectivity in deciding which is the main activity. Furthermore, the responses reflect the perceptions of the head of household rather than the individual in question. Thus, the results should be interpreted with some caution and should not be taken to imply that household members have just one (or even a single dominant) activity.

Crop production is the main activity of almost 90 percent of the heads of households in the survey. This is not surprising given that the sample was designed to represent farm households of Bénin, but it is not inevitable since an agricultural household could have a head of household involved in other economic activities. The proportion of heads of household whose main activity is crop production is over 90 percent in every department except for Ouémé. In this department, crop production is the main activity of 65 percent of the heads of household, but commerce and services are the main activity of 24 percent of the heads (see Table 4.1.17).

If we examine the main activity of all household members 15 years and older, rather than just the head of household, the activities are more diverse. Less than two thirds of household members (64 percent) report that crop production is their main activity. In Borgou and Atacora, significant proportions of the members list housework as the most important activity, while agricultural trade is given by 11 percent of the members in Atlantique. The most diversified activities are found in Ouémé, where 29 percent say their main activity is crop production, 24 percent cite food processing, and 24 percent say non-agricultural trade and services (see Table 4.1.18).

Sources of income

Farm households were asked to estimate the proportion of their cash income coming from each of eight sources:

- crop sales
- livestock and animal product sales
- non-farm enterprises
- agricultural wages
- non-agricultural wages
- remittances
- pension, gifts, and other assistance
- other

These results should be interpreted with some caution for several reasons. First, the results refer only to cash income and exclude the value of goods produced by the household. The structure of overall income (including home consumption) would show a greater importance of agriculture. Second, the results refer to gross income so they do not take into account the cost of generating this income. The structure of *net* income would show a greater importance of wages (which involve

little or no costs) and a smaller importance of commercial enterprises (for which costs are large relative to gross revenue). Third, the question requires respondents to recall income flows over the past year for all household members, something that is difficult to do when income varies by season, when income is earned by various household members, and when there are multiple sources of income.

With these qualifications in mind, the results indicate that farm households rely on a variety of income sources. Almost all households (93 percent) have some crop sales, a majority have livestock or animal product sales, and slightly more than half earn income from non-farm enterprises. Roughly one household in five earns money from agricultural wages and a similar proportion earns wages outside of agriculture. The average farm household in Bénin earns income from 2.6 of the 8 income sources (see Table 4.1.19).

Over half of the gross cash income (57 percent) comes from crop sales. The second largest source of income is non-farm enterprises, which contribute 17 percent of the total. Although a majority of households have income from livestock (including the sale of animal products), this source contributes just 7 percent of gross cash income. Agricultural and non-agricultural wages are earned by similar numbers of households (18 and 21 percent, respectively), but non-agricultural wages contribute twice as much to overall income (7 percent compared to 3 percent o of the total). This reflects the fact that non-agricultural wages generally provide higher wages and more hours of work per year (see Table 4.1.19).

In every department, the share of households with crop sales is over 85 percent. Somewhat surprisingly, the proportion of households earning income from livestock sales is highest in Atlantique. Although farmers in this department are not large-scale livestock producers, apparently the proximity of large urban markets makes the sale of animal products (including eggs) quite common. The proportion of households with non-farm enterprises is greatest in Ouémé and Atlantique. These figures include large numbers of traders that work in the urban centers and cross-border trade with Nigeria. Agricultural wages are earned by 20-27 percent of the households in all departments except Atlantique and Mono, where the percentages are much lower. Just 1 percent of the household in Atlantique report income from agricultural wages, presumably due to better opportunities in the non-agricultural sector (see Table 4.1.20).

Although almost all households report crop sale income, the importance of that income varies from one department to another. It is greatest in Zou (76 percent of total income) and smallest in Ouémé

(33 percent). Livestock income is most important in Atacora and Borgou (12-13 percent of total income), as would be expected. Although most households in Atlantique have income from animal product sales, the value of sales is modest. Non-farm enterprise income represents a relatively large share of income in Ouémé (35 percent) and Atlantique (22 percent), reflecting the large number of households involved in non-farm activities in those two departments. The contribution of agricultural wages to total income is small (4 percent or less) in every department except Atacora, where they represent 11 percent of the total. This may reflect the use of hired labor in cotton production in the north. Remittances are also more important in Atacora than in other departments. The contribution of non-agricultural wages is highest in Mono (17 percent of total income), paralleling the large percentage of households (50 percent) receiving income from this source in Mono (see Table 4.1.21).

Male- and female-headed households have somewhat different sources of income. Female-headed households tend to rely more on crop sales, which account for 64 percent of their cash income compared to 56 percent among male-headed households. At the same time, female-headed households rely less on income from livestock sales, non-farm enterprises, and non-farm wages. The importance of pensions, gifts, and assistance is greater among female-headed households (5 percent of the total) than among male-headed households (1 percent). Overall, however, the composition of male- and female-headed households is fairly similar (see Table 4.1.22).

The composition of income also varies across expenditure categories. The importance of crop sales rises from 48 percent in the poorest category to 60 percent in the richest. At the same time, the importance of non-farm enterprises, agricultural wages, non-agricultural wages, and remittances fall at higher levels of per capita expenditure. The contribution of these four types of income decline from 38 percent in the lowest category to 25 percent in the highest (see Table 4.1.23).

The composition of income changes significantly and predictably across farm-size categories. Crop sales rise in importance from 40 percent of total income among households in the smallest farm-size category to 76 percent of total income of those with the largest farms. Non-farm enterprises, agricultural wages, and non-agricultural wages become less important as farm size increases. These three sources account for 39 percent of income in the smallest farm-size category, but they represent just 12 percent of the total in the largest farm-size category. A similar decline is observed in the importance of remittances and pension/gifts/assistance (see Table 4.1.24). Thus, the percentage importance of remittances is not any greater for poor households in Bénin, but it is significantly higher among small farms. Even more paradoxically, pensions, gifts, and assistance

are highest among small farms and households with relatively high income. This underscores the finding that household income is not closely correlated with farm size in Bénin.

4.1.3 Land use

Land, along with labor, is one of the most important factors of production in Bénin agriculture. This section describes the quantity and quality of land cultivated by farmers and how it varies across regions and across different types of households. The topics covered in this section include farm size, land tenure and acquisition, land values, and distance from the farm to the plots.

Farm size

The average farm size in our sample of 899 farms was 3.3 hectares, although there is significant variation across departments. The farms tend to be larger in the more sparsely populated north and center. The average size is 5.4 hectares in Borgou and 4.8 hectares in Zou. In contrast, farms are much smaller in the densely populated south, notably in Mono and Ouémé where the average is 1.8-1.9 hectares (see Table 4.1.25 and 4.1.26).

To some degree, the regional differences in farm size are offset by the fact that there is a bimodal rainfall pattern in the south, allowing two crops per year. All the farm households in Atlantique and a majority of those in Mono, Ouémé, and Zou are able to produce two crops per year. The average sown area[4] varies from 3.2 hectares in Mono to 6.7 hectares in Zou (see Table 4.1.26).

In evaluating regional differences in farm size, it is also important to take into account household size. The average sown area per capita is 0.54 hectares and the variation across departments is modest, ranging from 0.38 in Ouémé to 0.76 in Zou.

Male-headed households have larger farms than female-headed households (3.4 vs. 2.5 hectares). On the other hand, a larger percentage of female-headed households can produce two crops per year and female-headed households tend to be smaller. The result is that there is practically no difference between male- and female-headed households in terms of per capita farmland (see Table 4.1.27).

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[4] The sown area refers to the sum of the areas cultivated across the year. In the north, where the single rainy season allows just one crop per year, the sown area is equal to the farm size.

Somewhat surprisingly, the relationship between farm size and per capita expenditure is not particularly strong. Households in the lowest expenditure category have farms that average 2.4 hectares compared to around 4 hectares for households in the highest two expenditure categories. The gap in sown area is somewhat larger because poor households are less likely to produce two crops per year compared to richer households. The gap in sown area per capita is even larger, because poor households tend to be larger than richer ones. Thus, households in the poorest expenditure category have just 0.32 hectares per capita compared to 0.80 hectares per capita for those in the highest expenditure category (see Table 4.1.28).

Land tenure and acquisition

For each plot of land cultivated by the household, farmers were asked about the ownership of the land. Two-thirds of the farmland is owned by the farm household and much of the remainder is either common property (15 percent) or land that is used without payment (11 percent). Only 5 percent of the area is rented and another 1 percent is sharecropped (see Table C-4.1.29).

Land rental markets appear to be much more active in Atlantique and Ouémé, where rented land makes up over 20 percent of the total[5]. This conforms to international patterns in which land markets tend to become more active where population density is high. The use of common property is rare in most departments, but accounts for 31 percent of the area in Zou and 19 percent in Borgou.

There are also significant differences in land tenure between male- and female-headed households. Female-headed households own just 50 percent of their farmland, relying on land they use without paying (28 percent) and common property (22 percent) much more than male-headed households (see Table 4.1.30).

Nonetheless, renting, sharecropping, and relying on common property do not appear to be associated with poverty. The proportion of farmland that is rented and sharecropped is roughly equal among low- and high-income households. Land used without payment is, on the other hand, more common among poor households than among rich (see Table 4.1.31).

[5] The total refers to the farmland used by farm households, thus excluding urban land, unused land, and land farmed by large enterprises.

Farmers were also asked how they obtained each plot of land. In the vast majority of the land (81 percent of the area), the land was inherited by or donated to the household. Just 9 percent of the area was purchased. It is very rare for households to report being allocated land by the village chief or by the government. Purchased land is most common in the south and becomes progressively less common as one moves north. In Ouémé, 36 percent of the land was purchased by the household, compared to 8 percent in Zou and close to 0 percent in Atacora and Borgou (see Table 4.1.32). This follows the same pattern observed for rented land, further confirming the idea that land markets are more active in the densely populated south.

Value of land

In the case of rented and sharecropped land, farmers were asked how much they paid the owners of the land. In the case of land rental, the average rate was FCFA 23 thousand per hectare per year. However, the rental rates varied widely across departments. The highest rental rates were found in the south: 33 thousand FCFA in Atlantique, 22 thousand in Mono, and 16 thousand in Ouémé. Rental rates in the center and north were much lower, between 6 and 10 thousand FCFA. These averages should be interpreted with some caution, however, given the small number of plots that were rented in these departments.

Regarding sharecropping, there were just 19 cases among the 899 households surveyed. Most of these farmers paid 30-35 percent of the harvest as payment for the land.

Source of water

Almost all agricultural production in Bénin is rain-fed. In the IFPRI-LARES Small Farmer Survey, 96 percent of the farmland was rainfed. Irrigation accounted for just 1 percent of the area, and this was concentrated in the department of Mono. The remaining 3 percent of the area was bottom-lands (*bas fond*), in which groundwater is an important source of moisture for plant growth. Most of the bottom-land was found in the department of Ouémé (see Table 4.1.33).

The use of irrigation and *bas-fond* land varies by the type of household:

- It is more common among male-headed households (5 percent) than among female-headed households (1 percent).

- It is no more common among richer households than poorer households.

- It is much more common among small farms than large, accounting for 15 percent of the area in the smallest farms, but just 3 percent of the area in the largest.

The latter finding conforms to the usual pattern in which farm size is inversely related to land productivity.

4.1.4 Allocation of time

Introduction

This section examines the allocation of time of members of farm households in Bénin. The survey asked for the time spent on eight activities during a typical day during the rainy season and the dry season. Separate questions are asked of an adult male and female, most commonly the head of household and his wife. The results must be interpreted with some caution because of a number of types of measurement error:

- First, the selection of a "typical" day is difficult given that the allocation of time varies from day to day within a season.
- In addition, the respondent must recall the allocation of time during another season, several months in the past.
- And finally, farm families may not have access to clocks to accurately measure the time spent on different activities, so the duration data are approximate.

Taking the average over men and women and over dry and rainy seasons, the most time-consuming activities of small farmers in Bénin are personal time, including eating and sleeping (9 hours per day), agricultural production (4.9 hours), leisure (3 hours), and non-agricultural work (2.6 hours). It is interesting to note that the time spent on post-harvest activities and non-agricultural activities (4.4 hours) is almost as much as the time spent on agricultural production (see Table 4.1.34).

Gender differences

The allocation of time differs sharply, however, between men and women. Men spend more time on agricultural production, leisure, and personal time, while women spend more time on

household work (including cooking, cleaning, and childcare), collecting fuelwood, and fetching water. For example, women spend 2.8 hours per day doing household work, 1.2 hours gathering fuelwood, and around 1 hour collecting water. In contrast, men spend less than three-quarters of an hour per day on all three activities combined. On the other hand, during the rainy season men spend 2.7 hours per day more on agricultural activities during the rainy than women do, 1.4 hours more on leisure, and 0.6 hours more on personal time. The time spent on post-harvest agricultural activities, including processing and marketing, is about equal between men and women, as is the time allocated to non-agricultural work (see Table 4.1.34).

Seasonal patterns

Looking at seasonal differences, agricultural production dominates the work during the rainy season, while post-harvest and non-agricultural activities become more important during the dry season. For example, men spent 7.6 hours on agriculture during the rainy season compared to a total of 3.4 hours on post-harvest and non-agricultural work. In the dry season, agricultural production falls to 4.2 hours, while post-harvest and non-agricultural work rise to 5.7 hours of the day. Leisure time is greater in the dry season than in the rainy season, though the increase is greater for men (0.9 hours) than for women (0.3 hours). Much of this difference is due to the fact that women must spend more time (an additional 0.4 hours) on water collection during the dry season. Other activities (personal time, household work, and fuelwood collection) do not vary significantly between dry and rainy seasons (see Table 4.1.34).

Differences across household types

Time allocation varies from one department to another. For example, in Atacora the allocation of time for men resembles closely the national average, but women spend more time on agriculture, post-harvest activities, fuelwood collection, and water collection and less on leisure and personal time. In Borgou, men devote more time to agricultural production than in any other department, but they also have more time for leisure than average. Women in Borgou, like those in Atacora, must spend more time than average on water and fuelwood collection. This is presumably due to the more arid climate and the limited forest cover in these two departments.

The departments of Atlantique and Ouémé are distinctive in that both men and women spend more time on non-agricultural activities than in other departments. In fact, the men in the farm households of Ouémé spend as much time on non-agricultural activities as they do on agricultural

production, and women actually spend more time on non-agricultural activities. This is presumably the result of the commercial and other opportunities associated with proximity to the major urban centers and to Nigeria. The patterns of time allocation in Zou are unusual in that leisure and personal time account for a larger part of the day than in other departments (see Table 4.1.35).

The allocation of time also varies across expenditure categories, although the differences are surprisingly small. The time spent on agricultural production and post-harvest activities does not vary consistently with expenditure category, nor does the time devoted to leisure or personal time. Only two clear patterns are observed. First, both men and women in the higher expenditure categories spend significantly more time on non-agricultural activities than do poor households. Men and women each spend 2.2 hours on non-agricultural activities in the lowest expenditure category, but 3.2-3.3 hours in the highest expenditure category. This is not surprising, given that non-agricultural activities require skills and capital that generate higher returns than agricultural activities. Second, the time women spend on household work, water collection, and wood gathering declines in higher expenditure categories. Women spend 5.4 hours per day on these three activities in the lowest expenditure category, compared to 4.7 hours in the highest category. This decline may be associated with the purchase of fuelwood, access to more convenient water sources, and the use of domestic employees to carry out these tasks (see Table 4.1.36).

Changes in time allocation

How has the allocation of time for men and women changed over time? The survey asks farmers which activity (if any) occupies more of their day now than it did in 1992. Roughly half of the respondents reported that there has been no change. The most commonly cited changes, however, were an increase in the time devoted to agricultural production during the rainy season. This was true for both men and women, cited by 31 percent and 24 percent of the households, respectively. The second most commonly cited change was an increase in non-agricultural work during the dry season, cited by 17-18 percent of households for both men and women (see Table 4.1.37).

These results could be read in two ways. Optimists would say that the economic reforms have been successful in providing better incentives for agricultural production, as well as stimulating non-agricultural activities in the off-season. Pessimists would argue that austerity has forced farmers to spend more time on agricultural production to make ends meet and to spend more time on low-

paying work in the informal sector. In order to resolve this difference, it is useful to look at how changes in time allocation differ regionally.

The proportion of households reporting increased time on agricultural activities is greatest in Atacora (25 percent of households), Borgou (24 percent), and Zou (20 percent) (see Table 4.1.38). Since these are the three main cotton producing departments of Bénin, these results suggest that the additional time allocated to agriculture is a response to better opportunities rather than a means of coping with hard times. The increase in personal time (particularly in Atacora and Zou) also supports this interpretation.

The changes in time allocation also differ between male- and female-headed households. Female-headed households are more likely to report an increase in time allocated to agriculture (27 percent compared to 18 percent for male-headed households) and more likely to report an increase in personal time (18 percent compared to 11 percent) (see Table 4.1.39). The interpretation of spending more time on agriculture is ambiguous, but the fact that female-headed households are more likely to report an increase in personal time should alleviate some of the concern that economic reforms adversely affect female-headed households.

4.1.5 Use of agricultural inputs

This section examines the use of agricultural inputs by farm households in Bénin, as well as the views of farmers regarding changes in input markets between 1992 and the present. One subsection is devoted to each of the following inputs: seed, fertilizer, pesticide, labor, and credit.

Seed

Farmers must decide whether to retain seed from the previous harvest or purchase seed. Although retaining seed is more economical, purchased seed may be of an improved variety that is higher-yielding or more pest-resistant. This decision will be based on the ease of harvesting and storing the seed, the availability of credit for seed purchases, and the reputation of the seed supplier for producing high-quality seed. Roughly three-quarter of the seed used by Bénin farmers is retained from the previous harvest, 18 percent is purchased, and 8 percent is received for free. However, more than half (56 percent) of all farm households in Bénin purchase at least some seed. These figures vary, of course, depending on the crop and on household characteristics.

Seed use by crop Although only 18 percent of all seed used is purchased, for some crops farrmers rely heavily on purchased seed. For example, farmers purchase three-quarters of their seed requirements for "other vegetables" and a majority (57 percent) of their cowpea seeds. On the other hand, less than 10 percent of the yam, sorghum/millet, and *piment* seed is purchased. Maize and manioc are in an intermediate position, with purchases meeting 13 and 18 percent, respectively, of the seed requirements of each crop. In the case of cotton, SONAPRA supplies cotton seed without charge to GVs for distribution to farmers (see Table 4.1.40).

Seed use by household type The proportion of seed that is bought or received free is higher in the south than in the north. For example, over half the seed used in Atlantique and about one-third of the seed in Ouémé and Mono is bought or received free. In contrast, the corresponding figures for Atacora and Borgou are 9 and 10 percent. Although a relatively high proportion of seed is purchased in Atlantique, the percentage of farm households that buy seed is small, just 26 percent. In contrast, over 70 percent of the farmers in Ouémé and Mono buy seed (see Table 4.1.41).

The patterns of seed use between male- and female-headed households present a mixed picture. Male-headed households are somewhat more likely to buy seed, but female-headed households are more likely to obtain free seed. Female-headed households rely on purchased and free seed for a larger share of their total seed requirements (see Table 4.1.42).

Similarly, the patterns of seed use across expenditure categories is somewhat contradictory. On the one hand, the proportion of household buying seed is relatively stable, being in the range of 53-62 percent for all groups. On the other, the share of total seed that is purchased or received free rises from 15-17 percent in the first two expenditure categories to 44 percent in the richest category (see Table 4.1.43).

It is sometimes suggested that cash constraints keep farmers from purchasing high-yielding varieties of seed. If this is true, cotton farmers should be more likely to use purchased seed than other farmers. In fact, the survey results indicate that cotton growers are no more likely to buy seed than other farmers. For example, maize producers that also grow cotton are no more likely to buy maize seed than maize producers that do not grow cotton (see Table 4.1.44). This suggest that annual cash revenue is not a major constraint on input demand, although cash availability at the time of planting may be.

Seed purchase patterns Almost all purchased seed (98 percent) is bought on a cash basis. Unlike fertilizer, it is generally not possible to purchase seed on credit. The most important suppliers of purchased seed are traders (55 percent), other farmers (36 percent), and CARDER (6 percent) (see Table 4.1.45). The suppliers of seed and the large share of cash transactions do not vary markedly between male- and female-headed household, nor across expenditure categories.

Changes in the availability of improved seed Farm households were asked whether the availability of improved seed varieties was better or worse than in 1992. Overall, the response was positive. Almost 40 percent reported that availability had improved and just 7 percent said that it had deteriorated. The remainder either saw no change (33 percent), had no opinion (18 percent), or said that the question was not applicable (2 percent) (see Table 4.1.46).

The perception of improved availability of seed varieties was strongest in Atacora, where 60 percent saw improvement and just 2 percent reported a deterioration. The perception was weakest in Atlantique, where most farm households reported no change since 1992. Outside of Atlantique, however, the percentage saying that availability had improved was at least four times greater than the percentage saying it had gotten worse (see Table 4.1.46).

The perception of improved availability was not limited to male-headed households or richer households. More households reported improvement than deterioration among both male- and female-headed households and among households in all five expenditure categories. In fact, poor households seemed to have a more favorable view of changes in seed availability than richer households did (see Tables 4.1.47 and 4.1.48).

Change in use of purchased seed Respondents were also asked if their use of purchased seed for each crop had increased or decreased since 1992. A majority of those growing each crop said that there had been no change in the use of purchased seed, but for most crops the number of households reporting an increase exceeded the number reporting a decrease. The strongest evidence for the wider use of purchased seed is in the case of rice, where 38 percent report an increase, while just 4 percent report a decrease. Purchased seed use has also increased in the growing of sorghum/millet, yams, *piment*, "other vegetables," cotton, and "other crops." The evidence is weaker in the case of manioc and cowpeas. On the other hand, there is no indication of increased use of purchased maize seed and the use of purchased groundnut seed appears to have declined (see Table 4.1.49).

Looking at the results by department, it appears that the use of purchased seed has expanded in Atacora and Borgou, due to the influence of yams, rice, and cotton. Purchased seed use has also expanded in Mono and Ouémé, due to the effect of vegetables. In Zou, there is no net change, while in Atlantique the use of purchased seed may have declined. The reasons for this pattern are not obvious (see Table 4.1.50).

Changes in the use of purchased seed are correlated with expenditure category. In particular, seed use has become less widespread among poor households and more widespread among non-poor households. This worrisome trend may be related to the fact that seed is almost always sold on a cash basis and the fact that government agencies are less involved in seed distribution than they used to be (see Table 4.1.51).

The main reasons given by respondents for increased use of purchased seed are previous experience (70 percent) and availability (15 percent). The main reasons for decreased use are the same: previous experience (51 percent) and availability (44 percent).

Fertilizer

Fertilizer use is more widespread in Bénin than in many countries in sub-Saharan Africa. According to the IFPRI-LARES Small Farmer Survey, about one-half of the farm households in Bénin use some fertilizer. Among farms that use fertilizer, the average quantity is 491 kilograms of fertilizer per year with a cost of about 92 thousand FCFA. This implies an application rate of 56 kilograms of fertilizer per hectare sown by all farm households in Bénin or 91 kg/ha sown by those farms that use fertilizer (see Table 4.1.52).

Fertilizer use by crop The proportion of growers of each crop that fertilize varies widely by crop. Cotton is fertilized by almost all growers, while maize is fertilized by one-third of the maize producers. Maize is followed by vegetables and rice. Other crops are only rarely fertilized. The average quantity used on cotton is 454 kg/farm, while the average on maize is 64 kg/farm. These figures understate the importance of fertilizer use on maize, however, since 90 percent of farms grow maize, but just 35 percent grow cotton. Of the total quantity of fertilizer used by farm households in Bénin, 65 percent is used on cotton, while 24 percent is applied to maize fields. None of the other crops accounts for more than 2 percent of the total. (see Table 4.1.53).

It is interesting to note that the probability that a given crop will be fertilized is also affected by whether or not the farm grows cotton. This is most striking in the case of maize, which is fertilized by 59 percent of cotton growers, but just 18 percent of non-cotton growers. In other words, the use of fertilizer on maize is three times more common among cotton farmers compared to other farmers. To a lesser degree, sorghum/millet and rice are also more likely to be fertilized when grown by cotton farmers (see Table 4.1.54). This reflects the fact that cotton farmers are able to purchase fertilizer and other inputs on credit from SONAPRA through the local *Groupement Villageois*.

Cotton farmers account for 87 percent of the volume of fertilizer purchased by small farmers in Bénin. Because of the diversion of fertilizer to other crops, cotton *fields* account for just 65 percent of the national volume. This implies that three-quarters of the fertilizer purchased by cotton farmers is used on cotton but another quarter is "diverted" to other crops[6]. Of this 25 percent that is diverted, most is applied to maize fields cultivated by cotton farmers (see Table 4.1.55)

Non-cotton growers account for about 13 percent of national fertilizer use by farm households. Of this amount, close to half is applied to maize, while the remainder is applied to *piment,* tomatoes, and other vegetables. (see Table 4.1.55).

Fertilizer use among different types of households The use of fertilizer differs sharply across regions within Bénin, however. In Borgou and Zou, over two-thirds of the farmers use fertilizer. Farmers that use fertilizer in these two departments apply over 600 kg/farm on average and spend close to 130 thousand FCFA on fertilizer. The overall application rate (including both users and non-users) is 87 kg/ha in Borgou and 77 kg/ha in Zou. These high rates of fertilizer use are linked to cotton production and the availability of fertilizer on credit. As will be discussed later, over 60 percent of the farmers in Borgou and Zou grow cotton and thus have access to fertilizer on credit (see Table 4.1.56).

The lowest fertilizer use is in Atlantique, where just 10 percent of the farms use fertilizer and those that do apply just 186 kg/farm on average (see Table 4.1.56). The low level of fertilizer use is related to the fact that farmers in Atlantique do not grow cotton and generally do not have access to inputs on credit

[6] Sixty-five percent of the total is applied to cotton and 87 percent of the total is used by cotton farmers, so 75 percent (0.65/0.87) of that used by cotton farmers is applied to cotton.

Ouémé presents an unusual case: just 18 percent of the farmers use fertilizer and the overall intensity of fertilizer use is low (24 kg /ha). Nonetheless, those farmers that use fertilizer use large quantities, resulting in an application rate of 135 kg/ha on these farms. This appears to be related to the intensive use of fertilizer on vegetable crops.

It is sometimes argued that female-headed households are at a disadvantage in the use of modern inputs such as fertilizer, but this does not appear to be the case in Bénin. According to the IFPRI-LARES Small Farmer Survey, female-headed households are just as likely to use fertilizer as male-headed households (50 percent) and the quantities they use are similar. Given that female-headed households have somewhat smaller farms, the application rate is actually somewhat higher on these farms (see Table 4.1.57).

A somewhat surprising result is that fertilizer purchases are no more common among high-income households than among low-income households. The proportion of farmers using fertilizer is roughly constant (42-59 percent) across expenditure categories. On the other hand, richer farmers buy larger quantities of fertilizer. In fact, farms in the highest expenditure category use twice as much fertilizer as those in the lowest category. This largely reflects the larger size of these farms. The application rate among users rises only modestly from 88 kg/ha in the lowest expenditure category to 97 kg/ha in the highest (see Table 4.1.58). One reason for the weak relationship between income and fertilizer use may be the fact that much of the fertilizer in Bénin is available on credit.

Fertilizer use is strongly correlated with farm size. The proportion of farmers using fertilizer rises from 31 percent among households in the smallest farm-size category to 75 percent among those in the largest category[7], while the average quantity used rises 12-fold from the first group to the second. On the other hand, the overall application rate lies in the range of 42-73 kg/ha with no consistent pattern across groups. Furthermore, the application rate among fertilizer users falls dramatically from 251 kg/ha to 83 kg/ha . In other words, among small farmers, only a small number use fertilizers but they use it very intensively. In contrast, among large farmers, a large majority use fertilizer, but they use it at a much lower application rate (see Table 4.1.59).

[7] Each farm size category includes 20 percent of the farm households. Thus, the smallest farm size category includes the smallest 20 percent of the farms in Bénin, while the fifth and largest farm-size category includes the largest 20 percent of the farms.

Perhaps the strongest factor determining fertilizer use is whether or not the household grows cotton. Almost all (97 percent) of cotton growers use fertilizer but less than one-quarter (24 percent) of farms not growing cotton use fertilizer. Furthermore, cotton farmers use almost three times as much fertilizer than do non-cotton farmers that use fertilizer. Of course, cotton farmers (located in the center and north) also have larger farms, but even on a per-hectare basis, cotton farmers use more fertilizer. The overall intensity of fertilizer use is 92 kg/ha among cotton growers and just 16 kg/ha among other farmers (see Table 4.1.60). These sharp differences are due to the fact that cotton farmers have access to fertilizer on credit, while other farmers generally do not, as well as to the economic returns from fertilization of cotton.

Regression analysis of fertilizer demand This section uses regression analysis to examine the factors influencing the amount of fertilizer applied on a given plot. Because many plots receive no fertilizer, the standard linear regression model would produce biased results. For this reason, we use the Heckman model,[8] which generates one equation describing the decision whether or not to use fertilizer and another equation describing the quantity used, assuming that some fertilizer is applied.

The factors influencing the decision to use fertilizer on a given plot are summarized as follows:

- Other things equal, a large household is more likely to use fertilizer than a small one. This result is understandable given the labor requirements of fertilizer application, the increased weeding associated with fertilizer use, and the fact that household members are the main source of labor for Bénin farmers.

- Ethnicity has a surprisingly strong effect on whether or not a farmer uses fertilizer. A household from the Fon (ethn1) or Nago (ethn3) group is less likely to use fertilizer, while one from the Adja (ethn2) group is more likely relative to other groups. These differences may agro-climatic variation, since ethnic groups tend to be geographically concentrated in Bénin.

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[8] The Heckman model describes a situation in which a dependent variable, y, is generated by the standard process $y = x\beta + u_1$, except that y and possibly some of the x's are only observed when $P = \phi(z\alpha + u_2) > 0.5$, where $\phi(.)$ is the cumulative normal density function, z is a vector of explanatory variables, β is a vector of coefficients, and u_2 is an error term distributed N(0,1). If, as is often the case, u_1 and u_2 are correlated, estimating these two relationships separately will generate biased and inconsistent estimates of β. The Heckman procedure generates one set of coefficients (α) predicting the probability that a household will use fertilizer (P) and another set (β) predicting the volume of fertilizer used (y) provided it uses some.

- Market prices have significant effects on fertilizer use. The coefficient on the fertilizer price indicates that a 10 percent increase in the price of fertilizer would reduce the proportion of fertilized plots by 8 percent. A 10 percent increase in the maize price would raise the proportion of fertilized plots by a similar amount. The coefficient on the price of cotton is the wrong sign and statistically significant. Part of the explanation is that there is very little variability in cotton prices.

- The positive and significant effect of agricultural wages on fertilizer use may reflect off-farm employment opportunities which make it easier for households to relieve the cash constraint to purchase fertilizer.

- Other things equal, small farms are somewhat more likely to use fertilizer than large ones, though the statistical significance is weak. This pattern may reflect greater labor use per hectare on small farms and/or a long-term tendency for farms to become smaller in more favorable areas.

- The probability of fertilizer use is higher on large plots than small, though the reasons for this are not obvious; there may be some fixed cost to applying fertilizer to a plot, making it less worthwhile for small plots.

- Zou (the excluded department) and Ouémé (dept5) are more likely to use fertilizer than the other four departments. Zou is the most accessible cotton-growing department, while Ouémé is close to Nigeria, the source of some smuggled fertilizer.

- The likelihood of fertilizing an irrigated plot is 27 percentage points greater than that of fertilizing an unirrigated plot. Not only is water a complement to fertilizer, but irrigated plots are more likely to be planted with high-value crops that provide a good return to fertilization.

- Crop mix is one of the strongest determinants of whether or not fertilizer is used on a given plot. Growing cotton on a plot raises the likelihood of applying fertilizer by 86 percentage points, making fertilization an almost certainty. Growing maize, rice, or vegetables also significantly increase the likelihood of using fertilizer, though to a lesser degree. The

omitted crops include sorghum, millet, cassava, sweet potatoes, and legumes that are less often fertilized.

- The interaction dummy variable for cotton growers and maize plots (ctg_mzp) is statistically significant and positive. This means that, other things equal, a cotton grower is much more likely to fertilize maize than a non-cotton grower. More specifically, being a cotton grower raises the probability of fertilizing a maize plot by 23 percentage points. This effect is probably linked to the availability of duty-free fertilizer on credit for cotton growers.

- Farmers buying maize seed are more likely to use fertilizer. This is expected since purchased seed is often of a high-yielding variety that responds better to fertilizer than do traditional varieties.

On the other hand, the probability of using fertilizer is not affected by household composition, the sex of the head of household, education or literacy, or various measures of proximity.

We now turn our attention to the determinants of the quantity of fertilizer used, conditional on fertilizer use. As shown in Table 9, fewer variables have a statistically significant relationship with the *amount* of fertilizer used compared to *whether or not* fertilizer is used. None of the labor, human capital, and market price variables are statistically significant at the 5 percent level. The determinants of the quantity of fertilizer used are as follows:

- Total fertilizer use increases with plot size but at a decreasing rate. In other words, the per hectare application rate declines with plot size. At the means, each additional hectare is associated with an additional 170 kilograms of fertilizer.

- Growing cotton on the plot does not increase the application rate and maize and rice cultivation are associated with *lower* application rates. Although crops other than cotton, maize, rice, and vegetables are not often fertilized, when they are, the application rates tend to be high.

- The interaction dummy indicating a cotton farmer growing maize has a negative and significant coefficient, suggesting that among maize fields that are fertilized, those of cotton farmers have lower application rates. One hypothesis is that this is the result of

policies of SONAPRA to discourage "leakage" of fertilizer to non-cotton fields. Alternatively, some cotton farmers may only be applying their "excess" fertilizer to maize, lowering the average below that of non-cotton farmers who overcome obstacles to fertilize maize.

- Bottom-land plots (*bas-fond*), which are generally marshy, receive higher applications of fertilizer, though irrigated ones do not, other things equal.

Fertilizer purchase patterns The IFPRI-LARES Small Farmer Survey also collected information on the characteristics of fertilizer purchases. Nationally, 88 percent of the fertilizer used by farm households is obtained through the official SONAPRA distribution channel, another 8 percent is distributed by CARDER, and just 6 percent is obtained from farmers and traders[9]. About 86 percent is purchased on credit, and of these transactions, almost all the credit (93 percent) is provided by the USPP through the *groupements villageois* (GVs) (see Table 4.1.61).

These averages hide dramatic regional differences in purchase patterns, however. In Atacora, Borgou, and Zou, over 90 percent of the fertilizer is obtained from SONAPRA through a GV, 89-98 percent is purchased on credit, and the credit is provided by the USPP through the GV in over 90 percent of the cases. At the other extreme, farmers in Atlantique and Ouémé obtain almost all their fertilizer (89-92 percent) from CARDER, and they almost always pay cash. Farmers in Mono are in an intermediate position because, as a marginal cotton producer, Mono has some access to fertilizer through the official SONAPRA channel (see Table 4.1.61).

The patterns in fertilizer purchases is fairly similar between male- and female-headed households. In fact, female-headed households are somewhat more likely to be able to buy fertilizer on credit from the GV than male-headed households (see Table 4.1.62). This is related to the fact that the percentage of cotton growers is somewhat higher among female-headed households (40 percent) than among male-headed households (35 percent).

Similarly, the patterns of fertilizer purchases do not vary markedly between poorer and richer farm households. The percentage of farmers getting fertilizer from the official SONAPRA channel and the percentage buying on credit is around 90 percent in the first three or four expenditure categories, but drops to 79 percent in the highest expenditure category (see Table 4.1.63).

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[9] It should be noted that some of the fertilizer purchased from farmers and traders may have originally been distributed through the official Sonapra channel and then resold.

Finally, if we divided the farm households into those that grow cotton and those that do not, we see sharp differences in the purchasing patterns. Among cotton growers (35 percent of all Bénin farmers), 98 percent of the fertilizer is obtained from SONAPRA through a GV and 97 percent is purchased on credit. In contrast, among non-cotton growers, 80 percent is purchased on a cash basis and the suppliers of fertilizer are much more varied, including CARDER (44 percent), traders (22 percent), GV/SONAPRA (21 percent), and other farmers (12 percent). Similarly, among the 20 percent of non-cotton growers that were able to buy fertilizer on credit, the sources of credit were varied, including the USPP/GVs, other formal financial institutions, and informal lenders (see Table 4.1.64). It may be surprising that non-cotton growers are buying fertilizer from GVs and even purchasing on credit. It should be recalled, however, that the percentage of households reporting GV membership (42 percent) is higher than the percentage growing cotton (35 percent).

Changes in the availability of fertilizer Respondents were asked whether the availability of fertilizer was better or worse than it had been in 1992. Overall, the proportion of households reporting better availability (21 percent) was approximately equal to the proportion saying that fertilizer was less available (20 percent). The response was generally positive in Borgou, Atacora, Zou, and Mono and negative in Atlantique and Ouémé (see Table 4.1.65). This may reflect the difference between farmers in the cotton zone and those outside it. Fertilizer prices doubled following the 1994 devaluation of the CFA franc, but for cotton growers the higher price of cotton more than offset this increase. In addition, the reduction in fertilizer subsidies in Nigeria probably affected the availability of fertilizer in neighboring Ouémé.

Although male-headed households were neutral on the change in fertilizer availability, female-headed households were more likely to report improvement (33 percent) than deterioration (7 percent) (see Table 4.1.66). The reasons for this difference hard difficult to determine, but these results do not support the common belief that female-headed households are more adversely affected by reforms.

Poor households are no more and no less likely to report improved availability of fertilizer than richer households. In other words, there is no link between the household's expenditure category and its view of the changes in fertilizer availability since 1992 (see Table 4.1.67).

Changes in fertilizer use Aggregate statistics indicate that national fertilizer use has increased dramatically over the past decade, but they do not tell us which households and which

crops are responsible for this increase. In the IFPRI-LARES Small Farmer Survey, respondents were asked whether their application rates of fertilizer on each crop had increased or decreased since 1992. For most crops, 40-60 percent of the households report no change, but more households cite increases than decreases. The largest increase appears in "other vegetables", where two-thirds of the growers report higher application rates. Similarly, almost half the *piment* growers report greater use of fertilizer. The results also indicate that fertilizer use has increased substantially on maize, sorghum/millet, groundnuts, *piment,* "other vegetables," cotton, and "other crops." On the other hand, fertilizer use on manioc and yams appears to have declined (see Table 4.1.68). Because the 1994 devaluation doubled the price of fertilizer while increasing the price of food crops by a smaller percentage, it is somewhat surprising that fertilization of maize, groundnuts, and some vegetables has increased. It may be that increased availability, both inside and outside the cotton system, has offset the impact of higher prices on demand.

Looking at the results by region, fertilizer use appears to have increased in every department except for Ouémé. The reason for this result is not obvious, although it may be related to changes in Nigerian policy which have reduced the subsidy rate on fertilizer. This presumably increased the price of Nigerian fertilizer in neighboring Ouémé (see Table 4.1.69).

The reported changes in fertilizer use do not vary much by sex of the head of household or by expenditure category. In every household category, the number of crops receiving more fertilizer is greater than the number receiving less. Because much of the fertilizer in Bénin is available on a credit-basis through SONAPRA and the *groupements villageois*, income is less of a constraint than in other countries.

When asked the reasons for the increase in fertilizer use, a large majority (86 percent) reported that it was in response to soil degradation. While soil degradation is certainly a factor, there is reason to question this explanation. It does not take into account that the economics of fertilizing cotton have improved, nor does it explain why changes in fertilization vary from one crop to another. The main reason given by respondents for a decrease in fertilizer use was, not surprisingly, the higher price (69 percent).

Pesticides

Pesticides are used on various crops in Bénin, but they are most commonly used on cotton. Almost all (97 percent) farmers use pesticides on their cotton, spending an average of 51 thousand

FCFA/farm. The percentage of growers using pesticides is over one-quarter for just two other crops: cowpeas and "other vegetables." Less than 3 percent of the growers of maize, manioc, yams, and sorghum/millet use pesticides on these crops. Overall, cotton accounts for 87 percent of the pesticides used by farm households in Bénin (in value terms), while cowpeas represent another 7 percent of the total (see Table 4.1.70).

Just as growing cotton makes it more likely a farmer will fertilize other crops, growing cotton also seems to make it more likely a farmer will apply pesticides on other crops. Forty-five percent of the cowpeas grown by cotton farmers receive pesticides compared to just 15 percent of the cowpeas grown by non-cotton farmers. Similarly, rice and groundnuts are more likely to receive pesticides on farms that also grow cotton. This is probably due to the fact that cotton farmers can obtain pesticides on credit from SONAPRA and apply them to other crops (see Table 4.1.71). Of the pesticides bought by cotton farmers, about 6 percent is "diverted" to other crops, mainly cowpeas.

Nationally, about 42 percent of farm households used pesticides. The average cost is 48 thousand FCFA among pesticide users and 20 thousand FCFA across all farm households. Given the close connection between cotton production and pesticide use, it is not surprising that pesticide use is most common in Zou and Borgou (where the proportion of farmers growing cotton is the highest). In Zou, 72 percent use pesticides (compared to 64 percent growing cotton), while in Borgou, 68 percent use pesticides (the same percentage as those growing cotton). Spending on pesticides is also highest in these two departments. At the other extreme, less than 1 percent of the farmers in Atlantique use pesticides (see Table 4.1.72).

Female-headed households are somewhat more likely to use pesticides (47 percent) compared to male-headed households (42 percent). In addition, the percentage of households using pesticides does not vary across expenditure categories.

The characteristics of pesticide purchases resembles those of fertilizer purchase. SONAPRA accounts for 83 percent of the pesticides bought by farm households in Bénin. In 79 percent of the cases, the purchase is on credit. As in the case of fertilizer, the pesticide purchase patterns differ sharply by region and between cotton growers and non-cotton growers. In Atacora, Borgou, and Zou, a large majority of the pesticides (87-98 percent) are supplied by SONAPRA through the GVs, and they are generally purchased on credit. In contrast, in Atlantique and Ouémé, pesticide are generally bought from traders and other farmers on a cash basis (see Table 4.1.73). These geographic patterns reflect the proportion of farmers in each department that grow cotton.

Respondents were asked whether the availability of pesticides had increased or decreased since 1992. Almost half the households had no opinion or said the question was not applicable because they never used pesticides. The number of households reporting improved availability (21 percent) was greater than the number reporting worse availability (15 percent), but the margin was not large. The strongest indications of improvement were in Borgou and Zou, while farmers in Ouémé reported a decline in availability (see Table 4.1.74).

Labor

The IFPRI-LARES Small Farmer Survey gathered information about the amount of labor devoted to different activities in growing each crop. This information was recorded for four types of labor: adult male family members, adult female family members, family members under 15 years of age, and hired laborers. The results presented here refer only to crops grown in the main agricultural season[10]. In calculating the number of person-days of work, we assumed that a day of labor by a child is equivalent to 0.5 days of labor for an adult.

The results show that the total amount of labor allocated to main-season crop production is 565 person-days per farm or 170 person-days per hectare. The labor input per farm is quite different across departments, but the labor input per hectare varies much less. The labor input is between 130 and 180 days/hectare in every department except Atacora, where it is 227 days/hectare. The labor input per hectare is greatest in Atacora, the poorest department, while labor input is close to the lowest in Atlantique, so the variation may be due to differences in the opportunity cost of family labor (see Table 4.1.75).

Labor use by activity The main activities are weeding (33 percent of the total labor time), land preparation (26 percent), and harvesting (23 percent). Differences in the allocation of labor to different activities does not follow a clear pattern, but presumably responds to the production characteristics of the main crops grown in each department (see Table 4.1.75).

The composition of labor use by activity is remarkably similar across expenditure categories and for male- and female-headed households. The only difference is that male-headed households and poor households appear to devote apply more labor per hectare in their crop production.

[10] Although the questionnaire also collected information on cotton production in the second season, this information was not incorporated because it complicated the interpretation of the results.

Labor use is quite different across farm-size categories. As farm size increases, the total amount of labor rises from 155 days in the smallest farm-size category to 1256 days in the largest. However, the amount of labor use *per hectare* falls steadily from 348 days/ha in the smallest farm-size category to 148 days/ha in the largest one (see Table 4.1.76). These results fit a pattern often found in studies of agriculture: that small farms are more intensively farmed that larger ones. An important reason, of course, is that, on small farms, there is more family labor available for each hectare of farmland. The composition of labor use by activity again shows little variation., although harvesting seems to account for a larger share among large farms.

Examining labor use by crop, maize and sorghum/millet require the least labor input per hectare (119 and 88 days/ha, respectively), whereas manioc and cowpeas require 142 days/ha and cotton 150 days/ha. The data suggest that yams are the most labor intensive crop. The results also indicate that the two root crops (manioc and yams) require more land preparation and planting than the other crops, while a large part of the labor input for cotton (almost half) is allocated to the harvest (see Table 4.1.77).

Labor use by type of labor Turning our attention to the types of labor used, the most notable finding is that over 80 percent of the farm households in Bénin hire at least some agricultural labor. The contribution of hired labor to the total labor inputs is much more modest: about one quarter of the person-days of work are carried out by hired labor. The use of hired labor is greatest in Atlantique and Ouémé, where high population densities reduce the transaction costs of labor markets and higher incomes allow farmers to use more hired labor. The contribution of hired labor is smallest in the sparsely populated Borgou and Atacora. Even in these departments, approximately 80 percent of the farm households hire some labor (see Table 4.1.78).

The contribution of family labor varies from 57-59 percent in Atlantique and Ouémé to 86-87 percent in Atacroa, Borgou, and Mono. Within the family, the ratio of male-to-female labor input varies across departments. In Borgou and Atacora, males family members contribute more than twice as many days of labor as female family members, whereas the contribution of each gender is more equal in Atlantique, Zou, and Mono. Child labor represents about 8 percent of the total labor input for crop production[11], and it varies from 3 to 14 percent depending on the crop (see Table 4.1.78).

[11] As noted earlier, a day of child labor was considered equal to 0.5 person-days.

Female-headed households, not surprisingly, have fewer male adult family members contributing labor to crop production. They compensate by increasing the labor contribution of female adults in the family, increasing the contribution of children, and making greater use of hired labor than male-headed households. Over 90 percent of our sample of female-headed households made use of hired labor, compared to just 80 percent among male-headed households (see Table 4.1.79).

As per capita expenditure rises, households rely less on family labor and more on hired labor. The contribution of hired labor rises from 17 percent in the lowest expenditure category to 34 percent in the highest. Hiring labor is not limited to higher-income households, however: over three-quarters of the households in the poorest expenditure category use some hired labor. Furthermore, the use of child family labor is not limited to poor households. Children contribute 7-8 percent of the total labor input in every expenditure category (see Table 4.1.80).

Somewhat surprisingly, large farms are no more reliant on hired labor than small farms. The contribution of hired labor to total labor input remains around 21-26 percent across farm-size categories. One explanation is that large farms tend to have large families living on them, so the total supply of family labor is greater. In addition, the labor input per hectare on large farms is much smaller, as described earlier. Another pattern is that the contributions of women and children increase, while that of men decreases, on larger farms.

The contribution of each type of labor differs by crop. For example, the hired labor account for 25-30 percent of the labor input in growing maize and manioc, but 10-15 percent of the total in cultivating sorghum/millet and yams. This difference may not reflect some characteristic of the crops themselves as much as the nature of labor markets in the regions where these crops are grown. Sorghum/millet and yams are grown in the north where labor markets are less active, while maize and manioc are somewhat concentrated in the south. Another pattern is that the role of female family members is much smaller in the case of yams and manioc than for the other crops. Although cash crops are sometimes considered "male" crops, the evidence from Bénin suggests that female family members contribute more to cotton production than to any other crops with the exception of cowpeas (see Table 4.1.81).

Finally, we consider the distribution of labor across activities for each type of labor. Male family members do not differ from the average in terms of the allocation of labor to each activity. On the other hand, both female family members and children spend a disproportionate share of their time on the harvest (46 percent of female labor input and 35 percent of children's input). Hired labors

are involved in all activities, but land preparation is the most important one, accounting for 42 percent of their labor input (see Table 4.1.82). This difference may be related to the fact that land preparation is difficult work but easy to monitor and somewhat flexible in timing, all of which make it suited for hired labor. Harvesting is more time-sensitive, and farmers may find it harder to monitor the quality of the work of hired laborers.

Wages The average wage paid to hired labor is 901 FCFA/day, although there is considerable regional variation. Wages are highest in the north, where average 1100-1200 FCFA/day and lowest in Atlantique, where they are just 532 FCFA/day. This is somewhat expected given the higher incomes in Atlantique. One explanation is that hired labor in the north is largely for cotton production so it tends to be concentrated in a few months of the year. In addition, the low population density in the north may force employers to pay a premium to attract workers from other areas.

Credit

Access to credit In this section, we examine access to credit, including loans received for any purpose but excluding in-kind credit such as the provision of inputs on credit. Overall, about 34 percent of all small farmers in Bénin received a loan in the 12 months prior to the survey. Roughly half of these received a loan from the formal sector (CLCAM or an NGO) and one half from the informal sector (friends, family, and moneylenders). It is rare for households to obtain a loan from formal and informal sources (see Table 4.1.83).

Access to credit varies significantly from one department to another. Credit appears to be most available in Zou, where over half (63 percent) of the households received a loan. In Mono and Ouémé, the proportion is at least a third, but in other departments less than 20 percent of farm households received a loan (see Table 4.1.83).

Female-headed households appear to have somewhat better access to credit, mainly due to access to formal-sector loans. This may be the result of programs to target credit at women, but it is difficult to give too much weight to this conclusion given the small number of female-headed households (39) in the sample (see Table 4.1.84).

The pattern by expenditure category is somewhat erratic. Households in the poorest expenditure category had the least access to credit, but those in the second-poorest category had the best access. Formal-sector credit was most common in the middle expenditure categories. Perhaps the poorest

households are not considered credit-worthy and the richest ones are able to self-finance their investments without resorting to credit. Informal credit was used by all groups in similar proportions (16-21 percent) (see Table 4.1.85).

Characteristics of loans The average size of the loans was 115 thousand FCFA. Loans from the informal sector were smaller (67 thousand FCFA) compared to those from the formal sector (146 thousand FCFA). The average loan period was 8 months and the average interest rate was 2.7 percent per month.

The most common sources of credit are CLCAM (29 percent of the loans), friends (20 percent), moneylenders (14 percent), and family (10 percent). CLCAM is particularly important in Borgou, Atacora, and, to a lesser extent, in Atlantique (see Table 4.1.86).

Farm households were asked how the loan funds were used. Almost two-thirds (63 percent) of the borrowers reported that the funds were used for hiring agricultural laborers (see Table 4.1.87).

Reasons for lack of credit According to the survey, households that did not receive credit generally had not applied for credit. About 35 percent of the households surveyed applied for credit and 34 percent received it, implying that almost everyone who applied was able to get a loan and that almost everyone who didn't get credit also didn't apply. The most important reasons for not applying for credit were that it was too risky (37 percent), that they had no need for credit (20 percent), and that the formalities were too complicated (see Table 4.1.88).

Perceptions of changes in credit Farmers were asked about their perceptions of changes in the availability of credit since 1992. Most of them (73 percent) said there had been no change, but more saw improvements (17 percent) than deterioration (7 percent). This pattern was found in every expenditure category, suggesting that the improvements have not been limited to the higher-income households (see Table 4.1.89). The opinion that access to credit has improved is concentrated in Zou and Mono (see Table 4.1.90). The most common reason cited for improved access to credit was that the area cultivated by the farm household had expanded. The most common reason cited for reduced access to credit was that interest rates have increased.

Agricultural assets

The ownership of agricultural assets (including animals) tells us something about the level of technology used in farming. In addition, it provides information on the ability of the farm households to cope with temporary reductions in income, since asset sales is one strategy for responding to adverse conditions. Finally, the patterns of animal ownership indicate the importance of livestock in the household economy.

The most commonly owned agricultural assets are poultry (owned by 84 percent of the farm households) and goats/sheep (owned by 62 percent). Slightly less than 10 percent of the Bénin farm households practice animal traction based on their own equipment and animals, judging by the fact that 8 percent own working cattle and 9 percent own a plow. Carts, harrows, and tractors are quite rare, each being owned by less than 4 percent of the households (see Table N-4.1.91).

Average herd size among owners of each type of animal were 23 fowl, 5 pigs, 9 goats/sheep, 6 working cattle and 12 other cattle. The value per animal, as assessed by the respondents, was 1000 FCFA per chicken, 7600 FCFA per pig, 8200 FCFA per goat/sheep, 64 thousand FCFA for cattle, and 89 thousand FCFA for working cattle (see Table N-4.1.91).

Overall, the average value of agricultural assets is 260 thousand FCFA. The largest elements are cattle and working cattle, together representing about 158 thousand FCFA or 60 percent of the total.

Looking at the geographic patterns of ownership, poultry are common in every department, being owned by at least 74 percent of the households in every department. Similarly, goats/sheep are owned by 54-70 percent of households with no clear geographic pattern. On the other hand, carts, plows, harrows, cattle, and work cattle are all much more common in Atacora and Borgou than in the other departments. For example, plows are owned by 43 percent of the farm households in Borgou and 17 percent of those in Atacora, but practically none of the farms in other departments. This difference reflects the impact of programs to introduce animal traction in the 1970s, combined with the problems of tsetse fly in central and southern Bénin. Pig production appears much more common in Atacora than elsewhere. As a result of these geographic differences, the value of agricultural assets is greatest in Borgou (920 thousand FCFA) and Atacora (370 thousand FCFA). In contrast, the average value ranges from 63 thousand to 126 thousand FCFA in the other four departments (see Tables 4.1.92 and 4.1.93).

In almost every category of agricultural asset, ownership is less common among female-headed households than among male-headed households. For example, animal traction (as determined by ownership of work cattle and a plow) is practiced by 9 percent of male-headed households but just 3-4 percent of female-headed households. This difference can be attributed to the fact that female-headed households are less common in the north where animal traction is used. However, even poultry and goat/sheep ownership is less common among female-headed households. The value of agricultural assets owned by male-headed households is 2.7 times larger than the vale of assets owned by female-headed households (see Tables 4.1.94 and 4.1.95).

In sharp contrast to household assets, agricultural assets are not closely correlated with per capita expenditure, although tractors, plows, and cattle appear to be somewhat more common in the two highest expenditure categories. The total value of agricultural assets is similar in the three lower categories (187-211 thousand FCFA), and substantially higher in the next two categories (over 330 thousand FCFA) (see Tables 4.1.96 and 4.1.97).

There is, however, a strong correlation between farm size and ownership of agricultural assets. For every category except tractors, poultry, and "other animals," the percentage of households owning each asset rises with farm size. Tractor ownership is so rare that the incidence cannot be well-measured unless the sample size is much larger. And poultry can be owned by even the smallest farmers. The value of agricultural assets rises sharply, from 65 thousand FCFA in the smallest farm-size category to 663 thousand FCFA in the largest (see Tables 4.1.98 and 4.1.99).

4.1.6 Agricultural production

In this section, we describe the patterns of agricultural production of farm households in Bénin based on the IFPRI-LARES Small Farmer Survey. Since the results are based only on the production of farm households, they may not reflect the patterns of overall production in Bénin, particularly for crops which are produced on plantations or by large-scale enterprises. Furthermore, since the results are based on interviews with a random sample of 899 farm households, the margin of error will be larger for:

- crops that are grown by only a small proportion of Bénin farmers,
- crops for which production is geographically concentrated in small areas, and
- crops whose volume is difficult to estimate for farmers.

The purpose of this section is not to generate estimates of national production; for this type of information, it would be preferable to rely on statistics from the Ministry of Rural Development. Rather, the purpose is to examine the patterns of agricultural production, storage, and marketing at the household level and relating these patterns to the characteristics of the household.

The survey confirms the importance of maize in the agricultural economy of Bénin. First, maize is the most widely grown crop, being produced by 89 percent of the farm households. By comparison, no other crop is grown by more than half the households. The second most widely grown crop is cowpeas, grown by 48 percent of farmers, followed by manioc, yams, cotton, and sorghum/millet, each of which is grown by 30-40 percent. At the other extreme, rice and sweet potatoes are produced by less than 10 percent of farm households in Bénin. These results imply that the average Bénin farmer grows about four of the 14 main crops (see Table 4.1.100).

Second, maize occupies about 37 percent of the area cultivated by farm households[12]. This is twice the area of the second crop, cotton, which accounts for about 18 percent of the total. Manioc, cowpeas, sorghum/millet, and groundnuts each represent 5-10 percent of the total area.

Third, maize is the most valuable crop, representing 27 percent of the total value of crop production. Cotton is second, contributing 22 percent, followed by manioc and yam. According to the survey results, the average value of crop production is 880 thousand FCFA (see Table 4.1.100).

Regional differences in production

Of course, these national average hide considerable regional variation in crop production. For example, cotton is grown by two-thirds of the farmers in Borgou and Zou, 37 percent in Atacora, 25 percent in Mono, and very few in Ouémé and Atlantique. Similarly, sorghum/millet and yams are grown by a large majority (at least 79 percent) of farmers in Borgou and Atacora, but only by small numbers of farmers in other departments. Cowpeas, rice, and groundnuts are also grown by a larger percentage of farmers in the north than in the south. In fact, manioc is the only crop grown more widely in the south than in the north. Maize, which used to be primarily a southern crop, has become widely grown in the north as well. At least three-quarters of the farm households in every department grow maize (see Table 4.1.101).

[12] This refers to the total sown area, summing the areas planted in the two agricultural seasons.

This discussion implies that farms in the north are more diversified than those in the south, in that each farm produces a wider range of crops. According to the IFPRI-LARES Small Farmer Survey, the average number of crops grown (among the 14 main crops) is 6-7 in Atacora and Borgou, 4.8 in Zou, and less than 4 in the three southern departments. In fact, farmers in Atlantique are the most specialized, growing an average of just 2.6 of the 14 crops.

The allocation of land among crops for each department confirms some of the patterns already mentioned. In Atacora and Borgou, the dominant crops in terms of area are cotton, sorghum/millet, yams, and maize. In Zou, they are maize and cotton, followed by cowpeas, groundnuts, and manioc. Even though maize is grown by the large majority of farmers in every department, it occupies a much larger share of cultivated land in the south. In the three southern departments, maize occupies over half the planted area, compared to less than one third in the center and north. Similarly, manioc occupies 10-19 percent of the area in the south, compared to just 4 percent in the north (see Table 4.1.102).

Gender differences in production

The cropping patterns of female-headed households do not differ markedly from those of male-headed households. Female-headed households are somewhat less likely to grow sorghum/millet, rice, and yams and more likely to grow cowpeas, cotton, and some types of vegetables. This is largely because female-headed households are less common in the north than in the center and south. The average number of crops grown is approximately equal, suggesting that female-headed households are neither more specialized nor more diversified than male-headed households (see Table 4.1.103).

The allocation of land among crops is also similar. In both types of household, maize accounts for 37 percent of the area and cotton around 20 percent. Manioc and some types of vegetables are more important on the farms of female-headed households, while sorghum/millet, yams, and "other crops" play a larger role in male-headed households. These differences largely reflect the greater concentration of female-headed households in the south (see Table 4.1.104).

Differences in production across expenditure groups

Cropping patterns are surprisingly stable across expenditure categories. Most of the crops, including maize, manioc, and cotton, are grown by similar percentage of rich and poor farm

households. The only clear patterns are found in sorghum/millet and yams, which are grown by a larger percentage of poor farms than richer farms (see Table 4.1.105).

The percentage allocation of land is also fairly similar across expenditure categories. Once again, the only crops showing a consistent pattern are sorghum/millet and yams, which account for a larger portion of the cultivated area of poor households. The share of land planted to these two crops falls from 15 percent in the poorest expenditure category to just 5 percent in the richest. One implication of this result is that agricultural research to improve yields and disease resistance in these two crops would have a greater impact on the poorest rural households than on relatively better-off ones. The percentage of land allocated to cotton is roughly constant across categories. This implies that the benefits of the cotton boom have been relatively well-distributed among income groups (see Table 4.1.106).

Differences in production across farm size groups

Although cropping patterns are similar across expenditure categories, they vary substantially across farm-size categories. The percentage of farms growing each crop rises with farm size. For example, only 7 percent of the smallest farms grow cotton compared to 70 percent of the largest. Similar trends are found for most of the major crops, the main exception being manioc. The average number of crops grown on a farm rises from less than 3 on the smallest farms to 6.5 on the largest (see Table 4.1.107).

The allocation of farm land among crops also changes as farm size increases. Three patterns can be identified.

- First, the proportion of land allocated to staple food crops such as maize, manioc, and yams declines. These three crops account for 59 percent of the area planted on the smallest 20 percent of farms, but this proportion falls to 41 percent on the largest 20 percent of farms. This is due to the fact that the consumption needs of the family are met on a smaller proportion of the total area of large farms.

- Second, although the trend is somewhat erratic, it appears that the share of land allocated to vegetables also declines with farm size. This is explained by the fact that vegetables are costly and labor-intensive to grow. On a large farm, these costs make it difficult to allocate more than a small portion of the total area to vegetables. In contrast, the high economic

returns per hectare and labor-intensivity make vegetables an attractive option for small farmers with the necessary skills and market access.

- Third, the share of land allocated to cotton and "other crops" rises from 9 percent in the smallest farm-size category to 32 percent in the largest. "Other crops" includes fruit trees, oilseeds, cashew, and a number of crops grown primarily for the market.

In summary, small farms allocate most of their land to staple foods with some vegetable production, while large farms devote an increasing share of the total area to cotton and other non-horticultural cash crops (see Table 4.1.108).

4.1.7 Agricultural marketing and storage

International experience indicates that rural development is associated with three trends: rising productivity in agricultural production, the movement of farmers from subsistence production to commercial production, and the rising share of non-farm income in rural areas. Thus, it is important to understand the patterns of agricultural marketing and the constraints that prevent farmers from becoming further integrated with the national and international economy. Although production data is available from official statistics, information on agricultural marketing patterns is generally only available from agricultural household surveys such as the IFPRI-LARES Small Farmer Survey.

This section describes three aspects of agricultural marketing in Bénin. First, it describes the patterns of crop sales and how marketed surplus varies by crop and across household types. Second, it examines the specifics of the sale of agricultural commodities, including the timing, the types of buyers, and the location of the transactions. Finally, it explores the perceptions of Bénin farmers regarding changes in agricultural marketing as a result of economic reforms over the past eight years.

Marketed surplus

As described elsewhere in this report, farmers in Bénin operate on a relatively small scale (3.3 hectares on average), with little mechanization (less than 10 percent use animal traction). Furthermore, the average per capita expenditure of farm households is 105 thousand CFA, equivalent to US$ 175. From this information, one might assume that the agricultural sector in

Bénin is characterized by semi-subsistence farmers, producing mainly for their own consumption and selling small amounts in good years when a surplus is generated. In fact, the evidence from the IFPRI-LARES Small Farmer Survey indicates that Bénin farmers are highly integrated into the market economy and that almost two-thirds of the value of crop production is marketed.

Percentage of households selling One measure of the extent of commercialization is to look at the proportion of growers that sell each crop. For most crops, at least two-thirds of the growers sell part of their harvest. This percentage is, of course, highest for cotton, which is sold by all farmers growing it. Tomatoes, groundnuts, and *piment* are sold by 90 percent of the farmers that grow them. The proportion is high even for basic food crops. Manioc is sold by three-quarters of the farmers that produce it, while maize and cowpeas are sold by two-thirds of those growing these crops. Among the main crops, only sorghum/millet is sold by less than half of the growers (see Table 4.1.109).

The percentage of *farm households* (as opposed to growers) that sell each crop is lower, of course. The most commonly marketed crop is maize, being sold by 57 percent of farm households in Bénin[13]. Cowpeas and cotton are sold by approximately one-third of the farm households, while groundnuts and manioc are sold by about one-quarter of them. The survey data indicate that the average Bénin farmers sells 2.8 of the 14 main crops (recall that Bénin farmers grow an average of 4.0 crops per farm) (see Table 4.1.109)

Percentage of output sold Another measure of commercial orientation is the marketed surplus ratio, defined as the amount sold as a proportion of the amount produced. The average market surplus ratio for a group of households can be calculated two ways:

- the *aggregate market share* calculated as 1) the total value of sales divided by the total value of output or 2) the average value of sales divided by the average value of production (in tables, we refer to this as 'Sales as % of production').
- the *average market share*, calculated as the average of the market surplus ratios for each household (in tables, we use 'Average % sold'). .

The aggregate market share gives greater weight to large producers and represents national or regional marketing patterns. The average market share describes the marketing patterns of a typical

[13] The proportion of households selling maize (0.57) cam be calculated as the proportion of households growing maize (0.87) multiplied by the proportion of maize growers that sell maize (0.66).

farm household and tends to be smaller. For example, in Bénin the average value of crop production is 880 thousand FCFA/farm, while the average value of sales is 570 thousand FCFA/farms. Thus, the aggregate market share is 65 percent. But if one calculates the market share for each household and takes the average, the result (the average market share) is 50 percent[14].

The share of total production that is sold (aggregate market share) is highest for cotton (100 percent), tomatoes (91 percent), and "other vegetables" (95 percent). At least two-thirds of the output of groundnuts, manioc, okra, *piment*, and "other crops" are sold. For maize, rice, and cowpeas, the proportion is 40-55 percent. The least marketed crops are sorghum/millet and yams, with sales accounting for just 11 percent of production (see Table 4.1.109).

It may seem surprising that close to 80 percent of the manioc output is sold, but it should be recalled that manioc yields 5-10 tons/ha and few households consume more than 1 ton/year. Thus, even a one-hectare plot of manioc will generate a large surplus. In addition, the market surplus ratio of large producers (who sell a large portion of their output) affects the average more than the ratio of small producers.

The market surplus ratio differs markedly across regions. Given that the main cash crop, cotton, is grown in the center and north, one might expect the market surplus share to be highest in those regions. In fact, the aggregate market share is highest in Atlantique (82 percent) and lowest in Atacora and Borgou (43 and 50 percent, respectively). This result can be explained as follows. In Atlantique, the two most important crops are manioc and maize, and over two-thirds of each crop are marketed. In addition, Atlantique has the highest marketed share for a number of crops: maize, cowpeas, groundnuts, manioc, *piment*, and "other crops". Presumably, this is due to the proximity of large urban markets and the relatively dense road network that reduces the transaction costs involved in marketing crops (see Table 4.1.110).

In Atacora, by contrast, the most important crops are yams and cotton. Although 100 percent of the cotton is marketed, just 11 percent of the yams are. In Borgou, cotton, yams, maize, and sorghum/millet dominate the value of crop production. Less than 10 percent of the yam and

[14] This analysis uses estimates of the value of agricultural production based on the prices observed for sales of the same commodity. Generally, department level average prices were used to impute the value of production, but in some cases it was necessary to use national average prices.

sorghum/millet output of Borgou is marketed and just 21 percent of the maize is.(see Table 4.1.110).

Mono, Ouémé, and Zou are in an intermediate position, with 63-71 percent of the value of crop production being marketed. Although the proportion of maize sold in these departments (30-48 percent) is less than in Atlantique, each of these three departments has important commercial crops that raise the average marketed share (manioc and "other vegetables" in Mono, manioc and tomatoes in Ouémé, and groundnuts and cotton in Zou) (see Table 4.1.110).

In terms of the average market share (the average percentage sold), Atlantique remains the most market oriented and Atacora the least. The average market share for Atacora is just 27 percent, implying that, on average, farm households sell barely one-quarter of their output. The large gap between the average market share and the aggregate market share is due to the influence of a relatively small number of cotton farmers in Atacora with high output and high market surplus ratios. In Borgou, where a larger proportion of farmers grow cotton[15], the two measures of market surplus are similar.

It is sometimes argued that female-headed households are less commercially oriented because cash crops are traditionally "male" crops. The IFPRI-LARES Small Farmer Survey data do not support this hypothesis for the case of Bénin. According to both measures of marketed surplus, female-headed households are at least as market oriented as male-headed households. This is partly due to the composition of crops grown by female-headed households, in which cotton plays a larger role, and partly due to the fact that female-headed households market a larger share of their maize production (see Table 4.1.111).

As expected, higher-income households market a larger share of their output. The share of crop production that is sold (the aggregate market surplus ratio) rises from 60 percent in the poorest expenditure category to 75 percent in the richest. The average market surplus ratio rises from 40 percent to 60 percent. The positive relationship is strengthened by a rising marketed surplus ratio for maize, but this is offset by the fact that cotton becomes less important in the crop mix of richer households. Thus, even the poorest households in rural Bénin sell a significant share of their output (see Table 4.1.112).

[15] According to the survey, the proportion of farmers growing cotton is 37 percent in Atacora and 68 percent in Borgou.

Surprisingly, the value of sales as a percentage of output (the aggregate market surplus) is more-or-less constant across farm-size categories. This is due to the influence of a number of small farms that produce high-value commodities, particularly vegetables, for the market. "Other vegetables" account for one third of the value of output in the smallest farm-size category, and these vegetables are produced almost exclusively for sale. The average proportion sold (the average market surplus), on the other hand, rises from 42 percent in the smallest farm-size category to 59 percent in the largest (see Table 4.1.113).

The difference in marketed surplus between cotton growers and other farmers is less than one might expect. The aggregate market surplus ratio is actually the same for these two groups, and the average market surplus ratio is only moderately higher for cotton growers (55 percent) than for other farmers (46 percent). Although cotton sales obviously contribute to the marketed surplus, this is partly offset by two factors. First, cotton growers sell a smaller proportion of their maize output than other farmers do (36 percent compared to 52 percent). Second, they also grow crops such as yams and sorghum/millet, only a small portion of which is sold (see Table 4.1.114).

Finally, it is useful to examine the distribution of farm households by the level of market surplus. Barely one-quarter (27 percent) of the farms in Bénin sell 30 percent or less of their harvest. At the other extreme, one farm in six (16 percent) sells more than 80 percent of its output. In biggest concentration of farms occurs in the middle: 39 percent of the farm households in Bénin sell 51-90 percent of their crop production. These results highlight the fact that the high aggregate market surplus ratio is not due to the influence of a small number of highly commercial farmers. Rather, over half of the farmers in Bénin sell the majority of their crop production (see Table 4.1.115).

Regression analysis of marketed surplus

This section uses regression analysis to examine the household characteristics that are associated with a strong market orientation, as measured by the share of crop production that is sold. The value of R^2 is 0.47, suggesting that close to one-half of the variation in marketed surplus is "explained" by the 34 independent variables included in Table 4.1.117. The analysis produced the following results:

- Larger households generate smaller marketed surpluses. This is expected, since larger households have greater consumption needs, reducing the portion of the total output that can be

sold on the market. Nonetheless, the effect is rather small: each additional household member is associated with a reduction in the market surplus ratio of 0.4 percentage points.

- Oddly, marketed surplus is positively associated with literacy but negatively associated with education. The coefficients imply that a head with three years of education who is literate will market more than an illiterate head with no education, but household heads with more than 10 years of education will have a smaller market surplus. Perhaps some basic education is necessary to take advantage of market opportunities, but highly educated household heads have better employment options outside agriculture and only produce for their household needs.

- Larger farms sell a larger percentage of their output, though the effect is modest. Each additional hectare in the main season raises the marketed surplus by 1.1 percentage points and each extra hectare in the second season increases marketed surplus by 2.5 percentage points.

- Growing cotton is associated with a larger marketed surplus. Given two otherwise identical farms in the same department, the one growing cotton will have a marketed surplus 16 percentage points higher than the one that is not. Membership in a *groupement villageois* (GV) is associated with another 5 percentage points in the marketed surplus ratio.

- Irrigation is associated with a 29 percentage point increase in the marketed surplus ratio. Irrigation increases production, allowing more to be sold, but it also allows the cultivation of crops such as vegetables and rice that are often commercialized.

- Finally, the departmental variables have a strong effect on the level of marketed surplus. Other factors equal, a farm in Atacora will have a market surplus ration 51 percentage points below that of those in Atlantique, while the corresponding figure for Borgou is 44 percentage points. Farms in Mono, Ouémé, and Zou also have significantly smaller market surplus rations, though the difference is somewhat less (22-35 percent). Since distance to road and sous-prefecture have already been controlled, these regional results suggest that access to major urban centers may be more important than access to a road or a provincial capital in terms of stimulating large market surpluses.

Some of the statistically insignificant results are also interesting. Poor households are no more subsistence-oriented that rich households, after controlling for farm size and other factors. Furthermore, female-headed households are just as market oriented as male-headed households.

Finally, proximity to an all-season road, a paved road, or to the sous-prefecture headquarters are not associated with higher market surplus ratios. As mentioned above, proximity to a large urban market seems to be more important than proximity to a good road.

Characteristics of sales transactions

Timing The IFPRI-LARES Small Farmer Survey collected information on each sales transaction carried out by the farmers in the sample. This allows us to estimate the distribution of marketed supply by month for each crop and each type of farmer. Since the marketing patterns vary from one year to the next, it should be kept in mind that the results presented refer to the year prior to the implementation of the survey (1998).

Maize sales take place throughout the year, but tend to be greater in the period March-June when 59 percent of the marketed surplus is sold. This corresponds to the three months before the main-season harvest. Thus, it appears that farmers are storing maize until just before the main harvest, perhaps to take advantage of higher prices or perhaps to ensure that their own consumption needs have been met first. A second period of maize sales occurs in December, when 12 percent of the annual volume is sold. This corresponds to the harvest of the second season in the south. (see Table 4.1.118).

Three-quarters of the sorghum/millet sales take place in the first six months of the year. In fact, around half of the sales occur in the second quarter (April-June). The monthly pattern of sales appears somewhat erratic because of the small number of farmers that sell sorghum/millet (see Table 4.1.118).

Cowpeas are sold throughout the year, but sales tend to be concentrated in the first four months of the year. Almost half (46 percent) of sales occur between January and April. August and December are also period of active commercialization of cowpeas (see Table 4.1.118).

One of the advantages of manioc is that the harvest can be delayed, allowing it to be “stored” in the ground until needed. Thus, manioc is useful for coping with the failure of other crops. The results of the IFPRI-LARES Small Farmer Survey suggest that in spite of this flexibility, the sales of manioc tend to be seasonally concentrated. Sixty percent of manioc sales take place in April and

May[16] (see Table 4.1.118).

The commercialization of yams, like that of sorghum/millet, is somewhat erratic due to the small volume marketed. Fifty-three percent of the total is marketed between December and March, , but sales in September are also significant.

Finally, cotton sales are also concentrated in the first few months of the year. Half of the total volume is sold in January and another 39 percent in February. The concentration of sales during a brief two month period puts a large burden on the transportation system. This is reflected in the fact that the sales of maize, cowpeas, and yams during these months are lower than before and after this period. In fact, 42 percent of the total volume of crop sales occur in January and February.

Types of buyers Traders are the dominant buyers of all the basic food crops. Sales to friends, family, cooperatives, or other organizations are negligible. Traders purchase 87 percent of the total marketed volume of sorghum/millet and more than 90 percent of the marketed surplus of maize, cowpeas, manioc, yams, and other crops. Cotton is a major exception to this pattern. Ninety-nine percent of the volume is sold through the official system, in which the *groupements villageois* market the cotton to SONAPRA on behalf of farmers. The farmers in the sample report that just 1 percent of sales are to traders. It should be noted, however, that sales to traders are illegal, so farmers may be under-reporting this type of sale.

Location of sales The place where the transaction occurs varied widely by crop. Over half of the sales of maize, sorghum/millet, and cowpeas take place at a market. In other words, the farmer brings the product to the market to find a buyer. The remainder is sold either on the farm (13-30 percent) or at the home of a friend or family member (17-22 percent).

In contrast, over three-quarters of the manioc and yams are sold on the farm. In other words, for these two crops, the usual pattern is for traders to come to the farm to make the purchase. This makes sense because the per kilogram value of these crops is lower than that of grains and legumes so the farmer faces a greater risk in bringing the product to market without knowing that current market conditions are.

Not surprisingly, most of the cotton (71 percent) is sold at the *groupement villageois*, with farmers taking responsibility for getting the harvested cotton to the GV buying station.

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[16] Although manioc sales transactions were dispersed over the period February-May, many of the larger manioc sales took place in April and May.

Changes in crop marketing

In this section, we discuss changes in the pattern of agricultural marketing since 1992 as reported by farm households. Respondents were asked to describe changes in the volume of crop sales, the type of buyers, the degree of competition among buyers, the volatility of prices, and the condition of roads.

Volume of crop sales Respondents were asked if the volume of crop sales of each crop had increased or decreased since 1992. Summing across crops, 40 percent of the responses were that sales had increased, while 26 percent were that sales had decreased. The remainder reported no change or that the question was not applicable. The trend toward increasing sales was most evident in the case of cotton, for which 65 percent of growers reported higher sales. Furthermore, more households report higher sales than lower sales for sorghum/millet, manioc, yams, and "other crops." On the other hand, in the case of maize and cowpeas, there did not appear to be any trend toward greater sales (see Table 4.1.119).

This trend toward increasing commercialization was not evenly distributed across households. Female-headed household were even split between those with increased sales and those with decreased sales. Furthermore, poor households were less likely to report increased crop sales since 1992, although in every expenditure category, the number reporting higher sales was greater than the number reporting lower sales.

Type of buyer With market liberalization, we might expect an increase in the participation of private traders over time. In order to test this hypothesis, respondents were asked whether the main type of buyer of each crop has changed since 1992. Eighty-five percent of the responses were that there has been no change in buyers. Another 12 percent reported that there are more sales to private traders now than there were in 1992. Reports of an increased role of private traders were most common for sorghum/millet (30 percent), yams (16 percent), and cowpeas (15 percent) (see Table 4.1.120). The fact that most households report no change in buyers confirms that private traders and markets were quite active in the early 1990s and that government policy to channel agricultural marketing through marketing boards was not very effective. At the same time, the fact that some households report an increased role of private traders suggests that the liberalization has had some impact, even in food markets.

Market competition One measure of the degree of competition is the number of traders

involved in buying crops in a given area. With a large number of buyers, it is more difficult for traders to collude in holding producer prices down. One of the strongest arguments for agricultural market liberalization is that increasing the degree of competition in crop marketing will improve the prices farmers receive for their output. In order to address this issue, the IFPRI-LARES Small Farmer Survey asked farmers whether they thought the number of crop buyers had increased or decreased since 1992. Over half (51 percent) of the respondents reported that the number of buyers had increased and just 8 percent reported a decrease; the remainder saw no change (30 percent), had no opinion (6 percent), or were not farming in 1992 (5 percent) (see Table 4.1.121).

The most positive responses were found among farmers in Atacora, Borgou, and Ouémé, where 73-86 percent of farmers reported an increase in the number of buyers. The only department where the response was not positive overall was Atlantique, where 89 percent reported no change (see Table 4.1.121) Since Atlantique is the most urbanized department, the number of traders may have been relatively high even in the early 1990s, so liberalization did not affect output markets greatly.

Both male- and female-headed household were relatively positive about changes in the number of buyers. Although the proportion reporting larger numbers of buyers was somewhat greater among male-headed households, 44 percent of female-headed households said that the number of buyers had increased and just 12 percent said it had decreased (see Table 4.1.122).

Nor is this improvement limited to richer households. In fact, poor households were much more likely to report increases in the number of crop buyers than richer households. For example, 62 percent of the households in the poorest expenditure quintile said the number of buyers had increased, but only 36 percent of households in the richest quintile said this (see Table 4.1.123). One possibible explanation is that many of the higher income households live in Atlantique which, as argued above, may have had a fairly active agricultural market even before the economic reforms of the 1990s.

Volatility of crop prices The majority of farm households either see no change in crop price volatility or do not have an opinion. On the other hand, among those who do perceive a change, more report that price volatility has declined (27 percent) than report an increase in volatility (10 percent). Perceived gains are strongest in Atacora and Borgou (see Table 4.1.124). This regional difference may be linked to the expansion of maize production in the north over the past ten years and/or satisfaction of cotton growers with the cotton price stabilization system.

Poor households are more likely to report a decline in crop price volatility than richer households (see Table 4.1.125). This is partly the result of the large number of poorer household in Atacora. In any case, this is a positive trend because poor households generally considered the most vulnerable to fluctuations in agricultural prices.

Availability of market information With the creation of the *Office National d'Appui a la Securité Alimentaire* (ONASA), the role of the government in food markets has been changed from direct intervention to maintaining strategic grain stocks and providing market information. The results of the survey indicate that there has been some improvement in the availability of market information. Thirty-seven percent of the households report an improvement, while just 8 percent report a deterioration. The responses are most positive in Atacora (where 86 percent report improvement), followed by Borgou, Ouémé, and Mono. Little or no net improvement is reported by households in Atlantique and Zou (see Table 4.1.126). In the case of Atlantique, the availability of information was probably fairly good even in 1992 as a result of the density of economic activity and proximity of the major urban centers.

Road conditions This is the one area investigated in which farm households generally perceive a deterioration. Almost 40 percent of the respondents say that road have deteriorated since 1992, while barely 31 percent say that roads have improved. Household were positive in Atacora and Mono, but negative in Atlantique, Borgou, and Zou (see Table 4.1.127). It is interesting to note that satisfaction with the changes in road conditions appears to decline as expenditure rises. The households in the poorest expenditure categories are fairly positive, while those in the highest two expenditure categories are distinctively negative (see Table 4.1.128).

Crop storage

Since agricultural production occurs at specific times during the year, but food consumption occurs throughout the year, storage is necessary to match supply and demand. The results of the IFPRI-LARES Small Farmer Survey indicate that much of the storage of agricultural commodities occurs on the farm. This section describes patterns in farm-level crop storage in Bénin.

Storage facilities Almost all (93 percent) farm households in Bénin have some form of storage facility. For this survey, we distinguish among three types of storage structures:

- The *grenier* or *cabane* is an independent structure made of wood and/or woven mats that is often temporary. This is the most common form of storage in Bénin, owned by 65 percent of the farms. They are particularly common in Atacora and Borgou, where the drier climate makes in-house storage unnecessary. These storage facilities are also found in 46-78 percent of the farms in other departments (see Table 4.1.129).

- A storeroom is defined as an independent structure that is permanent, often built from mud or mud bricks. Storerooms are owned by just 21 percent of the farms in Bénin, but 45-47 percent of those in the proportion being highest in Borgou and Zou. They appear to be associated with cotton production, perhaps due to the need for a secure place to store the valuable cotton harvest until it is marketed (see Table 4.1.129).

- The third type of storage is to use part of the household dwelling. About half the farm households use their dwelling to store agricultural commodities. The proportion is lowest in Atacora (20 percent) and Borgou (36 percent).

The average capacity is about 20 tons, but the average is strongly affected by a few large values. Over half the farms in Bénin have storage capacities of less than 3 tons. Storage capacity is largest in Zou and Borgou (see Table 4.1.129).

Female-headed households do not appear to be disadvantaged in terms of storage facilities. Although they are more likely to use their house for storage than male-headed households and the average capacity is smaller, 96 percent of female-headed households have some storage capacity and the median size is larger than that of male-headed households (see Table 4.1.130).

Storage facilities do not differ much between poor and rich farm households in terms of the type of storage or the median capacity. On the other hand, storage facilities do vary across farm-size categories. Larger farms are much more likely to have a grenier/cabane or a storeroom than small ones and their storage capacity is considerably larger (see Table 4.1.131).

Storage patterns Maize is the crop most commonly stored; 89 percent of farm households reporting storing maize. By comparison, less than 50 percent of the farms stored the other crops: sorghum/millet, small millet, rice, cowpeas, groundnuts, manioc, yams, and cotton. For the most part, these percentage simply reflect differences in the proportion of households growing each crop. Comparing the share of household growing each crop with the share storing it,

it is clear that virtually all growers store some part of the harvest in the case of maize, sorghum/millet, rice, and groundnuts. In the case of yams and cowpeas, at least 85 percent of the growers store some of the harvest (see Table 4.1.132).

The length of storage, defined as the time between the harvest and when the stored item runs out, is generally 6-9 months for all the main food crops and one month for cotton. Not surprisingly, large farms are able to store their harvest longer than small farms. For example, farms in the smallest farm-size category stored maize for an average of seven months, while those in the largest farm-size category stored it for ten months on average (see Table 4.1.133).

Bénin farmers report storage losses ranging from less than one percent for cotton to 14 percent for manioc. For most crops, storage losses ranges from 1 to 6 percent (see Table 4.1.134).

Most farmers (57 percent) cite insects as the main cause of storage losses, with rodents being cited by another 21 percent of the farmers. The cause of storage losses did not vary much by crop, department, or sex of head of household.

Motives for storage For each crop stored, households were asked the main reason for storing it: for later consumption, to sell at a higher price, to sell when the household needed cash, or other reasons. In almost two-thirds of the cases (65 percent), the motive was to consume commodity later in the year. The motives for storage varied by crop, however. Food crops were stored primarily for later consumption. The only two staples for which "selling at a higher price" was a significant secondary motive were maize and cowpeas (cited by 25 percent of the farmers). Cotton is stored for a month or so simply because it is not possible to sell it immediately after harvest (see Table 4.1.134).

There are also strong regional differences in the motive for storage. In Atlantique, 64 percent of the storage is to sell the crop later in the season when the price is higher. In contrast, “speculative storage” accounts for 29 percent of the total in Zou and less than 15 percent in the other departments. This pattern probably reflects the existence of large urban consumer markets in Atlantique, creating a demand for storage services in the region (see Table 4.1.135).

The motives for storage do not vary much between male- and female-headed households, nor across farm size categories. Income, however, makes a difference. Moving up through the expenditure categories, the proportion of crops stored for later consumption falls from 80 to 50

percent, while the proportion of crops being held to sell at a higher price rises from 9 to 36 percent (see Table 4.1.136). This is probably related to the fact that higher-income farm households can more easily tolerate the risk associated with speculating on seasonal price variations.

4.1.8 Expenditure

The most common, and perhaps the best measure, of the overall well-being of a household is per capita consumption expenditure. Consumption expenditure includes the following components:

- Food purchases: the amount spent on food for household consumption
- Home production: the value of goods produced by the household for its own consumption
- Non-food purchases: goods and services purchased for household consumption,
- Housing value: the rental value of the dwelling occupied by the household.

Food purchases are measured based on responses to a set of recall questions for 26 food categories. Home production is measured by quantity of food produced by the household for its own consumption, valued using the price of the same food items purchased in the same department. Non-food purchases are estimated based on recall questions for 27 non-food categories. And the rental value of housing is based on estimates by the respondent.

Overall expenditure patterns

According to the results of the IFPRI-LARES Small Farmer Survey, the average annual value of consumption expenditure among agricultural households in Bénin is 848 thousand FCFA per household or 105 thousand FCFA per capita. Food expenditures account for 53 percent of the total, half of which is purchased and half of which is produced by the farm households. Non-food expenditure (including the rental equivalent of housing) contributes the other half of total expenditure (see Table 4.1.137).

Both the level and the structure of expenditure vary from one department to another. Atacora and Mono have the lowest per capita expenditure, 85 and 88 thousand FCFA respectively. Atlantique has the highest level, with 139 thousand FCFA, followed by Ouémé. Zou and Borgou lie in between these two groups. The share of expenditure allocated to food ranges from 62-63 percent in Atacora and Borgou to 46-48 percent in Zou, Atlantique, and Ouémé. The contribution of home

production to total expenditure is highest in the two northern departments (42 and 46 percent) and lowest (12 and 16 percent) in Ouémé and Atlantique (see Table 4.1.137).

Female-headed households are often seen as disadvantaged relative to male-headed households. Indeed, other sections of this report reveal that female-headed households have fewer assets and smaller farms. Although the total expenditure of female-headed households is 31 percent below that of male-headed household, female-headed households also have fewer members. The net effect is that the per capita expenditure of female-headed households is just 6 percent below that of male-headed households. Furthermore, female-headed households spend a smaller share of their budget on food. As noted above, this is often associated with a higher standard of living. Finally, female-headed households rely less on home production than male-headed households. Just 19 percent of their expenditure derives from home production. This contradicts the usual view of female-headed farm households being mainly subsistence oriented (see Table 4.1.138).

Not surprisingly, the composition of expenditure changes as total expenditure rises. The poorest 20 percent of farm households in Bénin have an average per capita expenditure of just 48 thousand FCFA. Food accounts for fully 63 percent of the total and home production represents 37 percent. As expenditure rises, the share allocated to food falls steadily from 63 percent in the lowest expenditure category to 43 percent in the highest category. The inverse relationship between per capita expenditure and the food share is an almost universal pattern called Engle's Law. At the same time, the importance of home production declines from 37 percent in the poorest category to 17 percent in the richest. The falling importance of food produced at home is due to both the declining food share and a falling percentage of food that comes from own production. In the poorest expenditure category, households produce 59 percent of their food (in value terms), while in the highest expenditure category they produce less than 40 percent.

What is the relationship between farm size and expenditure patterns? Household expenditure rises steadily across farm-size categories, from 618 thousand FCFA in the smallest 20 percent of farms to double this figure among the largest 20 percent of farms. On the other hand, per capita expenditure does not vary significantly across farm-size categories. In other words, larger farms tend to have larger households, but larger farms are not associated with a higher standard of living. Given the similar levels of per capita expenditure, it is not surprising that the food share is relatively constant (52-54 percent) across farm-size categories. One notable difference is that home production plays a larger role in the budget of large farms than small ones. Home production contributes 13 percent of total expenditure for the smallest farms but 34 percent of the total in the

largest farms. This implies that home production supplies one-quarter of the food for the smallest farms but close to two-thirds of the food consumed by the largest farms (see Table 4.1.139).

Food expenditure

One measure of the importance of a food item is the average value of spending on the item. The results of the IFPRI-LARES Small Farmer Survey indicate that, in terms of value, maize is the most important food, accounting for 19 percent of the food budget of the average farm household. Maize is followed by fish and meat, each representing 7 percent of the food budget. It is interesting to note that the second and third largest items in the food budget are not basic staple foods. Yams, cassava, and sorghum/millet each represent 6-7 percent of the food budget, while rice, beans/cowpeas, tomatoes, cooking oil, and meals outside the home account for 4-5 percent (see Table 4.1.140).

Another measure of the importance of a food item is the proportion of households that consume it. The most widely consumed food items are maize (consumed by 97 percent of the households), condiments (97 percent), onions (96 percent), cooking oil (96 percent), fish (91 percent), tomatoes (91 percent), and beans/cowpeas (90 percent). Other foods consumed by at least two-thirds of the households include meat, rice, manioc flour, sugar, and yams. Less widely consumed are dairy and sorghum/millet, each of which is consumed by just 30-40 percent of farm households (see Table 4.1.140).

Food expenditure by source As mentioned above, food expenditure includes both cash purchases and home production (the value of food grown by the household for its own use). The proportion of food expenditure that is produced at home varies widely across commodities. Home production represents over three-quarters of the household supply of sorghum/millet, yams, cassava, and maize. On the other hand, home production accounts for less than one quarter of the supply of sugar, condiments, rice, fish, and onions. Cassava root is almost always obtained from home production, while cassava flour is usually purchased. Overall, home production accounts for half the value of food consumption, while the other half is purchased (see Table 4.1.141).

What proportion of household produce their own food and what proportion get it from the market? Almost all households produce some of their own food and purchase some food, but the percentages vary depending on the item. In the case of maize, 88 percent produce for their own consumption and 40 percent buy at least some maize over the course of the year. This implies that

a significant number of household (about 30 percent) supplement their own production with maize purchases. Few households purchase sorghum/millet (9 percent) or yams (34 percent). On the other hand, a large number of commodities are purchased by a majority of farm households: rice, beans/cowpeas, cassava flour, meat, fish, onions, and tomatoes. With the exception of some staple foods (maize, sorghum/millet, cassava, and yams), the proportion buying each food is generally greater than the proportion producing it for their own consumption (see Table 4.1.142).

The survey indicates that, of the 21 food items listed, farm households in Bénin produce an average of 6 of them for own consumption and buy an average of 12 of them. This suggests that the image of the semi-subsistence farmer who produces food for his family and sells some of the harvest to cover school fees and other non-food necessities is not accurate in the case of Bénin. The farm household economy is more complex, with the production of a relatively small number of food items for own use and reliance on the market for a large number of other foods (see Table 4.1.142).

Food expenditure by department The composition of food expenditure varies across departments, reflecting differences in income and agro-climatic zone. In Atacora and Borgou, sorghum/millet, yams, and maize are the most important food items in the budget. These three commodities alone account for 42 percent of the food budget in Atacora and 50 percent in Borgou. Although maize is important in the diets in every department, sorghum/millet and yams are specific to the north where they are produced. For example, sorghum/millet represents 15-18 percent of the food budget in the two northern departments but less than 3 percent elsewhere. Yams follow a similar pattern. Compared to the center and south, the share of the northern food budget allocated to staples (including grains, legumes, and root crops) is high: 55 percent in Atacora and 58 percent in Borgou. These departments also devote a larger share of the budget to meals outside the home, probably due to the market for agricultural labor generated by cotton production. At the same time, they allocate a smaller share of their food budget to beans/cowpeas, cassava, and fish than do households in other departments, reflecting production patterns. Food consumption patterns in Borgou are also notable for the small expenditures on alcoholic beverages (see Table 4.1.143).

In Atlantique, the most important elements in the food budget are meat, condiments, and maize. The diet is relatively diversified, with the top three food items representing just 30 percent of the total. Furthermore, just 34 percent of the food budget allocated to staples, less than in the other departments. Households in Atlantique allocate a larger share of their food budget to beans/cowpeas and to alcoholic beverages than elsewhere. The diversification, the importance of

meat, and the small share allocated to staples all reflect the relatively high income of households in Atlantique.

In Mono, maize, fish, and tomatoes are the largest items in the food budget. Maize alone accounts for one-third of the food budget, the highest figure among the six departments. Spending on the non-maize staples is less in Mono than in any other department. Fish expenditure is more important in Mono than in any other department except for Ouémé (see Table 4.1.143).

In Ouémé, the most important items in the food budget are fish, maize, rice, and cassava flour. Ouémé leads the other departments in its spending on fish and cassava flour. Cooking oil also appears more prominently in the food budgets of households in Ouémé.

The diets of households in Zou represent a mix between northern and southern patterns. The importance of yam and sorghum/millet is less than in Atacora and Borgou but more than in the southern departments. Zou is also notable for its relatively high consumption of cassava products (include roots and flour) and relatively low consumption of vegetables (see Table 4.1.143).

Food expenditure by expenditure category How does the composition of the food budget change as per capita expenditure rises? For some foods, the share of the food budget declines. This is particularly true to staple foods such as maize, sorghum/millet, and yams. For example, the food share of maize is falls from 24 percent in the lowest expenditure category to 12 percent in the highest expenditure category. The share allocated to yams and sorghum/millet declines by more than half across expenditure categories (see Table 4.1.144).

The proportion of the food budget allocated to high-value commodities rises with expenditure. For example, the share allocated to rice, tomatoes, meat, fish, dairy, and beverages rises across expenditure categories. These patterns reflect an international pattern in food consumption: as income rises, diets become more diversified, with households moving away from staples toward "luxury" foods that have a higher cost per calorie (see Table 4.1.144).

Non-food expenditure

The average value of non-food purchases among farm households in Bénin is 343 thousand FCFA per household or 42 thousand FCFA per capita. Social events, such as weddings and funerals, and "leisure and other" are the two largest categories, each accounting for 18 percent of

non-food spending. These are followed by clothing (16 percent), health (11 percent), and transportation (11 percent) (see Table 4.1.145).

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Non-food spending patterns vary somewhat across departments, but the differences are not large. Households in Atacora spend a larger proportion of their non-food budget on social events and "leisure and other" than do other departments. Those in Atlantique allocate a larger share to housing, transportation, and health. Households in Borgou devote more of the non-food budget to clothing and household goods. The departments of Mono, Ouémé, and Zou have non-food budgets that closely resemble the national average with one exception: households in Mono spend one quarter of their non-food budget on social events, more than any other department. Nonetheless, it should be kept in mind that large and infrequent budget items such as social events and housing repair, are subject to larger measurement errors than small frequent purchases (see Table 4.1.146).

The structure of non-food spending does not differ much between male- and female-headed households. Female-headed households appear to spend a somewhat larger share of the non-food budget to clothing, housing, and household goods. On the other hand, male-headed households allocate a larger share to "leisure and other" (see Table 4.1.147).

The composition of non-food spending does vary significantly across expenditure categories. The share of the non-food budget devoted to clothing, household goods, and energy fall with per capita expenditure. For example, clothing accounts for 25 percent of non-food spending among households in the poorest category, but the percentage falls to just 11 percent in the highest expenditure category. Other types of non-food spending become more important as expenditure rises: housing, transportation, and "leisure and other." For example, spending on housing (repairs and maintenance) rise from just 1 percent of non-food spending among the poorest households to 13 percent among those in the highest category (see Table 4.1.148).

Regression analysis of expenditure

This section uses regression analysis to examine the relationship between various household characteristics and its standard of living, as measured by per capita consumption expenditure. The result is an equation that "predicts" per capita expenditure on the basis of these household characteristics[17]. This type of analysis sheds light on some of the causes of poverty and

[17] Regression analysis finds the equation that best fits the data, given one dependant and various independent (or explanatory) variables. The analysis generates coefficients for each independent variable that

identifies the variables that are most closely associated with poverty. This may help policymakers focus efforts on addressing the root causes of poverty. In addition, this analysis can provide a method of targeting assistance on the poor, based on easily observable characteristics of the households. In some countries, government assistance is provided to households identified as poor based on variables known to be related to poverty, such as education, ownership of certain assets, and housing characteristics.

Table 4.1.149 shows the results of the regression analysis. The value of R^2 is 0.39, indicating that the regression equation "explains" 39 percent of the variation in per capita expenditure. This value is not unusually low for this type of analysis, but it does remind us that there is a lot of variation in per capita expenditure that cannot be capture by the variables included here.

The regression analysis includes 39 independent variables, of which 15 are statistically significant at the 5 percent level[18]. The results can be summarized as follows:

- Larger households are poorer households, other things being equal. Each additional household member is associated with a 4 percent reduction in per capita consumption expenditure[19]. This is a common pattern in household expenditure data and is thought to reflect the difficulties in supporting a large household.

- A household with a large proportion of children under the age of 15 is more likely to be poor. This is expected, since children do not contribute as much to household income as an adult does.

- The education of the head of household is positively associated with the per capita expenditure of the household. Each additional year is associated with a 3 percent increase in per capita expenditure. This implies that even among farm households, education contributes to the productivity and/or the employment opportunities. The effect of the education of the spouse is positive but statistically insignificant.

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describe the relationship between that variable and the dependent variable, holding all other variables constant.

[18] Statistical significance at the 5 percent level implies that there is only a 5 percent probability that the relationship found in the data could occur by chance.

[19] If the coefficient is B, then a one unit increase in the independent variable increases per capita expenditure by a factor of exp(B).

- Larger farms are associated with higher per capita expenditure. Each additional hectare planted in the main season is associated with a 3 percent increase in per capita expenditure, and each additional hectare planted in the second season has a similar effect.

- Having some *bas-fond* land is related to a 26 percent increase in per capita expenditure, holding other variables constant. This relatively large effect shows the value to the household of being able to grow vegetables and other water-intensive crops.

- Having a wall made of brick, rather than mud-brick or mud, is associated with higher per capita expenditure. Although clearly not a causal factor, the type of wall is a good indicator of the standard of living of the households.

- Households that own a table, radio, and/or a motorbike are likely to have higher per capita expenditures that those that do not. Each item is associated with a 9-11 percent increase in the expected per capita expenditure of the household.

- Finally, expenditure levels vary across departments, after holding education, farm size, and other variables constant. Per capita expenditure in Atacora, Borgou, Ouémé, Mono, and Zou are lower than that in Atlantique, with a 5 percent level of statistical significance. Although these regional variables capture differences in soils, rainfall, infrastructure, and ethnicity, the most likely explanation for this result is that households in Atlantique have better access to agricultural markets and employment opportunities in the urban centers of Cotonou and Port Novo.

A number of other variables were unexpectedly not associated with higher standards of living. For example, cotton growers are neither poorer nor richer than other farmers, after controlling for other variables (such as farm size and household size). Similarly, housing characteristics such as a cement or tile floor, a metal roof, and electrification are not useful predictors of household well-being.

Incidence of poverty for different types of households

This section examines the incidence of poverty in different types of households. In order make the results compatible with the *Enquête sur les Conditions de Vie Rurales* (ECVR), we adopt the "global poverty line" used in calculating the incidence of poverty in the ECVR. In order to

make the results from the IFPRI-LARES Small Farmer Survey compatible with those of the ECVR, we have made three adjustments.

- First, the poverty line of the ECVR is adjusted upward to reflect the increase in the cost of living between the two surveys[20].
- Second, we deduct the rental equivalent from our estimate of household expenditure because rental equivalent was not included in the ECVR measure of expenditure.
- Third, we calculate expenditure per adult equivalent following the practice used by the ECVR. Adult males are counted as 1.0 adult equivalent, adult females as 0.8, and children under 15 as 0.5.

Two measures of poverty are calculated: the incidence of poverty and the poverty gap. The incidence of poverty is simply the percentage of households that fall below the poverty line. The poverty gap takes into account both the incidence of poverty and the average income of the poor[21].

Applying the ECVR poverty rate to the data from the IFPRI-LARES Small Farmer Survey, we estimate that the incidence of poverty among farm households was 21 percent in 1998. The poverty gap measure is 4%, implying that the average poor households has per capita expenditures 20 percent below the poverty line[22] (see Table 4.1.150).

By comparison, the ECVR estimated that the rural poverty rate was 33 percent in 1994-95. The two surveys cover similar but not identical populations (farm households vs. rural households) and there are other differences in methodology, so it would be unwise to place too much confidence in the comparison. But even if we cannot say that rural poverty has declined by one third, this result strongly suggests that rural poverty has declined noticeably since 1994-95. This is supported by the fact that the food share in our survey is lower than in the ECVR (53 percent compared to 69 percent).

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[20] The price level during the ECVR was taken to be the consumer price index (base December 1991) for August 1994, the mid-point of the ECVR data collection. The price level for the IFPRI-LARES Small Farmer Survey was assumed to be the price index for June 1998, the mid-point of the reference period for the survey. Thus, the ECVR poverty line of 56,500 FCFA/adult equivalent was increased by a factor of (200.2/142.9) = 1.40, yielding a 1998 poverty line of 79,155 FCFA/adult equivalent.

[21] More specifically, the poverty gap is the incidence of poverty multiplied by the average gap between the poverty line and the average expenditure of the poor expressed as a percentage of the poverty line (see Foster, Greer, and Thorbecke, 1984).

[22] P1 = P0 x the average poverty gap (see footnote 20), so if P0=0.21 and P1=0.04, the average gap is 0.2 or 20 percent.

This would not be surprising in light of increases in cotton production. As discussed in Chapter 2, increases in cotton prices and cotton output have resulted in an additional 63 thousand FCFA of gross cotton revenue per farm household in Benin. crease in gross revenue from cotton of 63 thousand FCFA per farm household in Bénin.

The level of poverty in different household groups can be summarized as follows:

- The incidence of poverty is highest in Atacora (42 percent) and lowest in Atlantique (6 percent) and Zou (16 percent). This is what we would expect given the patterns in average per capita expenditure discussed earlier. The poverty gap measure shows roughly the same order.

- Male- and female-headed households have the same incidence of poverty (21 percent). On the other hand, the poverty gap for male-headed households is larger, suggesting that the depth of poverty among poor male-headed households is greater.

- The poverty rate is higher among households with many members compared to those with few members. In fact, the incidence of poverty is twice as great among households with more than 10 members compared to households with 5 or fewer members.

- Larger farms are associated with lower levels of poverty. Although the smallest farms do not fit well in the pattern, across the next four farm size categories, the incidence of poverty falls steadily from 30 percent to 11 percent. The poverty gap falls in a similar fashion.

- Similarly, poverty is lower among farm households that sell a larger share of their output. The poverty rate is around 30 percent for those selling less than half of their crop output (in value terms) and just 12 percent for those selling more than three-quarters of the total.

- Finally, the poverty rate among cotton farmers is essentially the same as that of other farmers in Bénin. Given the large increases in cotton production and the increases in the real price of cotton, it is quite possible that cotton farmers were poorer than other farmers a decade ago, but have now achieved parity.

It should be recognized that the ECVR poverty line is relatively low. If we adopt the World Bank's international poverty line of US$ 1 per person per day, then almost all the

farm households in Benin (95 percent) would be classified as poor. Thus, the poverty rate among rural households appears to be declining, but these households remain quite poor.

4.1.9 Household assets and housing characteristics

Household assets

Household assets are defined as goods that last more than a year or two and that directly contribute to the well-being of the household. Thus, this definition includes furniture, bicycles, radios, and electrical appliances, but excludes farm equipment which only contributes to well-being indirectly and consumables such as soap and fuel. Ownership of household assets is a reflection of income over recent years, as well as being a measure of the household's ability to cope with future changes in income. Families with many assets have the option of selling them if their income falls temporarily. Finally, ownership of household assets provides an intuitive picture of the household's standard of living.

According to the IFPRI-LARES Small Farm Survey, a majority of farm households in Bénin own each of the following assets: chairs, tables, beds, bicycles, and radio/CD players. On the other hand, for each of these items, 33-42 percent of the households do not own one. Motorbikes are owned by 26 percent and sewing machines and televisions/video cassette recorders (VCRs) by just 5-6 percent of the households. Barely 1 percent of Bénin farm households own a car or truck (see Table 4.1.151).

The average value of household assets is 226 thousand FCFA. Motorbikes are the largest component, accounting for more than one third of the total (see Table 4.1.152).

Looking at the pattern of asset ownership across departments, Zou has the highest frequency of many assets, including chairs, radio/CD players, bicycles, and vehicles. Atlantique and Ouémé are leaders in ownership of some other items. Atacora appears to the have the lowest frequency of ownership for various assets, including tables, beds, and television/VCRs, while Mono has the fewest of other items. The value of these household assets is highest in Zou (422 thousand FCFA) and lowest in Mono (94 thousand FCFA) and Atacora (120 thousand FCFA) (see Tables 4.1.153 and 4.1.154).

Female-headed households appear to have fewer household assets than male-headed households, though the differences appear in only some types of assets. For example, there is little difference in furniture ownership between the two groups, but female-headed households are less likely to own a radio/CD player, a television/VCR, a bicycle, or a motorbike. The total value of household assets is 231 thousand FCFA for male-headed households compared to 128 thousand FCFA for female-headed ones (see Tables 4.1.155 and 4.1.156).

Ownership of household assets is strongly correlated with per capita consumption expenditure. Of the 14 categories of assets, 10 show a positive relationship between the percentage of households owning and the expenditure category. The exceptions are "other furniture", sewing machines, bicycles, and "other assets". Sewing machines are productive assets for some households, thus explaining the fact that poor households are no less likely to own one. Bicycles are probably an inferior good at higher income levels, since motorbikes become more widespread among richer households. The overall value of household assets rises from 92 thousand FCFA in the poorest expenditure category to 471 thousand FCFA in the highest (see Tables 4.1.157 and 4.1.158).

Respondents were asked how the asset was acquired by the household. For most of the asset types, at least 85 percent of the households reported that the head of household purchased the item. Inheritance, gifts, home production, and purchases by the wife are small compared to purchases by the husband. One exception is heater/ovens, which are purchased by the wife in 58 percent of the households (see Table 4.1.159).

Housing characteristics

Housing is one of the most important assets owned by small-scale farmers in Bénin. The size and characteristics of the house are also key elements of the standard of living of the household. For these reasons, the IFPRI-LARES Small Farmer Survey collected information on the characteristics and estimated value of household dwellings.

The houses occupied by farmers in Bénin can be summarized as follows:

- More than three-quarters of the dwellings in rural Bénin (79 percent) have mud brick or dried mud walls. The remaining houses are divided evenly among three other types of walls: brick or stone, cement, and bamboo or straw.

- With regard to the floors, the houses are even divided between those with dirt floors (49 percent) and those with tile or cement floors (48 percent). Houses with brick, stone, or wood floors are quite rare.
- Close of three-quarters of the houses (72 percent) have sheet-metal rooves. Practically all the remaining houses have roofs made of straw.
- Fully 86 percent of the dwellings are owned by the farm household. Most of the other houses (12 percent) and very few (2 percent) are rented.

The housing characteristics do vary, however, by region. For example, houses in Mono and Ouémé are more diverse in terms of wall materials. Houses with brick or stone walls are more common in Ouémé than elsewhere, while houses with cement walls are more common in Mono. Somewhat surprisingly, these two departments also have higher proportions of houses with bamboo or straw walls. Cement or tile floors account for two-thirds of the houses in Ouémé and Atlantique, compared to about half nationwide. And metal rooves are most common in Zou, Atlantique, and Mono. These results indicate that, in general, houses in the south are more often constructed of more durable materials compared to those in the north (see Table 4.1.160).

In terms of ownership patters, Ouémé and Mono are unusual in having a relatively high proportion of houses that are used without payment (26 and 17 percent, respectively). House rental is also higher in these departments than elsewhere, although even here it is rare (4-5 percent). In the other departments, 88-99 percent of the dwellings are owned by the farm households (see Table 4.1.160).

There are also some differences between the dwellings of male- and female-headed households. Female-headed households tend to have lower quality walls (mud brick/mud) compared to male-headed households, but also tend to have higher quality floors (cement/tile) and higher quality roofs (metal sheet) relative to male-headed households. These patterns seem to reflect the geographic distribution of female-headed households, rather than housing preferences of men and women. Female-headed households are also less likely to own the house and more likely to use it without payment (see Table 4.1.161).

Not surprisingly, the materials used in housing are also correlated with per capita expenditure. As expenditure rises, the share of houses with mud brick or dried mud walls falls while that of houses with brick or stone rises. Even among the richest 20 percent of farm households, however, mud brick and dried mud walls are found in three-quarters of the houses. Floors are a better indicator of per capita expenditure. The incidence of dirt floors falls from 65 percent in the

poorest expenditure category to just 36 percent in the richest category. Conversely, cement and tile floors rise in importance in the higher expenditure categories. The material used in roofs also shifts as expenditure rises, with sheet metal becoming more common and straw becoming less so. Ownership status does not vary across expenditure categories (see Table 4.1.162).

The main source of water varies widely from one household to another. The most common sources are covered public wells (30 percent), purchased water (18 percent), open private well (17 percent), and river or lake (17 percent). Private water sources (including tap water, purchased water, and private wells) are most common in Ouémé and Mono. They account for over two-thirds of the households in these two departments compared to less than one-third in the other departments. The use of river or lake water is most common in Atacora, reflecting the low level of infrastructure in this department (see Table 4.1.163).

With regard to the main source of lighting, the only regional difference appears to be the high proportion of houses with electricity in Ouémé (14 percent). In the other departments, oil and kerosene lamps are used in 95-100 percent of the houses (see Table 4.1.163).

The sources of water reported by male- and female-headed households are quite similar. Similarly, there are only small differences in the main source of lighting between these two groups of households (see Table 4.1.164).

The main source of water is only weakly related to expenditure. As per capita expenditure rises, the use of purchased water and river/lake water declines, while the use of covered public wells rises. Other water sources, however, show little or no pattern. Even among the richest 20 percent of farmers in Bénin, most households rely on public water sources. The use of electricity rises with expenditure, as expected, but even in the highest expenditure category, just 7 percent of the households have electricity (see Table 4.1.165).

4.1.10 Sources of information

One of the most important ways the government can assist small farmers is by generating new agricultural technology through research and by disseminating the technology through an effective extension service. It is important to recognize, however, that farmers obtain information about

agricultural production and marketing from a variety of sources. This section describes the sources of information used by farmers in Bénin, as revealed by the IFPRI-LARES Small Farmer Survey.

Access to extension services

As part of the Structural Adjustment Program (PAS), the government of Bénin has been reducing the size of the extension service while improving the service provided by agents. One consequence of this program is that some areas have no agents assigned to it.

The IFPRI-LARES Small Farmer Survey reveals that few farmers have any contact with an extension agent during a given year. Just 19 percent of the farmers interviewed had had contact with an extension agent in the 12 months prior to the survey. Part of the reason is the fact that some areas have no agent. Twenty-nine percent of the farmers reported that no agent was assigned to the area where they live. In addition, more than half the farmers in areas that do have an agent had no contact with the agent in the previous year (see Table 4.1.166).

There are some regional differences in extension services. The percentage of farmers saying that an agent serves the area was highest in Atacora and Borgou. Farmers in Atlantique were the least likely to report contact with an extension agent (11 percent) and the least likely to get input assistance from one. Agents in Atacora rarely provide information on credit and marketing, while those in Ouémé and Borgou often do (see Table 4.1.166).

The survey results indicate that extension agents are no more likely to visit rich farmers than poor. In fact, there appears to be a tendency for middle-income farmers to report the most extension contact. The types of assistance provided by extension agents did not vary noticeably across expenditure categories (see Table 4.1.167).

Nor are extension agents any more likely to visit large farms than small. Agents do, however, offer different types of assistance. Small farms were more likely to get assistance in obtaining credit, while large farms were more likely to receive information on markets and crop prices (see Table 4.1.168).

On the other hand, there is a tendency for extension agents to visit male-headed households rather than female-headed households. Only 5 percent of female-headed households had contact with an agent, compared to 19 percent among male-headed households. Among those visited, female-

headed household were more likely to get assistance on input use and crop marketing than male-headed households (see Table 169).

Main source of information on different topics

In addition to questions about extension services, respondents were asked to identify their main source of information on various agricultural topics.

Seed When asked about their sources of information on seeds and different varieties, 40 percent cited friends and family and just 25 percent cited the extension service. It should be recalled, however, that these friends and family may have been originally informed by an extension agent. Cooperatives and GVs are more important in Atacora, Borgou, and Zou, but only in Borgou are they the most frequently cited source of information on seed. Traders are a negligible source of information on seed except in Mono, where they are cited by 30 percent of the households. This may be related to the high proportion of farmers growing vegetables in Mono (see Table 4.1.170).

Female-headed households rely on friends and family for information on seeds to a much greater extent than male-headed households. This is probably linked to the fact that female-headed households have little contact with extension agents (see Table 4.1.171).

Fertilizer and pest control When asked about sources of information on fertilizer use, the extension services and GVs are mentioned by 61 percent of the households. Again, GVs are the most important source of information in Atacora, Borgou, and Zou, while the extension service is the main source in Atlantique and Ouémé. Traders are a significant source of information on fertilizer only in Mono (see Table 4.1.172). Once again, female-headed households rely more on friends and family and less on the extension service than do male-headed households.

Regarding sources of information on pests and weed control, the responses were similar to those concerning fertilizer (see Table 4.1.173).

Crop production methods When asked about sources of information on crop production methods, the most common response was, somewhat surprisingly, friends and family. Thirty-eight percent of the households cited friends and family as the main source of information, compared to 29 percent mentioning the extension service and 16 percent GVs. As above, GVs are only important in the main cotton growing departments: Atacora, Borgou, and Zou (see Table 4.1.174).

Agricultural markets Friends and family were also the main source of information on crop prices and markets. In fact, friends and family were cited by almost half the households (48 percent). Traders are cited by 36 percent of the households and the extension services by just 5 percent. In some countries, radio reports are an important source of information on markets and prices, but only 4 percent of the Bénin farmers cite the radio as the most important source of marketing information (see Table 4.1.175).

Policy Finally, information about agricultural policies comes from a variety of sources, primarily the extension service, friends and family, and GVs. In Atacora, Borgou, and Zou, the GVs are cited most often, whereas in the other departments the extension service and friends and family are cited more often. Ten percent of the households report getting information on government policies from the radio (see Table 4.1.176).

4.1.11 Perceived changes in well-being

Perceived changes in well-being

In order to summarize the overall trend in rural living conditions, the IFPRI-LARES Small Farmer Survey asked respondents if their household was in better or worse economic condition compared to 1992. The results represent a clear vote of approval of economic changes over the past eight years: slightly more than half the households (52 percent) reported improved economic conditions and less than 28 percent reported poorer conditions. The remainder saw no change or had no opinion. The most positive responses were from Atacora and Borgou, where over two-thirds reported improvements and less than 15 percent said that their lives had gotten worse. The responses were generally positive, though to a lesser degree, in Mono, Ouémé, and Zou. Atlantique was the only department to produce a negative assessment, with 45 percent complaining of falling standard of living and 34 percent reporting improvements (see Table 4.1.177).

Male-headed household report improved economic conditions, but female-headed households were more likely to say conditions had deteriorated (see Table 4.1.178). In the regression analysis presented below, we show that after controlling for other factors (particularly location of residence), the gender of the head of household is not a statistically significant factor in the perceived changes in well-being. In particular, Atlantique has a high proportion of female-headed households.

Households in every expenditure category were, on average, positive about the changes in their economic situation since 1992. The strongest positive responses, however, were obtained from the poorest three household categories and the least positive response from the richest expenditure category. For example, 50-59 percent of the households in the lower three expenditure categories said their economic conditions had improved, compared to just 44 percent among households in the highest expenditure category (see Table 4.1.179).

Reasons for perceived changes in well-being

In order to assess the reasons for these views, respondents who reported a change in their economic condition were asked to identify the main factor causing this change. The main reasons cited by those seeing an improvement in their economic condition were increases in crop prices (27 percent), changes in the price or availability of food (25 percent), and increases in off-farm income (20 percent) (see Table 4.1.180).

The reasons cited by those who experienced deterioration in their economic condition were problems of household health (21 percent), poor weather (20 percent), and declining soil fertility (15 percent). It is worth noting that the three most important reasons given for improved economic conditions are factors that are probably linked to the economic reform program. On the other hand, the reasons given for declining economic conditions are random factors generally unconnected with economic policy. Thus, these results indicate that the evaluation of economic reforms by rural households is more positive than would be indicated by their perceived change in household well-being.

Regression analysis of perceived changes in well-being

We use regression analysis to explore the factors associated with the perceived change in household well-being. Because the dependent variable is a qualitative variable representing "better", "same", and "worse", an ordered probit analysis is used[23]. A positive coefficient means

[23] An ordered probit regression analysis is used when the dependent variable takes three or more values and represents a discrete variable with a natural ordering. Unlike linear regression, the dependent variable is discrete, such as the responses to a multiple-choice question, rather than continuous, such as income. Unlike a standard probit, the dependent variable takes more than two values. And unlike a multinominal logit, the dependent variable has a natural order.

that higher values of the independent variable is associated with more positive assessment of changes in household well-being.

- Households with a lower per capita expenditure were more likely to see improvements in household welfare since 1992. Since cotton growing and location are already controlled, this means that even among cotton growers (and non-cotton growers) and even within each department, poor households are more likely to report improved conditions than non-poor households.

- Households that have had contact with an extension agent and those that own a television also appear to be more likely to see improved economic conditions for their household. These variables may reflect greater awareness of the economic reforms and how the reforms might have influenced their own households. In addition, contact with an extension agent may contribute to positive attitudes toward the government and its attempts to improve rural living conditions.

- Households living far from the sous-prefecture center are less likely to report improvements in household well-being. The size of this effect is quite small, however: if a farm is located 120 km from the center (the maximum in the sample) rather than 18 km (the mean), the probability of seeing improved well-being falls by less than 2 percentage points.

- Finally, residents in Atacora and Borgou were significantly more likely to report improved economic conditions. For example, living in Atacora increases the probability of reporting improved welfare by 33 percentage points. This result may suggest that the cotton revenue has boosted general economic conditions in these departments, leading both cotton growers and non-cotton growers to see gains.

It is somewhat surprising that cotton growers are no more likely to report improved living well-being than non-cotton growers. It should be noted, however, that the statistical significance is only slightly below the 5 percent threshold usually considered acceptable. Furthermore, alternative regression models indicate that the cotton variable is highly significant when the departmental variables are excluded. In other words, either growing cotton or living in a cotton-growing department is associated with reports of improved well-being, but within each department cotton growers give similar responses to non-cotton growers.

An important result of this analysis is that large farms, commercially-oriented farms[24], and male-headed farms were no more likely to report improved household well-being than small, subsistence-oriented, and female-headed farms. For example, even among households selling very little of their output (less than 25 percent), over half report improved well-being since 1992. At least in the case of Bénin, it does not appear to be true that market liberalization favors those farmers that are already oriented toward production for the market.

4.2: Results of the Bénin Community Survey

4.2.1 Introduction

In order to complement the information obtained from the IFPRI-LARES Small Farmer Survey, the project also carried out a Community Survey, covering 98 rural communities in the Republic of Bénin. The questionnaire contained seven pages divided into six sections:

- Transportation infrastructure
- Agricultural markets
- Activities of *groupements villageois* and *groupements feminins*
- Credit for agriculture
- Extension services
- Agricultural production

Each section contained questions designed to briefly describe the current situation, as well as questions to explore changes that have occurred in the village since the initiation of the economic reforms. We have adopted 1992 as the reference year "before" the reforms.

The villages included in the sample are the same villages selected for the IFPRI-LARES Small Farmer Survey. The sample is a one-stage stratified random sample. In each department, a certain number of villages were selected randomly from a list of villages prepared for the *Prerecensement Agricole*. The number of villages selected in each department was proportional to the volume of agricultural production, subject to a lower limit of 10 villages per department. The respondent in each village was the village leader.

[24] The market surplus variable is not significant at the 5 percent level, adopted in for this study, but it is significant at the 10 percent level. On the other hand, the coefficient is quite small. A 10 percentage point increase in marketed surplus would result in a 1 percentage point increase in the probability of reporting improved welfare.

The questionnaire was developed by IFPRI in mid-1999. It was then field-tested and revised extensively in collaboration with LARES in October 1999. Data collection was carried out from November 1999 to February 2000, under the supervision of LARES.

Because of the relatively small number of observations, we do not provide results at the department level. Instead, some of the results are presented for three regions: North, Center, and South. The North is defined as the departments of Atacora and Borgou; the Center includes Zou; and the South covers Atlantique, Ouémé, and Mono.

4.2.2 Transportation infrastructure

For the purposes of this report, transportation infrastructure is defined as the length and quality of the road network and the number and availability of various means of transportation. The quality of the transportation infrastructure affects the markets for all commodities but it is particularly important in agricultural markets for two reasons. First, agricultural commodities have a low value/bulk ratio, implying that the cost of transporting these goods is a relatively large proportion of the final consumer price. For example, the cost of transportation accounts for a much smaller portion of the price of soap, radios, or cloth than of maize or manioc. Second, seasonal variation in agricultural production creates an additional burden on transportation infrastructure during the harvest period. In Bénin, the cotton harvest reduces the availability of vehicles for other agricultural commodities.

Road network

Village leaders were asked about the length of different types of roads within their villages. The results indicate that the average village has 29 kilometers of roads, but most of this consists of *pistes*, unmaintained narrow dirt roads that are little more than paths. Just 6 kilometers (21 percent) of the total are all-season roads and just 1 kilometer is paved. The length of the roads is greatest in the north and least in the south, although these figures do not take into account the geographic size of the village. Villages tend to be larger in the more sparsely populated north. Dry-season and pistes become impassable an average of three months of the year (see Table 4.2.1).

Respondents were also asked to assess the changes in road quantity and quality in their villages since 1992. A large majority (85 percent) reported that there had been no change in the length of

road network, although those citing an increase (12 percent) exceeded those reporting a decrease (2 percent). Improvements were reported in the North and the South, but none of the 18 village leaders in the Center reported improvement (see Table 4.2.2).

With regard to changes in road quality, the results are even less positive. Forty-five percent of the villages report a deterioration in road quality, compared to just 27 percent reporting improvements. Complaints about declining road quality were most common in the North and the South (see Table 4.2.3).

Transportation equipment

The vehicles used for agricultural transportation in rural villages of Bénin include large numbers of bicycles (102 per village on average) and motorbikes (23), and perhaps one car and one pick-up truck. The figures were quite similar in the North and South, but the Center differs in having fewer bicycles and fewer motorbikes, but more cars and push-carts (see Table 4.2.4).

The IFPRI-LARES Community Survey reveals that the number of vehicles used for agricultural transport has increased in the vast majority of villages since 1992. A large majority of village leaders (over 80 percent) report increases in the number of bicycles and motorbikes. Furthermore, the percentage reporting greater numbers of cars, pickup trucks, and other forms of transportation is 17-25 percent, compared to very small numbers of villages reporting smaller numbers (see Table 4.2.5). These increases could be linked to economic reforms in a number of ways: the liberalization of imports which made bicycles and motorbikes more available, the increase in agricultural trade as a result of marketing reforms, and/or greater acceptance of the legitimacy of private-sector investment and marketing activities.

4.2.3 Agricultural markets

This section examines the proximity of rural villages to different types of agricultural markets, the facilities of those markets, the number of traders, and access to input credit, as well as changes in these variables over time.

Current patterns

On average, rural villages are 6 kilometers from an assembly market, 15 kilometers from a wholesale market, and 48 kilometers from a consumption market. The distances are greatest in the North and least in the South, particularly for wholesale and consumer markets (see Table 4.2.6). The lower density of agricultural markets in the North both reflects and contributes to the lower degree of market orientation among farmers in the North. Another factor is that cotton, grown mainly in the North and Center, is marketed through the *groupement villageois,* whereas almost all the marketed output in the south passes through a market place.

Most villages have 20 or more assemblers and a similar number of retailers, but just a handful (2 top 7) of wholesalers. Input traders, brokers, and storage traders are rare, with an average of just one or two in each village. The number of traders operating in rural villages tends to be smaller in the North, again reflecting the lower level of agricultural marketing in this region (see Table 4.2.6).

Retailers, assemblers, and wholesalers operate 6-9 months of the year, with little variation across regions. The figures for other types of traders are erratic, due to the small number of these traders in each village (see Table 4.2.6).

Most assembly markets (63 percent) are located in the same commune as the village. Wholesale markets are often (49 percent) in the same *sous-prefecture*, but not in the same commune. In contrast, most of the consumption markets are in the same department but not in the same *sous-prefecture* (see Table 4.2.7). Most of these markets are periodic, meaning they are only active or they are more active at regular intervals. The most common pattern is for the markets to have a frequency of four or five days, although a few are daily and others are weekly (see Table 4.2.8).

Changes in markets

Village leaders were asked to evaluate the change in volume traded at these markets since 1992. The results strongly suggest that the volume of commodities traded at rural markets in Bénin has increased over the last eight years. Over three-quarters of the respondents report an increase in the quantities passing through assembly, wholesale, and consumer markets, and less than 10 percent cite a decrease in trading activity (see Table 4.2.9). This further supports the hypothesis made earlier that the economic reforms have stimulated the growth of agricultural marketing, implying a corresponding increase in the market-orientation of farm households in Bénin. The type of

questions posed by the IFPRI-LARES Community Survey do not allow us to quantify this increase, but it is notable that such a large share of villages report increased market activity.

The survey provides additional evidence of increased marketing activity. A majority (51-77 percent) of the respondents reported that the number of warehouses has increased in all three types of markets. Very few reported reductions. Furthermore, a number of villages report increasing numbers of stores (13-64 percent), while none report a shrinking number. The access to water in agricultural markets, an important factor in the sanitary condition of the commodities sold, has also improved, particularly in the consumption markets. One areas where little or no improvement is observed by the village leaders is in the number of telephones (see Table 4.2.10).

Finally, according to the village leaders interviewed, the number of assemblers, wholesalers, and retailers has increased since 1992. For example, 41 percent cite an increase in the number of wholesalers compared to just 10 percent reporting a decrease (see Table 4.2.11). This is a positive trend for two reasons. First, it confirms expanding agricultural trade in the rural areas of Bénin and suggests that farmers and traders may have responded to market reforms. Second, an increase in the number of traders is generally associated with a greater degree of competition in agricultural markets. It is more difficult for traders to collude to fix prices when there are many of them.

Examining the perceived change in wholesalers and retailers for each of the three regions, it is clear that the increase in the number of traders is not limited to one or two regions. In all three regions, the number of villages seeing an increase in traders exceeds the number seeing a decrease.

Input credit

The proportion of farmers getting input credits varies markedly across regions. Over 97 percent of the villages in the North and 88 percent of those in the Center report that farmers can purchase inputs on credit. The dominant source of input credit in these regions is the *groupements villageois* (GVs). By contrast, less than one third of the villages in the south say that their farmers can purchase inputs on credit. The source of the input credit also differs: in the South, the main source of credit is CARDER (see Table 4.2.12).

The village leaders were also asked to estimate the proportion of farmers that are able to purchase inputs on credit in their villages. In half the villages in the North, “all” farmers are said to get input

credit, while another third of the northern villages report that "most" farmers get input credit. In contrast, two-thirds of the villages in the South say that "none" of their farmers get inputs on credit.

4.2.4 Activities of *groupements villageois* and *groupements feminins*

The *groupements villageois* (GVs) play an critical role in agricultural marketing in Bénin, distributing inputs on credit to cotton farmers and acting as an agent of Sonapra in the collection of cotton. The *groupements feminins* (GFs) play a different and less well-documented role in agricultural marketing. The purpose of this section is to describe the activities of these two types of farmer organizations and explore some of the changes in them since 1992[25].

Groupements villageois

As is well-known, GVs are much more common in the cotton-growing areas of the North and Center of Bénin. According to the IFPRI-LARES Community Survey, 91 percent of the villages in the North have at least one GV and 79 percent of those in the Center do. By contrast, only 39 percent of the villages in the South have a GV. Among villages in the South that do have GVs, the incidence of multiple GVs is higher than in the North and Center (see Table 4.2.13).

This geographic split is also found in the activities carried out by the GVs. In the North and Center, the vast majority of GVs (85-90 percent) are involved in cotton marketing and the distribution of fertilizer, seed, and pesticide/herbicides. In the South, however, GVs are primarily involved in the marketing of maize and other food crops, with only a quarter of them participating in input distribution. Few GVs anywhere are involved in marketing cash crops other than cotton or in agricultural processing (see Table 4.2.14).

Most of the GVs involved in marketing maize and other food crops handle less than half the quantity marketed within the village. In contrast, GVs are usually able to dominate cotton marketing because of Sonapra's legal monopoly on cotton marketing (see Table 4.2.15).

Examining maize marketing activities by region reveals that northern GVs are more successful in handling a large proportion of the maize marketed by the village. In contrast, 80 percent of the GVs in the South market less than half the maize sold within the village (see Table 4.2.16).

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[25] As part of the same project, IFPRI and LARES also carried out a survey of GVs, the results of which are available in a separate report.

With regard to cotton marketing, almost all the villages in the North and Center report that the GVs handle all of the cotton marketing in the village. In the South, however, 60 percent of the villages say that the GVs does not really monopolize cotton marketing. Some of this may refer to legal sales of cotton directly to Sonapra or a cotton gin, while others may refer to illegal sales of cotton to traders (see Table 4.2.17).

In villages with a GV, the GVs tend to dominate the delivery of fertilizer, seed, and pesticides in the village. Village leaders report that "all" the inputs purchased in the village are delivered by the GV (see Table 4.2.18).

When asked about changes in the volume of crops marketed by GVs and changes in the quantity of inputs distributed by GVs, a large majority of villages reported increased quantities. Over 80 percent of the village leaders said that the quantities of maize, other food, and cotton had increased since 1992. Similarly, over 80 percent reported that the distribution of fertilizer, seed, and pesticides/herbicides had increased (see Table 4.2.19 and 4.2.20). These results mirror aggregate data that show impressive growth in cotton production and fertilizer use.

Groupements feminins

The *groupements feminins* (GFs) are less widespread than GVs, although at least one GF can be found in about three-quarters of the villages in each region. The number of GFs per village does not seem to vary much from one region to another, unlike that of GVs (see Table 4.2.21).

The GFs are involved in marketing tubers and cassava flour (in 38 percent of the villages), rice (11 percent), vegetable oil (42 percent), and other crops (73 percent). Unlike the GVs, very few GFs are active in the distribution of inputs. Also unlike the GVs, a large proportion (66 percent) of GFs carry out some form of agricultural processing. The marketing of tubers and cassava flour is particularly common among GFs in the South, as is agricultural processing (see Table 4.2.22).

Unlike GVs, which dominate cotton marketing and input distribution, the GFs play a smaller role in the agricultural markets of the village. For example, the GFs handle half or less of the villages marketed surplus of each of the commodities listed above (see Table 4.2.23).

According to village leaders, however, the GFs are playing a larger role in agricultural marketing than they did in 1992. For each of the main commodities marketed by the GFs, over two-thirds of the village leaders report an increase in the volume handled by GFs.

4.2.5 Credit

As part of the IFPRI-LARES Community Survey, village leaders were asked a few questions about the access to credit in their villages. Only a small percentage of rural villages in Bénin have an office of any of the formal financial institutions. In spite of the growth in the number of branches of the CLCAM, only 7 percent of the villages in our sample had a CLCAM branch. A similar percentage had an office of an NGO involved in the provision of credit (see Table 4.2.24).

When asked about the availability of credit from each type of lender, most village (64-100 percent) reported that there had been no change in the availability of credit since 1992. Of the remainder, most said that credit availability had improved. This was particularly in reference to CLCAM and NGOs (see Table 4.2.25).

When asked about changes in the overall availability of credit, the responses were more positive. Forty-four percent of the village leaders reported improved access to credit, whereas just 10 percent reported a deterioration. The biggest improvement was in the North, where almost two-thirds of the village leaders responded that access to credit had improved (see Table 4.2.26).

It is not clear how overall credit availability could improve so much given that availability from each source showed only mild improvement. One possibility is that the cumulative effect of small improvements from many sources was a strong impression of overall improvement. Another possibility is that the overall availability of credit was understood to include input credit provided by Sonapra through the GVs. This latter explanation is consistent with the finding that overall access to credit improved the most in the North.

4.2.6 Extension services

As part of the agricultural reform program, the extension service of CARDER has been restructured. This has meant a reduction in the number of extension agents and a reorganization of their assignments. The IFPRI-LARES Community Survey provides an opportunity to see how these changes are perceived in rural areas.

Village leaders were asked to identify the number of different types of extension agents that operate in their villages. Each village has, on average, 0.8 extension agents from CARDER, 0.3 from an NGO project, and a small number of private extension agents. The number of all three types of agents is somewhat higher in the North (see Table 4.2.27). These results reinforce the findings from the IFPRI-LARES Small Farmer Survey that farmers in Bénin have relatively little contact with extension agents. In that survey, barely 20 percent of the farmers had had contact with an extension agent over the 12 months prior to the interview.

The Community Survey indicates that the number of CARDER extension agents has fallen in more than one-third (35 percent) of the villages and has increased in just 4 percent of them. In the remaining 61 percent of the villages, the number of CARDER agents has not changed. Furthermore, it does appear that the number of extension agents hired by NGOs and private companies has increased to compensate for the loss of CARDER agents (see Table 4.2.28).

If we examine the change in the total number of extension agents by region, it is clear that the reduced staffing at CARDER is a national, not a regional, trend. In each of the three regions, many more village report a decline in the number of agents than report an increase. The most negative responses were from the Center, where none of the village leaders perceived an increase in agents and close to half (47 percent) reported a decrease. The only positive aspect of these results is that in each region 50-60 percent report that there has been no change in the number of extension agents serving the village.

4.2.7 Agricultural production and marketing

The last section of the IFPRI-LARES Community Survey focused on the area planted to major crops, crop yields, the net position (deficit or surplus) in each crop, and the production trends[26]. The results in this section should be treated with some caution because they are based on the views of the village leader. In some cases, these leaders have access to official production figures and their estimates may be quite reliable. In other cases, they may be little more than educated guesses. For example, 10 percent of the village leader were not able (or were not willing) to provide

[26] The Community Survey also collected village-level estimates of the area allocated to each crop. These results are not presented for two reasons. First, about 10 percent of the village leaders were not able to provide any information, and some of the information provided the other village leaders seems questionable. Second, more reliable information on area allocation is available from national statistics, making these results less useful.

estimates of the area planted to major crops in the village. Nonetheless, the results give an indication of the general patterns of agricultural production and marketing in rural villages of Bénin.

Production patterns

The area allocated to crops varies considerably from one region to another. In the North, the most important crops are cotton, sorghum/millet, yams, and maize. It should be noted that the share of the total allocated to cotton is certainly overestimated. Results from the IFPRI-LARES Small Farm Survey suggest that cotton area accounts for 39 percent of the cultivated area in Borgou and 13 percent in Atacora. In the Center, the main crops in terms of area are cotton and maize, while in the South maize and manioc are the dominant crops. It is also worth noting that the total area cultivated per village is largest in the North and smallest in the South (see Table 4.2.29).

The percentage of villages producing each crop illustrates the same regional distribution of crop production. Although maize and beans are grown in almost all villages across the three regions, most of the other crops show regional differences. Rice, sorghum/millet, yams, and cotton are grown in a majority of villages in the North, but in very few of the villages in the South. In contrast, manioc and tomatoes are produced in a larger share of villages in the South. Groundnut production appears more widespread in the Center than in either the North or South (see Table 4.2.30).

Crop yields, as estimated by village leaders, also vary by region. The national average of maize yield[27] is estimated at 1.09 tons/ha, very close to national maize yields estimated by CARDER. Maize yields tend to be higher in the North, where cotton farmers are able to purchase fertilizer on credit and "divert" some of it to maize plots. This pattern also mirrors official production statistics. Manioc yields are estimated at 8.9 tons/ha, close to the figure estimated by CARDER. Village leaders estimate yam yields to be 17 tons/ha on average, though this figure is considerably higher than estimates from CARDER (about 10 tons/ha). The average of the cotton-yield estimates is 0.95 tons/ha, perhaps 10-20 percent below official estimates (see Table 4.2.31).

[27] This is calculated as the simple average of the village-level estimates.

Marketing patterns

Village leaders were asked about the balance between village production and consumption of various commodities. The responses were classified as follows:

- Deficit: consumption exceeds production
- Self-sufficient: production is just sufficient to meet local demand
- Surplus: production exceeds consumption
- Not applicable: the village neither produces nor consumes the commodity.

For most commodities, the number of deficit villages exceeds the number of surplus villages. This is particularly the case for rice, beans, and yams, for which a majority of village report being in deficit. This does not necessarily mean that the country is in deficit for these commodities. A common pattern in agricultural marketing is for surpluses to be large in a few zones and for deficits to be small in a large number of consuming zones. For maize, the numbers of deficit and surplus villages are approximately equal. Manioc is the only commodity for which the number of surplus villages exceeds the number of deficit villages (see Table 4.2.32).

These results can also be presented at the regional level (see Table 4.2.33). The results can be summarized as follows:

- In the case of maize, almost half the villages in the North have deficits, while in the south the number of villages with surpluses exceeds the number with deficits.

- In rice, only a few villages in the North have surpluses, but most villages in every region are either deficit regions or they do not consume rice. This pattern reflects the fact that Bénin is a net importer of rice.

- Sorghum/millet surpluses are most common in the north, while villages in the south either have deficits or do not consume this commodity at all.

- In beans, most villages in all three regions have deficits, but less than 15 percent have surpluses. This pattern suggest the presence of cross-border imports of beans.

- In the case of manioc, most of the villages in the South and almost half of those in the Center have surpluses, while most of those in the North have deficits.

- Yams follows the reverse pattern. A large minority (41 percent) of the villages in the North have surpluses, while almost all those in the South (92 percent) have deficits.

It is important not to conclude from this summary that each commodity flows either north or south. Even in the production regions of each crop, there are significant numbers of villages in deficit. In the North, for example, 63 percent of the villages have rice deficits, 26 percent have sorghum/millet deficits, and 16 percent have yam deficits. Similarly, although manioc production is centered in the South, 15 percent of the villages there have deficits in this crop. These results highlight the complexity of the marketing channels that match surpluses in one area with deficits in another.

Production trends

Village leaders were asked whether the output of each crop had increased or decreased since 1992. For almost every commodity, the number of village reporting increased output exceeds the number reporting decreased output. The only exception was sorghum/millet, for which roughly equal numbers of villages reported increases and decreases. The commodities with the largest number of villages reporting higher output are maize and manioc. Close to two-thirds of the villages in Bénin reported that output of these two crops had increased since 1992 (see Table 4.2.34).

Looking at the regional patterns, it is clear that village leaders in the North are much more likely to report increased output than those in the Center and South. At least three-quarters of the villages in the North report expanded output of cotton, maize, and yams. Over half of them report higher production of rice, sorghum/millet, beans, and groundnuts. In contrast, there are only two commodities for which a majority of villages in the Center report production growth: cotton and maize. Similarly, in the South only two commodities are reported to have expanded in more than half the villages: maize and manioc (see Table 4.2.35).

4.3: Results of the Bénin Survey of *Groupements Villageois*

4.3.1 Introduction

Cotton production has increased dramatically in the past ten years. Between 1990 and 1997, cotton output rose from 146 thousand tons to 386 thousand tons. This represents an increase of 164 percent, or almost 15 percent per year. The use of agricultural inputs has increased at a similar rate. For example, fertilizer use has grown from 22.7 thousand tons in 1990 to 85 thousand tons in 1998, an annual growth rate of 16 percent.

This growth has been stimulated by the vertically integrated cotton marketing system and by policy reforms. The vertically integrated marketing system provides fertilizer, cotton seed, and other inputs to farmers on credit and manages the collection, ginning, and export of the cotton. The Societé Nationale de Promotion Agricole (SONAPRA) organizes the importation of fertilizer and other inputs through private importers. Cotton seed and agricultural inputs are provided to organizations of growers known as *groupements villageois* (GV) for distribution to farmers. At harvest, the GV organizes the assembly of the seed cotton and its sale to SONAPRA, deducting the cost of inputs from the payments to farmers. The cotton is ginned either by SONAPRA or by privately-owned gins and then exported. Recent reforms include the privatization of input importation, the emergence of a private cotton ginning sector, and the 1994 devaluation which doubled the local currency value of export earnings.

In spite of the impressive growth of the cotton sector, significant problems remain and additional reforms are being debated. In particular, a number of concerns have been raised about the cotton system:

- The number of GVs has increased rapidly in recent years, leading to considerable variation in the financial and administrative capacity of the GVs.

- The quality of inputs and the delivery of adequate quantities of inputs has been a problem on occasion.

- Some GVs have experienced problems recovering input credit from members, but it is not known how widespread this problem is.

- Although inputs are imported by private companies, SONAPRA sets the prices and manages the distribution of inputs to the GVs. Some have argued that this system could be made more competitive, resulting in lower input costs to farmers.

- SONAPRA fixes cotton prices and is the only legal buyer of cotton. Some efforts are underway to make this system more competitive while maintaining the ability of the system to provide inputs on credit and maintain repayment rates.

- Some reforms being contemplated would give greater responsibility to the GVs for selecting input suppliers, arranging cotton sales, and managing input credit. But the ability of the GVs to undertake these responsibilities is not known.

The objective of the IFPRI-LARES Survey of *Groupements Villageois* is to better understand the activities, capacity, and problems of these organizations. Specifically, the survey attempts to address the following questions:

- What are the basic characteristics of the GVs in terms of the year of establishment, membership, and activities?

- What is the management capacity of the GVs, as indicated by the education and experience of the GV secretaries and other managing officers?

- What is the physical capacity of the GVs in terms of the types of equipment and infrastructure they have?

- What is the range of commercial activities that the GVs carry out, including both input delivery, crop marketing, and provision of credit?

- What is the financial capacity of the GVs, as indicated by their revenues, expenditures, and debts?

- What are the perceptions of GV management regarding the problems they face and what steps are they taking to address these problems?

4.3.2 Survey methods

At the time of the survey, there were 2023 *groupements villageois* (GVs) marketing cotton. A list of these GVs was obtained from of the Societé Nationale de Promotion Agricole (SONAPRA). The number of GVs to be selected from each department was proportional to the cotton production in each department. Within each department, GVs were selected randomly from the list. In all, 189 GVs were interviewed.

The questionnaire was designed by IFPRI researchers in collaboration with LARES survey specialists. It consisted of 12 pages of questions covering the following topics: basic characteristics, management, assets, commercial activities (including input procurement and crop marketing), budget, and perception and problems.

The data collection for the survey was carried out according to the following schedule:

May 1999	Questionnaire design
June 1999	Training of enumerators and field testing
July-September 1999	Data collection

4.3.3 Basic characteristics

Virtually all the GVs in the sample (99 percent) have been formed since 1970 (see Table 4.3.1). More than one quarter of them were created between 1970 and 1974, as part of the new socialist policy of organizing agricultural production in cooperatives. Most of these GVs were the department of Borgou. GV formation was slower in the following decades, but it accelerated again in 1990-94, when roughly another quarter of the GVs were established. This second period of expansion reflects the expansion in cotton area that took place during this time. Many of these newer GVs were created in Zou and other departments outside the traditional cotton zone. This explains the fact that GVs in Zou have been in existence less than 9 years on average, compared to an average of over 20 years in Borgou (see Table 4.3.2).

Almost two-thirds of the GVs were reported to have been created in response to the initiative of the members. In the other cases, the initiative came from CARDER. This pattern did not vary significantly from one department to another (see Table 4.3.3).

All or almost all the GVs in the sample supply fertilizer, pesticides, cotton seed, and equipment to their members and handle the marketing of cotton. Roughly half of them also sell herbicides and other types of seed. These patterns are discussed further in section 6.

The membership of the GVs ranges from less than 100 to more than 500, but the average is 352 members. GVs tend to be larger in Borgou and Atacora and smaller in the other departments. Almost all the GVs have expanded since they were initially established (see Table 4.3.4). About 60 percent of the GVs had less than 100 members at the time they were formed (see Table 4.3.5 and Table 4.3.6).

GV officials were asked about the requirements for joining the GV. The most commonly cited requirements were paying dues (98 percent), growing cotton (73 percent), and being a resident of the village (61 percent). Concerning the circumstances that would lead to removing a member from the GV, unpaid debts was cited by three-quarters of the GVs. Less than one third of the GVs said that a member could be removed if they no longer grew cotton or if they moved out of the village. About 72 percent of the GVs said there were "other" circumstances under which a member could be removed, presumably including theft and other illegal activities (see Tables 4.3.7 and 4.3.8).

4.3.4 Human capital

Characteristics of GV staff

The typical GV has a president, a secretary, and a treasurer, but no permanent employee. The survey asked for the number of each type of employee that the GV had over the previous year. Three-quarters of the GVs had one of each of the officers, but the other quarter reported more than one. In most cases, this probably refers to a change of officers during the year. In a few cases, however, the number of presidents was three or more, suggesting some instability in GV management. The cases of multiple officers during the year were most common among GVs in Zou. Permanent employees are rare, being found in just 15 percent of GVs. In Atacora, however, nine out of the 17 GVs had permanent employees and the average number (including the zeros) was five (see Table 4.3.9).

The education of the GV officials is a measure (though not a perfect one) of the administrative capacity of the GV. The vast majority of GV secretaries (88 percent) have CM2 certificates, but less than a third of the treasurers do and barely a tenth of the presidents. Overall, 43 percent of the

officers have CM2 certificates. This percentage is highest in Zou, where a relatively large share of GV presidents and treasurers have certificates, and lowest in Mono/Ouémé (see Table 4.3.10).

Characteristics of GV secretaries

Given the importance of the secretary in the daily management of the GV, the survey asked additional information about the characteristics of the secretary. All but one of the 189 GV secretaries were male. The average secretary is 33 years old, speaks three languages, has been a member of the GV for nine years, and has been secretary for four years. Almost all the secretaries (97 percent) were residents of the village before becoming a member. These patterns are quite similar across departments (see Table 4.3.11).

The first language of the secretary is generally the same as the dominant language where the GV is located. This is the case for 94 percent of the GVs in the survey, but just 82 percent in Atacora (see Table 4.3.12).

GV secretaries tend to be more educated and somewhat better off than adults in rural areas. As noted above 88 percent of the secretaries have at least a CM2 certificate. In contrast, the average head of household in rural villages has just 2-3 years of education, according to the IFPRI-LARES 1998 Small Farmer Survey. In addition, GV secretaries are probably somewhat better off than the average rural farmer, judging by the percentage that own different types of assets. For example, 58 percent of GV secretaries own a motorbike compared to just 26 percent of all rural households. Similarly, 11 percent of GV secretaries own a television, compared to 5 percent among rural households. GV secretaries are also more likely to own a vehicle (4 percent) and a radio (79 percent) than other rural households (see Table 4.3.13).

The position of GV secretary is generally not a full-time occupation. Around 85 percent of the secretaries have other activities. Almost all of these secretaries (95 percent) report that this other activity is farming. The only exception to this pattern was in Mono/Ouémé, where less than half the GV secretaries are involved in other activities (see Table 4.3.11).

When asked about the method of selecting the secretary, over three-quarters of the GVs reported that he was elected. In most of the other cases, the position was “imposed” on the secretary by members of the GV.

4.3.5 Assets

In general, the only physical assets owned by *groupements villageois* are scales and storage facilities(see Table v14). A large majority of GVs (84 percent) own scales. Every GV interviewed in Borgou had a scale and at least three-quarters had a scale in Atacora and Zou. In fact, GVs in Borgou and Atacora often owned more than one scale. In contrast, just 3 of the 20 GVs interviewed in Ouémé and Mono had scales.

Seventy-nine percent of the GVs own storage facilities. Again, the proportion is highest in Borgou (88 percent) and lowest in the south (65 percent). Total storage capacity ranges from 0 to 3000 tons, but about half of the GVs have capacities less than 100 tons (see Tables 4.3.15 and 4.3.16). Given that the 85 percent of the GVs market more than 100 tons, it is clear that most GVs do not have storage capacity equivalent to one years output. Given the staggered harvest, however, it is not necessary to store the entire harvest at one time.

Ownership of other types of equipment was much less common. Just 7 percent of the GVs owned light transport equipment, such as carts, and 3 percent owned processing equipment. Only one of the 189 GVs interviewed had any form of motorized transportation equipment and none had telephones (see Table 4.3.17).

4.3.6 Commercial activities of the GV

This section describes the commercial activities of the *groupements villageois*. Three types of activities are discussed: the distribution of agricultural inputs, the marketing of crops, and the provision of credit to members.

Distribution of inputs

Every GV in the sample supplied fertilizer and pesticides to their members, and virtually every GV provided cotton seed. The distribution of herbicides and other seeds was less common. Somewhat more than half (57 percent) supplied other seeds, this pattern being much more common in Borgou and Atacora than in the southern departments. Slightly less than one half of the GVs (47 percent) provided herbicide to their members. Again, this was more common in Borgou and Atacora (see Table 4.3.18).

Suppliers The GV representatives were asked to name the most important supplier of each type of input. The GVs obtain fertilizer from more than a dozen different suppliers, the most important of which are SONAPRA (30 percent of the GVs) and NACSON (14 percent). Pesticides are also purchased from a wide range of suppliers. In contrast, SONAPRA is cited as the most important source of herbicides by more than three-quarters of the GVs and as the source of cotton seed by 95 percent of them. The USPPs are cited as the most important source of processing equipment for 62 percent of the GVs (see Table 4.3.19).

The level of satisfaction is relatively high (at least 80 percent) for suppliers of fertilizer, herbicides, cotton seed, and other inputs. On the other hand, just half of the GVs reported being satisfied with their pesticide supplier (see Table 4.3.20).

About 10 percent of the GVs reported obtaining inputs from outside the cotton system, meaning from an organization other than SONAPRA or the designated input suppliers. Even among these GVs, the outside sources accounted for just 20 percent of the input purchases (see Table 4.3.21). In most cases where a GV purchased from outside the system (17 out of 19), the supplier was another GV. The GVs said that these transactions were necessary because the quantity ordered was not sufficient for their members or the inputs were not available on time.

Types of inputs Generally, 85-90 percent of the members of the GVs order fertilizer, pesticide, and cotton seed. In Zou, the proportion was just two-thirds, but in the other departments it was generally over 90 percent. Herbicides are purchased by just 8 percent of the GV members (see Table 4.3.22).

The average quantity ordered was 417 kilograms of fertilizer per farm ordering fertilizer. This mean is affected by a few large values, however (see Table 4.3.23). In half of the GVs, the average quantity was less than 270 kilogram per farm, but the average was over 1000 kg/farm in thirteen GVs and over 3000 kg/farm in four GVs. It is interesting to note that all thirteen of these GVs were in Zou. These large quantities do not seem to be caused by large farms: the four GVs with more than 3000 kg/farm of fertilizer orders report just 110-250 hectares of cotton cultivation. Another possible explanation is that fertilizer is being used on other crops grown by GV members or that members are selling some of the fertilizer.

The quantity of cotton seed ordered per farm is largest among the GVs in the north (99 kg in Atacora and 64 kg in Borgou) and smallest in the south (16 kg in Mono/Ouémé). This reflects the

fact that farms, and hence the areas planted to cotton, are smaller in the south than in the north. The amount of pesticides ordered varies from 1 liter/farm in the southern departments to 15 liters/farm in Zou, the national average being 10 liters/farm. The quantity of herbicides ordered is 6 liters per farm ordering it, but it should be recalled that less than 10 percent of GV members order herbicides (see Table 4.3.23).

Input credit The survey asked about the proportion of inputs sold on credit. As expected, 95-100 percent of the fertilizer and pesticides are sold to members on credit. The percentage was somewhat lower in the case of herbicides (61 percent), largely because most GVs in Zou that sell herbicides do not offer input credit (see Table 4.3.24).

When asked about the factors that determined the amount of credit offered to members, cotton area was cited by 95 percent of the GVs and ability to repay was cited by 93 percent. Other factors were cited as well: credit needs for cotton (84 percent), credit history (73 percent), and trust and character (72 percent).

Trends GV representatives were asked to evaluate the trends in input use since 1992. Over 90 percent of the GVs reported increases in the use of fertilizer, pesticides, and cotton seed, as would be expected given national trends in input use and cotton production (see Table 4.3.25). The main reasons cited for these increases were the expansion in cotton area and rising numbers of GV members. On the other hand, the responses with regard to trends in herbicide use were more mixed, with 34 percent of the GVs reporting an increase and 20 percent reporting a decrease. Among GVs reporting a decrease in herbicide use, the most commonly cited reason was the price of the input (67 percent).

Crop marketing

Cotton dominates the marketing activities of the *groupements villageois.* Cotton is marketed by all 189 GVs in the sample, but maize is marketed by just 5 percent of the GVs and groundnuts and yams by even fewer. Furthermore, cotton represents 97 percent of the volume of crops marketed by the GVs and 99 percent of the value of crops marketed. Even in the south, cotton accounts for 95 percent of the value and volume of crops marketed (see Table 4.3.26). Given the importance of cotton and the small number of GVs marketing other crops, the remainder of this section will focus on cotton marketing.

Cotton area per GV ranges from 145 ha in the south to almost 500 ha in Borgou, the national average being 384. Similarly, each GV produces an average of 360 tons of seed cotton, with GVs in Borgou and Atacora being larger than those in Zou and the southern departments. The revenue from cotton sales averages 74 million FCFA (see Table 4.3.27).

The higher cotton production in the north is due to both greater numbers of cotton farmers and larger cotton areas on each farm. In Borgou, the average GV has 1.5 hectares of cotton per member, roughly twice the average area among GVs in the south (see Table 4.3.28).

Provision of credit

One of the most important functions of the GVs is to channel credit to farmers for the purchase of inputs and to facilitate loan recovery. According to the GV survey, 98 percent of the GVs provide inputs on credit to members. In addition, some GVs also provide loans in cash to members. Overall, 72 percent of GVs offer cash credit, with the percentage being highest in Atacora (94 percent) and Borgou (88 percent) (see Table 4.3.29).

No interest is charged to members for this credit, although presumably the interest costs are built into the cotton and input prices. Unlike in-kind input credit, cash credit carries an interest charge, typically around 12 percent per year (see Table 4.3.30).

Given the annual fluctuation in the level of credit provided to farmers, the survey asked for the maximum credit level over the previous year. The maximum input credit over the year averaged 25 million FCFA per GV. At the time of the survey, however, the amount of outstanding input credit was just 100 thousand FCFA per year. With regard to cash credit, highest value of this debt over the year was considerably less than the in-kind input credit (5 million FCFA per GV) but the current debt was higher (283 thousand FCFA) (see Tables 4.3.31 and 4.3.32).

In order to provide credit, GVs obtain loans from various sources. The in-kind credit provided to members in the form of inputs is based on in-kind credit provided to the GVs from SONAPRA. Cash loans to members are based on loans obtained from banks, non- governmental organizations (NGOs), and other institutions. For example, 72 percent of the GVs offer cash credit to members and 71 percent obtained credit from other sources (see Table 4.3.33). Most of this comes from banks at interest rates of around 17 percent. Although NGOs offer lower interest rates, the

available credit from this source is much smaller (see Table 4.3.34). Thus, GVs tend to subsidize the interest rates on the cash loans they offer to members.

Almost all GVs (96 percent) have bank accounts. The current balance of the account was around 700 thousand FCFA on average, but the maximum balance over the course of the previous year was 1.5 million FCFA. The size of the bank balances (both current and maximum) is largest in Zou and Borgou (see Table 4.3.35).

4.3.7 Budgets

In this section, we consider the sources of revenue and expenditure patterns of the *groupements villageois*.

Revenue

The GV survey collected information on various sources ofrevenue, including input distribution, crop marketing, and fees. The results indicate that cotton marketing is the most important source of income for GVs, representing 80 percent of the total. Member dues are the second in importance, accounting for about 8 percent of the total (see Table 4.3.36).

At the same time, the survey results suggest considerable variation in the sources of income across GVs. For example, among the 17 GVs surveyed in Atacora, member dues contributed 80 percent of total revenue. Member dues were also the most important source of revenue for the GVs in Ouémé and Mono.

In most regions, there are no fees or charges associated with input delivery. The only exception was some GVs in Zou that earn income from fees for fertiizer and pesticide distribution.

Expenditures

The expenditures of the GVs are more varied than the sources of income, with no single item dominating the budget. They include storage, dues to USPPs and UDPs, travel costs, maintenance, transportation, and investment in new storage facilities, as well as community investments such as schools, roads, and health centers.

The largest cost items are schools (21 percent of the total), storage facilities (10 percent), and travel costs (9 percent) (see Table 4.3.37). Travel costs refer to the expenses associated with trips by GV officials to meetings with other participants in the cotton system such as the USPP, the UDP, and SONAPRA.

Overall, social investments represent about 38 percent of the total. This includes road improvement, schools, payment of teacher salaries, and contributions to local health centers. In many cotton producing areas, GV expenditure has served as an important supplement to public expenditure social services.

4.3.8 Problems and perceptions of GVs

In the last section of the questionnaire, GV representatives were asked about various types of problems the GV may have experienced in the last year.

Input availability

The first topic concerns the availability of inputs. The GVs were asked if they received all the inputs that they ordered. In general, few GVs experienced any problems of this type. Less than 6 percent did not receive all the pesticides and herbicides they ordered, and 11 percent did not receive the full quantity of fertilizer requested. The problem was somewhat more common in the case of cotton seed: 14 percent of the GVs received less than the amount of cotton seed they ordered. Problems of input availability were quite rare in Borgou, but somewhat more common elsewhere (see Table 4.3.38).

Shortages of fertilizer and pesticide were attributed to the supplier not having sufficient stocks, whereas the respondents did not know why herbicides and cotton seed supplies were inadequate. Late delivery wasn't a common explanation.

The response of those GVs facing inadequate deliveries of fertilizer was split: in some cases, the GV purchased elsewhere, in others the members bought it elsewhere, and in others the members simply used less fertilizer. When facing inadequate supplies of cotton seed, GV members obtained cotton seed elsewhere.

Input quality

GV representatives were also asked about the quality of inputs. Very few GVs complained about the quality of herbicide (4 percent) and cotton seed (6 percent). Complaints about quality were somewhat more common in the case of fertilizer (15 percent), particularly in Atacora and Zou. The most common complaints about quality concerned pesticides. Over half the GVs in the sample reported that the pesticides were of poor quality, with the percentage being highest in Atacora (71 percent) and Borgou (67percent) (see Table 4.3.39).

The problem with the pesticides was that they were ineffective (86 percent of those complaining), while fertilizer problems were attributed to both ineffectiveness (48 percent) and counterfeit products (38percent). In the vast majority of cases where the quality was low, the GV members had no choice but to accept the inputs.

Farmers declining to take delivery on orders

A third input problem discussed is whether GV members took delivery on the inputs they ordered through the GV. This appears to be a small but not negligible problem. The number of GVs reporting this problem ranged from 4 to 9 percent, depending on the input. The number of members refusing to buy all they had ordered is less than 5 percent overall, but among GVs reporting the problem 29 percent of the members are implicated. In other words, most GVs (83 percent) had no problem in this regard, but those that did often had more than the quarter of the members defaulting on orders (see Table 4.3.40 and 4.3.41).

When asked about the reasons for this behavior, GV representatives attributed it to members ordering more than they needed. Few blamed it on weather being more adverse than expected. In the case of herbicides, pesticides, and cotton seed, the GVs generally stored the surplus for distribution the following year. In the case of fertilizer, which is more bulky, more effort was made to sell it elsewhere or return it to the supplier.

Credit repayment

A fourth problem concerns the repayment of input credits to the GV. Normally, the cost of inputs in deducted from the cotton payments at harvest time. About one half of the GV say that some members defaulted on their input credit, but these defaulters represent just 5 percent of all GV

members and 10 percent of the members in GVs reporting the problem. The problem appears to be more prevalent in Mono/Ouémé, where almost one quarter of all GV members are in default (see Table 4.3.42).

Loan defaulters are rarely expelled from the GV: three-quarters of the GVs said they "never" removed a farmer from the GV for this reason. Cutting off the credit for defaulters is also fairly uncommon. Almost37 percent of the GVs say they "never" do this and only 3 percent "always" do it. The most common response is to oblige relatives of the defaulting member to pay the debt: 48 percent of the GVs say this is" always" or "generally" done. In other cases, other GV members pay the debt (see Table 4.3.43).

Changes in problems since 1992

The GV representatives were asked to evaluate different aspects of the input distribution system compared to 1992. The main reform of the input delivery system since that year is the introduction of private traders who import inputs on behalf of SONAPRA. In general, large majorities of the GV representatives report improvements in several areas. Seventy-nine percent cite improved input availability, 69 percent say the timing of delivery has improved, 64 percent report that the location of delivery is more convenient than it used to be, and 64 percent say fertilizer quality has improved. Member repayment of loans has also improved: 53 percent report improvement and 15 percent say it was never a problem (see Table 4.3.44).

The sharp exception to this generally positive evaluation is in the area of pesticide quality. Two-thirds of the GV representatives say that pesticide quality has deteriorated since 1992 and barely one quarter report improvements.

With regard to cotton marketing, the survey examined the delays between cotton delivery and payment. In general, payment occurred 1-2 months after delivery, but the delay varied by region. In Atacora and Borgou, the delay was less than one month for the first two deliveries, whereas the delay was 1-2 months in Zou and more than 3 months in the south (see Table 4.3.45).

Almost two-thirds of the GVs say that there are problems with the system of cotton grading. The percentage is over 50 percent in every department except Zou, where it is just 31 percent. Similarly, 85 percent of the GVs report problems with cotton weighing. Again, the percentage is lowest in Zou (57 percent). When asked what the problem is, most GV report that the officials who

are grading and weighing the cotton can be paid to obtain a more favorable quality or quantity (see Table 4.3.46).

Cotton theft is also a problem. Overall, 14 percent of the GV report problems with theft. The share of GVs reporting this to be problem is highest in Borgou (22 percent).

On the other hand, the majority of GVs argue that cotton weighing and cotton classification has improved since 1992. In particular, 61percent say that classification has gotten better and 78 percent say the procedures for cotton weighting have improved. Only 23 percent of the GVs report that cotton theft is less of a problem than it used to be, but another 62 percent say it was never a problem (see Table 4.3.47).

However, there are two areas in which GV representatives say that the cotton system has deteriorated. First, two-thirds of the GVs say that the system of agricultural extension for cotton has worsened since 1992. Second, close to three-quarter (73 percent) report that the timing of payment has gotten worse (see Table 4.3.47).

Table 4.1.1-Description of sample of Bénin Small Farmer Survey

		Number of villages in sample	Percent of total	Number of households in sample	Percent of total	Sum of weights	Percent of total
Department	Atacora	15	15%	135	15%	62,189	13%
	Atlantique	10	10%	90	10%	60,806	13%
	Borgou	27	27%	242	27%	74,908	16%
	Mono	10	10%	90	10%	86,923	18%
	Ouémé	19	19%	171	19%	85,194	18%
	Zou	19	19%	171	19%	104,944	22%
Total		100	100%	899	100%	474,964	100%

Table 4.1.2-Household characteristics by department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Household size	8.8	7.6	11.3	7.4	8.4	9.1	8.8
Children under 15 yrs	4.2	3.5	5.7	3.2	4.3	4.4	4.2
Adults 15-65 yrs	4.3	3.9	5.4	3.9	4.0	4.5	4.3
Adults over 65 yrs	.4	.2	.2	.2	.1	.2	.2
Dependency ratio (%)	48%	46%	50%	45%	50%	49%	48%
Femaled headed (%)	0%	7%	2%	2%	3%	12%	5%
Polygamous (%)	30%	42%	29%	31%	39%	45%	36%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.3-Household characteristics by sex of head

	Sex of household head		
	Male	**Female**	**Total**
Household size	8.9	6.4	8.8
Children under 15 yrs	4.3	3.1	4.2
Adults 15-65 yrs	4.4	3.1	4.3
Adults over 65 yrs	.2	.2	.2
Dependency ratio (%)	48%	47%	48%
Femaled headed (%)	0%	100%	5%
Polygamous (%)	38%	5%	36%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.4-Household characteristics by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Household size	9.9	10.8	8.4	7.6	7.2	8.8
Children under 15 yrs	5.2	5.6	3.9	3.3	3.2	4.2
Adults 15-65 yrs	4.4	5.0	4.4	4.0	3.9	4.3
Adults over 65 yrs	.3	.2	.2	.2	.1	.2
Dependency ratio (%)	55%	51%	46%	44%	44%	48%
Femaled headed (%)	6%	7%	3%	6%	3%	5%
Polygamous (%)	35%	48%	38%	28%	33%	36%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.5-Years of education and literacy of adults (15 yrs and over)

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Education (years)	.7	1.2	.6	2.0	2.5	1.5	1.4
Can read	3%	4%	0%	4%	4%	2%	3%
Can write	0%		0%	0%	0%	2%	1%
Both	8%	12%	8%	21%	29%	17%	16%
Neither	89%	83%	92%	75%	67%	78%	81%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.6-Age, education, and literacy of head of household by department

		Department						
		Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Age (years)		48.9	47.0	47.4	46.2	42.0	47.1	46.3
Education (years)		.6	1.7	1.2	3.6	3.9	1.3	2.1
Literacy	Can read	5%	9%	0%	4%	4%	2%	4%
	Can write	1%			1%	0%		0%
	Both	8%	14%	14%	33%	44%	16%	23%
	Neither	87%	77%	86%	62%	52%	82%	73%
Total		100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.7-Age, education, and literacy of head of household by expenditure category

		Expenditure category (quintile)					
		Poorest	**2**	**3**	**4**	**Richest**	**Total**
Age (years)		47.4	46.3	48.2	45.5	43.9	46.3
Education (years)		1.2	1.7	1.9	2.5	3.3	2.1
Literacy	Can read	5%	2%	4%	2%	5%	4%
	Can write	1%		1%		0%	0%
	Both	14%	19%	19%	29%	32%	23%
	Neither	80%	79%	77%	69%	62%	73%
Total		100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.8-School attendance by age category and sex of head

	Sex of household head		
	Male	**Female**	**Average**
0-5 years	2%	0%	2%
6-10 years	43%	40%	43%
11-15 yrs	45%	62%	46%
16-20 yrs	15%	13%	15%
Over 20 yrs	1%	2%	1%
Average	16%	21%	16%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.9-School attendance by age category and department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Average**
0-5 years	2%	3%	1%	2%	3%	1%	2%
6-10 years	32%	54%	34%	45%	56%	41%	43%
11-15 yrs	31%	49%	31%	50%	66%	45%	46%
16-20 yrs	12%	11%	3%	16%	24%	21%	15%
Over 20 yrs	0%	1%	0%	2%	3%	1%	1%
Average	12%	17%	11%	18%	24%	16%	16%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.10-School attendance by age and expenditure categories

	Expenditure category (quintile)					
	Poorest	2	3	4	Richest	Average
0-5 years	2%	2%	0%	2%	3%	2%
6-10 years	35%	50%	36%	45%	48%	43%
11-15 yrs	35%	49%	46%	40%	60%	46%
16-20 yrs	6%	17%	18%	18%	16%	15%
Over 20 yrs	1%	2%	1%	1%	1%	1%
Average	13%	19%	14%	15%	19%	16%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.11-School attendance by age category and sex

	Male	Female	Average
0-5 years	3%	1%	2%
6-10 years	50%	33%	43%
11-15 yrs	56%	31%	46%
16-20 yrs	23%	7%	15%
Over 20 yrs	2%	0%	1%
Average	23%	10%	16%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.12-Ethnic background of household head

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Fon		24%	1%	52%		0%	12%
Adja		16%	2%		15%	31%	10%
Nago		3%	49%		0%	1%	8%
Bariba	4%					5%	1%
Mahi			3%				1%
Dendi				1%			2%
Otamari	14%				13%		2%
Holli			0%				3%
Yom	19%		0%				0%
Lopka	2%		44%	47%	41%	0%	38%
Other	60%	57%	1%	52%		0%	12%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.13-Ethnic background of household head

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Fon	15%	26%	21%	24%	26%	23%
Adja	18%	8%	14%	9%	10%	12%
Nago	6%	13%	7%	16%	8%	10%
Bariba	4%	15%	9%	8%	7%	8%
Mahi	1%	1%	3%	1%		1%
Dendi	0%	0%	1%	0%	1%	1%
Otamari	5%	2%	1%	1%	1%	2%
Holli	3%	4%	1%	1%	2%	2%
Yom	7%	1%	4%		2%	3%
Lopka	0%	0%	1%	0%		0%
Other	41%	29%	36%	40%	44%	38%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.14-Households by religion and department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Animist	43%	56%	22%	56%	17%	45%	39%
Muslim	33%	3%	58%		11%	9%	18%
Catholic	21%	24%	7%	19%	35%	30%	23%
Protestant	2%	15%	13%	20%	36%	15%	18%
Other	1%	2%		6%	2%	1%	2%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.15-Membership in cooperative or GV

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
GV	43%	1%	39%	33%	17%	58%	34%
Cooperative	28%	19%	7%	14%	10%	8%	13%
GV and Cooperative	6%	2%	30%	1%	5%	7%	8%
Not member	23%	77%	25%	52%	68%	28%	45%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.16-Membership in a credit club

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Yes	21%	92%	31%	57%	75%	63%	57%
No	79%	8%	69%	43%	25%	37%	43%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.17-Main activity of head of household by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Crop production	94%	98%	91%	94%	65%	96%	89%
Livestock production	1%		4%	2%			1%
Fishing					6%		1%
Food processing	0%			1%	1%		0%
Manufacturing	1%		1%		1%		0%
Construction		2%	0%	1%	1%	1%	1%
Agricultural trade					0%	1%	0%
Other trade & services	1%	0%	1%	1%	24%	1%	5%
Retired/Not working	2%		2%		1%	1%	1%
Housework			0%			1%	0%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.18-Main activity of adults (15+ years)

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Crop production	71%	80%	48%	89%	29%	71%	64%
Livestock production	1%		2%	1%	0%		0%
Fishing					2%	0%	0%
Food processing	3%	1%	1%	0%	24%	2%	5%
Manufacturing	1%	0%	0%		2%	0%	1%
Construction		1%	0%	0%	0%	1%	0%
Agricultural trade	0%	11%	0%	0%	3%	5%	3%
Other trade & services	1%	3%	1%	5%	24%	6%	7%
Unemployed			0%			2%	1%
Student	3%	4%	2%	4%	9%	7%	5%
Retired/Not working	5%	1%	4%	0%	4%	4%	3%
Housework	14%	0%	41%		2%	1%	10%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.19-Importance of each source of income

	Pct. of households with income	Share of total income
Crop sales	93%	57%
Livestock sales	60%	7%
Non-farm enterprises	53%	17%
Agricultural wages	18%	3%
Non-agricultural wages	21%	7%
Remittances	13%	3%
Pension, gifts, assistance	5%	2%
Other	26%	6%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.20-Percentage of households earning income from each source by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Crop sales	89%	100%	99%	91%	85%	97%	93%
Livestock sales	64%	73%	61%	44%	60%	64%	60%
Non-farm enterprises	48%	59%	34%	45%	85%	46%	53%
Agricultural wages	29%	1%	20%	8%	27%	22%	18%
Non-agricultural wages	18%	15%	17%	50%	17%	10%	21%
Remittances	26%	7%	5%	5%	11%	23%	13%
Pension, gifts, assistance	2%	0%	3%	1%	14%	7%	5%
Other	18%	2%	38%	6%	61%	26%	26%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.21-Share of income from each source by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Crop sales	42%	64%	67%	53%	33%	76%	57%
Livestock sales	13%	6%	12%	6%	4%	3%	7%
Non-farm enterprises	14%	22%	7%	19%	35%	6%	17%
Agricultural wages	11%	0%	1%	1%	4%	3%	3%
Non-agricultural wages	7%	6%	4%	17%	5%	3%	7%
Remittances	7%	2%	0%	2%	2%	3%	3%
Pension, gifts, assistance	0%	0%	1%	0%	7%	1%	2%
Other	7%	1%	8%	2%	11%	5%	6%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.22-Share of income from each source by sex of head

	Sex of household head		
	Male	**Female**	**Total**
Crop sales	56%	64%	57%
Livestock sales	7%	4%	7%
Non-farm enterprises	17%	11%	17%
Agricultural wages	3%	3%	3%
Non-agricultural wages	7%	4%	7%
Remittances	3%	2%	3%
Pension, gifts, assistance	1%	5%	2%
Other	6%	6%	6%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.23-Share of income from each source by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Crop sales	48%	50%	63%	62%	60%	57%
Livestock sales	6%	6%	7%	7%	7%	7%
Non-farm enterprises	20%	19%	15%	14%	16%	17%
Agricultural wages	4%	4%	2%	3%	2%	3%
Non-agricultural wages	10%	10%	4%	5%	5%	7%
Remittances	4%	2%	3%	1%	2%	3%
Pension, gifts, assistance	0%	2%	0%	3%	3%	2%
Other	7%	7%	5%	5%	5%	6%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.24-Share of income from each source by farm size category

	Farm size category (quintile)					
	Smallest	**2**	**3**	**4**	**Largest**	**Total**
Crop sales	48%	50%	63%	62%	60%	57%
Livestock sales	6%	6%	7%	7%	7%	7%
Non-farm enterprises	20%	19%	15%	14%	16%	17%
Agricultural wages	4%	4%	2%	3%	2%	3%
Non-agricultural wages	10%	10%	4%	5%	5%	7%
Remittances	4%	2%	3%	1%	2%	3%
Pension, gifts, assistance	0%	2%	0%	3%	3%	2%
Other	7%	7%	5%	5%	5%	6%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.25-Number of plots and area cultivated

Percent with 2 seasons	53%
Nbr plots in 1st season	4.1
Nbr. plots in 2d season	1.2
Area in 1st season (ha)	3.3
Area in 2d season (ha)	1.1
Farm size (ha)	3.3
Sown area (ha)	4.4
Farm size per capita (ha)	.41
Sown area per capita (ha)	.54

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.26-Number of plots and area cultivated by department

	Department					
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**
Percent with 2 seasons	0%	100%	0%	72%	63%	73%
Nbr plots in 1st season	4.6	3.0	5.8	3.3	3.2	4.7
Nbr. plots in 2d season	.0	1.6	.0	1.7	1.7	1.6
Area in 1st season (ha)	3.3	2.5	5.4	1.8	1.8	4.6
Area in 2d season (ha)	.0	1.7	.0	1.3	.8	2.1
Farm size (ha)	3.3	2.5	5.4	1.8	1.9	4.8
Sown area (ha)	3.3	4.2	5.4	3.2	2.7	6.7
Farm size per capita (ha)	.42	.36	.52	.30	.26	.55
Sown area per capita (ha)	.42	.59	.52	.50	.38	.76

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.27-Number of plots and area cultivated by sex of head of household

	Sex of household head	
	Male	**Female**
Percent with 2 seasons	53%	62%
Nbr plots in 1st season	4.1	3.4
Nbr. plots in 2d season	1.2	1.0
Area in 1st season (ha)	3.3	2.5
Area in 2d season (ha)	1.1	1.2
Farm size (ha)	3.4	2.5
Sown area (ha)	4.4	3.7
Farm size per capita (ha)	.41	.40
Sown area per capita (ha)	.54	.57

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.28-Number of plots and area cultivated by expenditure category

	Expenditure category (quintile)				
	Poorest	**2**	**3**	**4**	**Richest**
Percent with 2 seasons	45%	55%	51%	53%	64%
Nbr plots in 1st season	3.6	3.7	4.5	4.7	3.9
Nbr. plots in 2d season	.9	1.2	1.1	1.2	1.5
Area in 1st season (ha)	2.4	3.1	3.2	4.0	3.7
Area in 2d season (ha)	.7	1.1	.9	1.2	1.5
Farm size (ha)	2.4	3.1	3.3	4.1	3.9
Sown area (ha)	3.0	4.2	4.2	5.1	5.2
Farm size per capita (ha)	.25	.30	.40	.51	.58
Sown area per capita (ha)	.32	.40	.52	.67	.80

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.29-Land tenure by department (% of area)

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Own	94%	69%	71%	79%	59%	49%	67%
Sharecrop	.	.	0%	.	3%	1%	.
Rent	0%	24%	0%	8%	22%	0%	5%
Use without pay	1%	6%	10%	7%	11%	20%	11%
Common property	5%	.	19%	0%	1%	31%	15%
Other	.	.	.	2%	4%	0%	1%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.30-Land tenure by sex of head (% of area)

	Sex of household head		
	Male	**Female**	**Total**
Own	68%	50%	67%
Sharecrop	1%	0%	1%
Rent	6%	.	5%
Use without pay	10%	28%	11%
Common property	15%	22%	15%
Other	1%	.	1%
Total	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.31-Land tenure by expenditure category (% of area)

	Expenditure category (quintile)					
	Poorest	2	3	4	Richest	Total
Own	74%	68%	65%	63%	67%	67%
Sharecrop	1%	0%	1%	0%	1%	1%
Rent	6%	9%	3%	3%	7%	5%
Use without pay	13%	12%	13%	11%	7%	11%
Common property	5%	11%	18%	22%	16%	15%
Other	1%	1%	0%	1%	1%	1%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.32-Acquisition of owned land by department (% of area)

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Inherited/donation	100%	78%	65%	87%	62%	90%	81%
Purchased	.	21%	0%	13%	36%	8%	9%
Other	0%	1%	35%	0%	2%	2%	10%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.33-Source of water by department (% of area)

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Rain water	100%	100%	99%	91%	73%	98%	96%
Irrigation	.	0%	7%	0%	0%	1%	1%
Bas-fond	.	1%	2%	26%	2%	3%	3%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.34-Allocation of labor by sex and season (hours)

	Adult male			Adult female		
	Rainy	Dry	Average	Rainy	Dry	Average
Agricultural production	7.6	4.2	4.9	2.7	4.9	7.6
Post-harvest activities	1.4	2.4	1.5	1.9	1.8	1.4
Non-agricultural work	2.0	3.3	2.1	3.1	2.6	2.0
Leisure	3.3	4.2	1.9	2.2	3.0	3.3
Personal time	9.2	9.3	8.6	8.7	9.0	9.2
Household work	.2	.2	2.8	2.8	1.5	.2
Fuelwood collection	.2	.3	1.2	1.2	.7	.2
Water collection	.1	.2	.9	1.3	.6	.1
Total	24.0	24.0	24.0	24.0	24.0	24.0

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.35-Allocation of labor by sex and department (hours)

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Average**
Adult male							
Agricultural production	5.7	6.4	7.0	6.0	4.7	5.7	5.9
Post-harvest activities	2.0	2.7	1.6	2.4	1.6	1.3	1.9
Non-agricultural work	2.8	3.1	2.0	2.0	4.7	1.8	2.7
Leisure	3.4	2.6	4.4	3.5	3.0	5.1	3.8
Personal time	9.4	9.0	8.6	9.3	9.3	9.6	9.2
Household work	.1	.1	.2	.3	.4	.2	.2
Fuelwood collection	.5	.1	.1	.4	.2	.2	.3
Water collection	.2	.0	.1	.1	.1	.1	.1
Total	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Adult female							
Agricultural production	4.0	4.1	3.9	4.3	2.3	4.3	3.8
Post-harvest activities	2.2	2.2	1.1	1.1	2.4	1.4	1.7
Non-agricultural work	2.4	3.6	1.5	2.8	4.5	1.3	2.6
Leisure	1.4	1.5	2.7	1.7	1.6	3.1	2.1
Personal time	8.4	8.2	8.0	9.0	8.9	9.1	8.7
Household work	2.7	2.4	3.6	2.8	2.8	2.5	2.8
Fuelwood collection	1.6	1.0	1.6	1.3	.8	1.2	1.2
Water collection	1.3	.9	1.5	1.0	.8	1.1	1.1
Total	24.0	24.0	24.0	24.0	24.0	24.0	24.0

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.36-Allocation of labor by sex and expenditure category (hours)

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Average**
Adult male						
Agricultural production	5.8	5.7	6.3	6.0	5.6	5.9
Post-harvest activities	2.0	1.8	1.7	1.7	2.2	1.9
Non-agricultural work	2.4	2.6	2.2	2.8	3.2	2.7
Leisure	3.8	4.0	4.1	3.5	3.4	3.8
Personal time	9.3	9.3	9.2	9.3	9.1	9.2
Household work	.3	.2	.2	.3	.3	.2
Fuelwood collection	.4	.3	.2	.2	.1	.3
Water collection	.1	.1	.1	.1	.1	.1
Total	24.0	24.0	24.0	24.0	24.0	24.0
Adult female						
Agricultural production	3.6	3.8	3.8	4.2	3.5	3.8
Post-harvest activities	1.9	1.7	1.6	1.4	2.0	1.7
Non-agricultural work	2.4	2.3	2.5	2.6	3.3	2.6
Leisure	1.9	2.3	2.2	2.1	1.9	2.1
Personal time	8.7	8.6	8.5	8.8	8.6	8.7
Household work	2.9	2.9	2.9	2.7	2.6	2.8
Fuelwood collection	1.4	1.2	1.3	1.2	1.1	1.2
Water collection	1.1	1.2	1.2	1.0	1.0	1.1
Total	24.0	24.0	24.0	24.0	24.0	24.0

Source: IFPRI/LARES Small Farmer Survey

Table 4.1.37-Change in labor allocation by sex and season

		Adult male		Adult female		
		Rainy	**Dry**	**Rainy**	**Dry**	**Total**
Activity taking more time now	Agricultural production	31%	10%	24%	7%	18%
	Post-harvest activities	0%	3%	1%	2%	2%
	Non-agricultural work	4%	17%	6%	18%	11%
	Leisure	1%	5%	1%	1%	2%
	Personal time	10%	15%	10%	10%	11%
	Household work	0%	0%	3%	6%	2%
	Fuelwood collection		0%		1%	0%
	Water collection				1%	0%
	No change	51%	47%	52%	52%	50%
	Not applicable	2%	2%	2%	2%	2%
Total		100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.38-Change in labor allocation by department

Activity taking more time now	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Agricultural production	25%	18%	24%	10%	15%	20%	18%
Post-harvest activities	0%	6%		0%	2%	3%	2%
Non-agricultural work	28%	9%	9%	11%	9%	6%	11%
Leisure	4%	0%	2%	0%	1%	4%	2%
Personal time	10%	1%	4%	1%	1%	42%	11%
Household work	4%	1%	5%	1%	0%	3%	2%
Fuelwood collection	1%	0%		0%		0%	0%
Water collection	0%		1%			0%	0%
No change	23%	64%	56%	72%	69%	22%	50%
Not applicable	5%	1%		5%	3%	0%	2%
	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.39-Change in labor allocation by sex of head

		Sex of household head		
		Male	Female	Total
Activity taking more time now	Agricultural production	18%	27%	18%
	Post-harvest activities	2%	4%	2%
	Non-agricultural work	11%	9%	11%
	Leisure	2%	2%	2%
	Personal time	11%	18%	11%
	Household work	2%	2%	2%
	Fuelwood collection	0%		0%
	Water collection	0%		0%
	No change	51%	35%	50%
	Not applicable	2%	3%	2%
Total		100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.40-Source of seed by crop (percent of volume)

		Source			
		Retained	Purchased	Received free	Total
Crop	Maize	86%	13%	1%	100%
	Sorghum/millet	96%	2%	2%	100%
	Rice	68%	28%	3%	100%
	Cowpeas	43%	57%	0%	100%
	Groundnuts	61%	39%	0%	100%
	Manioc	72%	18%	11%	100%
	Yams	95%	4%	1%	100%
	Sweet potatoes	100%	.	.	100%
	Tomatoes	90%	10%	.	100%
	Okra	89%	8%	3%	100%
	Hot pepper	93%	4%	3%	100%
	Other vegetables	25%	75%	0%	100%
	Cotton	2%	4%	94%	100%
	Other crops	4%	95%	1%	100%
Total		74%	18%	8%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.41-Seed use by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Quantity used (kg/farm)	780	852	1,286	1,000	60	320	678
Quantity bought (kg/farm)	70	437	132	360	20	86	174
Cost of purchased seed (FCFA/farm)	2,251	10,635	2,411	13,227	9,602	57,348	18,871
Share of households buying seed (%)	37%	26%	43%	71%	73%	66%	56%
Share of households getting free seed (%)	45%	3%	74%	36%	24%	65%	43%
Share of seed bought or obtained free (%)	9%	51%	10%	36%	34%	27%	26%

Source: IFPRI-LARES Small Farmer Survey.
Note: Free seed refers primarily to cotton seed from SONAPRA.

Table 4.1.42-Seed use by sex of head

	Sex of household head		
	Male	**Female**	**Total**
Quantity used (kg/farm)	701	240	678
Quantity bought (kg/farm)	178	100	174
Cost of purchased seed (FCFA/farm)	19,559	5,653	18,871
Share of households buying seed (%)	56%	49%	56%
Share of households getting free seed (%)	42%	61%	43%
Share of seed purchased or obtained free (%)	25%	42%	26%

Source: IFPRI-LARES Small Farmer Survey.
Note: Free seed refers primarily to cotton seed from SONAPRA.

Table 4.1.43-Seed use by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Quantity used (kg/farm)	554	782	681	725	647	678
Quantity bought (kg/farm)	93	118	131	247	283	174
Cost of purchased seed (FCFA/farm)	3,141	5,764	59,986	9,756	15,974	18,871
Share of households buying seed (%)	53%	62%	58%	54%	52%	56%
Share of households getting free seed (%)	46%	41%	53%	45%	32%	43%
Share of seed purchased or obtained free (%)	17%	15%	19%	34%	44%	26%

Source: IFPRI-LARES Small Farmer Survey.
Note: Free seed refers primarily to cotton seed from SONAPRA.

Table 4.1.44-Share of producers of each crop that use purchased seed among cotton growers and other farmers

Crop	Cotton growers	Other farmers	Total
Maize	22%	27%	26%
Sorghum/millet	8%	10%	9%
Rice	38%	20%	31%
Cowpeas	51%	66%	59%
Groundnuts	43%	45%	44%
Manioc	3%	8%	6%
Yams	6%	11%	9%
Sweet potatoes	0%	0%	0%
Tomatoes	1%	14%	8%
Okra	1%	8%	3%
Hot pepper	1%	13%	9%
Other vegetables	32%	12%	21%
Cotton	82%	0%	81%
Other crops	7%	16%	13%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.45-Characteristics of seed purchases by department

		Department						
		Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Distance (km)		6.8	7.0	5.1	12.2	7.1	4.7	6.8
Supplier	Farmer	42%	44%	22%	26%	38%	42%	36%
	Trader	49%	44%	65%	72%	56%	46%	55%
	CARDER	8%	12%	1%	1%	6%	10%	6%
	GV/Sonapra	1%		13%	2%	1%	1%	2%
Total		100%	100%	100%	100%	100%	100%	100%
Mode of payment	Cash	97%	100%	90%	99%	100%	98%	98%
	Credit	1%		9%	1%		1%	2%
	Other	1%		1%			1%	0%
Total		100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.46-Perceived change in availability of high-yielding seed by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Better	60%	3%	30%	30%	32%	39%	33%
No change	3%	53%	11%	41%	19%	33%	27%
Worse	2%	0%	7%	2%	7%	7%	5%
No opinion	26%	37%	49%	20%	32%	19%	30%
Not applicable	9%	6%	3%	6%	9%	2%	6%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.47-Perceived change in availability of high-yielding seed by sex of head

	Sex of household head		
	Male	**Female**	**Total**
Better	33%	28%	33%
No change	27%	27%	27%
Worse	4%	11%	5%
No opinion	30%	31%	30%
Not applicable	6%	2%	6%
Total	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.48-Perceived change in availability of high-yielding seed by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Better	34%	36%	37%	34%	23%	33%
No change	25%	20%	26%	29%	34%	27%
Worse	5%	2%	6%	5%	6%	5%
No opinion	34%	35%	25%	26%	28%	30%
Not applicable	2%	6%	5%	6%	9%	6%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.49-Change in use of purchased seed by crop

		Increased	**Decreased**	**No change**	**Total**
Crop	Maize	16%	17%	67%	100%
	Sorghum/millet	28%	12%	60%	100%
	Rice	38%	4%	57%	100%
	Cowpeas	21%	14%	66%	100%
	Groundnuts	16%	21%	63%	100%
	Manioc	11%	5%	83%	100%
	Yams	20%	6%	74%	100%
	Sweet potatoes			100%	100%
	Tomatoes	14%	13%	73%	100%
	Okra	14%	5%	81%	100%
	Hot pepper	27%	7%	65%	100%
	Other vegetables	40%	8%	52%	100%
	Cotton	16%	1%	84%	100%
	Other crops	21%	7%	72%	100%
Total		19%	12%	68%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.50-Change in use of purchased seed by department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Increased	36%	10%	10%	27%	10%	17%	19%
Decreased	8%	29%	4%	8%	8%	19%	12%
No change	55%	61%	86%	65%	82%	64%	68%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.51-Change in use of purchased seed by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Increased	9%	17%	30%	19%	22%	19%
Decreased	14%	15%	15%	12%	6%	12%
No change	77%	68%	56%	69%	72%	68%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.52-Fertilizer use by department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Quantity (kg/farm)	138	18	471	130	64	513	243
Pct. households using fertilizer	56%	10%	69%	58%	18%	74%	50%
Quantity among users (kg/farm)	248	186	685	226	355	691	491
Price (FCFA/kg)	185	172	189	178	168	188	184
Cost among users (FCFA/farm)	46,890	32,746	129,414	40,687	60,089	129,889	91,648
Intensity (kg/ha)	42	4	87	41	24	77	56
Intensity among users (kg/ha)	64	31	106	109	135	86	91

Source: IFPRI-LARES Small Farmer Survey.
Note: Intensity refers to the amount of fertilizer per hectare of sown land

Table 4.1.53-Fertilizer use by crop

	Quantity (kg/grower)	**Percent of total quantity**	**Pct. of growers using**	**Quantity (kg/user)**
Maize	64	24%	33%	193
Sorghum/millet	3	0%	5%	60
Rice	13	0%	23%	57
Cowpeas	3	1%	6%	54
Groundnuts	1	0%	1%	64
Manioc	4	1%	6%	64
Yams	0	0%	0%	39
Sweet potatoes	2	0%	5%	38
Tomatoes	17	1%	14%	118
Okra	5	0%	7%	80
Hot pepper	23	2%	19%	124
Other vegetables	37	2%	30%	125
Cotton	454	65%	98%	464
Other crops	29	3%	14%	214
Total	55	100%	20%	272

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.54-Share of producers of each crop that apply fertilizer among cotton growers and other farmers

	Cotton growers	Other farmers	Total
Maize	59%	18%	33%
Sorghum/millet	10%	0%	5%
Rice	30%	13%	23%
Cowpeas	7%	6%	6%
Groundnuts	2%	0%	1%
Manioc	2%	7%	6%
Yams	1%	0%	0%
Sweet potatoes	0%	6%	5%
Tomatoes	16%	13%	14%
Okra	9%	1%	7%
Hot pepper	8%	26%	19%
Other vegetables	0%	54%	30%
Cotton	98%	.	98%
Other crops	1%	19%	14%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.55-Share of fertilizer used by crop and by type of farmer (percent of total quantity)

	Cotton growers	Other farmers	Total
Maize	18%	6%	24%
Sorghum/millet	0%	0%	0%
Rice	0%	0%	0%
Cowpeas	0%	0%	1%
Groundnuts	0%	0%	0%
Manioc	0%	1%	1%
Yams	0%	0%	0%
Sweet potatoes	0%	0%	0%
Tomatoes	0%	1%	1%
Okra	0%	0%	0%
Hot pepper	1%	1%	2%
Other vegetables	0%	2%	2%
Cotton	65%	.	65%
Other crops	0%	3%	3%
Total	87%	13%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.56-Fertilizer use by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Quantity (kg/farm)	138	18	471	130	64	513	243
Pct. households using fertilizer	56%	10%	69%	58%	18%	74%	50%
Quantity among users (kg/farm)	248	186	685	226	355	691	491
Price (FCFA/kg)	185	172	189	178	168	188	184
Cost among users (FCFA/farm)	46,890	32,746	129,414	40,687	60,089	129,889	91,648

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.57-Fertilizer use by sex of head

	Sex of household head		
	Male	Female	Total
Quantity (kg/farm)	242	264	243
Pct. households using fertilizer	50%	50%	50%
Quantity among users (kg/farm)	489	523	491
Price (FCFA/kg)	184	184	184
Cost among users (FCFA/farm)	91,383	96,663	91,648
Intensity (kg/ha)	55	72	56
Intensity among users (kg/ha)	90	96	91

Source: IFPRI-LARES Small Farmer Survey.
Note: Intensity refers to the amount of fertilizer per hectare of sown land

Table 4.1.58-Fertilizer use by expenditure category

	Expenditure category (quintile)					
	Poorest	2	3	4	Richest	Total
Quantity (kg/farm)	149	170	243	350	306	243
Pct. households using fertilizer	48%	42%	58%	59%	41%	50%
Quantity among users (kg/farm)	312	404	417	596	743	491
Price (FCFA/kg)	187	185	183	182	184	184
Cost among users (FCFA/farm)	58,914	75,477	77,644	111,613	137,492	91,648
Intensity (kg/ha)	49	41	58	68	58	56
Intensity among users (kg/ha)	88	83	86	94	97	91

Source: IFPRI-LARES Small Farmer Survey.
Note: Intensity refers to the amount of fertilizer per hectare of sown land

Table 4.1.59-Fertilizer use by farm size category

	Farm size category (quintile)					
	Smallest	**2**	**3**	**4**	**Largest**	**Total**
Quantity (kg/farm)	45	88	143	275	662	243
Pct. households using fertilizer	31%	36%	48%	57%	75%	50%
Quantity among users (kg/farm)	144	242	296	483	879	491
Price (FCFA/kg)	172	183	181	189	188	184
Cost among users (FCFA/farm)	24,139	45,270	53,746	90,874	165,678	91,648
Intensity (kg/ha)	73	42	45	53	63	56
Intensity among users (kg/ha)	251	116	95	93	83	91

Source: IFPRI-LARES Small Farmer Survey.
Note: Intensity refers to the amount of fertilizer per hectare of sown land

Table 4.1.60-Fertilizer use for cotton growers and other farmers

	Cotton growers	**Other farmers**	**Total**
Quantity (kg/farm)	601	50	243
Pct. households using fertilizer	97%	24%	50%
Quantity among users (kg/farm)	617	213	491
Price (FCFA/kg)	188	174	184
Cost among users (FCFA/farm)	116,234	37,156	91,648
Intensity (kg/ha)	92	16	56
Intensity among users (kg/ha)	94	75	91

Source: IFPRI-LARES Small Farmer Survey.
Note: Intensity refers to the amount of fertilizer per hectare of sown land

Table 4.1.61-Characteristics of fertilizer purchases by department

		Department						
		Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Distance (km)		5.0	7.0	2.3	15.9	6.5	2.1	6.5
Supplier	Farmer	1%	.	1%	13%	.	2%	3%
	Trader	3%	.	.	27%	5%	0%	3%
	CARDER	5%	92%	.	2%	88%	1%	6%
	GV/SONAPRA	92%	8%	99%	58%	7%	97%	88%
Total		100%	100%	100%	100%	100%	100%	100%
Payment	Cash	9%	100%	2%	41%	99%	5%	14%
	Credit	89%	.	98%	59%	1%	95%	86%
	Other	2%	.	.	.	.	0%	0%
Total		100%	100%	100%	100%	100%	100%	100%
Credit	CARDER	1%					1%	1%
	GV-USPP	97%		100%	92%	3%	98%	93%
	Other formal lender	1%			2%	65%		3%
	Informal lender	1%		0%	6%	31%	1%	3%
Total		100%		100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.62-Characteristics of fertilizer purchases by sex of head

		Sex of household head		
		Male	**Female**	**Total**
Distance (km)		6.7	2.4	6.5
Supplier	Farmer	3%	0%	3%
	Trader	3%	0%	3%
	CARDER	7%	1%	6%
	GV/SONAPRA	87%	99%	88%
Total		100%	100%	100%
Payment	Cash	14%	5%	14%
	Credit	86%	95%	86%
	Other	0%	0%	0%
Total		100%	100%	100%
Credit	CARDER	1%	1%	1%
	GV-USPP	93%	95%	93%
	Other formal lender	3%	2%	3%
	Informal lender	3%	1%	3%
Total		100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.63-Characteristics of fertilizer purchases by expenditure category

		Expenditure category (quintile)					
		Poorest	**2**	**3**	**4**	**Richest**	**Total**
Distance (km)		5.6	4.5	5.2	7.6	9.3	6.5
Supplier	Farmer	3%	3%	2%	4%	1%	3%
	Trader	2%	3%	5%	2%	4%	3%
	CARDER	6%	5%	3%	2%	16%	6%
	GV/SONAPRA	90%	90%	90%	92%	79%	88%
Total		100%	100%	100%	100%	100%	100%
Payment	Cash	10%	8%	9%	12%	23%	14%
	Credit	90%	91%	91%	88%	77%	86%
	Other	0%	1%	0%	.	.	0%
Total		100%	100%	100%	100%	100%	100%
Credit	CARDER	0%	3%				1%
	GV-USPP	90%	93%	97%	99%	86%	93%
	Other formal lender	6%	1%		1%	10%	3%
	Informal lender	3%	2%	3%	1%	5%	3%
Total		100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.64-Characteristics of fertilizer purchases for cotton growers and other farmers

		Cotton growers	Other farmers	Total
Distance (km)		2.5	16.6	6.5
Supplier	Farmer	1%	12%	3%
	Trader	0%	22%	3%
	CARDER	0%	44%	6%
	GV/SONAPRA	98%	21%	88%
Total		100%	100%	100%
Payment	Cash	3%	80%	14%
	Credit	97%	19%	86%
	Other	.	1%	0%
Total		100%	100%	100%
Credit	CARDER	1%	1%	1%
	GV-USPP	99%	39%	93%
	Other formal lender	0%	34%	3%
	Informal lender	0%	25%	3%
Total		100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.65-Perceived change in availability of fertilizers by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Better	27%		45%	26%	3%	24%	21%
No change	6%	1%	12%	21%	4%	39%	16%
Worse	22%	11%	12%	20%	36%	16%	20%
No opinion	32%	82%	25%	27%	48%	15%	36%
Not applicable	13%	6%	5%	5%	10%	6%	7%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.66-Perceived change in availability of fertilizers by sex of head

	Sex of household head		
	Male	Female	Total
Better	21%	33%	21%
No change	16%	19%	16%
Worse	20%	7%	20%
No opinion	35%	39%	36%
Not applicable	8%	2%	7%
Total	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.67-Perceived change in availability of fertilizers by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Better	21%	33%	21%	21%	33%	21%
No change	16%	19%	16%	16%	19%	16%
Worse	20%	7%	20%	20%	7%	20%
No opinion	35%	39%	36%	35%	39%	36%
Not applicable	8%	2%	7%	8%	2%	7%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.68-Change in fertilizer application rate by crop

		Increased	**Decreased**	**No change**	**Total**
Crop	Maize	39%	16%	46%	100%
	Sorghum/millet	45%	15%	41%	100%
	Rice	35%	23%	43%	100%
	Cowpeas	31%	16%	53%	100%
	Groundnuts	31%	11%	58%	100%
	Manioc	5%	27%	68%	100%
	Yams		15%	85%	100%
	Sweet potatoes	31%	21%	47%	100%
	Tomatoes	33%	17%	50%	100%
	Okra	27%	13%	60%	100%
	Hot pepper	48%	9%	43%	100%
	Other vegetables	66%		34%	100%
	Cotton	41%	13%	46%	100%
	Other crops	39%	15%	46%	100%
Total		39%	14%	47%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.69-Change in fertilizer application rate by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Increased	21%	26%	38%	46%	11%	53%	39%
Decreased	9%	13%	14%	11%	40%	6%	14%
No change	71%	61%	48%	43%	49%	41%	47%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.70-Pesticide use by crop

Crop	Share of growers using pesticide (%)	Cost among users (FCFA/farm)	Share of total value (%)
Maize	2%	10,708	1%
Sorghum/millet	1%	3,515	0%
Rice	5%	3,956	0%
Cowpeas	29%	10,342	7%
Groundnuts	1%	23,095	0%
Manioc	1%	5,985	0%
Yams	0%	700	0%
Sweet potatoes	2%	1,750	0%
Tomatoes	8%	12,506	1%
Okra	3%	9,455	0%
Hot pepper	11%	9,122	1%
Other vegetables	25%	11,499	2%
Cotton	97%	50,968	87%
Other crops	1%	31,316	0%
	14%	33,848	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.71-Share of producers of each crop that use pesticides among cotton growers and other farmers

Crop	Cotton grower	Other farmer	Total
Maize	2%	1%	2%
Sorghum/millet	1%	1%	1%
Rice	6%	3%	5%
Cowpeas	45%	15%	29%
Groundnuts	3%	0%	1%
Manioc	0%	1%	1%
Yams	1%	0%	0%
Sweet potatoes	0%	2%	2%
Tomatoes	3%	11%	8%
Okra	2%	7%	3%
Hot pepper	0%	19%	11%
Other vegetables	5%	43%	25%
Cotton	98%	0%	97%
Other crops	1%	1%	1%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.72-Pesticide use by department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Cost (FCFA/farm)	9,371	16	60,961	6,245	3,843	33,832	20,164
Pct. households using pesticide	37%	0%	68%	44%	16%	72%	42%
Cost (FCFA/user)	25,161	4,000	90,235	14,338	26,645	46,999	47,951

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.73-Characteristics of pesticide purchases by department

		Department						
		Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Distance (km)		3.1	6.0	3.0	9.5	19.4	2.2	5.0
Supplier	Farmer	6%	100%	2%	19%	11%	9%	7%
	Trader	1%			28%	24%	0%	5%
	CARDER	3%		0%	3%	28%	3%	5%
	SONAPRA	90%		98%	50%	36%	87%	83%
	Total	100%	100%	100%	100%	100%	100%	100%
Mode	Cash	17%	100%	2%	44%	90%	18%	21%
	Credit	83%		98%	56%	8%	82%	79%
	Other					2%		0%
Total		100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.74-Perceived change in availability of pesticides by department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Better	18%		45%	26%	6%	24%	21%
No change	8%		13%	21%	5%	39%	16%
Worse	18%	3%	9%	20%	18%	16%	15%
No opinion	44%	92%	28%	27%	62%	15%	41%
Not applicable	13%	6%	5%	5%	10%	6%	7%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.75-Allocation of labor by activity and department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Land preparation	24%	37%	23%	19%	39%	20%	26%
Planting	10%	12%	8%	9%	12%	7%	10%
Weeding	29%	28%	30%	44%	23%	42%	33%
Fertilization	1%	0%	2%	3%	1%	2%	2%
Harvest	24%	18%	33%	22%	22%	21%	23%
Processing	11%	6%	4%	4%	2%	8%	6%
Total	100%	100%	100%	100%	100%	100%	100%
Person-days/farm	740	352	897	245	346	787	565
Person days/ha	227	139	162	134	179	172	170

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.76-Allocation of labor by activity and farm size category

	Farm size category (quintile)					
	Smallest	**2**	**3**	**4**	**Largest**	**Total**
Land preparation	26%	29%	27%	28%	22%	26%
Planting	11%	10%	11%	9%	8%	10%
Weeding	36%	33%	33%	32%	35%	33%
Fertilization	2%	1%	1%	2%	2%	2%
Harvest	21%	22%	22%	23%	28%	23%
Processing	5%	6%	6%	7%	6%	6%
Total	100%	100%	100%	100%	100%	100%
Person-days/farm	155	280	426	678	1,256	565
Person-days/ha	348	206	190	176	148	170

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.77-Allocation of labor by activity and crop

	Maize	**Sorghum/ millet**	**Cowpeas**	**Manioc**	**Yams**	**Cotton**
Land preparation	27%	18%	20%	32%	34%	13%
Planting	10%	10%	9%	13%	17%	7%
Weeding	35%	36%	30%	38%	23%	22%
Fertilization	2%	0%	1%	0%	0%	7%
Harvest	20%	23%	28%	14%	20%	49%
Processing	7%	13%	11%	4%	6%	3%
Total	100%	100%	100%	100%	100%	100%
Person-days/farm	133	75	82	103	89	214
Ha of crop/farm	1.12	.86	.58	.73	.47	1.38
Person-days/ha	119	88	142	142	190	155

Source: IFPRI-LARES Small Farmer Survey.

Note: Results exclude intercropped plots because of the difficulty of attributing labor to each crop.

Table 4.1.78-Share of each type of labor by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Family labor	86%	57%	87%	87%	59%	79%	76%
Male family labor	56%	30%	59%	52%	33%	35%	44%
Female family labor	25%	23%	21%	32%	16%	30%	25%
Child family labor	5%	4%	7%	3%	9%	14%	8%
Hired labor	14%	43%	13%	13%	41%	21%	24%
Total labor	100%	100%	100%	100%	100%	100%	100%
Percent of households using hired labor	80%	93%	80%	68%	93%	76%	81%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.79-Share of each type of labor by sex of head

	Sex of household head		
	Male	Female	Total
Family labor	77%	68%	76%
Male family labor	45%	17%	44%
Female family labor	24%	38%	25%
Child family labor	7%	12%	8%
Hired labor	23%	32%	24%
Total labor	100%	100%	100%
Percent of households using hired labor	80%	94%	81%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.80-Share of each type of labor by expenditure category

	Expenditure category (quintile)					
	Poorest	2	3	4	Richest	Total
Family labor	83%	80%	79%	74%	66%	76%
Male family labor	49%	43%	46%	43%	38%	44%
Female family labor	27%	28%	26%	23%	21%	25%
Child family labor	8%	8%	7%	8%	7%	8%
Hired labor	17%	20%	21%	26%	34%	24%
Total labor	100%	100%	100%	100%	100%	100%
Percent of households using hired labor	78%	75%	81%	85%	85%	81%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.81-Share of each type of labor by crop

	Maize	Sorghum/ millet	Cowpeas	Manioc	Yams	Cotton
Family labor	75%	90%	84%	70%	85%	79%
Male family labor	39%	55%	41%	47%	70%	40%
Female family labor	27%	26%	33%	16%	11%	31%
Child family labor	8%	8%	10%	7%	5%	8%
Hired labor	25%	10%	16%	30%	15%	21%
Total labor	100%	100%	100%	100%	100%	100%
Percent of households using hired labor	68%	44%	51%	62%	50%	74%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.82-Allocation of labor by activity and type of labor

	Adult male family labor	Adult female family labor	Child labor	Hired labor	Total
Land preparation	26%	8%	13%	42%	26%
Planting	11%	14%	15%	4%	10%
Weeding	37%	19%	25%	32%	33%
Fertilization	2%	2%	3%	0%	2%
Harvest	20%	46%	35%	17%	23%
Processing	5%	11%	9%	4%	6%
Total	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.83-Percentage of households receiving loans in 1997-98 by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Obtained loan	18%	10%	19%	39%	33%	63%	34%
Obtained informal loan	6%	2%	5%	29%	18%	32%	17%
Obtained formal loan	13%	7%	14%	11%	15%	40%	18%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.84-Percentage of households receiving loans in 1997-98 by sex of head

	Sex of household head		
	Male	Female	Total
Obtained loan	33%	40%	34%
Obtained informal loan	18%	10%	17%
Obtained formal loan	18%	33%	18%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.85-Percentage of households receiving loans in 1997-98 by expenditure category

	Expenditure category (quintile)					
	Poorest	2	3	4	Richest	Total
Obtained loan	27%	39%	37%	35%	31%	34%
Obtained informal loan	17%	21%	17%	16%	18%	17%
Obtained formal loan	13%	21%	23%	21%	13%	18%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.86-Souce of loan by sex of head

	Sex of household head		
	Male	**Female**	**Total**
Friends	21%		20%
Family	10%	5%	10%
Money lender	14%	9%	14%
Traders	5%	4%	5%
CLCAM	28%	54%	29%
CARDER	2%		2%
USPP	6%	19%	7%
GV	4%		4%
ONG	2%	4%	2%
Mutuelle	7%	4%	7%
Total	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.87-Purpose of the loan by sex of head

	Sexof household head		Total
	Male	**Female**	
Personal spending	3%		3%
Fertilizer purchase	10%	21%	10%
Seeds purchase	3%		3%
Hired labor	62%	75%	63%
Ag equip investment	6%		6%
Non-ag investment	16%	4%	16%
Total	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.88-Percentage of households applying for credit and reasons for not applying by sex of head

		Sex of household head		
		Male	**Female**	**Total**
Percent applying for loan		34%	42%	35%
Reasons for not applying	Insufficient funds	7%	16%	7%
	Insufficient savings	3%	12%	3%
	Interest rates	3%		3%
	Complicated formalities	15%		14%
	No need for credit	21%	15%	20%
	Too risky	36%	50%	37%
	Previous problems	1%	2%	1%
	No local credit institution	9%	5%	9%
	Unlikely to be approved	5%		4%
Total		100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.89-Change in credit availability since 1992 by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Has increased	12%	23%	21%	13%	16%	17%
No change	84%	66%	67%	77%	72%	73%
Has decreased	4%	8%	10%	8%	6%	7%
Did not farm in 1992		3%	3%	2%	6%	3%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.90-Change in credit availability since 1992 by department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Has increased	4%	1%	8%	25%	25%	31%	17%
No change	91%	98%	84%	73%	33%	56%	73%
Has decreased		1%	8%	3%	26%	11%	7%
Did not farm in 1992	4%	0%	0%		16%	1%	3%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.91-Ownership of agricultural assets

	Percent owning	**Nbr. owned among owners**	**Nbr. owned including non-owners**	**Value among owners (FCFA)**	**Value including non-owners (FCFA)**
Cart	3%	1.1	.0	169,659	3,691
Plow	9%	1.3	.1	102,525	8,859
Harrow	2%	1.0	.0	49,041	659
Tractor	0%	1.6	.0	816,625	2,049
Cattle	14%	12.3	1.7	791,614	109,357
Work cattle	8%	6.5	.5	577,806	48,670
Goats/sheep	62%	8.7	5.4	71,582	44,612
Donkeys/horses	0%	1.0	.0	75,839	314
Pigs	6%	5.0	.3	38,201	2,236
Poultry	84%	22.6	19.1	23,500	19,749
Other animals	11%	3.8	.4	21,812	2,319

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.92-Percent of households owning agricultural assets by department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Cart	3%	0%	13%	0%	0%	1%	3%
Plow	17%	0%	43%	0%	0%	0%	9%
Harrow	2%	0%	10%	0%	0%	0%	2%
Tractor	2%	0%	0%	0%	1%	0%	0%
Cattle	33%	2%	46%	0%	0%	9%	14%
Work cattle	18%	2%	32%	0%	5%	0%	8%
Goats/sheep	65%	54%	70%	67%	57%	61%	62%
Donkeys/horses	1%	1%	0%	2%	0%	0%	0%
Pigs	30%	0%	0%	0%	4%	5%	6%
Poultry	89%	87%	80%	97%	83%	74%	84%
Other animals	23%	4%	0%	32%	5%	0%	11%
Other assets	91%	4%	95%	41%	12%	100%	39%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.93-Value of agricultural assets by department (FCFA/household)

	Department					
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**
Cart	3,028	0	20,588	0	0	214
Plow	22,149	0	37,773	0	0	0
Harrow	1,053	0	3,302	0	0	0
Tractor	4,511	0	9,246	0	0	0
Cattle	150,785	2,703	531,158	0	4,771	20,715
Work cattle	97,502	4,244	214,208	0	8,026	394
Goats/sheep	46,759	36,721	70,360	47,341	27,759	40,273
Donkeys/horses	1,493	0	736	0	0	0
Pigs	6,128	0	310	0	1,596	4,971
Poultry	25,069	18,650	18,549	18,856	14,636	22,981
Other animals	10,443	1,090	20	1,058	2,719	0
Other assets	1,319	0	14,088	40,605	3,165	36,734
Total	370,238	63,407	920,340	107,860	62,672	126,282

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.94-Percent of households owning agricultural assets by sex of head

	Sex of household head		
	Male	**Female**	**Total**
Cart	3%	2%	3%
Plow	9%	4%	9%
Harrow	2%	0%	2%
Tractor	0%	0%	0%
Cattle	14%	11%	14%
Work cattle	9%	3%	8%
Goats/sheep	64%	28%	62%
Donkeys/horses	0%	0%	0%
Pigs	6%	0%	6%
Poultry	85%	65%	84%
Other animals	11%	0%	11%
Other assets	39%	59%	39%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.95-Value of agricultural assets by sex of head (FCFA/household)

	Sex of household head	
	Male	**Female**
Cart	3,882	0
Plow	9,255	1,200
Harrow	693	0
Tractor	2,155	0
Cattle	112,095	55,344
Work cattle	50,840	5,889
Goats/sheep	46,086	13,186
Donkeys/horses	328	0
Pigs	2,352	0
Poultry	20,247	10,158
Other animals	2,305	0
Other assets	18,878	11,425
Total	269,118	97,203

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.96-Percent of households owning agricultural assets by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Cart	3%	2%	2%	4%	2%	3%
Plow	9%	8%	10%	11%	8%	9%
Harrow	2%	0%	2%	4%	1%	2%
Tractor	0%	0%	0%	0%	2%	0%
Cattle	12%	9%	17%	20%	11%	14%
Work cattle	6%	6%	9%	11%	10%	8%
Goats/sheep	61%	60%	64%	60%	67%	62%
Donkeys/horses	0%	1%	0%	0%	1%	0%
Pigs	7%	7%	4%	5%	7%	6%
Poultry	88%	85%	82%	85%	82%	84%
Other animals	7%	16%	10%	13%	8%	11%
Other assets	25%	31%	39%	42%	55%	39%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.97-Value of agricultural assets by expenditure category (FCFA/household)

	Expenditure category (quintile)				
	Poorest	**2**	**3**	**4**	**Richest**
Cart	3,406	2,647	3,611	7,036	1,749
Plow	9,720	8,605	8,234	11,798	5,913
Harrow	1,013	101	599	1,451	130
Tractor	0	0	0	7,276	2,961
Cattle	105,431	61,825	84,679	131,539	163,282
Work cattle	29,619	34,909	34,745	113,701	29,942
Goats/sheep	32,127	39,892	38,404	46,113	65,813
Donkeys/horses	203	713	260	0	379
Pigs	1,800	2,070	1,744	1,176	4,395
Poultry	18,699	18,216	16,242	20,019	25,574
Other animals	3,628	4,894	373	617	1,415
Other assets	1,308	13,424	22,004	18,981	36,931
Total	206,953	187,296	210,895	359,709	338,485

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.98-Percent of households owning agricultural assets by farm size category

	Farm size category (quintile)					
	Smallest	**2**	**3**	**4**	**Largest**	**Total**
Cart	0%	0%	0%	3%	10%	3%
Plow	0%	1%	4%	11%	29%	9%
Harrow	0%	0%	1%	1%	6%	2%
Tractor	0%	1%	1%	0%	0%	0%
Cattle	0%	7%	6%	21%	33%	14%
Work cattle	1%	3%	7%	9%	22%	8%
Goats/sheep	41%	54%	62%	72%	81%	62%
Donkeys/horses	0%	0%	0%	1%	1%	0%
Pigs	1%	5%	5%	9%	9%	6%
Poultry	81%	81%	89%	88%	83%	84%
Other animals	13%	8%	13%	9%	11%	11%
Other assets	29%	33%	12%	40%	81%	39%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.99-Value of agricultural assets by farm size category (FCFA/household)

	Farm size category (quintile)				
	Smallest	**2**	**3**	**4**	**Largest**
Cart	0	0	0	4,096	14,129
Plow	0	1,288	4,215	8,919	29,442
Harrow	0	85	90	324	2,749
Tractor	0	2,881	0	0	7,172
Cattle	3,076	29,306	74,756	152,812	282,877
Work cattle	1,502	6,447	27,513	34,020	171,239
Goats/sheep	22,861	33,857	32,394	60,167	72,185
Donkeys/horses	0	0	0	743	803
Pigs	207	1,301	1,074	3,151	5,355
Poultry	8,265	13,494	18,035	27,024	31,633
Other animals	1,828	225	756	3,604	4,521
Other assets	27,066	3,914	12,533	7,965	41,101
Total	64,804	92,799	171,367	302,825	663,207

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.100-Summary of production patterns by crop

	Percent of farms growing (%)	Area (ha per farm)	Percent of total area	Quantity (tons per farm)	Yield (tons per ha)	Value (1000 FCFA per farm)	Percent of total value
Maize	89%	1.58	37%	1.56	.98	237	27%
Sorghum/millet	36%	.26	6%	.28	1.05	37	4%
Rice	7%	.02	1%	.03	1.27	4	0%
Cowpeas	48%	.31	7%	.17	.55	34	4%
Groundnuts	27%	.23	5%	.28	1.21	31	4%
Manioc	35%	.40	9%	1.92	4.75	154	18%
Yams	34%	.10	2%	1.02	9.77	98	11%
Sweet potatoes	5%	.01	0%	.04	3.38	2	0%
Tomatoes	19%	.07	2%	.33	4.63	26	3%
Okra	17%	.06	1%	.05	.89	4	0%
Hot pepper	14%	.06	1%	.05	.92	10	1%
Other vegetables	14%	.04	1%	.07	1.70	21	2%
Cotton	34%	.79	18%	.91	1.16	193	22%
Other crops	20%	.32	7%	.20	.63	28	3%
Total		4.27	100%	6.91	1.62	880	100%

Source: IFPRI-LARES Small Farmer Survey.
Note: Intercropped area divided equally among crops. Area, quantity, and value averages include non-growers.

Table 4.1.101-Proportion of households growing each crop by department

	Department					
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou
Maize	76%	100%	96%	83%	91%	95%
Sorghum/millet	96%	.	85%	.	3%	18%
Rice	32%	.	14%	.	1%	4%
Cowpeas	63%	17%	66%	42%	42%	67%
Groundnuts	34%	5%	23%	11%	21%	63%
Manioc	40%	79%	59%	56%	83%	49%
Yams	96%	2%	79%	4%	13%	27%
Sweet potatoes	2%	2%	5%	3%	18%	2%
Tomatoes	2%	25%	31%	26%	24%	18%
Okra	29%	.	70%	6%	4%	22%
Hot pepper	7%	8%	17%	27%	19%	20%
Other vegetables	6%	.	20%	26%	12%	12%
Cotton	37%	.	68%	25%	4%	64%
Other crops	41%	20%	33%	16%	21%	22%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.102-Area allocation by crop by department

	Department					
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**
Maize	15%	79%	18%	57%	52%	27%
Sorghum/millet	23%	.	16%	.	0%	2%
Rice	3%	.	1%	.	0%	0%
Cowpeas	8%	1%	5%	10%	7%	10%
Groundnuts	4%	1%	2%	2%	3%	12%
Manioc	4%	13%	4%	10%	19%	10%
Yams	14%	0%	4%	0%	0%	0%
Sweet potatoes	0%	0%	0%	0%	0%	2%
Tomatoes	0%	4%	1%	4%	3%	0%
Okra	5%	.	2%	0%	1%	1%
Hot pepper	0%	0%	0%	0%	2%	2%
Other vegetables	0%	5%	.	0%	2%	2%
Cotton	13%	.	39%	9%	1%	24%
Other crops	9%	0%	2%	8%	4%	7%
Total	100%	100%	100%	100%	100%	100%
Area (ha)	3.38	4.01	5.39	3.08	2.60	6.52

Source: IFPRI-LARES Small Farmer Survey.
Note: Intercropped area divided equally among crops.

Table 4.1.103-Proportion of households growing each crop by sex of head

	Sex of household head	
	Male	**Female**
Maize	90%	97%
Sorghum/millet	32%	4%
Rice	8%	.
Cowpeas	50%	60%
Groundnuts	28%	44%
Manioc	61%	60%
Yams	36%	8%
Sweet potatoes	6%	.
Tomatoes	22%	19%
Okra	21%	25%
Hot pepper	17%	26%
Other vegetables	13%	25%
Cotton	35%	40%
Other crops	25%	12%

Table 4.1.104-Area allocation by crop by sex of head

	Sex of household head	
	Male	**Female**
Maize	37%	37%
Sorghum/millet	6%	1%
Rice	1%	.
Cowpeas	7%	7%
Groundnuts	5%	7%
Manioc	9%	16%
Yams	3%	.
Sweet potatoes	0%	.
Tomatoes	2%	1%
Okra	1%	2%
Hot pepper	1%	1%
Other vegetables	1%	3%
Cotton	18%	22%
Other crops	8%	2%
Total	100%	100%
Area (ha)	4.31	3.65

Source: IFPRI-LARES Small Farmer Survey.
Note: Intercropped area divided equally among crops.

Table 4.1.105-Proportion of households growing each crop by expenditure category

	Expenditure category (quintile)				
	Poorest	**2**	**3**	**4**	**Richest**
Maize	91%	93%	90%	88%	90%
Sorghum/millet	41%	30%	33%	30%	20%
Rice	7%	6%	7%	9%	7%
Cowpeas	53%	53%	55%	52%	41%
Groundnuts	23%	23%	32%	37%	27%
Manioc	62%	52%	61%	61%	67%
Yams	37%	39%	37%	34%	26%
Sweet potatoes	3%	4%	6%	7%	7%
Tomatoes	10%	25%	21%	28%	23%
Okra	21%	20%	23%	27%	16%
Hot pepper	12%	16%	19%	26%	14%
Other vegetables	11%	10%	16%	19%	12%
Cotton	35%	30%	44%	38%	28%
Other crops	24%	21%	22%	26%	29%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.106-Area allocation by crop and expenditure category

	Expenditure category (quintile)				
	Poorest	**2**	**3**	**4**	**Richest**
Maize	38%	45%	32%	31%	39%
Sorghum/millet	11%	6%	7%	6%	4%
Rice	1%	1%	0%	1%	0%
Cowpeas	7%	8%	8%	8%	6%
Groundnuts	4%	4%	5%	7%	7%
Manioc	9%	9%	8%	8%	14%
Yams	4%	3%	3%	3%	1%
Sweet potatoes	0%	0%	0%	0%	0%
Tomatoes	1%	2%	1%	2%	2%
Okra	1%	1%	1%	2%	1%
Hot pepper	1%	1%	1%	2%	2%
Other vegetables	0%	0%	1%	2%	1%
Cotton	17%	15%	25%	22%	13%
Other crops	5%	5%	9%	8%	10%
Total	100%	100%	100%	100%	100%
Area (ha)	2.97	4.16	4.04	5.20	5.00

Source: IFPRI-LARES Small Farmer Survey.
Note: Intercropped area divided equally among crops

Table 4.1.107-Proportion of households growing each crop by farm size category

	Farm size category (quintile)				
	Smallest	**2**	**3**	**4**	**Largest**
Maize	75%	91%	92%	97%	97%
Sorghum/millet	11%	26%	27%	42%	46%
Rice	.	5%	6%	11%	16%
Cowpeas	30%	44%	50%	55%	75%
Groundnuts	13%	22%	23%	33%	50%
Manioc	53%	65%	65%	57%	63%
Yams	11%	27%	29%	43%	62%
Sweet potatoes	6%	10%	4%	3%	4%
Tomatoes	10%	21%	23%	20%	33%
Okra	4%	11%	19%	27%	46%
Hot pepper	25%	11%	13%	11%	27%
Other vegetables	23%	4%	9%	12%	20%
Cotton	7%	21%	31%	46%	70%
Other crops	11%	17%	27%	31%	38%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.108-Area allocation by crop and farm size category

	Farm size category (quintile)				
	Smallest	**2**	**3**	**4**	**Largest**
Maize	42%	52%	44%	40%	30%
Sorghum/millet	4%	5%	5%	7%	6%
Rice	.	0%	0%	1%	1%
Cowpeas	11%	8%	6%	6%	8%
Groundnuts	5%	4%	4%	6%	6%
Manioc	13%	11%	11%	9%	9%
Yams	4%	3%	2%	3%	2%
Sweet potatoes	1%	0%	0%	0%	0%
Tomatoes	2%	2%	3%	2%	1%
Okra	0%	1%	1%	2%	1%
Hot pepper	4%	1%	1%	1%	2%
Other vegetables	4%	0%	1%	1%	1%
Cotton	5%	9%	13%	17%	23%
Other crops	4%	3%	6%	7%	9%
Total	100%	100%	100%	100%	100%
Area (ha)	.65	1.99	3.11	5.20	10.36

Source: IFPRI-LARES Small Farmer Survey.
Note: Intercropped area divided equally among crops.

Table 4.1.109-Summary of marketing patterns by crop

	Share of households growing (%)	Share of growers selling (%)	Share of households selling (%)	Value of production (1000 F/farm)	Value of sales (1000 F/farm)	Sales as percentage of production
Maize	89%	66%	58%	237	109	46%
Sorghum/millet	36%	34%	13%	37	4	11%
Rice	7%	69%	5%	4	1	43%
Cowpeas	48%	66%	32%	33	17	53%
Groundnuts	27%	95%	26%	31	23	74%
Manioc	35%	76%	27%	154	129	84%
Yams	34%	54%	18%	97	10	11%
Sweet potatoes	5%	67%	3%	2	1	71%
Tomatoes	19%	97%	19%	26	23	91%
Okra	17%	69%	12%	4	2	69%
Hot pepper	14%	93%	13%	10	8	85%
Other vegetables	14%	88%	12%	21	20	95%
Cotton	34%	100%	34%	192	192	100%
Other crops	20%	75%	15%	27	23	85%
Total	.	.	.	880	570	65%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.110-Marketed share of output by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Average
Maize	18%	69%	21%	30%	36%	49%	46%
Sorghum/millet	15%	.	7%	.	.	31%	11%
Rice	41%	.	47%	.	50%	21%	43%
Cowpeas	36%	70%	36%	56%	58%	56%	53%
Groundnuts	68%	87%	71%	70%	83%	73%	74%
Manioc	20%	89%	28%	73%	65%	83%	84%
Yams	11%	0%	8%	42%	10%	19%	11%
Sweet potatoes	0	0%	100%	2%	93%	77%	68%
Tomatoes	56%	90%	78%	91%	95%	65%	91%
Okra	23%	.	58%	88%	96%	47%	69%
Hot pepper	31%	94%	91%	93%	89%	61%	85%
Other vegetables	0%	.	41%	98%	78%	73%	95%
Cotton	100%	.	100%	98%	100%	100%	100%
Other crops	37%	100%	81%	92%	94%	79%	85%
Sales as % of output	43%	82%	50%	64%	63%	71%	65%
Average % sold	27%	75%	47%	49%	52%	58%	50%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.111-Marketed share of output by sex of household head

	Sex of household head		
	Male	Female	Average
Maize	46%	56%	46%
Sorghum/millet	11%	0%	11%
Rice	43%	.	43%
Cowpeas	53%	46%	53%
Groundnuts	73%	75%	74%
Manioc	84%	85%	84%
Yams	11%	25%	11%
Sweet potatoes	71%	.	71%
Tomatoes	91%	75%	91%
Okra	69%	55%	69%
Hot pepper	86%	66%	85%
Other vegetables	95%	77%	95%
Cotton	100%	100%	100%
Other crops	85%	91%	85%
Sales as % of output	64%	75%	65%
Average % sold	50%	57%	50%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.112-Marketed share of output by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Average**
Maize	36%	38%	41%	44%	60%	46%
Sorghum/millet	6%	11%	9%	13%	16%	11%
Rice	30%	55%	42%	38%	45%	43%
Cowpeas	46%	44%	42%	56%	64%	53%
Groundnuts	63%	74%	73%	76%	73%	74%
Manioc	73%	80%	85%	86%	86%	84%
Yams	8%	10%	9%	12%	18%	11%
Sweet potatoes	66%	65%	76%	66%	74%	71%
Tomatoes	93%	91%	92%	86%	92%	91%
Okra	61%	74%	75%	55%	77%	69%
Hot pepper	88%	92%	91%	73%	90%	85%
Other vegetables	97%	74%	97%	92%	84%	95%
Cotton	100%	100%	100%	100%	100%	100%
Other crops	82%	64%	84%	78%	93%	85%
Sales as % of output	60%	56%	62%	65%	74%	65%
Average % sold	40%	46%	52%	51%	60%	50%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.113-Marketed share of output by farm size category

	Farm size category (quintile)					
	Smallest	**2**	**3**	**4**	**Largest**	**Average**
Maize	22%	44%	46%	45%	50%	46%
Sorghum/millet	8%	6%	10%	12%	12%	11%
Rice	.	34%	44%	32%	48%	43%
Cowpeas	45%	48%	45%	45%	57%	53%
Groundnuts	71%	76%	69%	72%	75%	74%
Manioc	83%	86%	85%	80%	86%	84%
Yams	6%	7%	8%	16%	11%	11%
Sweet potatoes	62%	81%	77%	87%	49%	71%
Tomatoes	86%	89%	91%	95%	90%	91%
Okra	63%	76%	72%	77%	52%	69%
Hot pepper	87%	87%	84%	91%	82%	85%
Other vegetables	98%	86%	96%	55%	68%	95%
Cotton	100%	100%	99%	100%	100%	100%
Other crops	94%	75%	93%	85%	83%	85%
Sales as % of output	64%	59%	64%	61%	68%	65%
Average % sold	42%	46%	48%	51%	59%	50%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.114-Marketed share of output for cotton growers and other farmers

	Type of farm		
	Cotton growers	Other farmers	Average
Maize	64%	59%	64%
Sorghum/millet	42%	46%	48%
Rice	64%	59%	64%
Cowpeas	42%	46%	48%
Groundnuts	64%	59%	64%
Manioc	42%	46%	48%
Yams	64%	59%	64%
Sweet potatoes	42%	46%	48%
Tomatoes	64%	59%	64%
Okra	42%	46%	48%
Hot pepper	64%	59%	64%
Other vegetables	42%	46%	48%
Cotton	64%	59%	64%
Other crops	42%	46%	48%
Sales as % of output	65%	65%	65%
Average % sold	55%	46%	50%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.115-Distribution of households by marketed share of crop production

Marketed share of output (%)	Percentage of farm households
0-10	11%
11-20	7%
21-30	9%
31-40	8%
41-50	9%
51-60	12%
61-70	12%
71-80	15%
81-90	10%
91-100	6%
Total	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.116-Descriptive statistics

Variable	Obs	Mean	Std. Dev	Min	Max
lnexppc	899	11.42784	.5208458	9.759819	13.87848
mktsurp	899	49.925	26.79296	0	100
change	899	2.29366	.8537053	1	3
hhsize	899	8.958843	4.958792	1	40
under15p	899	.4508652	1922644	0	.8571429
over65p	899	.0328324	1050383	0	1
femhead	899	.0433815	2038278	0	1
agehead	899	46.42158	13.83281	0	95
age2	899	2346.097	1384.6	0	9025
edhead	899	1.69188	3.318916	0	19
lithead	899	.2313682	4219419	0	1
spouse	899	.8932147	309012	0	1
edsps	899	.3784946	1.499432	0	16
litsps	899	.6889816	3765098	0	1
fsize1	899	3.809033	4.097106	0	50.35997
fsize2	899	.8868974	1.594825	0	12.02479
cotton	899	.4393771	4965875	0	1
irrig	899	.0200222	1401542	0	1
basfond	899	.1290323	3354222	0	1
connect	899	.3303671	4706071	0	1
fon	899	.2013348	4012209	0	1
gv	899	.5116796	5001418	0	1
tontine	899	.5439377	.498343	0	1
coop	899	.2602892	.4390366	0	1
extcont	899	.1913237	.3935622	0	1
distroad	888	5.792925	13.21275	0	100
distsp	898	18.52171	17.64196	0	120
distpave	898	28.83536	32.98809	0	140
goodflor	899	.4404894	4967222	0	1
goodwall	899	.0678532	.2516338	0	1
goodroof	899	.6674082	.4714039	0	1
goodwatr	899	.1913237	.3935622	0	1
electric	899	.0378198	.1908664	0	1
chair	899	.5784205	.4940868	0	1
bed	899	.5951057	.4911448	0	1
table	899	.6040044	.4893357	0	1
radio	899	.5684093	.4955738	0	1
tv	899	.0444939	.2063044	0	1
bike	899	.7107898	.4536481	0	1
mbike	899	.2625139	.4402453	0	1
dpt1	899	.1501669	.3574337	0	1
dpt3	899	.269188	.4437847	0	1
dpt4	899	.1001112	.3003153	0	1
dpt5	899	.1902113	.3926863	0	1
dpt6	899	.1902113	.3926863		

Table 4.1.117-Regression for market

mktsurp	Coef.	Std. Err.	t	P>|t|	95% Conf. Interval	
lnexppc	2.342816	1.653593	1.42	0.157	-.9027834	5.588415
hhsize	-.4830476	.2039495	-2.37	0.018	-.8833507	-.0827445
under15p	3.573701	4.151387	0.86	0.390	-4.574455	11.72186
over65p	-23.39178	7.666943	-3.05	0.002	-38.44012	-8.34345
femhead	-1.305981	4.120266	-0.32	0.751	-9.393056	6.781093
agehead	.0473332	.2904433	0.16	0.871	-.522736	.6174025
age2	-.0001902	.0029354	-0.06	0.948	-.0059518	.0055713
edhead	-.0535772	.4518079	-0.12	0.906	-.9403657	.8332114
lithead	3.203497	3.159042	1.01	0.311	-2.996929	9.403924
spouse	-6.445677	3.688122	-1.75	0.081	-13.68456	.7932041
edsps	-.1496231	.541652	-0.28	0.782	-1.212753	.9135073
litsps	-.8453692	2.673113	-0.32	0.752	-6.092036	4.401298
fsize1	1.087633	.2243764	4.85	0.000	.6472375	1.528029
fsize2	2.496011	.5518592	4.52	0.000	1.412846	3.579175
cotton	17.51794	2.389311	7.33	0.000	12.8283	22.20757
irrig	27.5205	5.283764	5.21	0.000	17.14977	37.89124
basfond	3.780614	2.335456	1.62	0.106	-.8033155	8.364544
connect	1.146439	1.554952	0.74	0.461	-1.905553	4.19843
fon	-4.235055	2.298833	-1.84	0.066	-8.747102	.2769913
gv	5.013865	2.18928	2.29	0.022	.7168426	9.310887
tontine	3.699041	1.645559	2.25	0.025	.4692116	6.92887
coop	1.117093	1.719995	0.65	0.516	-2.258838	4.493023
extcont	.4923875	1.86597	0.26	0.792	-3.170056	4.154831
distsp	-.0491041	.0446473	-1.10	0.272	-.1367358	.0385277
distroad	.0040265	.0624312	0.06	0.949	-.1185107	.1265636
distpave	.0020498	.0275648	0.07	0.941	-.0520531	.0561526
radio	3.200157	1.601023	2.00	0.046	.0577405	6.342573
tv	-2.021784	3.760542	-0.54	0.591	-9.402808	5.359241
bike	.5573723	1.679772	0.33	0.740	-2.739609	3.854353
mbike	.0622795	1.851583	0.03	0.973	-3.571926	3.696485
dpt1	-49.84899	3.533821	-14.11	0.000	-56.78502	-42.91296
dpt3	-43.70596	3.617778	-12.08	0.000	-50.80677	-36.60515
dpt4	-32.88928	3.40562	-9.66	0.000	-39.57368	-26.20488
dpt5	-23.94695	3.030601	-7.90	0.000	-29.89528	-17.99862
dpt6	-28.30028	3.247713	-8.71	0.000	-34.67475	-21.92582
_cons	42.03238	21.30498	1.97	0.049	.2159167	83.84884

Source	SS	df	MS
Model	290083.917	35	8288.11191
Residual	346966.722	851	407.716478
Total	637050.639	886	719.01878

Number of obs = 887
F(35, 851) = 20.33
Prob > F = 0.0000
R-squared = 0.4554
Adj R-squared = 0.4330
Total Root MSE = 20.192

Table 4.1.118-Distribution of sales volume by crop and month

	Maize	Sorghum/ millet	Cowpeas	Manioc	Yams	Cotton	Other	Total
January	6%	10%	10%	1%	8%	50%	6%	21%
February	8%	10%	6%	9%	17%	39%	13%	21%
March	18%	7%	17%	7%	15%	3%	7%	8%
April	18%	20%	13%	41%	9%	0%	7%	15%
May	13%	11%	6%	19%	9%	.	6%	8%
June	10%	19%	3%	7%	1%	.	8%	5%
July	2%	6%	5%	6%	2%	.	10%	4%
August	3%	8%	12%	6%	4%	.	14%	5%
September	3%	2%	4%	3%	14%	.	9%	3%
October	5%	.	4%	0%	5%	.	6%	2%
November	3%	.	6%	1%	2%	0%	7%	2%
December	12%	7%	13%	2%	13%	7%	7%	7%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.119-Change in quantity sold since 1992 by crop

	Maize	Sorghum/ millet	Cowpeas	Manioc	Yams	Cotton	Other	Total
Sales increased	39%	27%	33%	36%	35%	65%	41%	40%
Sales decreased	37%	12%	37%	28%	25%	16%	22%	26%
No change	21%	27%	27%	30%	31%	13%	28%	25%
Not applicable	3%	34%	3%	6%	10%	6%	9%	9%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.120-Change in the type of buyer since 1992 by crop

More sales to:	Maize	Sorghum/ millet	Cowpeas	Manioc	Yams	Cotton	Other	Total
Private traders	11%	30%	15%	6%	16%	0%	15%	13%
SONAPRA	0%				0%	0%		0%
Mills			0%	0%	0%		0%	0%
Coop/GV				0%				0%
Friends/familiy	0%	1%	0%	0%	2%		1%	0%
Others	0%		1%	2%	5%		4%	2%
No change	88%	69%	84%	91%	76%	100%	80%	85%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.121-Perceived change in number of buyers of crops by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Better	86%	2%	73%	20%	76%	47%	51%
No change	1%	89%	12%	65%	5%	20%	30%
Worse	1%		4%	0%	7%	28%	8%
No opinion	7%	4%	9%	9%	3%	3%	6%
Not applicable	6%	6%	3%	5%	9%	2%	5%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.122-Perceived change in number of buyers of crops by sex of head

	Sex of household head		
	Male	Female	Total
Better	51%	44%	51%
No change	30%	37%	30%
Worse	8%	12%	8%
No opinion	6%	4%	6%
Not applicable	5%	2%	5%
Total	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.123-Perceived change in number of buyers of crops by expenditure category

	Expenditure category (quintile)					
	Poorest	2	3	4	Richest	Total
Better	62%	58%	54%	44%	36%	51%
No change	27%	27%	29%	35%	33%	30%
Worse	2%	6%	7%	10%	16%	8%
No opinion	7%	3%	7%	6%	6%	6%
Not applicable	2%	6%	4%	5%	8%	5%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.124-Perceived change in volatility of crop prices by department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Better	78%	2%	41%	6%	13%	31%	27%
No change	5%	36%	31%	79%	66%	30%	43%
Worse	2%	2%	4%	4%	8%	32%	10%
No opinion	10%	54%	22%	6%	4%	5%	15%
Not applicable	6%	6%	3%	5%	9%	2%	5%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.125-Perceived change in volatility of crop prices by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Better	35%	33%	33%	25%	12%	27%
No change	42%	47%	47%	39%	38%	43%
Worse	5%	8%	5%	15%	19%	10%
No opinion	16%	7%	11%	15%	23%	15%
Not applicable	2%	6%	4%	5%	8%	5%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.126-Perceived change in availability of market information by department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Better	86%	2%	42%	38%	42%	22%	37%
No change	3%	76%	37%	54%	46%	42%	43%
Worse	1%	0%	5%		1%	31%	8%
No opinion	4%	16%	14%	2%	3%	3%	6%
Not applicable	6%	6%	3%	5%	9%	2%	5%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.127-Perceived change in road conditions by department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Better	72%	0%	23%	49%	33%	13%	31%
No change	6%	0%	19%	33%	30%	39%	24%
Worse	18%	92%	54%	12%	26%	46%	40%
No opinion		2%	1%	0%	6%	1%	2%
Not applicable	4%	6%	3%	5%	5%	2%	4%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.128-Perceived change in road conditions by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Better	41%	36%	33%	24%	20%	31%
No change	27%	30%	28%	22%	12%	24%
Worse	29%	28%	37%	47%	59%	40%
No opinion	1%	2%		3%	3%	2%
Not applicable	2%	4%	3%	4%	7%	4%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.129-Types of storage used and total capacity by department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Pct. using a grainery	94%	78%	83%	57%	46%	51%	65%
Pct. using a storeroom	14%	2%	45%	0%	9%	47%	21%
Pct. using their house	20%	75%	36%	55%	54%	65%	52%
Pct. using any storage	100%	100%	100%	73%	90%	100%	93%
Average capacity (mt)	3.25	1.35	55.13	1.68	4.77	39.52	19.61
Median capacity (mt)	3.00	1.00	6.00	1.20	2.00	10.00	2.80

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.130-Types of storage used and total capacity by sex of head

	Sex of household head		
	Male	**Female**	**Total**
Pct. using a grainery	66%	49%	65%
Pct. using a storeroom	22%	16%	21%
Pct. using their house	51%	73%	52%
Pct. using any storage	93%	96%	93%
Average capacity (mt)	19.84	14.59	19.61
Median capacity (mt)	2.70	4.30	2.80

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.131-Types of storage used and total capacity by farm size category

	Farm size category (quintile)					
	Smallest	**2**	**3**	**4**	**Largest**	**Total**
Pct. using a grainery	30%	69%	69%	77%	81%	65%
Pct. using a storeroom	9%	17%	16%	19%	45%	21%
Pct. using their house	53%	65%	50%	43%	47%	52%
Pct. using any storage	74%	98%	95%	98%	100%	93%
Average capacity (mt)	3.13	40.67	3.51	8.88	34.14	19.61
Median capacity (mt)	1.20	1.50	1.90	3.00	7.50	2.80

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.132-Percent of households storing each crop

Maize	4%
Sorghum/millet	2%
Rice	1%
Cowpeas	6%
Groundnuts	1%
Manioc	14%
Yams	3%
Cotton	0%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.133-Storage losses and period of storage by crop

		Storage period (months)	
	Storage losses (percent)	**Average**	**Median**
Maize	4%	8.7	9.0
Sorghum/millet	2%	7.8	8.0
Rice	1%	5.8	5.0
Cowpeas	6%	6.2	5.0
Groundnuts	1%	6.2	6.0
Manioc	14%	7.0	6.0
Yams	3%	6.2	6.0
Cotton	0%	1.4	1.0

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.134-Main reason for storing each crop

	Crop							
	Maize	**Sorghum/ millet**	**Cowpeas**	**Manioc**	**Yams**	**Cotton**	**Other**	**Total**
Seeds	0%	1%	1%		10%		4%	2%
Later consumption	68%	92%	62%	90%	84%	1%	29%	65%
Source of cash	6%	5%	12%	2%	2%		25%	8%
To sell at higher price	25%	2%	25%	8%	3%	1%	38%	18%
Not able to sell	0%	0%	0%	0%	0%	98%	1%	7%
Other	0%	0%	1%		1%		3%	1%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.135-Main reason for storing crops by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Seeds	3%		1%	3%	6%	1%	2%
Later consumption	87%	30%	81%	75%	66%	38%	65%
Source of cash	4%	6%	6%	3%	9%	13%	8%
To sell at higher price	3%	64%	9%	14%	14%	29%	18%
Not able to sell	1%	0%	4%	4%	4%	18%	7%
Other	1%		0%	0%	0%	2%	1%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.136-Main reason for storing crops by crop by expenditure category

	Expenditure category (quintile)					
	Poorest	2	3	4	Richest	Total
Seeds	2%	2%	2%	2%	1%	2%
Later consumption	80%	67%	67%	57%	50%	65%
Source of cash	4%	10%	7%	13%	6%	8%
To sell at higher price	9%	13%	14%	20%	36%	18%
Not able to sell	4%	7%	9%	8%	8%	7%
Other	0%	1%	1%	1%	0%	1%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.137-Summary of expenditure by department (FCFA/year)

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Household expenditure							
Purchased food	140,885	304,256	166,693	175,245	321,680	224,976	223,168
Home-produced food	274,117	150,741	468,757	158,746	103,103	218,852	225,020
Non-food purchases	180,626	450,933	307,124	216,274	387,080	469,241	342,507
Rental equivalent	61,428	50,686	74,749	22,901	76,694	57,426	56,957
Total	657,056	956,616	1,017,323	573,166	888,557	970,495	847,651
Per capita expenditure	84,672	139,290	94,803	88,034	116,479	110,108	105,203
Share of expenditure on food	63%	48%	62%	58%	48%	46%	53%
Share of expenditure from home production	42%	16%	46%	28%	12%	23%	27%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.138-Summary of expenditure by sex of head (FCFA/year)

	Sex of household head		
	Male	**Female**	**Total**
Household expenditure			
Purchased food	226,523	158,595	223,168
Home-produced food	231,018	109,576	225,020
Non-food purchases	345,791	279,312	342,507
Rental equivalent	57,636	43,881	56,957
Total	860,967	591,365	847,651
Per capita expenditure	105,515	99,200	105,203
Share of expenditure on food	53%	45%	53%
Share of expenditure from home production	27%	19%	27%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.139-Summary of expenditure by farm size category (FCFA/year)

	Farm size category (quintile)					
	Smallest	**2**	**3**	**4**	**Largest**	**Total**
Household expenditure						
Purchased food	239,861	207,937	218,151	216,393	233,931	223,168
Home-produced food	82,306	141,000	193,042	262,753	441,053	225,020
Non-food purchases	239,912	280,680	300,769	356,731	529,997	342,507
Rental equivalent	61,450	40,194	47,678	58,698	76,768	56,957
Total	623,530	669,811	759,640	894,574	1,281,749	847,651
Per capita expenditure	103,161	105,125	107,266	100,384	109,991	105,203
Share of expenditure on food	52%	52%	54%	54%	53%	53%
Share of expenditure from home production	13%	21%	25%	29%	34%	27%

Source: IFPRI-LARES Small Farmer Survey

Table 4.1.140-Summary of food expenditure patterns

	Expenditure (FCFA/ household)	Expenditure (FCFA/ person)	Share of total food expenditure (%)	Pct. of households consuming (%)
Maize	85,575	10,185	19%	97%
Sorghum/millet	27,939	2,919	6%	33%
Rice	20,052	2,508	4%	82%
Beans/cowpeas	20,650	2,526	5%	90%
Groundnuts	8,230	1,053	2%	53%
Cassava flour	20,015	2,587	4%	79%
Cassava	9,918	1,138	2%	61%
Yams	29,169	3,104	7%	71%
Tomato	21,325	2,984	5%	92%
Onion	7,707	1,086	2%	97%
Other vegetables	15,159	2,079	3%	80%
Meat	31,158	3,828	7%	88%
Fish	29,913	4,157	7%	92%
Dairy products	11,959	1,367	3%	40%
Condiments	19,321	2,620	4%	97%
Sugar	5,903	725	1%	76%
Cooking oil	20,906	2,794	5%	97%
Meals outside home	21,690	2,698	5%	64%
Other food	22,758	2,869	5%	86%
Non-alcoholic drinks	4,782	640	1%	29%
Alcoholic drinks	14,059	2,045	3%	60%
Total	448,187	55,912	100%	.

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.141-Food consumption by source (percent of commodity total)

	Percent purchased	Percent home produced	Total
Maize	22%	78%	100%
Sorghum/millet	6%	94%	100%
Rice	85%	15%	100%
Beans/cowpeas	52%	48%	100%
Groundnuts	29%	71%	100%
Cassava flour	56%	44%	100%
Cassava	13%	87%	100%
Yams	13%	87%	100%
Tomato	39%	61%	100%
Onion	86%	14%	100%
Other vegetables	31%	69%	100%
Meat	57%	43%	100%
Fish	94%	6%	100%
Dairy products	41%	59%	100%
Condiments	100%	0%	100%
Sugar	100%	0%	100%
Cooking oil	65%	35%	100%
Meals outside home	100%	0%	100%
Other food	38%	62%	100%
Non-alcoholic drinks	100%	0%	100%
Alcoholic drinks	83%	17%	100%
Total	50%	50%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.142-Percent of households obtaining food from different sources

	Pct. of households buying (%)	Pct. of households producing for own use (%)	Pct. of households consuming (%)
Maize	40%	88%	97%
Sorghum/millet	9%	29%	33%
Rice	76%	9%	82%
Beans/cowpeas	53%	50%	90%
Groundnuts	30%	24%	53%
Cassava flour	55%	39%	79%
Cassava	12%	52%	61%
Yams	34%	39%	71%
Tomato	71%	46%	92%
Onion	92%	7%	97%
Other vegetables	56%	47%	80%
Meat	70%	54%	88%
Fish	90%	9%	92%
Dairy products	36%	4%	40%
Condiments	97%	1%	97%
Sugar	76%	0%	76%
Cooking oil	80%	27%	97%
Meals outside home	64%	0%	64%
Other food	74%	56%	86%
Non-alcoholic drinks	29%	0%	29%
Alcoholic drinks	54%	12%	60%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.143-Food consumption by department (percent of household total)

	Department					
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**
Maize	11%	9%	20%	32%	21%	19%
Sorghum/millet	15%	0%	18%	0%	0%	2%
Rice	3%	5%	2%	4%	7%	5%
Beans/cowpeas	3%	9%	2%	4%	5%	5%
Groundnuts	3%	2%	0%	1%	1%	4%
Cassava flour	1%	6%	1%	6%	7%	6%
Cassava	3%	1%	3%	1%	1%	3%
Yams	16%	3%	12%	1%	2%	6%
Tomato	4%	7%	2%	8%	6%	3%
Onion	2%	2%	1%	2%	2%	1%
Other vegetables	3%	4%	3%	5%	3%	3%
Meat	7%	10%	5%	5%	5%	9%
Fish	3%	8%	1%	10%	13%	6%
Dairy products	2%	1%	8%	0%	1%	1%
Condiments	4%	10%	2%	5%	2%	5%
Sugar	1%	1%	1%	2%	1%	2%
Cooking oil	3%	5%	5%	3%	7%	5%
Meals outside home	5%	4%	6%	2%	3%	7%
Other food	9%	3%	5%	4%	5%	5%
Non-alcoholic drinks	0%	4%	0%	0%	2%	1%
Alcoholic drinks	4%	7%	1%	4%	3%	3%
Total	100%	100%	100%	100%	100%	100%
Value (FCFA/household)	415,000	454,995	635,448	333,992	424,783	443,830

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.144-Food consumption by expenditure category (percent of household total)

	Expenditure category (quintile)				
	Poorest	**2**	**3**	**4**	**Richest**
Maize	24%	22%	23%	20%	12%
Sorghum/millet	9%	6%	7%	8%	3%
Rice	3%	5%	3%	4%	6%
Beans/cowpeas	4%	4%	4%	4%	5%
Groundnuts	2%	2%	1%	2%	2%
Cassava flour	4%	6%	4%	4%	4%
Cassava	3%	3%	2%	2%	2%
Yams	9%	7%	8%	6%	4%
Tomato	4%	5%	4%	4%	6%
Onion	2%	2%	2%	2%	2%
Other vegetables	4%	3%	3%	3%	4%
Meat	5%	6%	7%	7%	8%
Fish	6%	6%	6%	5%	9%
Dairy products	1%	1%	2%	2%	5%
Condiments	4%	4%	5%	4%	5%
Sugar	1%	1%	1%	1%	1%
Cooking oil	4%	5%	5%	4%	5%
Meals outside home	3%	5%	5%	5%	5%
Other food	4%	4%	4%	7%	6%
Non-alcoholic drinks	0%	0%	1%	1%	2%
Alcoholic drinks	3%	3%	3%	2%	4%
Total	100%	100%	100%	100%	100%
Value (FCFA/household)	291,790	450,290	403,925	486,835	608,060

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.145-Summary of non-food expenditure patterns

	Expenditure (FCFA/household	**Expenditure (FCFA/person)**	**Percent of total**
Clothing	55,038	6,660	16%
Housing	27,988	3,029	8%
Household goods	33,914	4,423	10%
Energy	14,185	1,870	4%
Health	39,100	4,802	11%
Education	12,305	1,349	4%
Transportation	36,928	4,731	11%
Social events	60,820	7,552	18%
Leisure and other	62,228	7,917	18%
Total	342,507	42,333	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.146-Non-food expenditures by department (percent and FCFA/household/year)

	Department					
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou
Clothing	15%	12%	22%	17%	15%	17%
Housing	7%	12%	9%	3%	6%	9%
Household goods	11%	9%	12%	9%	9%	10%
Energy	6%	3%	4%	6%	5%	3%
Health	5%	17%	8%	10%	9%	14%
Education	3%	2%	3%	6%	5%	4%
Transportation	5%	19%	5%	12%	11%	9%
Social events	20%	19%	17%	25%	13%	17%
Leisure and other	27%	8%	20%	12%	27%	17%
Total	100%	100%	100%	100%	100%	100%
Value (FCFA/household)	180,625	450,931	307,123	216,275	387,079	469,243

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.147-Non-food expenditures by sex of household head (percent and FCFA/household/year)

	Sex of household head	
	Male	Female
Clothing	16%	19%
Housing	8%	10%
Household goods	10%	13%
Energy	4%	4%
Health	11%	11%
Education	4%	4%
Transportation	11%	10%
Social events	18%	18%
Leisure and other	18%	11%
Total	100%	100%
Value (FCFA/household)	345,790	279,317

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.148-Non-food expenditures by expenditure category (percent and FCFA/household/year)

	Expenditure category (quintile)				
	Poorest	2	3	4	Richest
Clothing	25%	21%	18%	18%	11%
Housing	1%	3%	7%	5%	13%
Household goods	13%	13%	12%	11%	7%
Energy	8%	6%	5%	4%	3%
Health	12%	12%	9%	14%	11%
Education	4%	6%	4%	3%	3%
Transportation	7%	6%	10%	11%	13%
Social events	16%	19%	21%	18%	17%
Leisure and other	14%	14%	15%	17%	22%
Total	100%	100%	100%	100%	100%
Value (FCFA/household)	130,507	222,050	284,389	340,320	736,744

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.149-Results of regression analysis of per capita expenditure

lnexppc	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
hhsize	-.0406988	.0039601	-10.28	0.000	-.0484714	-.0329262
under15p	-.4329865	.0840464	-5.15	0.000	-.5979469	-.2680261
over65p	.0552481	.1593503	0.35	0.729	-.2575135	.3680097
femhead	-.1619898	.0856008	-1.89	0.059	-.330001	.0060213
agehead	.0009161	.0060259	0.15	0.879	-.0109111	.0127434
age2	-.0000142	.0000608	-0.23	0.816	-.0001335	.0001051
edhead	.0288329	.009173	3.14	0.002	.0108287	.046837
lithead	-.0639197	.0646628	-0.99	0.323	-.1908352	.0629958
spouse	-.070357	.0762074	-0.92	0.356	-.2199314	.0792175
edsps	.0105675	.0111089	0.95	0.342	-.0112363	.0323713
litsps	-.0339426	.0553908	-0.61	0.540	-.1426597	.0747745
fsize1	.0260696	.0045434	5.74	0.000	.0171521	.0349871
fsize2	.0323311	.0113619	2.85	0.005	.0100307	.0546315
cotton	-.0193509	.0483013	-0.40	0.689	-.1141533	.0754514
irrig	.0292616	.1106171	0.26	0.791	-.1878497	.246373
basfond	.228785	.0470573	4.86	0.000	.1364242	.3211458
connect	.0364873	.0316192	1.15	0.249	-.0255727	.0985473
fon	-.0454943	.0471972	-0.96	0.335	-.1381295	.047141
gv	.0333456	.0443694	0.75	0.453	-.0537395	.1204307
tontine	.0167991	.0336968	0.50	0.618	-.0493386	.0829368
coop	-.0537258	.0346418	-1.55	0.121	-.1217183	.0142667
extcont	-.0398267	.0375991	-1.06	0.290	-.1136236	.0339701
goodflor	.04695	.0352515	1.33	0.183	-.0222391	.1161392
goodwall	.1930705	.0618704	3.12	0.002	.0716357	.3145053
goodroof	-.0079116	.0365781	-0.22	0.829	-.0797045	.0638812
goodwatr	.0310831	.0377491	0.82	0.411	-.0430082	.1051744
electric	.0622505	.0850837	0.73	0.465	-.1047457	.2292467
chair	.006915	.0368393	0.19	0.851	-.0653906	.0792205
bed	.0652272	.0366733	1.78	0.076	-.0067525	.137207
table	.1097689	.0392198	2.80	0.005	.0327911	.1867466
radio	.110775	.0336198	3.29	0.001	.0447884	.1767616
tv	.1487136	.0794283	1.87	0.062	-.007182	.3046099
bike	.0327626	.0346776	0.94	0.345	-.0353002	.1008253
mbike	.0945837	.0384352	2.46	0.014	.0191457	.1700216
dpt1	-.293085	.0724056	-4.05	0.000	-.4351977	-.1509724
dpt3	-.1665184	.074673	-2.23	0.026	-.3130812	-.0199555
dpt4	-.4866183	.0697797	-6.97	0.000	-.623577	-.3496595
dpt5	-.3951789	.0624593	-6.33	0.000	-.5177697	-.2725881
dpt6	-.2497067	.0658173	-3.79	0.000	-.3788883	-.1205251
_cons	11.87134	.1696002	70.00	0.000	11.53846	12.20422

Source	SS	df	MS
Model	94.129893	39	2.413587
Residual	149.479834	859	.174016104
Total	243.609727	898	.271280319

Number of obs = 899
F(39, 859) = 13.87
Prob > F = 0.0000
R-squared = 0.3864
Adj R-squared = 0.3585
Root MSE = .41715

Table 4.1.150-Measures of poverty for different household groups

		Percent of households	Incidence of poverty (P0)	Poverty gap (P1)
Department	Atacora	13%	42%	10%
	Atlantique	13%	6%	1%
	Borgou	16%	20%	3%
	Mono	18%	24%	4%
	Ouémé	18%	23%	6%
	Zou	22%	16%	3%
Sex of head of household	Male	95%	21%	5%
	Female	5%	21%	2%
Household size	1-5	26%	13%	2%
	6-10	46%	23%	4%
	More than 10	28%	27%	7%
Farm size category (quintile)	Smallest	20%	24%	6%
	2	21%	30%	7%
	3	20%	23%	4%
	4	19%	19%	3%
	Largest	20%	11%	3%
Market surplus	0 - 25%	24%	31%	7%
	26 - 50%	20%	30%	6%
	51 - 75%	30%	16%	3%
	76 - 100%	25%	12%	2%
Type of farm	Cotton growers	35%	20%	4%
	Other farmers	65%	22%	5%
Total		100%	21%	4%

Source: IFPRI-LARES Small Farmer Survey
Note: Based on updated ECVR poverty line of 79,155 FCFA/adult equivalent (see text)

Table 4.1.151.-Ownership of households assets

	Percent owning	Nbr. owned among owners	Nbr. owned including non-owners	Years owned	Value among owners (FCFA)	Value including non-owners (FCFA)
Chairs	60%	5.6	3.4	5.8	12,172	7,156
Tables	62%	1.7	1.1	5.7	7,066	4,140
Beds	63%	2.2	1.4	7.1	25,985	15,966
Other furniture	67%	4.1	2.8	5.1	13,145	8,446
Heater/oven	22%	2.2	.5	6.2	14,209	2,968
Radio/CD player	58%	1.5	.8	5.9	23,089	13,254
TV/VCR	5%	1.0	.0	3.7	102,032	4,834
Sewing machine	6%	1.2	.1	9.3	50,339	2,861
Bicycle	67%	1.5	1.0	8.9	46,275	30,624
Motorbike	26%	1.1	.3	7.5	311,341	78,809
Car/truck	1%	1.6	.0	5.3	3,320,298	42,565
Refrigerator	0%	1.2	.0	8.2	223,085	793
Other assets	44%	1.2	.6	4.3	209,202	92,616

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.152-Value of household assets (FCFA/household)

Chairs	7,156
Tables	4,140
Beds	15,938
Other furniture	8,444
Heater/oven	2,964
Radio/CD player	13,237
TV/VCR	4,834
Sewing machine	2,858
Bicycle	30,624
Motorbike	78,260
Car/truck	42,098
Refrigerator	792
Other assets	14,164
Total	225,510

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.153-Percent of households owning household assets by department

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Chairs	49%	64%	55%	43%	68%	77%	60%
Tables	45%	77%	48%	45%	78%	75%	62%
Beds	43%	65%	63%	80%	59%	64%	63%
Other furniture	60%	84%	47%	92%	79%	45%	67%
Heater/oven	12%	57%	20%	1%	6%	38%	22%
Radio/CD player	49%	54%	52%	46%	70%	70%	58%
TV/VCR	1%	4%	2%	2%	16%	3%	5%
Sewing machine	4%	2%	5%	3%	13%	7%	6%
Bicycle	77%	63%	74%	56%	52%	80%	67%
Motorbike	15%	26%	28%	10%	41%	29%	26%
Car/truck	0%	1%	0%	0%	2%	4%	1%
Refrigerator	0%	0%	1%	0%	1%	0%	0%
Other assets	100%	16%	97%	100%	28%	100%	44%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.154-Value of household assets by department (FCFA/household)

	Department					
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**
Chairs	4,715	8,279	5,485	3,595	10,401	9,459
Tables	1,918	5,575	4,123	1,574	5,843	5,382
Beds	7,435	11,083	28,451	9,911	13,767	21,613
Other furniture	1,357	7,580	7,323	12,592	8,747	10,262
Heater/oven	1,020	2,795	5,584	3	989	6,402
Radio/CD player	8,738	11,988	12,320	10,147	15,825	17,740
TV/VCR	82	6,648	4,119	1,073	15,678	1,421
Sewing machine	2,706	640	2,816	1,249	5,077	3,792
Bicycle	36,273	20,313	44,715	22,144	15,593	42,420
Motorbike	55,862	85,477	74,891	26,744	104,459	111,156
Car/truck	0	26,599	2,568	0	10,380	164,858
Refrigerator	0	0	2,841	0	1,919	0
Other assets	373	3,329	18,166	5,315	20,593	27,869
Total	120,478	190,306	213,404	94,346	229,271	422,375

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.155-Percent of households owning household assets by sex of head

	Sex of household head		
	Male	**Female**	**Total**
Chairs	60%	59%	60%
Tables	62%	62%	62%
Beds	63%	58%	63%
Other furniture	68%	57%	67%
Heater/oven	21%	38%	22%
Radio/CD player	59%	36%	58%
TV/VCR	5%	0%	5%
Sewing machine	6%	7%	6%
Bicycle	69%	34%	67%
Motorbike	27%	5%	26%
Car/truck	1%	2%	1%
Refrigerator	0%	0%	0%
Other assets	45%	0%	44%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.156-Value of household assets by sex of head (FCFA/household)

	Sex of household head	
	Male	**Female**
Chairs	7,267	5,020
Tables	4,171	3,544
Beds	16,285	9,267
Other furniture	8,482	7,720
Heater/oven	2,862	4,934
Radio/CD player	13,597	6,312
TV/VCR	5,085	0
Sewing machine	2,825	3,477
Bicycle	30,827	26,728
Motorbike	81,738	11,318
Car/truck	41,720	49,370
Refrigerator	834	0
Other assets	14,900	0
Total	230,592	127,690

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.157-Percent of households owning household assets by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Chairs	44%	55%	66%	64%	74%	60%
Tables	41%	57%	64%	68%	79%	62%
Beds	49%	56%	65%	71%	75%	63%
Other furniture	76%	66%	67%	67%	58%	67%
Heater/oven	12%	14%	17%	27%	39%	22%
Radio/CD player	43%	52%	59%	62%	75%	58%
TV/VCR	1%	4%	2%	6%	10%	5%
Sewing machine	7%	3%	6%	6%	7%	6%
Bicycle	65%	65%	72%	71%	62%	67%
Motorbike	11%	29%	23%	27%	38%	26%
Car/truck	0%	0%	1%	1%	5%	1%
Refrigerator	0%	0%	0%	0%	2%	0%
Other assets	23%	47%	46%	57%	49%	44%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.158-Value of household assets by expenditure category (FCFA/household)

	Expenditure category (quintile)				
	Poorest	**2**	**3**	**4**	**Richest**
Chairs	3,550	5,174	6,797	8,062	12,218
Tables	1,440	3,702	3,713	5,282	6,568
Beds	9,863	11,782	12,400	18,843	26,830
Other furniture	3,225	4,656	7,120	7,646	19,621
Heater/oven	1,388	2,720	2,237	4,268	4,205
Radio/CD player	6,391	10,227	11,978	16,983	20,630
TV/VCR	1,532	2,011	5,573	2,854	12,248
Sewing machine	3,043	1,243	3,368	3,345	3,304
Bicycle	26,121	30,220	31,102	36,430	29,237
Motorbike	31,092	67,047	74,226	85,398	133,702
Car/truck	0	2,010	13,855	13,368	181,788
Refrigerator	0	603	0	0	3,363
Other assets	4,671	21,720	3,033	23,648	17,605
Total	92,316	163,115	175,402	226,127	471,320

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.159-Source of assets

	Source				
	Purchased by husband	**Purchased by wife**	**Purchased jointly**	**Other**	**Total**
Chairs	79%	3%	12%	5%	100%
Tables	85%	1%	8%	6%	100%
Beds	83%	1%	12%	4%	100%
Other furniture	72%	12%	10%	6%	100%
Heater/oven	35%	58%	3%	4%	100%
Radio/CD player	92%	1%	4%	2%	100%
TV/VCR	99%			1%	100%
Sewing machine	72%	6%	13%	8%	100%
Bicycle	90%	1%	6%	4%	100%
Motorbike	97%		1%	2%	100%
Car/truck	93%	7%			100%
Refrigerator	100%				100%
Other assets	91%	1%	8%		100%
Total	82%	6%	8%	4%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.160-Housing characteristics by department

		Department						
		Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Walls	Brick/stone	2%	2%	1%	6%	18%	8%	7%
	Mud brick/mud	95%	97%	82%	53%	65%	90%	79%
	Cement	2%	1%	12%	21%	2%	1%	7%
	Other	2%	0%	4%	20%	15%	1%	7%
Total		100%	100%	100%	100%	100%	100%	100%
Floors	Dirt	62%	29%	70%	64%	25%	43%	49%
	Brick/stone	2%	3%	3%		2%	1%	2%
	Wood				2%	6%	1%	2%
	Cement/tiles	36%	69%	26%	34%	66%	56%	48%
Total		100%	100%	100%	100%	100%	100%	100%
Roof	Metal sheet	29%	83%	64%	80%	74%	86%	72%
	Straw	70%	16%	33%	19%	25%	14%	27%
	Other	0%	1%	4%	1%	0%		1%
Total		100%	100%	100%	100%	100%	100%	100%
Ownership	Own	99%	94%	95%	78%	70%	88%	86%
	Rent	1%	0%		5%	4%	1%	2%
	Use w/out pay		6%	5%	17%	26%	11%	12%
Total		100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.161-Housing characteristics by sex of head

		Sex of household head		
		Male	**Female**	**Total**
Walls	Brick/stone	7%	2%	7%
	Mud brick/mud	78%	93%	79%
	Cement	7%	3%	7%
	Other	8%	2%	7%
Total		100%	100%	100%
Floors	Dirt	49%	33%	49%
	Brick/stone	2%		2%
	Wood	2%		2%
	Cement/tiles	47%	67%	48%
Total		100%	100%	100%
Roof	Metal sheet	71%	82%	72%
	Straw	28%	16%	27%
	Other	1%	1%	1%
Total		100%	100%	100%
Ownership	Own	87%	71%	86%
	Rent	2%		2%
	Use w/out pay	11%	29%	12%
Total		100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.162-Housing characteristics by expenditure category

		Expenditure category (quintile)					
		Poorest	**2**	**3**	**4**	**Richest**	**Total**
Walls	Brick/stone	2%	5%	8%	6%	13%	7%
	Mud brick/mud	85%	79%	78%	79%	75%	79%
	Cement	6%	8%	7%	8%	5%	7%
	Other	8%	8%	7%	7%	7%	7%
Total		100%	100%	100%	100%	100%	100%
Floors	Dirt	65%	50%	49%	42%	36%	49%
	Brick/stone	2%	1%	1%	3%	2%	2%
	Wood		4%	2%	1%	2%	2%
	Cement/tiles	33%	45%	48%	54%	59%	48%
Total		100%	100%	100%	100%	100%	100%
Roof	Metal sheet	57%	76%	75%	75%	75%	72%
	Straw	42%	22%	24%	25%	24%	27%
	Other	1%	2%	1%	1%	1%	1%
Total		100%	100%	100%	100%	100%	100%
Ownership	Own	84%	86%	88%	84%	89%	86%
	Rent	4%	1%	2%	3%	1%	2%
	Use w/out pay	12%	13%	10%	14%	10%	12%
Total		100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.163-Main source of water and lighting by department

		Department						
		Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Water	Private tap	1%	3%	3%	38%	38%	12%	18%
	Purchased	3%	9%	4%	7%		10%	6%
	Covered private well	10%	10%	13%	30%	26%	9%	17%
	Open private well	40%	72%	38%	14%	9%	24%	30%
	Covered public well	4%		22%	2%	2%	12%	7%
	Open public well	42%	5%	20%	5%	21%	14%	17%
	River/lake				2%	1%	18%	4%
	Other	100%	100%	100%	100%	100%	100%	100%
Total		1%		4%		15%	0%	3%
Lighting	Electricity	95%	100%	96%	100%	85%	100%	96%
	Oil/kerosene lamp	4%		0%				1%
	Candles/wood	100%	100%	100%	100%	100%	100%	100%
Total		1%	3%	3%	38%	38%	12%	18%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.164-Main source of water and lighting by sex of head

		Sex of household head		
		Male	Female	Total
Water	Private tap	1%		1%
	Purchased	18%	13%	18%
	Covered private well	6%	5%	6%
	Open private well	17%	16%	17%
	Covered public well	30%	31%	30%
	Open public well	7%	13%	7%
	River/lake	17%	20%	17%
	Other	4%	3%	4%
Total		100%	100%	100%
Lighting	Electricity	4%		3%
	Oil/kerosene lamp	96%	99%	96%
	Candles/wood	1%	1%	1%
Total		100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.165-Main source of water and lighting by expenditure category

		Expenditure category (quintile)					
		Poorest	**2**	**3**	**4**	**Richest**	**Total**
Water	Private tap	1%	2%	1%	2%		1%
	Purchased	23%	23%	17%	11%	14%	18%
	Covered private well	5%	7%	3%	7%	6%	6%
	Open private well	15%	13%	18%	19%	20%	17%
	Covered public well	23%	22%	33%	37%	36%	30%
	Open public well	10%	6%	8%	4%	9%	7%
	River/lake	21%	24%	14%	14%	12%	17%
	Other	1%	3%	6%	8%	4%	4%
Total		100%	100%	100%	100%	100%	100%
Lighting	Electricity	1%	3%	3%	4%	7%	3%
	Oil/kerosene lamp	97%	96%	96%	96%	93%	96%
	Candles/wood	2%	1%	0%			1%
Total		100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.166-Frequency and nature of extension contact by department

	Department					
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**
Pct. household with agent in area	97%	59%	83%	71%	54%	66%
Average number of contacts in past year	.7	.3	.9	3.4	.6	.4
Pct. of households with contact in past year	22%	11%	23%	26%	13%	17%
Pct. of those contacted receiving assistance on...						
Input use	63%	14%	90%	42%	92%	91%
Production methods	81%	100%	94%	85%	91%	84%
Credit	9%	0%	42%	51%	80%	33%
Prices and markets	46%	4%	64%	0%	69%	36%
Crop marketing	9%	0%	45%	0%	52%	17%
Other assistance	14%	87%	23%	30%	64%	30%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.167-Frequency and nature of extension contact by expenditure category

	Expenditure category (quintile)					
	Poorest	**2**	**3**	**4**	**Richest**	**Total**
Pct. household with agent in area	70%	79%	74%	65%	64%	71%
Average number of contacts in past year	.6	.8	2.7	.7	.7	1.1
Pct. of households with contact in past year	16%	16%	29%	18%	14%	19%
Pct. of those contacted receiving assistance on...						
Input use	53%	75%	71%	67%	81%	70%
Production methods	87%	79%	86%	96%	91%	88%
Credit	40%	40%	37%	46%	39%	40%
Prices and markets	29%	39%	37%	43%	33%	37%
Crop marketing	19%	26%	19%	23%	18%	21%
Other assistance	23%	39%	43%	41%	20%	35%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.168-Frequency and nature of extension contact by farm size category

	Farm size category (quintile)					
	Smallest	**2**	**3**	**4**	**Largest**	**Total**
Pct. household with agent in area	69%	68%	72%	72%	72%	71%
Average number of contacts in past year	2.9	.6	.6	.7	.7	1.1
Pct. of households with contact in past year	20%	13%	17%	20%	23%	19%
Pct. of those contacted receiving assistance on...						
Input use	50%	71%	71%	74%	81%	70%
Production methods	85%	95%	91%	90%	81%	88%
Credit	64%	35%	38%	19%	42%	40%
Prices and markets	8%	47%	46%	35%	48%	37%
Crop marketing	1%	19%	31%	17%	34%	21%
Other assistance	34%	28%	38%	34%	37%	35%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.169-Frequency and nature of extension contact by sex of head

	Sex of household head		
	Male	**Female**	**Total**
Pct. household with agent in area	71%	65%	71%
Average number of contacts in past year	1.1	.1	1.1
Pct. of households with contact in past year	19%	5%	19%
Pct. of those contacted receiving assistance on...			
Input use	69%	84%	70%
Production methods	88%	100%	88%
Credit	40%	50%	40%
Prices and markets	36%	50%	37%
Crop marketing	21%	50%	21%
Other assistance	35%	21%	35%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.170-Source of information on seeds

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Extension service	32%	55%	23%	13%	23%	15%	25%
Friend/family	35%	38%	26%	45%	50%	43%	40%
Traders	0%		0%	36%	14%	0%	9%
Radio	5%	4%	6%	1%	8%	4%	5%
Research center		2%	1%		1%		0%
Coop/GV	23%	1%	43%			28%	16%
Ministry of Rural Development					0%		0%
Other	5%		0%	6%	3%	9%	4%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey

Table 4.1.171-Source of information on seeds

	Sex of household head		
	Male	Female	Total
Extension service	25%	14%	25%
Friend/family	39%	64%	40%
Traders	9%	1%	9%
Radio	5%		5%
Research center	0%		0%
Coop/GV	17%	16%	16%
Ministry of Rural Dev	0%		0%
Other	4%	5%	4%
Total	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.172-Source of information on fertilizers

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Extension service	28%	79%	23%	9%	46%	23%	32%
Friend/family	13%	14%	9%	30%	38%	23%	22%
Traders	1%			20%	1%		3%
Radio	1%	3%	6%		7%	5%	4%
Research center		2%					0%
Coop/GV	32%	1%	60%	33%		36%	29%
Ministry of Rural Dev				1%			0%
SONAPRA				3%		5%	2%
Other	26%		2%	3%	7%	8%	8%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.173-Source of information on pests and weed control

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Extension service	24%	62%	29%	25%	42%	21%	33%
Friend/family	14%	33%	16%	42%	31%	25%	27%
Traders						0%	0%
Radio	2%	2%	5%		14%	5%	5%
Research center		3%			1%	9%	2%
Coop/GV	26%	1%	45%	1%	1%	31%	19%
Other	34%		5%	32%	11%	9%	15%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey

Table 4.1.174-Source of information on crop production methods

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Extension service	33	53%	28%	27%	30%	13%	29%
Friend/family	34%	41%	27%	36%	46%	41%	38%
Radio	3%	3%	5%		11%	6%	5%
Research center		2%	1%		3%		1%
Coop/GV	24%	1%	38%			30%	16%
Other	6%		2%	37%	10%	10%	12%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.175-Source of information on crop prices and markets

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Extension service	4%		8%		1%		5%
Friend/family	61%	70%	31%	66%	26%	42%	48%
Traders	28%	2%	32%	31%	65%	45%	36%
Radio	0%	1%	10%	2%	7%	3%	4%
Coop/GV	3%		16%			9%	5%
Other	4%		3%		1%	2%	2%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey

Table 4.1.176-Source of information on agricultural policies

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Extension service	25%	58%	15%	31%	31%	8%	26%
Friend/family	22%	28%	7%	51%	38%	9%	24%
Traders		1%	0%		1%		0%
Radio		13%	9%	1%	23%	7%	10%
Coop/GV	28%		57%	9%	2%	37%	23%
Ministry of Rural Dev	0%		0%			34%	8%
Other	24%	0%	11%	7%	5%	4%	8%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Small Farmer Survey.

Table 4.1.177-Perceived change in overall living conditions since 1992 by department

	Department						
	Atacora	Atlantique	Borgou	Mono	Ouémé	Zou	Total
Better	77%	34%	69%	43%	51%	45%	52%
No change	1%	16%	6%	26%	14%	20%	15%
Worse	13%	45%	14%	28%	33%	30%	28%
No opinion	8%	6%	11%	3%	2%	5%	5%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.178-Perceived change in overall living conditions since 1992 by sex of head

	Sex of household head		
	Male	Female	Total
Better	53%	37%	52%
No change	15%	15%	15%
Worse	27%	45%	28%
No opinion	5%	3%	5%
Total	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.179-Perceived change in overall living conditions since 1992 by expenditure category

	Expenditure category (quintile)					
	Poorest	2	3	4	Richest	Total
Better	50%	59%	59%	49%	44%	52%
No change	20%	15%	9%	15%	15%	15%
Worse	27%	18%	29%	32%	31%	28%
No opinion	2%	7%	2%	4%	11%	5%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.180-Main reason for the improvement in conditions

	Department						
	Atacora	**Atlantique**	**Borgou**	**Mono**	**Ouémé**	**Zou**	**Total**
Change in crop prices	36%	4%	20%	47%	33%	16%	27%
Change in weather				2%		1%	0%
Change seeds and inputs	1%			23%		5%	5%
Change in prices or food availability	6%	68%	46%	2%	21%	27%	25%
Change in cash crop production	5%	3%	5%			27%	7%
Change in off-farm income	42%	13%	9%	15%	21%	15%	20%
Change in household health	8%		12%		11%	3%	6%
Change in soil fertility			0%			2%	1%
Change in access to land					2%	2%	1%
Change in access to credit		2%		2%			0%
Other	3%	10%	8%	10%	12%	2%	7%
Total	100%	100%	100%	100%	100%	100%	100%

Source: IFPRI/LARES Small Farmer Survey.

Table 4.1.181-Regression for perceived change in well-being

change	Coef.	Std. Err.	z	P>|z|	95% Conf. Interval	
lnexppc	-.2054401	.0985885	-2.08	0.037	-.3986701	-.0122102
mktsurp	.0035438	.0020357	1.74	0.082	-.000446	.0075337
hhsize	-.0207655	.0124848	-1.66	0.096	-.0452351	.0037042
under15p	.2679314	.2498048	1.07	0.283	-.2216771	.7575399
over65p	.1332301	.4562656	0.29	0.770	-.761034	1.027494
femhead	-.231811	.2441472	-0.95	0.342	-.7103307	.2467088
agehead	-.0006692	.0176371	-0.04	0.970	-.0352373	.0338989
age2	-.0000754	.0001789	-0.42	0.673	-.000426	.0002752
edhead	.0294055	.0267765	1.10	0.272	-.0230755	.0818864
lithead	-.3547115	.1864592	-1.90	0.057	-.7201649	.0107418
spouse	.0922859	.2246507	0.41	0.681	-.3480214	.5325932
edsps	-.0363134	.0320437	-1.13	0.257	-.099118	.0264911
litsps	-.0920824	.1654687	-0.56	0.578	-.4163951	.2322302
cotton	.2613276	.1452739	1.80	0.072	-.0234041	.5460592
fsize1	.0112825	.0141542	0.80	0.425	-.0164592	.0390243
fsize2	.0517047	.0333987	1.55	0.122	-.0137557	.117165
irrig	.4557959	.3337666	1.37	0.172	-.1983745	1.109966
basfond	-.1837732	.1342883	-1.37	0.171	-.4469734	.079427
connect	.0639005	.0943407	0.68	0.498	-.1210039	.2488049
fon	-.1974852	.1333296	-1.48	0.139	-.4588064	.0638361
gv	-.0965004	.1296053	-0.74	0.457	-.3505222	.1575214
tontine	.0760265	.0988257	0.77	0.442	-.1176683	.2697213
extcont	.4640769	.1179854	3.93	0.000	.2328298	.695324
distsp	-.0052027	.0024944	-2.09	0.037	-.0100916	-.0003138
radio	.0477592	.0968805	0.49	0.622	-.1421231	.2376416
tv	.65714	.2322529	2.83	0.005	.2019326	1.112347
bike	.0601497	.1008815	0.60	0.551	-.1375745	.2578739
mbike	.1780742	.1124442	1.58	0.113	-.0423125	.3984608
dpt1	1.261566	.2358351	5.35	0.000	.7993374	1.723794
dpt3	.7922735	.22932	3.45	0.001	.3428146	1.241732
dpt4	.1048854	.2085674	0.50	0.615	-.3038991	.51367
dpt5	2859493	.1818112	1.57	0.116	-.070394	.6422927
dpt6	.21851	.1965316	1.11	0.266	-.1666847	.6037048

Ordered probit estimates

Number of obs = 898
LR chi2(33) = 167.37
Prob > chi2 = 0.0000
Log likelihood = -805.19386
Pseudo R2 = 0.0941

Table 4.2.1-Road infrastructure

	Region			
	North	Center	South	Total
Length of road in village (km)	.	.	.	.
Paved road	1	0	1	1
All-season road	11	3	5	6
Dry-season road	10	8	4	6
Pistes	28	15	7	16
Period when not usable (months)	.	.	.	.
Paved road	0	0	0	0
All-season road	1	0	0	0
Dry-season road	3	5	2	3
Pistes	3	6	2	3

Source: IFPRI-LARES Community Survey

Table 4.2.2-Change in road length

	Region			
	North	Center	South	Total
Increase	24%		10%	12%
No change	69%	100%	90%	85%
Decrease	7%			2%
Total	100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.3-Change in road quality

	Region			
	North	Center	South	Total
Improved	32%	16%	28%	27%
No change	7%	68%	26%	29%
Deteriorated	61%	16%	46%	45%
Total	100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.4-Number of vehicles used for agricultural transport

	Region			
	North	Center	South	Total
Bicycles	130	44	115	102
Push-carts	1	7	4	4
Carts	8	4	1	4
Motorbikes	26	13	26	23
Cars	1	2	1	1
Pick-up trucks	1	1	1	1
Truck	0	1	0	0
Trailer trucks	0	0	0	0

Source: IFPRI-LARES Community Survey

Table 4.2.5-Change in number of vehicles used for agricultural transport

	Increased	No change	Decreased	Total
Bicycle	85%	7%	9%	100%
Push-cart	25%	73%	2%	100%
Cart	22%	75%	3%	100%
Motorbike	83%	11%	6%	100%
Cars	17%	80%	3%	100%
Pick-up	21%	79%		100%
Truck	4%	95%	1%	100%
Trailer trucks	1%	99%		100%

Source: IFPRI-LARES Community Survey

Table 4.2.6-Characteristics of agricultural markets

	Region			
	North	Center	South	Total
Distance (km)				
Collection market	5	10	5	6
Assembly market	23	18	7	15
Consumption market	102	35	18	48
Number of traders				
Input traders	0	3	0	0
Assemblers	5	23	30	20
Wholesalers	7	2	6	6
Brokers	1	0	3	2
Storage merchants	0	0	0	0
Retailers	22	17	20	20
Months of operation				
Input traders	3	6	0	1
Assemblers	7	9	8	8
Wholesalers	6	9	6	6
Brokers	5	11	2	4
Storage	0	.	2	1
Retailers	8	9	7	8

Source: IFPRI-LARES Community Survey

Table 4.2.7-Location of closest markets relative to village

	Location of collection market	Location of assembly market	Location of consumption market
In the village	21%	4%	3%
In the same commune	42%	23%	13%
In the same sous-prefecture	24%	49%	18%
In the same department	12%	23%	62%
In another department	1%	1%	4%
Total	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.8-Frequency of closest markets

	Frequency collection market	Frequency assembly market	Frequency consumption market
Daily	1%		
Every 2 days	4%		12%
Every 3 days	4%	6%	4%
Every 4 days	37%	47%	35%
Every 5 days	33%	33%	32%
Every 6 days	12%	6%	10%
Every week	9%	9%	8%
Total	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.9-Change in volume of markets

	Change in volume of collection market	Change in volume of assembly market	Change in volume of consumption market
Increased	77%	83%	88%
No change	14%	10%	8%
Decreased	9%	7%	4%
Total	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.10-Change in facilities of markets

	Increased	No change	Decreased	Total
Number of warehouses				
Collection market	51%	46%	3%	100%
Assembly market	61%	39%		100%
Consumption market	77%	21%	1%	100%
Number of stores				
Collection market	13%	86%	1%	100%
Assembly market	38%	62%		100%
Consumption market	64%	36%		100%
Number of telephones				
Collection market	7%	93%		100%
Assembly market	9%	91%		100%
Consumption market	31%	69%		100%
Access to water				
Collection market	29%	69%	2%	100%
Assembly market	35%	60%	5%	100%
Consumption market	52%	45%	3%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.11-Change in number of traders

	Change in number of input traders	Change in number of assemblers	Change in number of wholesalers	Change in number of brokers	Change in number of storage merchants	Change in number of retailers
Increased	1%	41%	24%	15%	2%	53%
No change	98%	48%	72%	85%	97%	38%
Decreased	1%	10%	4%	1%	1%	9%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.12-Availability and source of input credit for farmers

	Region			
	North	**Center**	**South**	**Total**
Farmers get credit for inputs	97%	89%	32%	64%
Credit from CARDER	4%	6%	89%	25%
from NGOs	4%	0%	0%	2%
from projects	0%	0%	6%	1%
from GVs	91%	88%	6%	69%
from traders	0%	0%	0%	0%
from others	5%	41%	0%	14%

Source: IFPRI-LARES Community Survey

Table 4.2.13-Number of GVs per village by region

		Region			
		North	**Center**	**South**	**Total**
Number of GVs	0	9%	21%	61%	37%
	1	72%	74%	11%	42%
	2	14%	5%	10%	10%
	3	3%		11%	7%
	4			2%	1%
	5 or more	2%		5%	3%
Total		100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.14-Activities of GVs in village (percent of villages with GVs)

	Region			
	North	**Center**	**South**	**Total**
Marketing maize	26%	13%	51%	30%
Marketing other food crops	26%	7%	76%	37%
Marketing cotton	91%	93%	25%	71%
Marketing other cash crops	2%	7%	0%	3%
Fertilizer distribution	89%	87%	25%	69%
Seed distribution	89%	87%	25%	69%
Herb/pest distribution	85%	87%	25%	67%
Processing	0%	7%	0%	2%

Source: IFPRI-LARES Community Survey

Table 4.2.15-Share of village crop marketing carried out by GV (percent of villages with GVs)

	Maize sales	**Other food crop sales**	**Cotton sales**	**Other cash crop sales**
All	8%	12%	90%	
More than half	32%	13%	4%	
About half	11%	16%	2%	
Less than half	49%	60%	4%	100%
Total	100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.16-Share of village maize marketing carried out by GV (percent of villages with GVs)

	Region			
	North	Center	South	Total
All	22%			8%
More than half	42%	50%	20%	32%
About half	14%	50%		11%
Less than half	22%		80%	49%
Total	100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.17-Share of village cotton marketing carried out by GV (percent of villages with GVs)

	Region			
	North	Center	South	Total
All	98%	93%	41%	90%
More than half			41%	4%
About half			19%	2%
Less than half	2%	7%		4%
Total	100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.18-Share of village input distribution carried out by GV (percent of villages with GVs)

	Fertilizer sales	Seeds sales	Herb/pest sales	Processing revenues
All	99%	100%	99%	
More than half	1%		1%	
About half				100%
Total	100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.19-Change in volume of crops marketed by GV since 1992

	Maize	Other food crops	Cotton	Other cash crops
Increased	86%	87%	82%	45%
No change	14%	13%	4%	55%
Decreased			14%	
Total	100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.20-Change in volume of inputs distributed by GV since 1992

	Fertilizer changed	Seeds changed	Pesticides/ herbicides
Increased	88%	89%	88%
No change	4%	4%	4%
Decreased	8%	7%	8%
Total	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.21-Number of GFs per village by region

		Region			
		North	Center	South	Total
Number of GFs	0	26%	21%	23%	24%
	1	49%	42%	36%	41%
	2	14%	16%	9%	12%
	3	7%	11%	4%	6%
	4		5%	15%	8%
	5 or more	4%	5%	13%	8%
Total		100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.22-Activities of GFs in village (percent of villages with GFs)

	Region			
	North	Center	South	Total
Marketing of tubers/gari	12%	7%	68%	38%
Marketing of rice	22%	20%	0%	11%
Marketing of oil	26%	33%	55%	42%
Marketing of other crops	90%	53%	70%	73%
Distribution of inputs	10%	0%	0%	3%
Agricultural processing	45%	40%	90%	66%

Source: IFPRI-LARES Community Survey

Table 4.2.23-Share of village crop marketing and input distribution carried out by GF (percent of villages with GVs)

	Marketing of tuber/gari	Marketing of rice	Marketing of oil	Marketing of other commodities	Distribution of inputs	Agricultural processing
All		27%	10%	10%	74%	9%
More than half	39%	27%	36%	23%		32%
About half	10%	26%	13%	15%		15%
Less than half	52%	20%	41%	53%	26%	44%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.24-Percentage of village with different types of lenders

	Region			
	North	Center	South	Total
Commercial banks	0%	0%	0%	0%
CLCAM	11%	5%	5%	7%
NGOs	5%	11%	7%	7%
Money lenders	4%	3%	4%	4%
Other lenders	7%	21%	9%	11%

Source: IFPRI-LARES Community Survey

Table 4.2.25-Change in availability of credit from each source

	Commercial bank	CLCAM	NGO	Money lender	Other lenders
Increased		28%	13%	4%	10%
No change	100%	64%	87%	88%	89%
Decreased		7%		8%	1%
Total	100%	100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.26-Change in availability of credit from each source

	Region			
	North	Center	South	Total
Increased	64%	42%	32%	44%
No change	35%	32%	60%	46%
Decreased	2%	26%	9%	10%
Total	100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.27-Average number of extension agents working in each village by region

	Region			
	North	Center	South	Total
CARDER agents	1.4	.3	.6	.8
NGO agents	.4	.1	.3	.3
Private company agents	.1	.0	.0	.0
Total	1.8	.3	1.0	1.1

Source: IFPRI-LARES Community Survey

Table 4.2.28-Change in the number of each type of extension agent since 1992

	CARDER agents	NGO agents	Private company agents	Overall
Increased	4%	13%	4%	9%
No change	61%	84%	95%	58%
Decreased	35%	3%	1%	33%
Total	100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.29-Area planted per village by crop by region (ha)

	Region			
	North	Center	South	Total
Maize	58	72	177	118
Rice	9	1	0	3
Sorghum/millet	71	19	0	26
Beans	36	24	36	33
Groundnut	21	54	43	39
Manioc	25	25	145	83
Yams	73	3	0	23
Tomatoes	1	2	19	10
Cotton	256	218	18	133
Cashew nut	15	62	0	18
Total	565	480	438	486

Source: IFPRI-LARES Community Survey

Table 4.2.30-Percentage of villages reporting production of each crop

	Region			
	North	**Center**	**South**	**Total**
Maize	66%	61%	85%	74%
Rice	50%	17%	0%	19%
Sorghum/millet	62%	56%	0%	31%
Beans	66%	61%	83%	73%
Groundnut	54%	61%	72%	64%
Manioc	47%	56%	87%	68%
Yams	66%	22%	0%	25%
Tomatoes	37%	44%	71%	55%
Cotton	92%	89%	24%	59%
Cashew nut	29%	28%	0%	15%

Source: IFPRI-LARES Community Survey

Table 4.2.31-Average yield by crop by region (tons/ha)

	Region			
	North	**Center**	**South**	**Total**
Maize	1.44	1.05	.83	1.09
Rice	1.39	2.83	2.50	1.62
Sorghum/millet	.97	.71	.	.91
Beans	.83	.63	.27	.53
Groundnut	1.21	.57	.46	.75
Manioc	9.95	6.98	8.71	8.86
Yams	18.40	8.00	15.54	16.98
Tomatoes	1.75	2.64	5.12	3.85
Cotton	1.08	.71	.98	.95
Cashew nut	1.69	1.05	.	1.52

Source: IFPRI-LARES Community Survey

Table 4.2.32-Distribution of villages by commodity balance

	Deficit	**Self-sufficient**	**Surplus**	**Not applicable**	**Total**
Maize	38%	28%	34%		100%
Rice	72%	6%	2%	21%	100%
Sorghum/m illet	40%	14%	16%	30%	100%
Bean	60%	28%	11%	1%	100%
Groundnut	37%	34%	24%	4%	100%
Manioc	20%	28%	46%	6%	100%
Yam	55%	14%	21%	10%	100%
Tomato	39%	16%	32%	13%	100%
Onions	64%	1%		35%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.33-Commodity balance in each crop for each region

		Region			
		North	**Center**	**South**	**Total**
Maize	Deficit	46%	42%	32%	38%
	Self-sufficient	26%	21%	32%	28%
	Surplus	28%	37%	36%	34%
Total		100%	100%	100%	100%
Rice	Deficit	63%	16%	100%	72%
	Self-sufficient	9%	16%		6%
	Surplus	5%			2%
	Not applicable	22%	68%		21%
Total		100%	100%	100%	100%
Sorghum/millet	Deficit	26%	21%	56%	40%
	Self-sufficient	32%	21%		14%
	Surplus	41%	16%		16%
	Not applicable		42%	44%	30%
Total		100%	100%	100%	100%
Bean	Deficit	56%	58%	63%	60%
	Self-sufficient	30%	37%	23%	28%
	Surplus	10%	5%	14%	11%
	Not applicable	4%			1%
Total		100%	100%	100%	100%
Groundnut	Deficit	51%	21%	36%	37%
	Self-sufficient	10%	53%	41%	34%
	Surplus	24%	26%	24%	24%
	Not applicable	14%			4%
Total		100%	100%	100%	100%
Manioc	Deficit	31%	16%	15%	20%
	Self-sufficient	35%	32%	22%	28%
	Surplus	18%	47%	63%	46%
	Not applicable	16%	5%		6%
Total		100%	100%	100%	100%
Yam	Deficit	16%	28%	92%	55%
	Self-sufficient	36%	11%		14%
	Surplus	41%	22%	8%	21%
	Not applicable	7%	39%		10%
Total		100%	100%	100%	100%
Tomato	Deficit	49%	63%	24%	39%
	Self-sufficient	7%	26%	18%	16%
	Surplus	6%	5%	59%	32%
	Not applicable	38%	5%		13%
Total		100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.34-Distribution of villages by the change in production since 1992

	Increased	No change	Decreased	Not applicable	Total
Maize	66%	13%	22%		100%
Rice	20%	8%	3%	69%	100%
Sorghum/millet	18%	13%	15%	55%	100%
Bean	43%	24%	29%	4%	100%
Groundnut	46%	23%	16%	15%	100%
Manioc	64%	16%	10%	9%	100%
Yams	29%	11%	7%	53%	100%
Tomatoes	37%	32%	10%	21%	100%
Onion	3%	8%	3%	86%	100%
Cotton	45%	6%	10%	40%	100%
Cashew	18%	7%		75%	100%

Source: IFPRI-LARES Community Survey

Table 4.2.35-Change in production of each crop since 1992 by region

		Region			
		North	**Center**	**South**	**Total**
Maize	Increased	75%	68%	59%	66%
	No change	9%	11%	16%	13%
	Decreased	16%	21%	25%	22%
Total		100%	100%	100%	100%
Rice	Increased	52%	21%		20%
	No change	10%	5%	8%	8%
	Decreased	8%		2%	3%
	Not applicable	31%	74%	90%	69%
Total		100%	100%	100%	100%
Sorghum/millet	Increased	54%	5%		18%
	No change	15%	21%	8%	13%
	Decreased	27%	32%		15%
	Not applicable	3%	42%	92%	55%
Total		100%	100%	100%	100%
Bean	Increased	59%	26%	41%	43%
	No change	24%	47%	15%	24%
	Decreased	12%	21%	42%	29%
	Not applicable	5%	5%	2%	4%
Total		100%	100%	100%	100%
Groundnut	Increased	52%	37%	47%	46%
	No change	18%	42%	18%	23%
	Decreased	11%	21%	17%	16%
	Not applicable	19%		18%	15%
Total		100%	100%	100%	100%
Manioc	Increased	47%	47%	82%	64%
	No change	15%	37%	9%	16%
	Decreased	14%	11%	7%	10%
	Not applicable	24%	5%	2%	9%
Total		100%	100%	100%	100%
Yams	Increased	73%	22%	4%	29%
	No change	9%	17%	10%	11%
	Decreased	7%	22%	2%	7%
	Not applicable	11%	39%	85%	53%
Total		100%	100%	100%	100%
Tomatoes	Increased	33%	11%	50%	37%
	No change	13%	68%	29%	32%
	Decreased	7%	16%	10%	10%
	Not applicable	47%	5%	11%	21%
Total		100%	100%	100%	100%
Onion	Increased	3%		4%	3%
	No change	4%	26%	4%	8%
	Decreased	3%	11%		3%
	Not applicable	90%	63%	92%	86%
Total		100%	100%	100%	100%
Cotton	Increased	88%	72%	8%	45%
	No change	2%	6%	8%	6%
	Decreased	4%	11%	14%	10%
	Not applicable	7%	11%	71%	40%
Total		100%	100%	100%	100%
Cashew	Increased	37%	33%		18%
	No change	4%	13%	8%	7%
	Not applicable	59%	53%	92%	75%
Total		100%	100%	100%	100%

Source: IFPRI-LARES Community Survey

Table 4.3.1-Distribution of GVs by starting year

Starting year	Number	Percent of total
Before 1970	2	1.1%
1970-74	52	27.7%
1975-79	29	15.4%
1980-84	16	8.5%
1985-89	29	15.4%
1990-94	46	24.5%
Since 1995	14	7.4%
Total	188	100%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.2-Average age of GVs by department

	Age (years)	Number
Atacora	11.1	17
Borgou	21.9	103
Mono/Ouémé	14	20
Zou	8.6	49
Total	16.6	189

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.3-Distribution of GVs by source of initiative to form

Source of initiative	Number	Percent of total
Members	122	64.6%
SONAPRA	1	0.5%
CARDER	61	32.3%
USPP	2	1.1%
Other	3	1.6%
Total	189	100%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.4-Increase in membership since start of GV

	Nbr members at creation	Nbr members now
Atacora	162	387
Borgou	147	401
Mono/Ouémé	71	187
Zou	71	306
Total	117	352

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.5-Number of members at start of GV

Members at start	Number	Percent of total
Less than 100	96	60.8%
100-199	35	22.2%
200-299	13	8.2%
300-399	9	5.7%
400-499	1	0.6%
500 or more	4	2.5%
Total	158	100%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.6-Number of members now

Members now	Number	Percent of total
Less than 100	20	10.6%
100-199	38	20.1%
200-299	39	20.6%
300-399	29	15.3%
400-499	18	9.5%
500 or more	45	23.8%
Total	189	100%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.7-Requirements for GV membership (percent of GVs)

	Resident of village	Cotton grower	Recommendations	Pay dues	Other
Atacora	76%	100%	82%	94%	75%
Borgou	58%	71%	42%	100%	68%
Mono/Ouémé	40%	95%	0%	90%	0%
Zou	69%	61%	31%	100%	27%
Average	61%	74%	38%	98%	50%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.8-Conditions for removing a member (percent of GVs)

	Not a village resident	Not a cotton grower	Unpaid debts	Other
Atacora	18%	18%	59%	71%
Borgou	24%	17%	80%	90%
Mono/Ouémé	40%	85%	80%	11%
Zou	51%	43%	67%	59%
Average	32%	31%	75%	72%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.9-Number of each type of employee

	President	Secretary	Treasurer	Permanent employee
Atacora	1	1.1	1	5.2
Borgou	1.2	1.2	1.3	.7
Mono/Ouémé	1.1	1	1.1	.1
Zou	1.8	1.9	2	.2
Average	1.3	1.3	1.4	.9

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.10-Percentage of GV officials with CM2 certificate

	President	Secretary	Treasurer	Average
Atacora	0%	94%	25%	40%
Borgou	5%	91%	28%	41%
Mono/Ouémé	3%	89%	11%	32%
Zou	34%	78%	47%	51%
Average	11%	88%	31%	43%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.11-Descriptive statistics for secretary of GV

	Age	Nbr languages spoken	Years member	Years secretary	Village resident previously (%)	Other activities (%)	Responsible for other (%)
Atacora	30	3	9	3	100	94	18
Borgou	32	3	10	5	97	96	25
Mono/Ouémé	31	2	9	5	95	45	15
Zou	35	3	8	4	98	75	29
Average	33	3	9	4	97	85	24

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.12-Percentage of secretaries whose first language is dominant language of region

	Number	Percentage
Atacora	17	82%
Borgou	103	97%
Mono/Ouémé	20	95%
Zou	49	90%
Total	189	94%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.13-Personal assets owned by secretary of GV

	House	Vehicle	Motorcycle	Bicycle	TV	Radio	Telephone
Atacora	82	0	71	71	0	76	0
Borgou	76	5	57	58	12	73	1
Mono/Ouémé	80	0	45	75	5	85	0
Zou	96	6	61	90	14	92	0
Average	82	4	58	69	11	79	1

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.14-Percentage of GVs with different types of equipment

	Scales	Processing equip	Light transp equip	Storage structure	Motorised transp	Telephone at GV HQ
Atacora	88%	12%	0%	82%	0%	0%
Borgou	100%	0%	6%	88%	0%	0%
Mono/Ouémé	16%	0%	0%	60%	0%	0%
Zou	76%	7%	14%	67%	0%	0%
National	84%	3%	7%	79%	0%	0%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.15-Average storage capacity by department

	Storage capacity (tons)
Atacora	119
Borgou	159
Mono/Ouémé	55
Zou	235
Average	164

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.16-Distribution of GVs by storage capacity

Storage capacity (mt)	Number	Percent of total
Less than 50	62	32.8%
50-99	31	16.4%
100-149	39	20.6%
150-199	15	7.9%
200-249	15	7.9%
250-299	5	2.6%
300-349	4	2.1%
350-399	2	1.1%
400 or more	16	8.5%
Total	189	100%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.17-Value of each type of equipment (incl zeroes)

	Scales	Storage structure
Atacora	1,797,059	857,059
Borgou	1,115,718	2,483,757
Mono/Ouémé	1,250	717,750
Zou	324,286	910,204
Average	853,884	1,742,603

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.18-Percentage of GVs distributing each input

	Chemical fertilizer	Pesticides	Herbicides	Cotton seed	Other seeds	Equipment	Other
Atacora	100%	100%	36%	100%	56%	100%	13%
Borgou	100%	100%	56%	98%	76%	99%	7%
Mono/Ouémé	100%	100%	90%	95%	6%	95%	0%
Zou	100%	100%	13%	100%	35%	92%	9%
Average	100%	100%	47%	98%	57%	97%	7%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.19-Distribution of GVs by suppliers of different inputs

	Fertilizer	Pesticides	Herbicides	Cotton seed	Processing equipment	Other
SONAPRA	29.6%	31.2%	77.1%	94.7%	24.3%	36%
USPP	1.1%	1.1%		4.8%	62.2%	18.6%
SAMAC	3.7%	1.6%				1.2%
SOGICOM	5.3%	5.8%				3.5%
SOTICO	7.4%	10.6%	14.3%		1.4%	3.5%
FRUITEX		3.2%				7%
ECA	3.2%	2.6%	1.4%		6.8%	1.2%
AWERO	3.7%	3.7%				1.2%
ADAIC	0.5%	0.5%				1.2%
AIGLON	8.5%	7.9%	1.4%		1.4%	2.3%
CACI	4.2%	1.6%				1.2%
EDACI	4.2%	3.7%				8.1%
NACSON	13.8%	12.2%				9.3%
TTM	2.6%	3.7%	1.4%		1.4%	1.2%
SDI	7.4%	5.8%	1.4%	0.5%	2.7%	1.2%
Other	4.8%	4.8%	2.9%			3.5%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.20-Percent of GVs satisified with supplier by input

	Fertilizer	Pesticides	Herbicides	Cotton seed	Other
Atacora	41	29	100	76	100
Borgou	94	35	97	98	93
Mono/Ouémé	95	95	100	70	100
Zou	59	67	100	75	90
Average	80	49	98	87	93

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.21-Percent of GVs using outside suppliers and share of inputs from them

	Purchace inputs from outside cotton system	% of total input
Atacora	0	
Borgou	11.8	6
Mono/Ouémé	5	100
Zou	12.2	35
Average	10.1	20

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.22-Percentage of GV members ordering each input

	Fertilizer	Pesticide	Herbicide	Cotton seed
Atacora	92%	92%	2%	92%
Borgou	98%	98%	8%	97%
Mono/Ouémé	88%	91%	35%	94%
Zou	68%	66%	0%	66%
Average	89%	89%	8%	88%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.23-Quantity of inputs purchased by GV per farmer ordering

	Fertilizer (kg/farm)	Pesticide (liters/farm)	Herbicide (liters/farm)	Cotton seed (kg/farm)
Atacora	240	7	4	99
Borgou	317	9	7	2316
Mono/Ouémé	4356	1	1	2314
Zou	8730	15	6	2363
Average	2946	10	6	2100

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.24-Percentage of inputs sold by GV on credit

	Fertilizer	Pesticide	Herbicide	Cotton seed
Atacora	100%	100%	100%	100%
Borgou	100%	100%	100%	98%
Mono/Ouémé	96%	96%	90%	100%
Zou	93%	93%	100%	100%
Average	98%	98%	99%	99%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.25-Trends in input use

	Fertilizer	Pesticide	Herbicide	Cotton seed
Increased	93%	93%	34%	91%
No change	0%		45%	4%
Decreased	5%	6%	20%	3%
Average	100%	100%	100%	100%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.26-Share of cotton in the volume and value of crops marketed by GV

	Cotton share in volume	Cotton share in value
Atacora	98%	99%
Borgou	99%	99%
Mono/Ouémé	95%	95%
Zou	97%	98%
Total	98%	99%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.27-Characteristics of cotton production by department

	Members growing cotton	Pct growing cotton	Cotton area (ha)	Cotton output (mt)	Cotton marketed (mt)	Cotton sales (million FCFA)
Atacora	336	92%	398	529	442	91
Borgou	362	98%	493	530	478	93.3
Mono/Ouémé	182	94%	145	113	112	24.9
Zou	175	66%	240	248	249	48.7
Average	292	89%	384	357	377	74.2

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.28-Characteristics of cotton production per member by department

	Cotton area per member (ha)	Cotton output per member (mt)	Cotton sales per member (mt)	Cotton sales per member (FCFA)
Atacora	1.08	1.16	1.11	229,542
Borgou	1.53	1.48	1.41	272,467
Mono/Ouémé	0.74	0.5	0.49	108,712
Zou	0.92	0.99	0.99	199,022
Average	1.25	1.14	1.17	232,022

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.29-Percentage of GVs giving credit to members

	Cash credit to members	In-kind credit to members	Total
Atacora	94%	100%	100%
Borgou	88%	99%	100%
Mono/Ouémé	45%	100%	100%
Zou	41%	94%	96%
Average	72%	98%	99%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.30-Average annual interest rates on loans from GV to members

	Interest rate for cash loans (%)	Interest rate for in-kind loans (%)
Atacora	14.1	0
Borgou	13.2	0
Mono/Ouémé	10.8	0
Zou	8.1	.2
Average	12.4	0

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.31-Average value of maximum debt of members to GV over past year

	Max cash credit to members	Max in-kind credit to members
Atacora	7,848,205	24,454,785
Borgou	7,898,073	32,450,986
Mono/Ouémé	515,000	6,624,400
Zou	411,348	16,438,914
Average	5,171,307	24,847,501

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.32-Average value of current debt of members to GV

	Current cash debts of members	Current in-kind debts of member	Total
Atacora	749,412	0	749,412
Borgou	270,451	8,417	278,868
Mono/Ouémé	506,950	991,430	1,498,380
Zou	57,143	0	57,143
Average	283,256	109,501	392,757

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.33-Percentage of GVs getting credit from different sources

	Bank	NGO	Other	Total
Atacora	76%	0%	35%	94%
Borgou	72%	7%	37%	88%
Mono/Ouémé	30%	0%	10%	40%
Zou	23%	4%	18%	41%
Average	56%	5%	29%	71%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.34-Average annual interest rate on GV debt

	Interest from bank (%)	Interest from NGO (%)	Interest from other (%)
Atacora	23.4		5.3
Borgou	17	7.7	4.6
Mono/Ouémé	12		12.5
Zou	13.3	3.5	5.6
Average	17.1	6.8	5.1

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.35-Information on GV bank accounts

	Percent with bank account	Current balance of account	Minimum balance over past year	Maximum balance over past year
Atacora	82%	422,804	229,863	938,400
Borgou	99%	586,218	712,595	1,782,696
Mono/Ouémé	100%	378,505	395,102	651,223
Zou	92%	1,120,084	973,393	1,417,542
Average	96%	690,158	699,809	1,501,416

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.36-Percent of revenue from each source

	Department				
	Atacora	**Borgou**	**Mono/ Ouémé**	**Zou**	**Average**
Fertilizer	0	0	0	75	20
Pesticide	0	0	0	39	10
Herbicide	0	0	0	0	0
Cotton seed	0	0	0	2	1
Other inputs	0	1	0	0	1
Cotton	11	9	25	36	18
Other crops	0	0	0	2	1
Member dues	67	58	100	48	60
USPP funds	11	4	0	25	10
Vehicle rental	0	0	0	0	0
Storage fees	0	1	0	7	2
NGO funds	0	1	0	0	1
Other	89	66	0	41	54
Total revenue	100	100	.	100	100

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.37-Average storage capacity by department

	Storage capacity (tons)
Atacora	119
Borgou	159
Mono/Oeme	55
Zou	235
Average	164

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.38-Percentage of GVs saying they did not receive all the inputs ordered

	Fertilizer	**Pesticide**	**Herbicide**	**Cotton seed**
Atacora	24%	0%	20%	6%
Borgou	3%	2%	4%	4%
Mono/Ouémé	10%	0%	6%	10%
Zou	22%	16%	0%	39%
Total	11%	5%	6%	14%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.39-Percentage of GVs saying they had quality problems with inputs

	Fertilizer	**Pesticide**	**Herbicide**	**Cotton seed**
Atacora	47%	71%	20%	18%
Borgou	4%	67%	2%	0%
Mono/Ouémé	0%	0%	6%	0%
Zou	33%	35%	0%	18%
Total	15%	52%	4%	6%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.40-Percentage of GVs in which members didn`t buy all they ordered

	Fertilizer	Pesticide	Herbicide	Cotton seed
Atacora	29%	6%	0%	0%
Borgou	6%	7%	2%	4%
Mono/Ouémé	20%	20%	22%	15%
Zou	2%	6%	0%	0%
Total	9%	8%	7%	4%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.41-Percentage of members not buying all they ordered

	Percentage among GVs with problem	Percentage across all GVs
Atacora	37%	12%
Borgou	24%	4%
Mono/Ouémé	58%	15%
Zou	6%	1%
Total	29%	5%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.42-Problem of members not repaying credits from GV

	Pct. of GVs reporting problems of repayment	Pct. of members among GVs with problem	Pct. of members across all GVs
Atacora	59%	2%	1%
Borgou	46%	6%	3%
Mono/Ouémé	55%	52%	23%
Zou	59%	6%	2%
Total	52%	10%	5%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.43-Frequency of sanctions against members not paying debts to GV

	No more credit	Removed from GV	Relatives reimburse	Market members reimburse	GV members reimburse
Always	3%		30%	4%	18%
Generally	21%	10%	18%	18%	12%
Sometimes	39%	17%	46%	19%	35%
Never	37%	74%	6%	59%	35%
Total	100%	100%	100%	100%	100%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.44-Opinion of changes in input marketing since 1992

	Input availability	Timing of delivery	Delivery location	Fertilizer quality	Pesticide/ herbicide quality	Member repayment
Has improved	79%	69%	64%	64%	26%	53%
Has worsened	15%	22%	13%	21%	67%	24%
No change	5%	8%	22%	14%	6%	6%
Was never a problem		1%	1%			15%
Doesn`t know			1%	1%		1%
Total	100%	100%	100%	100%	100%	100%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.45-Average delay in payment (months)

	1st cotton delivery	2nd cotton delivery	3rd cotton delivery	4th cotton delivery
Atacora	0.8	0.9	1.4	2
Borgou	0.6	0.9	1.3	1.5
Mono/Ouémé	3.2	3.1	3	2.6
Zou	1.3	2	1.8	2
Total	1.1	1.2	1.5	1.7

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.46-Problems in cotton marketing (percent of GVs citing)

	Problems in cotton grading	Problems in cotton weighing	Problems with cotton theft
Atacora	65%	94%	6%
Borgou	76%	94%	22%
Mono/Ouémé	95%	95%	0%
Zou	31%	57%	6%
Total	65%	85%	14%

Source: IFPRI-LARES Survey of Groupements Villageois

Table 4.3.47-Opinion of changes in cotton marketing since 1992

	Cotton extension	Cotton classification	Cotton weighing	Timing of payment	Cotton theft
Has improved	26%	61%	78%	19%	23%
Has worsened	68%	24%	11%	73%	5%
No change	6%	14%	11%	7%	6%
Was never a problem		1%			62%
Doesn`t know				1%	3%
Total	100%	100%	100%	100%	100%

Source: IFPRI-LARES Survey of Groupements Villageois

CHAPTER 5 – RESULTS FROM THE MALAWI SMALLHOLDER FARMER AND COMMUNITY SURVEYS

5.1: Results from the Smallholder Farmer Survey

5.1.1 Survey methods

Sampling

Malawi is administratively divided into three regions: The North, the Center and the South. The Center occupies the largest surface area (38 percent of the total country area) and is considered the bread-basket of Malawi. The North has the smallest surface area (28 percent) and is sparsely populated while the South is the most densely populated region. The extent of poverty is higher in the South than elsewhere in the country (National Economic Council, 2000)[28]. The three regions are sub-divided into 155 Extension Planning Units (EPAs): 31 in the North, 68 in the Center, and 56 in the South. Each EPA is sub-divided into sections, which are managed by Field Assistants working for the MOAI. In total, there are over 2,000 sections. In turn, sections are divided into blocks, which are the equivalent of villages.

The methodology used for selecting the farmer sample was based on a geographically stratified random sample technique. First, 40 of the 155 EPAs were randomly selected. Second, two villages from each EPA were randomly selected with the purpose of choosing 10 households in each. Finally, since female-headed households constitute about 30 percent of all households, in case where information was available about the gender of the household head, seven male-headed households and three female-headed households were randomly selected to make up the 10 households in each village. Otherwise, 10 households were selected randomly in each village with no regard to gender distribution. Selection of villages was done with replacement to take into consideration the possibility that a village was: a) inaccessible due to bad roads or security problems, b) had some extraordinary circumstances such as a funeral, or c) had less than 15 households. Replacements for selected households were also used in case a household refused to

[28] Based on the 1997-98 Integrated Household Survey analyzed by the Poverty Monitoring System of the National Economic Council of Malawi (2000), the extent of rural poverty was 69 percent in the South compared to 65 percent in the Center and 62 percent in the North.

participate in the survey or if there was no household member present during the survey to answer knowledgeably about farm production. The total sample included 800 farm families covering the three regions of the country. The list of EPAs and villages selected in the final sample are presented in Table 5.1.

Because each farmer in Malawi did not have an equal probability of being selected for the sample, weights are applied in analyzing the data. The weights (also called expansion factors) are the inverse of the probability of selection. Thus, if farmers in a region were under-represented in the sample, the weights compensate for this by giving greater weight to these farms in the calculation of national averages and percentages. Because the sample was selected in a three-stage process, the calculation of the weighting factor involves three terms:

$$W_{hg} = \frac{EPA_r}{epa_r} \frac{V_e}{v_e} \frac{H_{vg}}{h_{vg}}$$

where W_{hg} = the weight for household h with head of gender g

EPA_r = the total number of EPAs in region r

epa_r = the number of EPAs selected for the sample in region r

V_e = the total number of villages in EPA e

v_e = the number of villages selected for the sample in EPA e

H_{vg} = the total number of households of gender g in village v

h_{vg} = the number of households selected for the sample of gender g in village v

The first term extrapolates from the EPAs selected for the sample to the entire region (North, Center, and South). The second term extrapolates from the selected villages to the entire EPA. Note that v_e is equal to two for all EPAs in the sample. The third term extrapolates from the households in the sample to all the households in the village. In order to ensure that female-headed households represented 30 percent of the sample (reflecting secondary data about farm households in Malawi), the weights are different for male- and female-headed households. For female-headed households, the weight uses the number of female-headed households in the village (H_{vg}) divided by the number of female-headed households in the sample (h_{vg}). The same procedure is used for male-headed households.

The weights are used to calculate averages, percentages, and sums throughout the report. They compensate for the fact that some regions or household types are over-represented in the sample relative to the population, while others are under-represented.

Questionnaire

The survey used a 27-page pre-coded questionnaire, designed by IFPRI, the Agricultural Policy Research Unit (APRU) at Bunda College of Agriculture, and its collaborators. It was revised following three field tests. The questionnaire was composed of 16 sections: household member characteristics, household characteristics, land use and cropping patterns, crop production, source of labor and labor use, input use and purchases (fertilizers, manure, seeds, pesticides), changes in labor and inputs, credit use and source, crop sales and marketing, storage, sources of information, consumption (food and non-food), time allocation, inventory of assets (household and agricultural), sources of income, and farmers' perceptions.

Data collection

The IFPRI/APRU Smallholder Farmer Survey employed a team of seven enumerators and two supervisors. The enumerators were selected from a group of bachelor level students who had some experience conducting household-level surveys. The survey team was directed and supervised by Mr. Richard Kachule from APRU. The enumerators were trained for two weeks in which every section of the questionnaire was reviewed and explained. The training also included three field trips to pre-test the questionnaire, practice using it, and identify potential problems. A manual was prepared to guide the enumerators in completing the questionnaire, defining key terms, and deciding difficult cases. The supervisors were also trained on how to randomly select the villages and households to include in the sample. Data collection took place from August to early November 1998.

5.1.2 Farm household characteristics and income sources

This section describes the basic socio-economic characteristics of the smallholder farm household members and their sources of income. The statistical results are disaggregated either by region, total annual household expenditures per capita (which include food and non-food

expenditures as well as the rental value of the residence), farm size per household, or gender of the household head. The regional breakdown includes the North, the Center, and the South. Total household expenditures are grouped into five quintiles. Each quintile groups 20 percent of the households (or 160 households) in a separate expenditure category. For example, the lowest quintile represents the 160 poorest households (those that have the smallest value of annual expenditures per capita) while the upper quintile is made up of the 160 richest households. The average value of total per capita expenditures of each expenditure quintile is presented at the top of Table 5.2. It ranges from MK 1,079for the lowest expenditure quintile to MK 6,550 for the wealthiest group.[29] Average total per capita expenditures for all households are MK 3,083. Similar to the expenditures quintiles described earlier, farm households are grouped into five categories according to farm size, with the first quintile representing the households with the smallest farms (0.5 ha on average) and the fifth quintile representing those with the largest farms (3.0 ha on average.)

Socio-economic characteristics

Analysis of the smallholder farmer data indicates that average household size is about 5 with an average number of 2 to 3 children per household (see Table 5.2). Household size decreases with per capita expenditures as the poorest households have an average of 6 members while the richest have an average of 4. Table 5.2 also shows the breakdown of the household heads of each family by ethnic group and religious affiliation. Results show that ethnic group composition in Malawi is fairly diverse although ethnic groups have a distinct geographical distribution. The Chewa, which are the largest ethnic group representing a little more than one-third of the farm household heads in Malawi, are mainly found in the Center. The Tumbuka are largely present in the North, while the Yawo and Lomwe are concentrated in the South. More than three-quarter of farm household heads are Christians whereas less than one-fifth are Moslem. Moslems are more concentrated in the Southern region of Malawi while the North has the highest concentration of Christians. The distribution of ethnic groups and religious background by expenditure category does not show any definite trend in terms of one group being richer than the other.

[29] It is difficult to convert these numbers into US dollar because the Malawian Kwacha was devalued several times during the period 1997/98, increasing from 15 MK/US$ in 1997 to 42 MK/US$ at the end of 1998.

On average, around 20 percent of the households belong to a club and only about 5 percent are members of a cooperative or association. Clubs are smaller than associations and are made up of several farm families. They are usually initiated by the extension officers of the MOAI. Associations can be formed from a group of clubs. Clubs and associations are especially important for the production and marketing of smallholder cash crops (such as tobacco, coffee, and chillies). For example, in order to sell tobacco on the auction floor, a producer has to be registered with the Tobacco Control Commission (TCC), which assigns him/her a registration number. However, registration numbers are only given out to farms that are larger than 10 hectares. To be able to sell tobacco on the auction floor, smallholder farmers can either form a club made up of at least 10 farm families and sell their tobacco jointly as a club, or they can sell their tobacco to an intermediate buyer (IB) who in turns sells it at the floor.

In Table 5.3, membership in a club or association is also disaggregated by farm size. As shown in this table, membership in a club, cooperative or association increases with farm size, which is not an unusual result. We also note from results not shown here that male-headed households are more likely to be members in a club or association than female-headed households. Of those farmers that are members of an association, female-headed households only belong to tobacco associations while about a quarter of the male-headed households are members in other associations, such as for coffee, cotton or horticultural crops. Membership in clubs or associations is also higher in the Northern region than in the Central or Southern region (37 percent of farmers in the North compared with less than 20 percent in the Center or Southern region for club membership, and 9 percent of Northern farmers compared with about 4 to 5 percent of Central or Southern farmers for membership in an association).

In Table 5.4, more detailed socio-economic characteristics of the household head are disaggregated by expenditure group. The average age of a household head is 42 and the average number of years in farming is 19. Both average age and years in farming decline a little with household expenditures. This may suggest that younger farmers are a little better off than their older counterparts. As mentioned earlier, attempts were made to replicate the national gender distribution of household heads. Therefore, about 34 percent of the sample is composed of female-headed households. A higher percentage of female-headed households is found in the Southern region (42 percent versus about 24 to 26 percent in the other two regions). Female-

headed households seem to be more concentrated in the lowest expenditure groups, perhaps confirming the fact that they are poorer than their male counterparts.

About 44 percent of the household heads cannot read or write. Table 5.4 indicates that the percentage of illiterate household heads is highest in the two poorest expenditure quintiles. However, there seems to be little difference in the level of literacy between the three other expenditure quintiles. As expected, in terms of educational attainment, farmers in the richest expenditure quintile have the highest percentage of formal education. The farm-size break-down of the educational variables shows similar trends. The regional breakdown suggests that farmers in the North have a higher level of literacy and educational attainment than farmers in the South or Centre (for example, 72 percent of household heads in the North are literate compared to about 55 percent in the other two regions). As expected, only 33 percent of the female heads are literate compared to 69 percent of the male heads. Educational attainment is also heavily biased against women as about half of the females that head their households have received no formal education while only one-fifth of their male counterpart are in a similar position.

Most household heads consider farming as their main activity (93 percent); only about 4 percent classify working in the service sector as their primary activity. A higher percentage of the non-poor households work in the service sector while a larger number of poorer households are engaged in agriculture. Additionally, whereas 99 percent of female-headed households consider farming as their main activity, 90 percent of male heads work primarily in agriculture. The most important secondary activity for female heads of households is unpaid housework (65 percent followed by food processing (22 percent). For males, the most important secondary activities are service sector employment (15 percent), or employment in construction or manufacturing (between 12 to 14 percent each).

Income sources

Aside from their own home production, farm households derive income from a variety of sources. Table 5.5 shows the percent of households that receive income from each type of activity as well as the contribution of each activity to the total revenue of the household. The figures indicate that more than 60 percent of households receive some income from crop sales, about 40 percent from non-farm self-employment and a little less than 40 percent from wages in

agricultural work. Other less common sources of income are sales from livestock or poultry (one third of the households), remittances (29 percent of the households) and wages or salaries from non-agricultural work (18 percent of the households). In terms of the share of each income source to total household income revenues, crop sales contribute the most, providing about 40 percent of total household income. Although about 37 percent of households derive wages from working in agriculture, the contribution of these wages to their total income is very small (about 5 percent). Other important activities that contribute to total income are non-farm self-employment (22 percent) and wages from non-farm work (17 percent).

These income statistics are broken down by region, gender, farm size and expenditure quintiles in Tables 5.6 through 5.8. The numbers indicate that crop and animal sales are more important in the North and the Center, both in terms of the percent of households that sell and the contribution of these sales to total income. This is an expected result as livestock production and farm size are larger in the North and Center than in the South. Wages from agricultural labor are more common amongst the poorest and smallest farm households. There seems to be wide disparities between agricultural wages and wages in the service sector so that farmers that derive additional income from agricultural work seem to be economically worse off than those that work in other sectors of the economy. Surprisingly, households with larger farm sizes also seem to derive a larger share of their income from wages outside the agricultural sector. As expected, crop sales increase with farm size as larger farms tend to have more surplus production over and above their household consumption needs than smaller farms. On the other hand, sales of livestock and poultry contribute a larger share of the income of poorer farmers than richer ones.

5.1.3 Land use

This section describes the basic characteristics of the Malawian smallholder farm including farm size and land ownership.

Farm size

We define farm size as the area of land cultivated by the smallholder farming household. Table 5.9 disaggregates farm size and other farm characteristics by region. Smallholder farms are segmented as each household has an average of 3 plots of about 0.46 ha each. Total average farm

size is 1.4 ha. The largest farms are found in the Northern region followed by the Center and the South. Average farm size also varies by the gender of the household head; it is about 1.1 ha for female headed households and 1.5 ha for male-headed ones (not reported in Table 5.9). In addition, while 28 percent of the female-headed households are located in the bottom farm size quintile, only 7 percent of these households find themselves in the top farm size quintile. For male-headed households, the distribution is more even. In Table 5.10, the above farm size characteristics are disaggregated by farm size quintiles. We note that larger farm sizes are due to both a greater number of plots and larger plot sizes.

Most farm households own their farmland; only about 2.5 percent rent their land. Plots are for the most part inherited (77 percent) or allocated by the village chief (20 percent). About 6 perecent of the plots use irrigated water or a combination of irrigation and rainwater. The rest rely on rainfed agriculture. On average, it takes the farmer about 18 minutes to get to his/her plot from his/her house. Most management decisions regarding the farm plot are made by the household head. Management decisions by the spouse or jointly by both spouses are only made in 5 percent and 8 percent of the households respectively.

Figure 5.1 shows the distribution of households by farm size. About 37 percent of the smallholder households have less than 1 ha, 42 percent between 1 and 2 ha, 19 percent between 2 to 4 ha, and 2 percent above 4 ha. This distribution does not conform with the 1992 estimates from the World Bank which suggest that about 55 percent of small farmers cultivate less than 1 hectare (World Bank, 1995). This discrepancy is perhaps due to the fact that farmers tend to over-estimate their plot size. Additional random inspection of a sample of the surveyed farmers suggests that the farm area reported by the farmers was on average about 30 percent larger that the actual farm-size as measured by the enumerators.

As shown in Figure 5.2, farm size is positively associated with expenditure levels, but not in a linear fashion. While the poorest farmers have the smallest farm size and the richest farmers have the largest farms, the farm size of the groups in the middle expenditure category is fairly similar across categories. On the other hand, dividing farm size by household size shows that farm size per capita increases more significantly across expenditure groups. This indicates that richer households tend to not only have larger farm sizes but also bigger farms per capita because of the smaller size of their family.

5.1.4 Time allocation

In Malawi, as in many other societies, some work activities are shared equally by men and women, while other activities are more gender specific. As Table 5.11 shows, men spend considerable more time in non-farm employment while women are busier with household work, collecting firewood and water. Both spend an approximately equal amount of time on agricultural production. However, men spend a little more time on cash crop and other farm production and twice as much time buying and selling crops. When asked on which activity the household member is spending more time than before 1995, the majority of both the main male and female in the household mentioned food crop production, cash crop production, or both; 18 percent of the males spend more time on non-farm production, while 17 percent of the females spend more time on household work.

5.1.5 Use of agricultural inputs and assets

In this section, we report the results of the survey regarding the use of inputs such as labor, seeds, fertilizers, and credit. Each of these inputs as well as their costs and source of purchases are discussed in turn below.

Labor

Smallholder farmers in Malawi rely mainly on family labor for their crop production activities. The use of hired labor is more limited as only about one-third of the households hire labor to help in their crop production activities. The average daily wage rate paid for hired labor in 1998 was MK 42 per person-day, or the equivalent of about $1 a day. Most hired workers are paid in cash; about 30 percent are paid either in kind or through labor exchange, or both.

Table 5.12 shows the amount of family labor (male, female, and child) used for each crop production activity as well as hired and total labor used (in terms of total and percent of person-days per year). In calculating total family labor person-days, child labor-days are equivalent to half an adult person-day. The figures indicate that women spend approximately 17 more person-days per year than their male counterparts on crop production activities. The most time

consuming family labor activities for all types of family labor are land preparation (one-third of total family labor), weeding (29 percent) and harvesting (19 percent).

Table 5.13 disaggregates total family labor by crop. The most labor-intensive crops are tobacco, followed by cotton, maize, and rice. In general, although females work more days in total, as a proportion of their own total labor days, males tend to spend more time on cash crops (such as tobacco and cotton), while females devote more time to food crops such as maize, cassava, beans, sorghum, etc.

Fertilizer use

An important question that has emerged following the reforms relates to the impact of input market liberalization on the use of fertilizer by smallholder farmers. Because all fertilizers in Malawi are imported, fertilizer prices are highly sensitive to devaluation. As mentioned in Chapter 3, the Malawian Kwacha (MK) was devalued several times since 1994, increasing from about 9 MK/US$ to the dollar in 1994 to 45 MK/US$ in 1999. Similarly, the average price of a 50 Kg bag of NPK or urea increased from about 100 MK per 1994-95 to about 800 to 900 MK in 1998-99. Since the consumer price index rose by a factor of 3.5 over this period, the real price of fertilizer more than doubled. The impact of the higher fertilizer price is exacerbated by the fact that most fertilizer is used on maize, whose relative price (as a non-tradable) falls with devaluation. The fertilizer/maize price ratio has, on average, increased since 1994 and remains above the level of the 1980s. As a result, total fertilizer use has declined from its peak in 1992-93 at 74 thousand mt of nutrients to less than 50 thousand mt in 1994 and 1995. Fertilizer use picked up again in 1996, 1997 and 1998, partially due to the free input programs. Total fertilizer use, however, is still lower than in the early 1990s.

Approximately 23 percent of the cropped area in Malawi is fertilized. The use of fertilizer varies with the type of crop planted. For example, 61 percent of the tobacco area is fertilized, compared to 27 percent for maize and 24 percent for vegetables. Given the large area devoted to maize, however, 63 percent of the fertilizer used is applied to maize. Cassava and sweet potatoes are generally not fertilized. The IFPRI/APRU Smallholder Farmer survey results indicate that manure is used by 23 percent of the farmers (mainly from their own animals) while about 35 percent of the farmers use fertilizers. For farmers that did not use any fertilizer, about 44 percent

attributed it to the fact that fertilizer was too expensive and another 45 percent explained that their crops do not need fertilizer. Therefore, the low use of fertilizer in Malawi is a combination of both high costs and lack of belief or information about the usefulness of fertilizer.

There are wide variations in the extent of fertilizer use by region, gender, farm size, and expenditure group. It also seems to matter whether the farmer is a tobacco grower or not. Figures 5.3 to 5.6 show that fertilizer use is more widespread in the North followed by the Center and the South. Male-headed households are more likely to use fertilizer than female-headed households. Fertilizer use also increases with farm size and expenditure levels, reflecting the fact that bigger and richer farmers have more access or use more fertilizers than smaller and poorer ones.

A striking difference in the likelihood of fertilizer use is whether the farmer grows tobacco or not; approximately three-quarter of tobacco growers used fertilizer compared to one-quarter of non-tobacco growers. Furthermore, tobacco farmers are three times as likely to fertilize their maize fields than non-tobacco growers. It is likely that producing tobacco affords the farmers extra cash income with which to buy fertilizer. Tobacco growers purchase about 58 percent of all fertilizer purchases by smallholders. For households that do use fertilizer, the average application rate is 157 kg/ha. The most common fertilizers purchased by fertilizer users are CAN (about 60 percent of households), followed by Compound D (about 50 percent of households) and Super D (about 47 percent). Urea was purchased by only 6 percent of fertilizer users. Pesticide or herbicide use is not common as only 7 percent of all households purchased these inputs.

Regression analysis of fertilizer use

In the regression analysis for fertilizer use, we examine both the determinants of the probability of using fertilizer and the factors that affect the amount of fertilizer used in Malawi. Since there are a large number of households that do not use fertilizer, the error terms will not be normally distributed and the coefficients estimated by ordinary least squares will be biased. On the other hand, limiting the regression to households that use fertilizer will introduce sample selection bias. Therefore, we use the maximum-likelihood estimation of the Heckman model[30].

[30] The Heckman model describes a situation in which a dependent variable, y, is generated by the standard process $y = x\beta + u_1$, except that y and possibly some of the x's are only observed when $P = \Phi(z + u_2) > 0.5$, where $\Phi(.)$ is the cumulative normal density function, z is a vector of explanatory variables, α is a vector of coefficients, and u_2 is an error term distributed N(0,1). If, as is often the case, u_1 and u_2 are correlated,

Table 5.14 provides a definition and descriptive statistics for the explanatory variables used in the analysis.

Determinants of the decision to use fertilizer in Malawi. Table 5.15 shows the factors that influence the decision to use fertilizer. The results can be summarized as follows:

- Secondary education has a significant effect on the likelihood to use fertilizer. Presumably, a higher level of education increases the awareness of farmers about the benefits of fertilizer. Age of the household head, household size, and household composition are all statistically insignificant.

- Keeping everything else constant, female-headed households may be *more* likely to use fertilizer than male-headed ones, although this effect is only significant at the 8 percent level and the difference in the probability is only 2 percentage points. This suggests that when other factors are controlled for, there is no gender bias against women in fertilizer use.

- Plot size increases the likelihood of using fertilizer. For each 1 hectare increase, the probability of using fertilizer on the plot rises by 12 percent. The coefficient on the squared plot size variable indicates that this effect tampers off as plot size increases. Total farm size, on the other hand, has no effect on the probability of using fertilizer.

- The regional dummies suggest that farmers in the North are most likely to apply fertilizer to a given plot, other factors held constant, followed by farmers in the Center and then farmers in the South. This result confirms the evidence that fertilizer use in the South is more limited.

- The price of fertilizer does not seem to have a significant effect on the probability of using fertilizer. The wage variable and the price of tobacco are also statistically

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estimating these two relationships separately will generate biased and inconsistent estimates of β. Heckman proposed a two-step procedure, but computational capacity now allows simultaneous estimation of β, α, and $\rho = cov(u_1,u_2)$ with maximum likelihood methods. Thus, the Heckman procedure generates one set of coefficients α predicting the probability that a household will use fertilizer (P) and another set (β) predicting the volume of fertilizer used (y) provided it uses some.

insignificant. The coefficient on tobacco price may be insignificant because there is little variation in the variable. Alternatively, farmers may perceive fertilization of tobacco to be "always" profitable, so fertilizer demand is limited only by cash and credit constraints. On the other hand, the price of maize is positive and significant. This suggests that farmers base their decision to use fertilizer on the fertilizer-maize price ratio, rather than on the price of fertilizer alone.

- Tobacco, maize and vegetable plots are more likely to receive fertilizer than other plots. Growing tobacco on a plot increases the probability of using fertilizer by 33 percentage points, while a maize or vegetable plot increases this probability by 19 to 20 percentage points compared to other plots. One very interesting result is that tobacco growers are more likely to apply fertilizer on their maize plots than non-tobacco growers. This result confirms the descriptive analysis which showed that tobacco growers are three times as likely to fertilize their maize plots than non-tobacco producers. Cash derived from tobacco sales provides farmers with additional income to buy fertilizer. It is also possible that the residual of the fertilizer purchased for tobacco production is used on the farmers' maize plot.

- Use of purchased seeds for maize are also positively associated with fertilizer use. This is an expected finding because hybrid maize seed, which is purchased on a yearly basis, responds better to fertilizer than retained seed. Purchased tobacco seed, however, is not significant, because there is little variation in the variable (almost all tobacco seeds are purchased).

- Membership in a credit club or a cooperative/association seem to increase the likelihood of using fertilizer. Both credit clubs and cooperatives/associations in Malawi increase the access of farmers to group-based credit and to input and output markets.

- The number of extension visits shows no significant impact. This result may be due to the fact that there was not much variability among the farmers regarding the number of visits. Most farmers received between 16 and 18 extension visits per year. The variable that measures the distance to the fertilizer market is not significant. This finding

suggests that farmers in remote areas may not be at a disadvantage regarding access to fertilizer.

- Table 5.15 also reveals differences in the probability of using fertilizer among ethnic groups. For example, the Ngoni and the Yawo are more likely to use fertilizer than other groups. However, the magnitude of these differences are less than 7 percentage points. The ethnic variations regarding fertilizer use may be due to cultural practices or other sub-regional and agro-ecological factors that are not captured by the other independent variables.

- Per capita consumption expenditures (a proxy for per capita income) has a positive and significant effect on the probability of fertilizer use. This is expected in Malawi since most fertilizer purchases are cash-based and require a certain amount of cash income. The magnitude of this effect is small however. A ten percent increase in per capita expenditures increases the likelihood of fertilizer use by less than 0.5 percentage points. Non-farm income, however, is not a significant determinant of the choice to use fertilizer. Number of animals, which approximate wealth or the use of manure, are all non-significant, except for number of pigs. Pig farms in Malawi are becoming more common and are an important source of income to farmers. This might raise the ability of farmers to purchase fertilizer.

Determinants of the quantity of fertilizer used in Malawi. In Table 5.16, the factors that influence the quantity of fertilizer used per plot are estimated. Most of the variables that are significant determinants of the likelihood of using fertilizer also influence the quantity of fertilizer used.

- Household size and secondary level education of the household head have a positive impact on the quantity of fertilizer used. Household size is a proxy for amount of family labor available and its positive coefficient (although only significant at the 7 percent level) suggests that family labor complements fertilizer application in crop production. Secondary education of the household head is associated with 76 kg of additional fertilizer use per plot. This may reflect better access to information about crop production.

- As in the results from the previous equation, the quantity of fertilizer used seems to be positively associated with plot size but not related to farm size. This is a common finding in many agricultural systems. The irrigation variable shows the same insignificant impact as on the probability of using fertilizer. On the other hand, plot ownership has a negative effect. This latter result may be spurious as only 4 percent of the households in Malawi did not own their land.

- The regional dummies show almost the same trend as for the probability of using fertilizer: fertilizer application rates are lower in the South compared to the North and Central regions.

- The price variables again show that the price of fertilizer, the wage rate, and the price of tobacco are not significant, while the maize price is positive and significant. The interpretation of these results follows the same logic discussed earlier.

- Similar to the probability of using fertilizer, fertilizer application rates are linked to the type of crop grown on the plot. For example, compared to other crops, fertilizer use is higher on maize, tobacco, and vegetable plots. Similarly, if the household grows tobacco it will apply more fertilizer to its maize plot.

- Credit club membership increases the quantity of fertilizer used. However, while membership in a cooperative/association had a positive effect on the probability of fertilizer use, it does not seem to be a significant determinant of the quantity of fertilizer used.

- There are some ethnic differences in the fertilizer application rates. The Lomwe and Yawo use larger quantities of fertilizer per plot than other groups.

- Not surprisingly, per capita consumption expenditures not only has a positive impact on the probability of fertilizer use but also on fertilizer quantity application. The other resource variables are all insignificant expect for the number of pigs owned,

which as we mentioned earlier, is a significant source of income for farmers in Malawi.

Seed use

Figure 5.7 shows the percentage of households that use different types of seeds. Most households use their own seeds (85 percent), about a half purchase hybrid seeds, and around 40 percent purchase local seeds. The average application rate for seeds is 10 kg/ha for hybrid, 14kg/ha for local, and 66 kg/ha for own seeds. The most important hybrid seed used is maize. The purchase of hybrid seeds is broken down by the different household categories. While 55 percent of male-headed households purchased hybrid seeds, about 41 percent of female-headed households did. Purchase of hybrid seeds is also higher in the North (60 percent) compared with the Center (57 percent) and the South (43 percent). As shown in Figures 5.8 and 5.9, the use of hybrid seeds increases with both farm size and expenditures levels.

Fertilizer and seed sources

Following the liberalization of fertilizer and seed markets in 1994/1995, several local and international companies started to distribute fertilizers and seeds in Malawi, including multinationals such as Norsk-Hydro and Cargill. However, the most important source of inputs in general remains ADMARC. The survey data indicate that 42 percent of input purchases are made from ADMARC, 27 percent from other farmers, 18 percent from traders, and 13 percent from private companies. Traders and private companies are more important sources of input for farmers with smaller farm sizes, whereas larger and richer farmers tend to use ADMARC more frequently. Other farmers are important sources of inputs to small and poor farmers. The disaggregation of these percentages by type of input are presented in Tables 5.17 and 5.18. These tables reveal that for fertilizers, ADMARC remains the major supplier, whereas for seeds, other farmers and traders are more important sources.

Overall, about 90 percent of all inputs are purchased in cash. Most seed purchases are made in cash, except for coffee and tobacco seeds where 25 percent and 9 percent of purchases are made on credit respectively. Depending on the type of fertilizer used, two-third to four-fifths of all fertilizer purchases are made in cash and between one-fifth and one-third are made on credit. The

most important sources of input on credit are the Malawi Rural Finance Corporation (33 percent of households), other sources (26 percent), ADMARC (14 percent), friends (14 percent), and traders (11 percent). Traders in the Central region are more active as a source of input on credit. In the North, the MRFC is the most important source of input on credit, while in the South, other sources of input on credit are the most common. Traders and ADMARC seem to provide very little input on credit to female-headed households; less than 8 percent of all female-headed households receive input on credit from these sources. Female-headed households rely mainly on other sources of credit, MRFC, and friends. ADMARC's input on credit seems to favor more male-headed households and farmers with larger farm sizes.

Tables 5.19 and 5.20 show the average price paid for the different types of seeds and fertilizers as well as the average distance to the input source. Average distance to an input source is 6 km, which is not excessively far. About 90 percent of all input purchases are conducted by the household head.

5.1.6 Changes in labor and inputs since 1995

In order to capture changes in access to and use of inputs since the reforms of 1995, farmers were asked directly about changes in their use of inputs such as hired labor, family work done by women, seeds, and fertilizer, since 1995. As shown in Table 5.21, the majority of farmers reported no change in the use of these inputs. Only about 9 percent noted a decrease in the use of hired labor or family work performed by women, whereas about one-third said that their use of women labor had increased. Also, only about 16-18 percent reported that their use of seeds or fertilizer had decreased since 1995. This indicates that input market liberalization is not perceived as having had dramatic impact on the use of labor, fertilizer or seeds by small farmers.

For those who reported changes in input use, the main reason for the increase in labor use was a change in cropping pattern, whereas the main reason for the decrease in labor was blamed on the inavailability or high cost of labor. Among farmers that claimed a change in the use of purchased seeds or fertilizers, the main reason behind the decrease in use was higher prices. For those who increased their use of input, this was attributed to higher revenues from buying and applying the input. In addition, for seeds, about one-third of the farmers that increased their use of purchased seeds explained that the main reason for the increase was the higher availability of seeds since the

reforms. These last two findings suggests that (a) farmers that have increased their use of inputs have either realized the benefits of modern agricultural technology or, more likely, they have diversified into higher value crops (such as tobacco) where the application of more expensive inputs is more profitable; and (b) seeds have become more available since 1995, albeit at higher prices.

Access to and use of credit

As expected, not many smallholder farmers apply for credit. A little less than 20 percent of the smallholder farmer households applied for credit during the period June 1997 to June 1998 (see Table 5.22). The main reasons cited for not applying for credit are due to (1) difficulties dealing with lending institutions (32 percent), (2) unavailability of credit institutions (24 percent), (3) lack of collateral (19 percent), and (4) not wanting to borrow money (18 percent). In over 90 percent of the households, it is the household head who applies for the loan. Of those that applied for a loan, only two-third received the loan they applied for. The main purposes for a credit application are for personal expenses (37 percent of the applicants), agricultural investments (28 percent), or fertilizer purchases (14 percent). The main sources of credit were friends and family (57 percent of applicants), followed by the MRFC (17 percent), the National Association of Business Women (NABW) (4 percent) and the Small Enterprise Development Organization of Malawi (SEDOM) (4 percent). As in many other sub-Saharan African countries where rural credit markets are not well developed, smallholders have to rely mainly on relatives and friends to secure some credit when they are cash-constrained. The average amount borrowed is about MK 550 for an average period of four months and at an average monthly interest rate of 7 percent

Only 25 percent of the households mentioned that their access to credit has changed since 1995. Of those households, 59 percent said that there has been an increase in access to credit while 41 percent said there was a decrease. The decrease in credit access is attributed solely to the closure of a credit source in the area. Of those that experienced an increase in credit access, the main contributing factors are less collateral requirement (40 percent), more availability of different sources of credit (35 percent), and a new source of credit opened in the area (24 percent).

Contrary to expectations, female-headed households do not seem to have significantly less access to credit than male-headed households. As Table 5.22 indicates, about 16 percent of the former

applied for credit compared to 20 percent for the latter. Females were almost as likely as men to obtain credit. However, while 49 percent of female-headed households applied for a loan for personal expenses, only 32 percent of the male-headed households used it for personal expenses. Male-headed households tended to use more credit than female-headed households for agricultural investments and to purchase fertilizers. Also, while a higher percentage of male-headed households borrowed from moneylenders, female-headed households seemed to borrow more from the MRFC. The MRFC charges market interest rates similar to any commercial bank. This is probably why female-headed households pay interest rates that are four times higher than their male counterparts (16 versus 4 percent per month). It seems that only male-headed households had access to the SEDOM, the Development of Malawi Traders (DEMATT), or credit clubs. Female-headed households were also more likely to note an increase in access to credit since 1995.

The survey data suggest that although larger and wealthier farmers are more likely to apply for credit, they are less or equally likely to obtain the loan than smaller or poorer farmers. This may indicate that there is no discrimination against small and less well-off farmers in terms of granting credit. The only difference in terms of farm size and wealth is that smaller and poorer farmers tend to rely more on money lenders and to borrow for personal expenses while larger and wealthier farmers use the SEDOM more often and borrow mainly for investment purposes. The MRFC is also more commonly used by wealthier farmers. As expected, smaller farmers are more likely to not apply for credit because of lack of collateral. Poorer farms seem also more likely than richer ones to witness a decrease in access to credit since 1995. However, perception about a decrease in access to credit since 1995 was not positively associated with farm size.

Differentiating between tobacco and non-tobacco growers shows that the probability of applying for a loan was higher for tobacco growers: while 24 percent of tobacco growers applied for a loan, only 17 percent of non-tobacco growers applied for one. The purpose of the loan also differs a little bit between tobacco and non-tobacco growers. Use of loans for personal expenses and to buy fertilizer was more important for tobacco growers; while use of loans for investment purposes was more frequent for non-tobacco growers. This may indicate that tobacco growers have more access to credit to smooth out current consumption because of their higher credit-worthiness. Use of loans for fertilizer is also more important for tobacco growers since they are three times as likely to apply fertilizer than non-tobacco growers. Surprisingly, almost an equal

share of tobacco and non-tobacco growers received the loan they applied for (69 and 68 percent respectively). Therefore, there does not seem to be discrimination based on the type of crop grown by the farmer.

Agricultural assets

Farm households own several small agricultural equipment. Table 5.23 demonstrates that the most common ones are the hoe (owned by 99 percent of the households), followed by the sickle, the axe and the panga knife (each owned by about two-thirds of the households). Carts, ploughs, shovels, and spayers are much less common (less than or equal to 10 percent). In terms of animal ownership, the most common livestock are goats (owned by 66 percent of the households), followed by pigs (34 percent), and donkeys (12 percent). Only 8 and 5 percent of the households own cattle and poultry respectively.[31] The average herd size for livestock owners are 8 to 9 goats, 5 donkeys, 4 to 5 pigs, and 11 chickens.

The disaggregation by region shown in Table 5.24 reveals that the frequency of ownership of agricultural assets (including animals) is more common in the North, followed by the Center and the South. Similar to household assets, male-headed households are also more likely to own agricultural assets than female-headed households (see Table 5.25). The ownership of agricultural assets is positively related with expenditure levels and farm size (see Tables 5.26 and 5.27), except for poultry which is more commonly owned by small farms.

5.1.7 Crop production

Table 5.28 indicates the percent of households that grow each crop, the area allocation, as well as average production and yields by crop. Maize remains the most important crop both in terms of the percent of the households that grow it (99 percent) and in the percent cultivated area allocated to it (67 percent). Groundnuts are the second most important output and are usually home consumed or grown for cash income. The other important food crops are beans followed by cassava and sweet potatoes. Tobacco is the most important cash crop followed by soybeans and cotton. Vegetables are grown by about 13 percent of the households. Average maize yields are

[31] The percent of poultry owners seems to be grossly under-reported as the food expenditure data reported later show that about one-third of the farm households grew their own chickens.

less than 1 mt per ha which are fairly low compared to Kenya (1.7 mt/ha) or South Africa (2.3 mt/ha) but higher than Zimbabwe (0.73 mt/ha) for 1990-94 (Beyerlee and Eicher, 1997). Usually hybrid maize could produce up to 3 mt per ha. However, it seems that most smallholder households still use their own seeds, which are very low yielding (see the section on input use).

The importance of each crop varies by region and gender of the household head. As Table 5.29 shows, a higher percentage of male-headed households grows cash crops such as tobacco and soybeans. Female-headed households are more likely to grow cassava while a higher percent of male-headed households grow sweet potatoes. In term of regional distribution, we also note a few variations in cropping patterns. For example, tobacco and soybeans are more widely grown in the Center while beans, cassava and sorghum are more common in the North and South. Maize and groundnuts are grown all over the country. As expected, Table 5.30 shows that larger farms tend to grow more cash crops and are more diversified in general. The same applies for richer farmers, except for tobacco and soybeans (see Table 5.31). Contrary to expectations, tobacco is not more likely to be grown by richer farmers; about 20 percent of the farmers in each expenditure category grow tobacco and the percent cultivated area (5 to 7 percent) varies little across expenditure groups.

Yields vary when disaggregated by gender of household head, region, and expenditure group. For example, for most crops, yields seem to be lower in the South. For almost all crops, male-headed households have higher yields than female-headed ones. Also, yields do not seem to follow a clear pattern across different farm sizes indicating no economies of scale in farm crop production. On the other hand, maize yields seem to be higher for richer farmers. This is probably because richer farmers are more educated about input use and have more cash to buy inputs than poorer farmers.

5.1.8 Crop storage

As Table 5.32 shows, most smallholder farmer households in Malawi (about 90 percent) use their own house to store their produce. About 56 percent also use a granary, 12 percent use a shed and 10 percent use a pit. Other storage facilities such as stores, warehouses, or storage bins are very rarely used (less than 1 percent each). In the Southern region, the use of granaries is almost half as popular as in the North or Center; people in the South are more likely to use their own house as

the main storage space. Pits are more common in the North, while sheds are more used in the Center (mainly because tobacco which is grown in this region is usually stored in sheds). Granaries are more common for farmers with larger farm sizes.

Almost all households own their storage space (house, granary, or shed); very few rent this type of storage space. Rental of storage space is a bit more common for warehouses (22 percent of households that use a warehouse rent it), stores (8 percent rental), and pits (6 percent). Storage rental seems to occur only in the Central region, and mainly for the poorest farmers. Richer and farmers with large farm sizes do not rent any storage space. The average capacity of a granary is about 3.2 mt of maize. Except for warehouses, which have an average capacity of about 9 mt, the other types of storage facilities have an average capacity of less than 1 mt. Table 5.33 presents the average quantity of each crop that a household has in storage one month after harvest as well as the number of months needed to deplete the stock. The averages by crop include only those households that store that specific crop.

As Table 5.33 demonstrates, maize stocks are the largest among other commodities and it is stored for the longest time (for 6 months after harvest). This is because it is the main staple that is consumed all year long. The other commodities that are stored for long periods of time are other food crops such as rice, beans, groundnuts and vegetables[32] (about 5 months after harvest). Cash crops such as tobacco, cotton or sunflower are stored for much shorter periods of time (2 months). Storage losses in general are small (0-1 percent of total stock). Only vegetables, sweet potatoes, and maize witnessed a higher percentage of storage losses (2-3 percent of stock). Losses for these crops are mainly due to pests or (loss or gain of) humidity.

The main reasons cited for storage do not vary much by type of crop. Most food crops are stored to be eaten throughout the year, while cash crops are stored mainly to sell and meet cash needs later in the year. Thirty four percent of the households stored tobacco because they couldn't sell it when they wanted to (they have to wait for the auction floor scheduling). The same applies for 75 percent of the households that stored sunflower.

[32] It is very unlikely that vegetables can be stored for 5 months. It is more likely that small farmers meant that vegetable production in the field can last for 5 months and therefore they have access to that stock for about 5 months out of the year.

5.1.9 Agricultural marketing

Marketed surplus

Tables 5.34 and 5.35 show the crop disposal patterns of households by crop. Except for cash crops such as tobacco and cotton, which are grown for sale, most food crops are mainly produced for subsistence. For example, only 12 percent of the households sell any maize and the total marketed surplus for maize is only 6 percent. Maize is considered the most important subsistence crop for small farmers in Malawi. For other food grain crops (except sorghum), between 20 and 60 percent of the producers (i.e. those that grow the crop) sell some amounts. However, the proportion sold is quite small; the marketed surplus for most food grain crops is less than 45 percent. Vegetables and soybeans are mainly grown as cash crops in Malawi and the percentage marketed is about 70 to 80 percent. The category "other crops" is also highly commercialized because it consists mainly of cash crops such as sunflower, coffee, chillies, and paprika. As expected, tobacco represents about 50 percent of the value of all crop sales. All other crops represent each less than 10 percent of the total value of sales.

Another way to examine marketing patterns is to consider the distribution of farm household by the market surplus ratio, defined as the value of crop sales as a percentage of the value of crop production. Table 5.36 highlights the fact that farms in Malawi produce mainly for own consumption. Only 18 percent of the farm households sell more than half their output and forty-six percent sell less than 10 percent. This presents a sharp contrast with the marketing patterns in Benin, where 54 percent of the farms sell more than half their output.

In general, male-headed households are more commercialized than female-headed ones. Male-headed households sell about 26 percent of their output compared to 15 percent for female-headed households. Not surprisingly, the share of output sold also increases with farm size and expenditure category. In about 80 to 90 percent of the households, the household heads makes the crop disposal decision for both cotton and tobacco. For maize, on the other hand, in 25 percent of the households, either the spouse or both the spouse and the head make the decision regarding crop distribution. For the other crops such as potatoes, beans, sorghum, the crop disposal decisions are made by either the spouse or both in about 33 percent of the households. Therefore, one can deduce that for the most lucrative crops such as tobacco, crop disposal is more

heavily controlled by household heads. Household heads are also three times as likely as other household members to be the ones selling the crop in the market .

The average quantity sold of each crop per selling household, the number of transaction per year, and the average price received per kg are shown in Table 5.37. The average quantity sold of any crop is about 280 kgs. The crop with the largest volume sold is sweet potato (570 kg) followed by maize (350 kgs). The average number of sale transactions per year for any one crop is two. Most crops are sold at harvest time, around June and July.

Regression analysis of marketed surplus. In this section, we analyze the factors that change the market orientation of the household. The dependent variable is measured as the share (in value terms) of total production that is marketed (see Table 5.38). The results from the ordinary least squares regression analysis show an adjusted R^2 of 0.39, which means that about 40 percent of the variation in marketed surplus is explained by the variables included in the regression equation. The remaining results are as follows:

- The greater the number of children under 15, the lower the marketed surplus of the household. This is expected since households with more dependent children have more consumption needs, and therefore less output can be sold to the market. Although only significant at the 10 percent level, each additional child is associated with a 6 percentage point decline in marketed surplus.

- Not surprisingly, farm size is positively associated with marketed surplus. Households with larger farms have more production beyond and above subsistence consumption that can be sold to the market. However the effect is small, increasing marketed surplus by only about 2.6 percent.

- The variable with the most important effect on marketed surplus is whether the households grows tobacco or not. Tobacco growers have a marketed surplus that is 30 percent higher than non-tobacco growers. This is expected since all the tobacco that is produced is usually sold and the value of tobacco, compared to other crops, is fairly high. Therefore, being a tobacco grower significantly increases the market orientation of the household.

- Households that belong to a club also have a higher level of marketed surplus (by about 3 percent). As mentioned earlier, farmer clubs are usually created to help farmers market their crop. This result shows that farmers' club should be encouraged to help increase the commercialization of smallholder agricultural production.

- More contact with extension agents also increases the market orientation of the household by about 4 percent. This may indicate that more access to information is beneficial for the commercialization of agricultural production.

- The Yawo, followed by the Chewa and the Tumbuka have lower marketed surplus than other ethnic groups. However, there does not seem to be a strong regional difference in terms of the extent of commercialization of farmers.

- As predicted, the longer the distance of the farm from the road, the lower the marketed surplus (by about 6 percentage points). Longer distances to transportation networks imply that the cost of marketing a crop are higher. Therefore, farmers in remote areas have a lower level of market orientation.

- The ownership of a radio, which also increases access to market information, increases marketed surplus by around 4 percent. Access to market information increases the ability of farmers to assess whether market conditions are appropriate to sell their crops.

The remaining variables show that holding everything else constant, the level of expenditures, gender, age or education of the household head, do not have a significant impact on the market orientation of the household. This suggests that there is no intrinsic bias against poorer households or women in terms of access to agricultural markets.

Types of buyers

Overall, 35 percent of crop sales transactions are with traders, 30 percent with consumers, 19 percent with ADMARC, and 11 percent at the auction floors. In terms of volume, these percentages are basically similar; i.e. traders buy up about 30 percent of the total volume of sales,

ADMARC captures another 17 percent, and consumers about 38 percent. The types of crop buyers, however, vary by crop. Table 5.39 indicates that for maize for example, the most common buyer is ADMARC, whereas for tobacco, auction floors dominate. It is interesting to note that the likelihood of sales to ADMARC increases with expenditure and farm size. This indicates that ADMARC is still more accessible to wealthier and larger farmers.

Location of sale

The location of the sale also varies by the crop, but in general, about 37 percent of all transactions are conducted in the market, 26 percent on the farm, 18 percent at ADMARC, and 11 percent at the auction floor. Bulky commodities such as tuber crops and vegetables are more likely to be sold on the farm. Grains are more likely to be sold at the market or ADMARC depots; while tobacco is more likely to be sold at the auction. Small farmers use various means to transport their crops to their point of sale market or to ADMARC's depots. The most common mean of transport is by foot (34 percent of all transactions), followed by bicycles (17 percent), animal and cart (12 percent), car and truck (10 percent; mainly to take tobacco to the auction), and the rest is either not transported or transported by other means. About 57 percent of transport means are owned and 43 percent are rented. The average distance traveled to sell a crop is 8 km and the average time it takes to take the crop to the sale point is 1 hour and 15 minutes. Average transport costs to sale point are 46 MK/km/ton. These numbers indicate that farmers in Malawi do not have access to a cheap source of transport to sell their crop and that modern transport means are still not very common. As a result, farmers still travel long distances on foot or by bicycle to sell their produce.

Farmers were asked about the factors that affect their choice of buyer or sale point. The answers were split almost 50-50 between "best price offered" and "closest location". Therefore, both prices and distance are important in determining sales by small farmers in Malawi. Only 3 percent cited "pre-established relationship with buyer." Farmers were also asked whether they are always able to sell when they want to. Only 18 percent said that they couldn't. They attributed this to either because buyers only buy at certain periods (65 percent) or that they can't store the crop for long (30 percent). The latter reason applies mainly for tuber crops (such as cassava and sweet potato) and vegetables. Few farmers (only 10 percent) contract their crop. The crop that are mostly contracted are cash crops such as tobacco, cotton, chillies, sunflower, and beans. The

most important contractors are the auction (40 percent of all contracts), ADMARC (30 percent), and traders (22 percent).

Changes in crop marketing

Only 17 percent of households noted a change in the distribution of their sales to buyers since 1995. Cash crops such as tobacco, cotton, coffee, chillies, and sunflower, were the areas where most changes were reported. Of those households that reported a change, about 38 percent noted an increase in sales to traders, while 19 percent said that they increased sales to ADMARC. The rest increased their sales to the auction (15 percent), relatives and friends (13 percent) and others (15 percent). The change in sale distribution varies by crops. For example, more sales to traders are observed for maize and groundnuts, while increased auction sales refer mainly to tobacco. Coffee producers also have increased sales to coffee cooperatives since 1995.

5.1.10 Expenditure patterns

The most common, and perhaps the best measure, of the overall well being of a household is per capita consumption expenditure. Consumption expenditure includes the following components:

- Food purchases: the amount spent on food for household consumption
- Home production: the value of goods produced by the household for its own consumption
- Non-food purchases: goods and services purchased for household consumption,
- Housing value: the rental value of the dwelling occupied by the household.

Food purchases are measured based on responses to a set of recall questions for 29 food and beverage categories. Home production is measured by quantity of food produced by the household for its own consumption, valued using the price of the same food items purchased in the same region. Non-food purchases are estimated based on recall questions for 14 non-food categories. And the rental value of housing is based on estimates by the respondent.

Overall expenditure patterns

According to the results of the IFPRI-APRU Small Farmer Survey, the average annual value of consumption expenditure among agricultural households in Malawi is 14 thousand MK per household or 3.1 thousand MK per capita. Food expenditures absorb about two-thirds of total expenditures (67 percent); food purchases account for a little over one third (37 percent) and home produced food a little less than one third (30 percent). Non-food expenditure (including the rental equivalent of housing) contributes another third of expenditure (see Table 5.40).

The level of expenditure varies from one region to another. As expected, per capita expenditures are higher in the North (3.9 thousand MK) than in the Center (3.0 thousand MK) and the South (2.9 thousand MK). The share of expenditure allocated to food is about two-thirds in all three regions (61 percent in the North compared to 69 percent in the Center and 67 percent in the South). The contribution of home production to total expenditure is also approximately the same in the three regions (31 percent in the North, 30 in the Center, and 28 in the South).

Female-headed households are a little disadvantaged relative to male-headed households. The total expenditure of female-headed households is 31 percent below that of male-headed household (see Table 5.41). Because male-headed households have larger families, however, per capita expenditure of female-headed households are only 12 percent below that of male-headed households. Female-headed households spend a larger share of their budget on food (70 percent compared to 66 percent). They also rely a little more on home production than male-headed households (32 percent compared to 30 percent). The share of non-food purchases is, on the other hand, lower for female-headed households than for male-headed households (17 percent compared to 25 percent).

Not surprisingly, the composition of expenditure changes as total expenditure rises (see Table 5.42). The poorest 20 percent of farm households in Malawi have an average per capita expenditure of just 1.08 thousand MK. The richest 20 percent of the farm households have an average per capita expenditure of 6.5 thousand MK. The food share in total expenditures does not seem to vary much between the first four expenditure groups (about 70 percent in all cases). The share diminishes only for the wealthiest 20 percent of the households (61 percent). This structure

indicates that the extent of poverty in Malawi is such that more than 60 percent of the population still spends more than 70 percent of their budget on food. In the poorest four expenditure categories, home produced food constitutes 34 percent of total expenditures, while in the highest expenditure category it accounts for 23 percent.

The relationship between farm size and expenditure patterns shows similar trends as for expenditure groups. Household expenditure rises steadily across farm-size categories, from 9.9 thousand MK in the smallest 20 percent of farms to 23.4 thousand MK among the largest 20 percent of farms. Per capita expenditure also increases with farm-size, but not as much (2.6 thousand MK for the smallest farms to 4.1 thousand MK for the largest ones). The food shares are also relatively constant across farm size groups. The farmers in the first four farm size groups spend about 70 of their expenditures on food. Only the last group with the largest farm size spend about 61 percent of their expenditures on food. The contribution of home production, on the other hand does not show a clear pattern across farm size groups (see Table 5.43).

Food expenditure

The results of the IFPRI-APRU Small Farmer Survey indicate that, in terms of value, maize is by far the most important food item, accounting for 32 percent of the food budget of the average farm household. Maize is followed by fish (representing 8 percent of the food budget), eggs (7 percent), and leafy vegetables (6 percent). It is interesting to note that the second and third largest items in the food budget are not basic staple foods. Beans/Pulses, groundnuts, potatoes, rice, and tomatoes each represent 4-5 percent of the food budget, while cassava, wheat products, sorghum, onions, cooking oil, and coffee/tea account each for 1-2 percent (see Table 5.44).

Another measure of the importance of a food item is the proportion of households that consume it. The most widely consumed food items are maize (consumed by 99 percent of the households), fish (93 percent), tomatoes (92 percent), sugar (86 percent), chicken (84 percent), leafy vegetables (83 percent), beans/pulses (83 percent), and groundnuts (81 percent). Other foods consumed by at least two-thirds of the households include potatoes, cassava, eggs, beef, and cooking oil. Less widely consumed items are sorghum, wheat products, fruits and nuts, other

vegetables and legumes, dairy products, sweets, and food away from home, each of which is consumed by less than one-third of farm households (see Table 5.44).

Food expenditure by source. As mentioned above, food expenditure includes both cash purchases and home production (the value of food grown by the household for its own use). The proportion of food expenditure that is produced at home varies widely across commodities. Home production represents over two-thirds of the household supply of maize, potatoes, groundnuts, and eggs. Home production of other food items such as cassava, rice, beans, and sorghum represents between 50 and 65 percent of total household supply. About one-third of the chicken and other meat (mainly goat) and less than 10 percent of onions and tomatoes are home produced. All the remaining food items are purchased. Overall, home production accounts for slightly less than half (44 percent) of the value of food consumption, while a little over a half (56 percent) is purchased (see Table 5.45).

Almost all households produce some of their own food and purchase some food, but the percentages vary depending on the item. In the case of maize, 96 percent produce for their own consumption and 73 percent purchase at least some maize over the course of the year. This implies that a significant number of household (about 70 percent) supplement their own production with maize purchases. Fifty percent and 70 percent of the households produce eggs and grow chicken for their own use, respectively. And, about 25 to 50 percent of households produce potatoes, cassava, beans/pulses, and groundnuts for their own use. On the other hand, a large number of commodities are purchased by over 40 percent of the farm household: potatoes, cassava, rice, beans/pulses, leafy vegetables, tomatoes, onions, beef, other meat, fish, sugar, cooking oil, and coffee/tea. Except for maize, groundnuts, chicken and eggs, the proportion of households buying each food is generally greater than the proportion producing it for their own consumption. This suggests that the image of the farmer who produces food for his family and sells some of the harvest to cover school fees and other non-food necessities is not particularly relevant for Malawi. The farm household economy is more complex, with the production of a small number of food items for own use and reliance on the market for a large number of other foods (see Table 5.46).

Food expenditure by region. The composition of food expenditure does not vary significantly across regions, except that in the Northern region, diets seem to be more diversified. For the majority of the food items, except for a few items such as maize, tomatoes, vegetables,

wheat, and fruits and nuts, a higher percentage of households in the North consume the product compared to households in the Center or South (see Table 5.47). Maize occupies a higher share of the total food budget of households in the Central and Southern region (around one-third in the Center and South compared to 20 percent in the North) (see Table 5.48). In the North, following maize, the most important items in terms of their share of the total food budget are rice (11 percent), fish and eggs (8 percent each), and potatoes and tomatoes (6 percent each). In the Center, eggs (8 percent), fish (7 percent), and groundnuts (6 percent) are the other important food items after maize. In the South, the other important food items are fish (10 percent), leafy vegetables (7 percent), and rice, beans/pulses, and eggs (5 percent each).

Food expenditure by gender of the household head. Table 5.49 shows that for most food commodities (except beans/pulses, groundnuts, sorghum, other legumes and leafy vegetables), a lower percentage of female-headed households consume the commodity compared to male-headed households. This may indicate that female-headed households are worse off in terms of the diversification of their diet. Lower levels of total income limit the food purchasing power of female-headed households; they have to rely more on home produced food which is not as diverse as what they can find in the market.

Food expenditure by expenditure category. As per capita expenditure rises, the number of food items consumed by the household also increases, implying a more diversified diet for richer households. As expected, this difference is more significant for more expensive food items such as rice, onions, fruits and nuts, beef, chicken, other meat, eggs, dairy products, cooking oil, sugar, sweets, soft drinks, and food away from home (see Table 5.50). In terms of the share in the total food budget, only for maize and leafy vegetables, the share of the food budget declines with per capita expenditures (see Table 5.51). For the poorest expenditure group, maize constitutes 47 percent of the total food budget, while for the richest expenditure group it accounts for 26 percent. The other important food items for the wealthier farmers are fish and eggs.

Non-food expenditure

The average value of non-food expenditures among farm households in Malawi is MK 3.3 thousand per household or MK 697 per capita. Household goods, and "leisure and other" are the two largest categories, accounting respectively for 32 and 20 percent of non-food spending.

This is followed by clothing (17 percent), transportation (13 percent), and energy (11 percent) (see Table 5.52).

Non-food spending patterns vary somewhat across regions. Households in the North spend a larger share of their non-food budget on energy and transportation and less on household goods and "leisure and other" than households in the other two regions. The Central and Southern regions show similar non-food expenditure patterns except that households in the Center spend a higher share on "leisure and other" and a smaller share on transportation (see Table 5.53).

The structure of non-food spending does not differ much between male- and female-headed households. Female-headed households appear to spend a somewhat larger share of the non-food budget to household goods. On the other hand, male-headed households allocate a larger share to "leisure and other" (see Table 5.54).

The composition of non-food spending does vary significantly across expenditure categories. The share of the non-food budget devoted to clothing, household goods, education, and social events falls with per capita expenditure. For example, clothing accounts for 24 percent of non-food spending among households in the poorest category, but the percentage falls to just 11 percent in the highest expenditure category. The share on "leisure and other", on the other hand, increases quite significantly with household expenditure levels (from 10 percent in the poorest households to 34 percent in the richest ones) (see Table 5.55).

Regression analysis of expenditure. This section uses regression analysis to examine the relationship between various household characteristics and its standard of living, as measured by per capita consumption expenditure. The adjusted R^2 for the regression is 0.42. The results are reported in Table 5.56 and are summarized as follows:

- Both household size and the number of children have a negative effect on the level of consumption expenditures per capita. This suggests that farmers with larger family size and more children are also poorer because they have a larger number of non-working persons. Expenditures per capita decrease by about 11 percent with household size and 64 percent with the number of children.

- Surprisingly, the education of the household head or the spouse have no effect on expenditure levels. Returns to education in the rural sector of Malawi are lower than in the urban sector where education is more valued.

- As expected, farm size is positively associated with the wealth status of the household. Each additional hectare increases per capita expenditures by about 12 percent.

- Use of irrigation water is negatively associated with standards of living. This result is a bit hard to interpret, but we recall that only 6 percent of the households used irrigation, and therefore this result could be spurious.

- Membership in a cooperative or association is positively related with expenditure (the coefficient is equal to 17 percent). It is normal that well to do farmers are more likely to belong to associations than their poorer counterparts. But membership in a club, which is more frequent, is not associated with expenditure levels.

- More frequent contact with extension agents is related with a 9 percent increase in per capita expenditures.

- The characteristics of the house are also associated with expenditure levels. Households that have a house made up of a cement roof (compared to an earth or stone roof) are usually better off by about 16 percent.

- Some assets such as chairs, beds and radios are also more common in households with higher per capita expenditures. Each item is associated with a 12-15 percent higher level of per capita expenditure.

The other results suggest that the gender of the household head, the ethnic group, other housing characteristics, and the regional location of the household do not have a significant relationship with expenditure levels. Furthermore, *ceteris paribus*, tobacco growers do not seem to have higher levels of expenditures than non-tobacco growers.

5.1.11 Household assets and housing characteristics

Household assets

Household assets include durable goods that households purchase such as furniture, bicycles, appliances, etc. The number and value of household assets can approximate the living standards of the household and reflect the household's permanent income levels.

As Table 5.57 demonstrates, the most common household assets owned are a radio, followed by chairs, tables, and bicycles. Except for the radio, less than 50 percent of the households own any of those assets. In the villages of Malawi, farmers usually sleep or sit on floor mats. Chairs, beds, and tables are not a common occurrence. For most items, except for chairs, the average household who owns an asset has between 1 or 2 units of each. The most valuable asset a household owns on average is a bicycle followed by a radio. Expensive items such as cars, motorcycles, and televisions are only owned by about 1 percent or less of all households.

Tables 5.58 to 5.61 show the pattern of households asset ownership by region, gender of head, farm size and expenditure quintiles. The disaggregation by region indicates that the frequency of ownership of household assets is higher in the North than in the other two regions. Surprisingly, it seems that in the Central region, the extent of household asset ownership is lower than in the Southern region. Male-headed households are also more likely to own household assets than female-headed ones. As expected, ownership of household assets is highly correlated with farm size and expenditure levels. This suggests that household assets are a good measure of the wealth and income levels of the household.

On average, in more than 80 percent of the households, the assets were purchased by the husband. In the case of a television, however, in one-third of the households it was purchased by the husband, another one-third reported that it was bought by the wife, while about one-quarter reported that is was received as a gift. Other furniture and sewing machines show the highest rate of inheritance (about 16 percent of the households).

Housing characteristics

The overwhelming majority (99 percent) of farmers own their house. As shown in Table 5.62 the average value of a farmer household dwelling (value of residence and plot of land) is MK 6,035. The value of the dwelling increases with levels of expenditure. The most common types of dwellings are made of mud walls, earth floors, thatch or straw roofs, with no electrical source for energy or lighting. The most prevalent source of drinking water is a borehole followed by public wells. On average, households have to travel about half a kilometer to get water, about 8 km to use a telephone, and about 0.3 km to get to the nearest road accessible by a truck. The characteristics of the dwelling structure and the households' access to different amenities such as sources of drinking water, access to a telephone or a main road, do not seem to vary a lot with expenditure levels. The only exception is for brick or stone houses which are more likely to be owned by better-off farmers. These also seems to be some gender differences in the quality of the dwellings; male-headed households are twice as likely as female-headed households to have a house made of brick or stones and the average value of a male headed household dwelling is MK 6,730 compared to MK 4,644 for female-headed households.

5.1.12 Sources of information and access to extension services

Smallholder farmers receive most of their agro-economic information from extension agents. About two-third to 70 percent obtain information on seed varieties, fertilizer use and prices, controlling pests and weeds, and crop production techniques from extension agents. Approximately half of them also get information on prices, crop marketing and government policies from extension agents. Other important sources of information are the radio, followed by family and friends. The radio is more important for prices and changes in government policies than for technological information. Because of the sparse population density in the North, the extension agent to farmer ratio is higher in this region compared to the Center or the South.

The use of extension agents also seems to increase with farm size. This is perhaps because farmers with a larger land area have a higher marginal benefit from meeting with an extension agent than smaller farms or because extension agents visit bigger farms in general. Farmers are visited an average of 17 times a year. Most extension agents visits are done with a group of farmers, or the whole village. The type of information that extension agents provide include

information on agricultural input use, crop production methods, how to obtain credit for crop production, and information on input and crop prices and crop marketing. The most useful type of information that farmers would like to get is how to increase yields followed by how to conserve and manage the land. Only about a quarter of the households noted that access to extension and information services has gotten worse since 1995. The rest mentioned either better access (36-38 percent) or no change (38-39 percent).

In about 70 percent of the households, the extension agent's visit is attended by the household head. For the rest of the households, either the spouse or both the head and the spouse attend the extension agent meeting. Female-headed households are almost as likely to get extension services as their male-headed counterpart. However, in male-headed households, extension agents visit the head in 63 percent of the households, or the head and spouse in 27 percent of the households. Therefore, the spouse of a male-headed household is less likely to see an extension agent.

5.1.13 Farmers' perceptions about the reforms

To get an idea of how farmers feel about the reform, farmers were asked about their perceptions regarding the changes that have occurred since the reform of 1995. The first series of questions focused on whether some crops had become more profitable since 1995. Table 5.63 summarizes the farmers' responses. For most crops, farmers noted that profitability had increased since the reforms of 1995. This perhaps reflects the fact that market liberalization has favored the agricultural sector in general, in terms of better prices and more opportunities for marketing by smallholders.

The second series of questions focused on perceptions regarding changes in the availability of inputs since 1995 (see Table 5.64). About two-thirds of the households noted that seeds had become more available since 1995. And, for about half of the households, labor had also become more available since then. Perceptions about the availability of fertilizer were more negative; only about 39 percent reported an increase in fertilizer availability, 37 percent noted a decrease, and 23 percent reported no change. Since most farmers do not use pesticides, the majority did not know if they had become more or less available since 1995. These results suggest that, more than for any other input, the rising cost of fertilizer has become an important issue for farmers following the reforms.

It was also important to find out whether the market reforms of 1995 had led to a more competitive marketing environment (in terms of a more varied selection of input sellers and crop buyers to farmers), better information flow to farmers, and better transport infrastructure. Table 5.65 shows that about 45 percent of farmers felt an improvement in the number of input sellers while 65 percent noted an increase in the number of crop buyers. Information about crop prices or crop production methods has also either improved or not changed for most farmers. The only institution that deteriorated was roads; 68 percent of the households noted that roads had gotten worse since 1995. Investment in road and other transport infrastructure has declined in many African countries since market reforms. This is mainly because reforms have also been accompanied by budgetary cuts in public expenditures resulting in lower funds for road development and maintenance.

Finally, farmers were asked whether they felt better or worse off since 1995 and the reasons for their answers (see Tables 5.66 and 5.67). About 62 percent of the farmers felt worse off now than in 1995. Fifty-six percent of the households in this group explained that they felt worse off because fertilizer had become more expensive, while about 12 percent reported the higher cost of food prices in stores. Each of the other reasons listed were reported by less than 10 percent of the households. The fact that fertilizer had become more expensive and that farmers claimed that they could no longer afford to buy it were the main impetus for the SPS and the APIP. It is also possible that during the interviews, farmers exaggerated their view about the cost of fertilizer in the hope that they would get more or would be included in these initiatives. This is especially relevant since earlier results on changes in input use since 1995 reveal that only 18 percent of the farmers reported a decline in fertilizer use since 1995. Nonetheless, the impact of higher fertilizer prices on small farmers raises some concerns on the effects of fertilizer market liberalization. Before the reforms, farmers had some access to subsidized fertilizer through ADMARC, even if it was rationed and not always available on time. Farmers were also able to obtain this fertilizer on credit in return for selling their output to ADMARC. With liberalization, this institutional set-up is no longer available and most small traders have been reluctant to provide input on credit to farmers because of their inability to enforce contract with farmers.

Another 24 percent of farmers felt better off since 1995. The two most important reasons advanced for feeling better off were growing more cash crops (25 percent of those feeling better

off) and earning more money from non-farm work (25 percent). The other less frequently cited reasons were health of family member was better, better crop prices, and better weather. As Tables 5.66 and 5.67 demonstrate, feeling better off is positively associated with farm size and expenditure levels. This may indicate that the reforms have benefited larger and wealthier farmers.

Regression analysis of perceived changes in well-being. We use regression analysis to explore the factors associated with the perceived change in household well-being. Because the dependent variable is a qualitative variable representing "better", "same", and "worse", an ordered probit analysis is used[33]. A positive coefficient means that higher values of the independent variable are associated with a more positive assessment of changes in household well-being. The results, shown in Table 5.68, are interpreted as follows.

- Households with higher per capita expenditures are more likely to report that they feel better off since 1995. This may be a limited indication that the reforms have benefited better off farmers than poorer farmers, or it could be that richer farmers are usually more optimistic about reforms in general than poorer farmers.

- Higher marketed surplus also increased the likelihood of feeling better off since 1995. Again this may confirm the evidence that more commercially oriented farmers have benefited from market liberalization, while subsistence farmers either feel the same or worse off since the reforms.

- Households with larger family size are more likely to feel better off, but it is not clear why that would be so.

- Literate household heads are less likely to feel better off than their non-literate counterparts. This may be because they are a bit more open and critical in general and the returns to literacy in rural areas have not changed much since the reforms.

[33] An ordered probit regression analysis is used when the dependent variable takes three or more values and represents a qualitative variable with a natural ordering. Unlike linear regression, the dependent variable is a discrete variable, such as a multiple-choice response, rather than a continuous variable such as income. Unlike a standard probit, the dependent variable takes more than two values. And unlike a multinominal logit, the dependent variable has a natural order.

- Surprisingly, tobacco growers are more likely to feel either no change or worse off since 1995. This is a puzzling result, as the number of tobacco growers has increased significantly since 1995 and the production of burley tobacco by small farmers has more than doubled since the reforms. It could be that tobacco growers have felt the impact of higher fertilizer prices more acutely than other farmers because they are more likely to use fertilizer. Therefore, the increase in the price of imported fertilizer due to subsidy removal without a corresponding increase in tobacco prices may have been more harmful to them.

- If a household head is related to the village chief (a measure for being better connected), he/she is less likely to feel better off since 1995. Again, there may be some social village dynamics that may have changed since 1995 and that cannot be explained here.

The non-significant results show that the likelihood of feeling worse off or better off is not affected by the gender of the household head, ethnicity, farm size, membership in a club or association, access to road infrastructure (measure by distance to main road), ownership of assets such as radio or bike, or regional location. This again highlights the fact that, contrary to many criticism of the reforms, the reforms were not more negatively perceived by female-headed households or households with smaller farms.

5.2 Results from the Malawi Community Survey

5.2.1 Survey and questionnaire

The community survey in Malawi consisted of a survey of the 40 EPAs that were randomly selected for the smallholder farmer survey. The questionnaire included general information questions about the selected EPA, its agricultural production, its road infrastructure, its access to transportation services, the availability of input and output markets, the implementation of the SPS and APIP programs in the EPA, the existence of farmers' clubs and associations, the supply of extension and credit services, and the availability of storage facilities and telephone services. The survey was implemented in the period November 1999 to February 2000. The interview was conducted with the MOAI extension officers allocated to each EPA.

5.2.2 General information

In general, an average EPA comprises about 160 villages, 18.7 thousand farming households, and 87 thousand people. The average total surface area of an EPA is about 50 thousand hectares, about half of which is arable. The average population density is about 1.74 person per ha. There are some regional differences in these statistics (see Table 5.69). For example, the average number of villages in an EPA in the central region is 214, about twice as high as in a Southern or Northern EPA. Total surface area of an EPA in the North is slightly larger than in the South or Center (51 thousand ha compared to 49.9). However, population density is highest in the Southern region (2.06 person per ha) compared to the Central region (1.54 person per ha) or Northern region (1.59 person per ha). The share of arable land area is highest in the Central region, which is why it is considered the bread basket of Malawi.

5.2.3 Agricultural Production Information

Table 5.70 gives a break-down of crop production patterns in the EPAs. As expected, maize is the most important cereal, while cassava and sweet potatoes are the most important tubers produced. Tobacco is the most important cash crop. Crop production patterns differ slightly between regions. For example, higher production of maize, sweet potatoes, beans, sorghum, vegetables, fruits and nuts, chillies, and cotton are noted in the Southern region; more Irish potatoes, groundnuts, sunflower, soybeans, and tobacco are grown in the Center; and production of cassava, rice, and sugar is highest in the North.

The yields reported by the EPA extension officers are higher than those estimated from the small-holder farmer survey (see Table 5.71). The reason could be that the extension officers are reporting the yields for the best seed varieties. Or they could be inflating their EPA's yields to demonstrate their effectiveness in promoting adoption of agricultural technology by small farmers. For example, maize yields reported by the EPA extension officers are 2.2 tons/ha, while the average yield estimated in the small farmers' survey is less 1 ton/ha. The lower yields estimated from the small farmers' survey could also be because farmers tended to over-estimate farm-size. Different crop yields do not show a clear regional pattern, although yields in the North seem to be in general, higher than in the other regions.

Over three-quarter of the EPAs reported that agricultural production had increased since 1995 because of more crops being grown. And about two-third of the EPAs indicated that the marketed share of agricultural production had also increased since 1995, mainly because in the majority of the EPAs (73 percent) more farmers were selling crops in 1998 than in 1995.

5.2.4 Road Infrastructure

Rural road infrastructure in Malawi is still very poorly developed. The average EPA in Malawi has a limited amount of paved roads (about 32 kms). The length of dirt roads (113 kms) is three times as long as paved roads and twice as long as gravel roads (56 kms). The Central region is the most developed in terms of road infrastructure; it has the longest road network for all three road types (paved, gravel, and dirt) (see Table 5.72). The Northern and Southern regions have an almost equal extent of roads. During the rainy season (December-March), most dirt roads and some gravel roads become impassable. For example, for the majority of EPAs (about three-quarter), the dirt roads became impassable during the months of January, February, and parts of December and March. And for about a quarter of the EPAs, gravel roads also became impassable during those months.

Extension officers were asked about changes in road infrastructure in their EPA since 1995. About 68 percent noted that there has been no change in the length of roads since then, 18 percent said that there were new roads, and 13 percent indicated that some roads had become impassable (see Table 5.73). The percentage of EPAs that noted that there were new roads was higher in the Southern and Northern regions (25 percent compared to 11 percent in the Center). This may be an indication that the government is investing more in the regions where road infrastructure is still very poor. On the other hand, the quality of the roads had worsened for about 40 percent of the EPAs but had improved for another 38 percent; only 22 percent noted no change in the quality of the roads. More than half the EPAs in the South noted a worsening in road quality.

5.2.5 Transportation Services

Table 5.74 shows that the number of privately owned trucks and minivans or buses has increased since 1995, while for ADMARC owned transport, the number of trucks had either stayed approximately the same or decreased. This trend indicates an increasingly important role for private sector transportation services, in line with the liberalization efforts. Despite this change, however, the number of large trucks (more than 1 ton) is still small (about 6 per EPA).

5.2.6 Availability and Access to Input and Output Markets

Most agricultural markets in Malawi are involved in selling input, and buying and selling crops (see Table 5.75). Markets are usually open either on a daily basis or a few times a week. Markets that are specialized in crop selling are more commonly available either once or twice a week. For the majority of the markets, the frequency of operation and the volume of trade handled has increased or not changed since 1995 (see Table 5.76). The closest input and crop markets are on average located about 6 to 9 kms away from the villages where the farmers were interviewed. As expected, distances between the villages and the markets are a bit longer in the Northern region than in the other regions; the smallest distances are found in the Southern region.

In general, output traders are more ubiquitous than input traders (see Table 5.77). And, as expected, there are usually twice as many retailers than wholesalers in the average EPA. Output assemblers are more common in Center, while output wholesalers are more common in the North, and retailers in the South. For commodities, ADMARC markets are less numerous than private ones, but for inputs, ADMARC markets dominate private ones. ADMARC outlets seem to be distributed equally across regions, however private input retailers are more common in the Central region.

Crop buyers usually operate about 3 to 5 months during the year, usually after the harvest season. Private crop sellers operate longer, about 7 to 8 months a year. Input sellers usually operate for more months of the year than crop buyers or sellers. ADMARC, on the other hand, sells commodities year-round. This may indicate that only ADMARC has the capacity to store or import crops to sell year-round.

The changes in the number and types of traders since 1995 are reported in Table 5.78. For the majority of the EPAs (64 percent), the number of assemblers has not changed; in 21 percent of the EPAs, the number of assemblers has actually declined. On the other hand, the number of private crop wholesalers and retailers has increased in most EPAs, whereas the number of ADMARC crop markets has not changed in most cases (81 percent of the EPAs). This indicates that market reform has led to an increase in the number of private traders. This usually should lead to greater market competition, better prices, and more market choices for producers and consumers. In the input markets, the number of private retailers seems to have increased the most, followed by private wholesalers. For most ADMARC input markets and the subsidiary of input manufacturers, there are no changes since 1995. In all cases, it is the number of retailers that has increased the most since the reforms. This is expected since retailing is an easy business to get into and does not require a lot of capital, technical expertise, or business savvy as wholesaling would.

5.2.7 Starter Pack Initiative (SPS)

The EPA survey indicates that, as expected, all the EPAs were included in the SPS during the 1998/99 season. About 93 percent of the households in each EPA were included in the SPS. This is not surprising since the SPS was supposed to cover all farming households and some of the households in each EPA may not be involved in farming. In 95 percent of the cases, both fertilizer (urea or 23-21-0) and seed (mainly maize, groundnuts, and soybeans) were distributed for free. In about 5 percent of the EPAs, only fertilizer was distributed. The quantities distributed were about 15 kgs of fertilizer and 4 kgs of seeds.

5.2.8 Agricultural Productivity Investment Program (APIP)

About 97 percent of the EPAs were covered in the APIP, but only 10 percent of the households in each EPA were part of the program. A higher percent of households in the Northern region were included (19 percent compared to 8 percent of the households in the Center and 5 in the South). The APIP is a more selective program; it only includes households who are interested in applying for input on credit and who are eligible for credit (no history of loan default and demonstrated ability to repay). Again, in 90 percent of the cases, both fertilizer and seed are distributed on credit under the APIP. The average quantities given are 98 kgs of fertilizer and 10 kgs of seed.

The most common fertilizers distributed are urea and 23-21-0 and the most common seeds are maize followed by soybeans. The average value of the input-credit APIP package is about MK 2,043 (US $45). Households usually pay back the loan in cash or a combination of in-kind and cash at a specified loan closing date.

5.2.9 Farmers' Associations and Clubs

On average, each EPA has about one farmers association and 121 farmers' clubs. Clubs are usually made up of a few farmers and are useful for farmers to market their cash crops together (such as selling tobacco on the auction floor) and obtain input on credit as a group. The most common types of clubs are tobacco and horticultural clubs. Associations are usually more formal and are made up of several clubs. Both clubs and associations are, in most cases, initiated by the MOAI, but in some instances they are self-initiated by the farmers themselves (more for clubs than associations).

5.2.10 Formal and Informal Credit Services

Each EPA has, on average, 3 moneylenders, less than one commercial bank branch, about 2 Malawi Rural Finance Corporation (MRFC) branches, about 1.5 NGOs, and very few have Savings and Credit Cooperatives (SACCO) (see Table 5.79). NGOs and MRFC branches are more heavily concentrated in the South while no moneylenders were reported in the Center. We also find more commercial bank branches in the North. Not all these credit institutions lend to small farmers however. For example, only 12 percent of commercial banks and 2/3 of SACCO lend to small farmers. The other credit institutions all lend to small farmers. As Table 5.80 shows, the number of moneylenders and NGOs seems to have increased since 1995. For the other credit institutions, few EPAs report changes in their availability in their respective areas.

5.2.11 Storage Facilities

On average, in each EPA, there is an ADMARC or a private sector storage facility available for rent. It is rare for farmers' association to have storage facilities available for rent. Storage facilities seem to be more available in the North and South than in the Center (see Table 5.81). This is a little surprising since the Central region is more agriculturally oriented than the other regions. The number of storage facilities has either increased or not changed much since 1995. In the South for example, about 11-12 percent of the EPAs noted an increase in storage facilities owned by ADMARC or associations. Furthermore, about 50 percent and 29 percent of the EPAs in the Center and the North, respectively, noted an increase in privately owned storage facilities since 1995.

5.2.12 Extension and Communication Services

Extension services are still widely available in Malawi. Each EPA has an average of 14 MOAI extension officers, 2 NGO extension officers, and about one private company extension representative. Among MOAI agents, 2 out of 14 agents are women. However, about 90 percent of the EPA officers noted that the number of MOAI extension agents has decreased since 1995. On the other hand, in 72 percent of the EPAs, the number of NGO extension officers has increased, while the number of private company representatives has either increased (in 33 percent of the EPAs) or not changed at all. Therefore, it seems that the reforms, which have been accompanied by budgetary cuts, have resulted in a lower number of government extension officers (although their number is still high in Malawi compared to other African standards, including Benin). Official extension officers are now being supplanted by NGO and private company representatives.

On the telecommunication front, one can say that Malawi still lags behind many other developing countries. There is on average, only 2 public telephones per EPA (about 3 per Northern EPA and between 1 and 2 in the other 2 regions). The number of telephones has either not changed since the reforms (69 percent of the EPAs), or increased in only 25 percent of the EPAs. More positive changes were recorded in the Southern and Northern EPAs.

Table 5.1 – IFPRI/APRU Smallholder Farmer Survey Sample in Malawi

Region	Region #	EPA	EPA #	# of villages	# of households
North	1	Chisenga	01	2	20
		Lufita	02	2	20
		Karonga South	03	2	20
		Ntchenanchena	04	2	20
		Zombwe	05	2	20
		Eswazini	06	2	20
		Champhira	07	2	20
		Chintheche	08	2	20
Central	2	Madisi	09	2	20
		Mndolera	10	2	20
		Nachisaka	11	2	20
		Kaluluma	12	2	20
		Kalulu	13	2	20
		Msitu	14	2	20
		Ntchisi Boma	15	2	20
		Tembwe	16	2	20
		Mtakataka	17	2	20
		Linga	18	2	20
		Chitsime	19	2	20
		Mpenu	20	2	20
		Demela	21	2	20
		Mlomba	22	2	20
		Ukwe	23	2	20
		Mayani	24	2	20
		Lobi	25	2	20
		Njolomole	26	2	20
South	3	Bazale	27	2	20
		Mbonechera	28	2	20
		Nyambi	29	2	20
		Malosa	30	2	20
		(Mayaka) Ngewero	31	2	20
		Lungwena	32	2	20
		Mpilipili	33	2	20
		Masambanjati	34	2	20
		Thumbwe	35	2	20
		Namanjiwa	36	2	20
		Mulanje South	37	2	20
		Lisungwi	38	2	20
		Kalambo	39	2	20
		Makhanga	40	2	20
Total			**40**	**80**	**800**

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.2 – Household characteristics by expenditure category

	Expenditure category (quintile)					
	Poorest	**2nd**	**3rd**	**4th**	**Richest**	**Total**
Average total annual expenditures per capita (MK)	1,079	1,890	2,650	3,648	6,550	3,083
Average household Size	6	5	5	4	4	5
Average No. of children	3	3	2	2	1	2
Ethnic group: % of household heads that are						
Chewa	36	37	34	37	26	34
Ngoni	9	7	14	13	8	10
Tumbuka	2	5	7	6	11	6
Tonga	1	1	1	1	2	1
Lomwe	24	23	11	23	19	20
Sena	1	2	1	2	5	2
Yawo	19	17	22	8	21	17
Other	8	8	10	10	8	9
Religious affiliation: % of household heads that are						
Christian	73	73	76	87	72	76
Moslem	21	21	18	12	25	19
None	6	6	6	1	4	5

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.3 – Percent of household heads member in a club or association by farm size*

	Farm Size (quintile)					
	Smallest	**2nd**	**3rd**	**4th**	**Largest**	**Total**
Membership in a club	11	15	21	23	34	20
Membership in a coop./association	3	1	5	9	11	5

*The average farm size in the five groups is 0.5, 0.9, 1.3, 1.8, and 3.0 ha respectively.
Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.4 – Socio-economic characteristics of the household head

	Expenditure category (quintile)					
Household head characteristics	**Poorest**	**2nd**	**3rd**	**4th**	**Richest**	**Total**
Average Age	44	45	41	39	40	42
Average No. of years in farming	20	22	18	16	17	19
Percent that are:						
Female	45	39	25	25	23	34
Illiterate (cannot read & write)	55	47	38	36	41	44
Have had no formal education	44	39	24	22	25	31
Have had some or completed primary education	54	56	67	72	66	63
Have had some or completed JCE	2	5	1	3	7	4
Have had some or completed MSCE	0	0	7	3	10	3
Whose primary activity is farming	98	96	93	93	84	93
Whose primary activity is in services	0	2	3	3	13	4

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.5 – Sources of income and income shares

Source of income	Percentage of Household earning income from this source	Contribution to total income (percentage)
Wages from ag. labor	37	5
Wages from other work	18	17
Non farm self-employment	40	22
Crop sales	63	40
Livestock & poultry sales	33	5
Remittances	29	6
Pension, gifts, social assistance	4	2
Other	5	3
Total	100	100

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.6 – Percentage of households and percentage of total income by income source, region, and gender

	Region			Gender	
	North	Center	South	Male	Female
Percentage of households that receive income from:					
Wages from ag. work	31	36	38	39	33
Wages from other work	19	17	18	20	12
Non-farm self-employ.	57	37	39	40	39
Crop Sales	70	69	57	68	55
Livestock/poultry sales	49	36	28	34	31
Remittances	29	26	31	20	45
Pension, gifts, social assist	5	5	4	3	7
Other	7	5	5	5	5
Percentage of total income from each source:					
Wages from ag. work	3	4	6	4	5
Wages from other work	21	16	17	18	13
Non-farm self-employ.	22	19	26	23	20
Crop Sales	36	43	38	41	32
Livestock/poultry sales	6	8	3	4	8
Remittances	7	4	6	3	15
Pension, gifts, social assist	2	4	1	2	3
Other	3	3	3	3	3

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.7 – Percentage of households and percentage of total income by income source and expenditure group

	Expenditure quintile				
	Poorest	**2nd**	**3rd**	**4th**	**Richest**
Percentage of households that receive income from:					
Wages from ag. work	41	47	39	25	29
Wages from other work	18	16	16	16	22
Non-farm self-employ.	46	39	32	35	47
Crop Sales	44	66	70	69	69
Livestock/poultry sales	29	32	34	30	43
Remittances	20	28	35	28	30
Pension, gifts, social assist	1	7	2	6	5
Other	3	5	5	5	8
Percentage of total income from each source:					
Wages from ag. work	9	8	5	5	1
Wages from other work	12	10	12	17	25
Non-farm self-employ.	30	15	19	15	30
Crop Sales	29	41	52	49	29
Livestock/poultry sales	10	4	4	6	4
Remittances	6	9	4	5	5
Pension, gifts, social assist	0.5	10	0.5	1	1
Other	2	3	3	3	3

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.8 – Percentage of households and percentage of total income by income source and farm size group

	Farm size quintile				
	Smallest	**2nd**	**3rd**	**4th**	**Largest**
Percentage of households that receive income from:					
Wages from ag. work	45	41	32	30	28
Wages from other work	21	16	15	15	23
Non-farm self-employ.	41	36	44	38	43
Crop Sales	30	63	73	76	84
Livestock/poultry sales	25	27	33	44	42
Remittances	32	27	26	37	18
Pension, gifts, social assist	6	2	5	6	4
Other	4	6	6	5	2
Percentage of total income from each source:					
Wages from ag. work	9	8	2	3	2
Wages from other work	19	14	12	10	30
Non-farm self-employ.	40	15	21	24	17
Crop Sales	15	39	49	50	39
Livestock/poultry sales	2	4	8	5	5
Remittances	11	6	3	4	4
Pension, gifts, social assist	2	7	1	1	1
Other	3	7	2	3	0.5

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.9 – Farm Characteristics by Region

	Regions			
	North	**Center**	**South**	**Total**
Average No. of plots owned	4	3	3	3
Average plot size in ha	0.5	0.5	0.4	0.5
Average farm size in ha	2.0	1.5	1.1	1.4
Average time needed to get from residence to field (in minutes)	13	21	16	18

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.10 – Farm characteristics by farm size

	Farm size quintile				
	Smallest	**2nd**	**3rd**	**4th**	**Largest**
Average No. of plots owned	2	3	3	4	5
Average plot size in ha	0.3	0.4	0.5	0.6	0.6
Average farm size in ha	0.5	0.9	1.3	1.8	3.0

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.11 – Time allocation to various activities by gender

Activities	**Percent of male time in a 24-hour day**	**Percent of female time in a 24-hour day**
Food Crop Production	17	16
Cash Crop Production	9	7
Other Farm Production	5	3
Buying & Selling Crops	4	2
Other non-farm employment	13	4
Leisure	11	10
Personal time	37	37
Household work	3	12
Collecting firewood	0.8	5
Collecting water	0.2	4

Note: Male is defined as the male head in the household and the female is the most active female in the household.
Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.12 – Farm labor use and allocation by type of activity

Activities	Family Labor (in person days and percent)			Total Family Labor (person - days and percentage)	Total Hired Labor (person - days and percentage)	Total Labor Use (person – days)
	Male	Female	Child			
Land preparation	16 (34)	21 (33)	11 (30)	43 (34)	2.7 (38)	46
Planting	4 (10)	6 (10)	3 (12)	12 (10)	0.3 (4)	12
Weeding	13 (29)	19 (29)	9 (26)	37 (29)	2.2 (31)	39
Fertilizer application	1 (2)	1 (1)	1 (2)	2 (1)	0.1 (1)	2
Topping/desuckering	1 (1)	1 (1)	1 (2)	2 (1)	0.4 (6)	2
Harvesting	9 (19)	12 (19)	6 (20)	23 (19)	1.1(15)	24
Threshing/ cleaning	2 (5)	4 (6)	2 (7)	7 (5)	0.3 (4)	7
Total in person days	46 (100)	63 (100)	16 (100)	125 (100)	7.1 (100)	132

Note: Figures in parentheses are column percentages.
Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.13 – Family labor use by type of crop

Crop	Total Family labor (in person days)	Males share of total family labor	Female share of total family labor	Child share of total family labor
Maize	61	32	50	18
Sweet potato	27	35	46	19
Cassava	39	32	51	17
Rice	56	30	50	21
Beans/Pulses	31	29	55	16
Sorghum	29	33	57	10
Groundnuts	36	31	49	20
Vegetables	38	44	36	20
Tobacco	75	40	41	19
Cotton	69	42	47	11
Soybeans	32	36	46	18

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.14 – Descriptive statistics of variables in Malawi fertilizer model

Variable	Mean	Std. Dev.	Min.	Max.	Description
qfert*	105.858	111.197	1.00	1200.00	Quantity of fertilizer applied to plot (kg)
hhsize	5.356	2.531	1.00	44.00	Size of the household
femhead	0.227	0.419	0.00	1.00	Dummy for female headed household
age	41.352	14.039	18.00	86.00	Age of household head
pct0_5	19.393	18.161	0.00	75.00	Pct. of members 0 to 5 years old
pct6_15	25.383	20.330	0.00	80.00	Pct. of members 6 to 15 years old
pctov65	2.400	10.102	0.00	100.00	Pct. of members over 65 years old
educ1	0.678	0.467	0.00	1.00	Dummy for head has primary education
educ2	0.067	0.251	0.00	1.00	Dummy for head has higher education
ethn1	0.361	0.480	0.00	1.00	Dummy for Chewa ethnic group
ethn2	0.116	0.320	0.00	1.00	Dummy for Ngoni ethnic group
ethn3	0.147	0.354	0.00	1.00	Dummy for Tumbuka ethnic group
ethn4	0.106	0.308	0.00	1.00	Dummy for Lomwe ethnic group
ethn5	0.124	0.330	0.00	1.00	Dummy for Yawo ethnic group
pmaize	4.172	3.188	0.80	35.71	Price of maize (MK/kg)
ptob	16.995	4.993	2.94	32.69	Price of tobacco (MK/kg)
pfert	11.516	12.290	5.86	86.18	Average price of fertilizer (MK/kg)
wage	63.528	49.930	3.00	500.00	Wage rate (MK/day)
plotarea	0.445	0.353	0.00	6.48	Size of plot in hectares
plotar2	0.322	1.184	0.00	41.93	Size of plot in hectares squared
farmsize	2.098	1.486	0.20	11.33	Total farm size in hectares
farmsz2	6.610	13.930	0.04	128.41	Total farm size in hectares squared
owner	0.961	0.193	0.00	1.00	Dummy variable for plot ownership
irr	0.070	0.255	0.00	1.00	Dummy variable for irrigated plot
reg2	0.456	0.498	0.00	1.00	Dummy variable for Central region
reg3	0.289	0.453	0.00	1.00	Dummy variable for Southern region
tob	0.086	0.280	0.00	1.00	Dummy variable for tobacco plot
maize	0.447	0.497	0.00	1.00	Dummy variable for maize plot
veg	0.042	0.201	0.00	1.00	Dummy variable for vegetable plot
tbg_mzp	0.117	0.321	0.00	1.00	Dummy for maize plot and tobacco grower
mzseed	0.623	0.485	0.00	1.00	Dummy for maize seed buyer
tbseed	0.192	0.394	0.00	1.00	Dummy for tobacco seed buyer
extvisit	17.533	15.014	0.00	60.00	Number of contacts with extension
club	0.277	0.447	0.00	1.00	Dummy club membership
coop	0.100	0.300	0.00	1.00	Dummy cooperative membership
distfert	7.463	5.423	0.40	33.63	Distance to fertilizer seller (km)
expend	3268.603	2881.804	59.00	25567.45	Expenditure (MK/person)
nfincval	2101.196	6130.869	0.00	77600.00	Nonfarm income (MK)
catnum	0.534	1.771	0.00	18.00	Number of cattle
goatnum	6.905	8.991	0.00	56.00	Number of goats
pignum	1.970	3.290	0.00	22.00	Number of pigs

Source: 1998 IFPRI-APRU National Survey of Small Farmers in Malawi

Note: The statistics for qfert refer to the 500 plots with positive fertilizer use, while the statistics for the other variables refer to all 2668 plots

Table 5.15 – Determinants of the decision to use fertilizer in Malawi

	Coef.	Robust Std. Err.	Z	P>|Z|	Partial Effect
hhsize	0.023	0.019	1.190	0.234	0.3%
femhead	0.174 *	0.101	1.722	0.085	2.2%
age	0.002	0.004	0.504	0.615	0.0%
pct0_5	-0.002	0.003	-0.807	0.419	-0.0%
pct6_15	0.000	0.002	0.101	0.919	0.0%
pctov65	-0.001	0.004	-0.273	0.785	-0.0%
educ1	0.111	0.100	1.110	0.267	1.4%
educ2	0.517 ***	0.167	3.103	0.002	6.6%
ethn1	-0.201	0.175	-1.145	0.252	-2.6%
ethn2	0.396 **	0.158	2.504	0.012	5.1%
ethn3	0.028	0.158	0.174	0.862	0.4%
ethn4	0.287	0.204	1.405	0.160	3.7%
ethn5	0.471 **	0.186	2.524	0.012	6.0%
pmaize	0.026 ***	0.007	3.569	0.000	0.3%
ptob	0.006	0.008	0.690	0.490	0.1%
pfert	0.002	0.003	0.556	0.578	0.0%
wage	-0.001	0.001	-1.431	0.152	-0.0%
plotarea	1.256 ***	0.329	3.816	0.000	16.1%
plotar2	-0.379 **	0.171	-2.213	0.027	-4.8%
farmsize	-0.062	0.075	-0.824	0.410	-0.8%
farmsz2	0.007	0.006	1.083	0.279	0.1%
owner	-0.270	0.175	-1.545	0.122	-3.5%
irr	-0.107	0.223	-0.482	0.630	-1.4%
reg2	-0.288 *	0.165	-1.738	0.082	-3.7%
reg3	-0.770 ***	0.175	-4.403	0.000	-9.9%
tob	2.616 ***	0.212	12.341	0.000	33.5%
maize	1.530 ***	0.145	10.574	0.000	19.6%
veg	1.563 ***	0.279	5.593	0.000	20.0%
tbg_mzp	0.289 **	0.123	2.349	0.019	3.7%
mzseed	0.798 ***	0.094	8.468	0.000	10.2%
tbseed	0.022	0.113	0.197	0.844	0.3%
extvisit	0.000	0.002	-0.141	0.888	0.0%
club	0.246 ***	0.095	2.575	0.010	3.1%
coop	0.209 *	0.117	1.787	0.074	2.7%
distfert	-0.002	0.006	-0.294	0.769	-0.0%
expend	0.000 ***	0.000	3.495	0.000	0.0%
nfincval	0.000	0.000	1.579	0.114	0.0%
catnum	0.025	0.022	1.107	0.268	0.3%
goatnum	0.001	0.005	0.212	0.832	0.0%
pignum	0.038 ***	0.011	3.515	0.000	0.5%
Constant	-3.712 ***	0.374	-9.932	0.000	-47.5%

Source: Probit stage of Heckman analysis of data from the 1998 IFPRI-APRU National Survey of Small Farmers in Malawi.

Table 5.16 – Determinants of quantity of fertilizer used in Malawi

	Coef.	Robust Std. Err.	Z	P>|Z|
hhsize	4.298 *	2.354	1.826	0.068
femhead	17.088	13.797	1.239	0.216
age	0.460	0.454	1.013	0.311
pct0_5	-0.511	0.390	-1.310	0.190
pct6_15	-0.096	0.308	-0.310	0.756
pctov65	-0.136	0.471	-0.288	0.773
educ1	17.924	13.678	1.310	0.190
educ2	76.067 ***	25.192	3.019	0.003
ethn1	-37.395	25.635	-1.459	0.145
ethn2	42.159	27.506	1.533	0.125
ethn3	3.542	20.506	0.173	0.863
ethn4	62.616 **	29.825	2.099	0.036
ethn5	76.398 ***	24.288	3.145	0.002
pmaize	3.118 **	1.318	2.367	0.018
ptob	0.746	1.130	0.660	0.509
pfert	0.119	0.386	0.309	0.757
wage	-0.088	0.101	-0.869	0.385
plotarea	196.932 ***	49.445	3.983	0.000
plotar2	-58.737 **	26.113	-2.249	0.024
farmsize	-9.702	10.497	-0.924	0.355
farmsz2	1.199	1.027	1.168	0.243
owner	-54.342 ***	20.788	-2.614	0.009
irr	-21.994	28.166	-0.781	0.435
reg2	-29.979	19.040	-1.574	0.115
reg3	-115.135 ***	28.805	-3.997	0.000
tob	328.368 ***	83.663	3.925	0.000
maize	194.074 ***	53.964	3.596	0.000
veg	200.617 ***	59.143	3.392	0.001
tbg_mzp	35.175 **	17.521	2.008	0.045
mzseed	87.069 ***	25.677	3.391	0.001
tbseed	11.001	12.747	0.863	0.388
extvisit	0.266	0.300	0.887	0.375
club	23.379 *	12.954	1.805	0.071
coop	12.651	16.091	0.786	0.432
expend	5.651E-03 ***	2.032E-03	2.781	0.005
nfincval	1.154E-03	7.290E-04	1.583	0.113
catnum	1.280	3.626	0.353	0.724
goatnum	0.192	0.546	0.351	0.725
pignum	4.970 ***	1.573	3.160	0.002
Constant	-433.953 ***	139.375	-3.114	0.002

Source: Regression stage of Heckman analysis of data from the 1998 IFPRI-APRU National Survey of Small Farmers in Malawi.

Table 5.17 – Sources of fertilizer purchases

	Source (percentage of households)					
Fertilizer Types	**Other Farmer**	**Trader**	**ADMARC**	**SFFRFM**	**Private Co**	**Other**
CAN	14	6	63	4	17	.6
DAP	24	27	31	0	19	0
Urea	4	9	71	3	14	0
Cpd D	14	6	46	0	35	0
23-31-0	13	4	67	0.4	15	0.7
Super D	5	0	57	1	38	0
Sulphate of amm.	0	0	100	0	0	0

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.18 – Sources of seed purchases

	Source (percentage of households)					
Types of Seeds	**Other Farmer**	**Trader**	**ADMARC**	**SFFRFM**	**Private Co**	**Other**
Maize	26	19	37	0	17	0.2
Sweet Potato	98	0	0	0	0	2
Cassava	97	3	0	0	0	0
Rice	60	5	32	0	0	3
Beans/Pulse	57	26	17	0	0	0
Sorghum	60	40	0	0	0	0
Groundnuts	53	26	19	0	1	0.5
Vegetables	11	56	20	0	13	0
Tobacco	13	7	58	0	21	0.6
Soybeans	40	12	40	0	2	6

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.19 – Average price paid by fertilizer type and average distance to input source

Type of fertilizer	**Average price (MK per kilogram)**	**Average distance to input source (in kms)**
CAN	6	7
DAP	5	11
Urea	13	6
Compound D	5	7
23-21-0	10	6
Super D	2	7
Sulphate of Ammonia	7	5

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.20 – Average price paid by seed type and average distance to input source

Type of seeds	Average price (MK per kilogram)	Average distance to input source (in kms)
Maize	18	6
Sweet potato	3	2
Cassava	32	2
Rice	8	4
Beans/Pulses	6	4
Sorghum	5	2
Groundnuts	15	4
Vegetables	5	3
Tobacco	7	10
Soybeans	13	5

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.21 – Changes in input use since 1995

	Percentage of Households that reported		
	Inccreased since 1995	Decreased since 1995	No change since 1995
Use of hired labor	10	9	80
Proportion of family work done by women	31	9	58
Purchased Seeds	13	16	69
Fertilizer use	4	18	76

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.22 – Access and use of credit by gender

		Percent of Male-Headed Housholds	Percent of Female-Headed Households	Total
Percent who applied for a loan		20	16	19
Reasons for not applying for a loan	Lack of collateral	17	24	19
	Not wanting to borrow money	14	25	18
	No credit Institution available	28	16	24
	Difficulties dealing with credit institutions	32	31	32
	Other	9	5	9
Percent who obtained a credit		68	67	68
Purposes for applying for a loan	Personal expenses	32	49	37
	Agricultural Investment	32	20	28
	Fertilizer purchases	17	9	14
	Seed purchases	6	6	6
	Other non-agricultural investments	13	16	14
Main credit institutions applied to	Friends & family	56	60	57
	MRFC	14	23	17
	Moneylender	12	5	10
	NABW	3	7	4
	SEDOM	5		4
	DEMATT	2		1
	Credit Club	2		2
	Trader	1		1
	WWB	1	1	1
	Other	4	3	4
Amount borrowed in MK		664	335	556
Monthly Interest rate		4	16	7
Percent who agreed that credit access has changed		26	23	25
Of those that said there is a change	Increased access	56	66	59
	Decreased access	44	34	41

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.23 – Ownership of agricultural assets

Agricultural assets	Percent owning	Nbr. owned among owners	Nbr. owned including non-owners	Value among owners (KW)	Value including non-owners (KW)
Cart	3	1.2	.0	3,460	79
Hoe	99	3.6	3.6	52	50
Sickle	68	1.2	.8	24	16
Panga Knife	65	1.1	.8	29	18
Axe	67	1.3	.9	26	16
Shovel	10	1.1	.1	67	6
Plough	2	1.2	.0	536	11
Water & tin cans	40	1.7	.7	64	25
Sprayer	11	4.2	.4	452	4
Cattle/Ox	8	4.3	.4	.	0
Pigs	34	4.6	1.6	.	0
Goets/Sheep	66	8.6	5.7	0	0
Poultry	5	11.0	.5	.	0
Donkeys	12	5.3	.6	.	0
Other animals	0	2.0	.0	.	0

Source: IFPRI/APRU Malawi Small Farmer Survey, 1998.

Table 5.24 – Percent of households owning agricultural assets by region

	Name of region		
Agricultural assets	**Northern**	**Central**	**Southern**
Cart	6	5	1
Hoe	100	98	100
Sickle	81	71	63
Panga Knife	62	66	65
Axe	96	67	61
Shovel	19	10	8
Plough	10	3	0
Water & tin cans	46	53	27
Sprayer	37	14	3
Cattle/Ox	25	11	2
Pigs	43	42	26
Goets/Sheep	81	73	56
Poultry	10	4	5
Donkeys	27	14	6
Other animals	5	0	0

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.25 – Percent of households owning agricultural assets by gender of household head

	Gender	
Agricultural assets	**Male**	**Female**
Cart	4	1
Hoe	100	98
Sickle	75	56
Panga Knife	74	49
Axe	74	54
Shovel	13	4
Plough	3	1
Water & tin cans	47	26
Sprayer	12	8
Cattle/Ox	10	4
Pigs	38	27
Goets/Sheep	69	59
Poultry	4	7
Donkeys	15	6
Other animals	0	0

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.26 – Percent of households owning agricultural assets by expenditure category

	Expenditure quintiles				
Agricultural assets	**Poorest**	**2nd**	**3rd**	**4th**	**Richest**
Cart	2	3	2	4	3
Hoe	99	100	100	100	96
Sickle	58	62	77	69	78
Panga Knife	55	64	68	69	74
Axe	57	68	66	68	78
Shovel	0	9	7	15	21
Plough	1	1	3	3	4
Water & tin cans	27	38	51	40	45
Sprayer	6	10	7	16	15
Cattle/Ox	6	9	8	8	11
Pigs	23	32	35	42	41
Goets/Sheep	48	68	71	72	71
Poultry	6	4	6	5	4
Donkeys	6	10	9	16	18
Other animals	0	0	0	0	1

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

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Table 5.27 – Percent of households owning agricultural assets by farm size category

	Farm size quintiles				
Agricultural assets	**Smallest**	**2nd**	**3rd**	**4th**	**Largest**
Cart	0	1	3	5	7
Hoe	97	100	100	100	100
Sickle	57	62	71	78	81
Panga Knife	56	64	62	68	83
Axe	50	63	61	79	91
Hovel	6	9	9	12	16
Plough	0	1	2	4	5
Water & tin cans	22	42	40	45	54
Sprayer	1	6	12	18	24
Cattle/Ox	3	4	9	14	15
Pigs	15	31	35	48	49
Goets/Sheep	51	66	57	78	81
Poultry	6	6	4	4	3
Donkeys	1	11	8	15	30
Other animals	0	0	0	1	0

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.28 – Cropping patterns, production and yields

Crop	**Percent of households growing this crop**	**Percent of farm area**	**Average area allocated to crop for households that grow the crop in ha**	**Average quantity harvested for households that grow the crop in kgs**	**Average yield for households that grow the crop in kg/ha**
Maize	99	67	0.85	766	943
Groundnuts	47	16	0.43	245	900
Beans	33	18	0.63	108	222
Tobacco	22	6	0.45	276	830
Cassava	21	12	0.56	322	686
Sweet Potato	18	3	0.25	326	2,914
Vegetables	13	2	0.29	206	1,421
Soybeans	10	2	0.41	126	427
Sorghum/millet	8	4	0.51	148	379
Rice	7	2	0.33	413	2,068
Cotton	5	2	0.52	296	631
Other crops	0.1 - 4				

Other crops include: Irish potato, sugar, coffee, chillies, fruit & nut trees, and sunflower
Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.29 – Percent of households growing crops by region and gender

	Gender of Household Head		Region		
Crop	**Male-headed Household**	**Female-headed Household**	**North**	**Center**	**South**
Maize	99	99	95	98	100
Groundnuts	49	43	58	60	34
Beans	33	33	33	18	45
Tobacco	26	13	25	31	13
Sweet Potato	21	12	38	19	14
Cassava	19	25	32	6	31
Vegetables	15	8	10	18	9
Soybeans	12	5	12	18	2
Sorghum/millet	8	9	16	1	13
Rice	8	6	18	4	8
Cotton	5	4	0.8	5	5

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.30 – Percent of households growing crops by farm size

	Farm Size Quintile				
Crop	**Smallest**	**2nd**	**3rd**	**4th**	**Largest**
Maize	98	98	100	99	99
Groundnuts	26	45	54	60	59
Beans	35	35	24	29	40
Tobacco	9	14	28	26	42
Sweet Potato	8	14	13	29	34
Cassava	32	18	12	18	24
Vegetables	1	16	12	14	23
Soybeans	1	4	12	16	21
Sorghum/millet	13	7	3	6	15
Rice	8	3	6	11	12
Cotton	2	3	7	7	4

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.31 – Percent of households growing crops by expenditure group

	Expenditure Group Quintile				
Crop	**Poorest**	**2nd**	**3rd**	**4th**	**Richest**
Maize	97	100	100	99	98
Groundnuts	33	45	50	54	55
Beans	25	36	34	35	34
Tobacco	20	22	25	21	21
Sweet Potato	9	18	20	21	25
Cassava	19	27	18	18	23
Vegetables	7	15	18	10	13
Soybeans	9	9	13	9	9
Sorghum/millet	8	13	4	7	9
Rice	5	7	9	9	8
Cotton	2	4	5	5	8

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.32 – Use of storage facilities by type

	Region			
	North	**Center**	**South**	**Total**
Percent of households:				
That use their house to store	89	83	96	90
That use a granary	73	72	39	56
That use a shed	13	18	7	12
% of households that use a pit	21	9	9	10

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.33 – Characteristics of crop storage

Crop	**Total quantity in storage one month after harvest (in kgs)**	**Months needed for stocks to be depleted**	**Percentage of households that store to eat later in the year**	**Percentage of households that store to meet cash needs later in the year**	**Percentage of households that store in the hope that they can sell at higher prices later**	**Percentage of households that store for other reasons (seeds, workers payment, can't sell when want to, etc.)**
Maize	642	6	93	0.3	1.5	5
Sweet potato	157	3	88	12	0	0
Cassava	273	4	88	2	6	4
Rice	317	5	77	13	4	6
Beans	91	5	77	4	2	17
Sorghum	160	4	83	5	0	12
Groundnuts	174	5	69	7	8	16
Vegetables	133	5	77	14	9	0
Tobacco	713	2	0	59	7	34
Cotton	313	2	0	71	10	19
Soybeans	86	4	33	25	4	38

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.34 – Crop disposal by type of crop

Crops	Production (kg/household)	Sales (marketed surplus) Percentage	Consumption Percentage	Seed Percentage	Gift/payment Percentage	Other uses Percentage
Maize	726	6	86	1	3	4
S. potato	55	37	57	0	5	0
Cassava	80	30	64	1	3	2
Rice	32	43	43	2	6	5
Beans/pulses	37	22	71	4	2	2
Sorghum	12	8	79	3	2	7
Groundnuts	114	30	54	7	4	5
Vegetables	25	81	16	0.5	2	0
Tobacco	59	98	0	0	2	0
Cotton	13	100	0	0	0	0
Soybeans	11	66	26	6	2	0
Other crops	46	89	9	0	2	0

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.35 – Crop scale characteristics by type of crop

Crops	Pct of households producing	Pct of households selling	Pct of producers selling	Sales (kg/ per household)	Value of sales (MK/per household)	Pct of sales value
Maize	97	12	12	44	181	9
S. potato	18	11	58	20	62	3
Cassava	19	8	42	24	71	4
Rice	7	4	58	14	67	3
Beans/pulses	33	7	20	8	39	2
Sorghum	8	1	9	1	4	0
Groundnuts	47	16	34	35	128	6
Vegetables	13	11	87	20	186	9
Tobacco	21	20	99	58	1007	50
Cotton	5	5	100	13	82	4
Soybeans	8	6	69	8	30	1
Other crops	6	6	97	**41**	165	8

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.36 – Distribution of households by marketed share of crop production

		Percentage of households
Marketed share of output percentage:	0-10	46
	11-20	11
	21-30	9
	31-40	8
	41-50	8
	51-60	8
	61-70	5
	71-80	4
	81-90	1
	91-100	0
Total		100

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.37 – Characteristics of the crop formation for these households that sell the crop

Crops	Average quantity sold in kgs	Average # of transaction	Price per kg (MK/kg)
Maize	350	1	4.9
S. Potato	574	2	3.7
Cassava	237	2	2.8
Rice	321	2	5.2
Beans	128	2	6.0
Sorghum	136	3	4.9
Groundnuts	219	2	4.1
Vegetables	124	2	8.5
Tobacco	236	2	16.0
Cotton	286	1	7.8
Soybeans	122	2	3.8
Average over all crops	278	2	

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.38 – Determinants of Marketed Surplus

Regression estimating market surplus.

Source	SS	df	MS
Model	206747.392	33	6265.07249
Residual	292339.054	754	387.717578
Total	499086.446	787	634.16321

Number of obs	= 788
F(33, 754)	= 16.16
Prob > F	= 0.0000
R-squared	= 0.4143
Adj R-squared	= 0.3886
Root MSE	= 19.691

mktsurp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnexppc	1.871772	1.393702	1.34	0.180	-.8642259	4.60777
hhsize	-.0638836	.3381293	-0.19	0.850	-.7276704	.5999032
under15p	-6.042047	3.627017	-1.67	0.096	-13.1623	1.078205
over65p	-1.947058	8.343658	-0.23	0.816	-18.32662	14.4325
femhead	-1.031479	2.55941	-0.40	0.687	-6.055895	3.992937
agehead	.1548097	.3204561	0.48	0.629	-.4742826	.783902
age2	-.0028641	.0036615	-0.78	0.434	-.0100521	.0043239
edhd1	1.611182	2.529941	0.64	0.524	-3.355384	6.577748
edhd2	.3820479	4.146952	0.09	0.927	-7.758897	8.522993
lithead	-4.183061	2.381329	-1.76	0.079	-8.857884	.4917613
edsp1	-1.196561	1.807039	-0.66	0.508	-4.743987	2.350865
edsp2	4.58606	5.692353	0.81	0.421	-6.588685	15.7608
litsps	3.789403	2.693442	1.41	0.160	-1.498133	9.07694
fsize	2.623875	.7985801	3.29	0.001	1.05617	4.191579
tobgrow	29.59809	1.887501	15.68	0.000	25.89271	33.30347
irrig	-2.743568	3.749643	-0.73	0.465	-10.10455	4.617412
connect	-.7744049	1.524391	-0.51	0.612	-3.766961	2.218151
club	3.269406	1.939598	1.69	0.092	-.5382484	7.07706
coop	1.16853	3.063082	0.38	0.703	-4.844651	7.181712
extcont	4.235256	1.7657	2.40	0.017	.768983	7.701529
chewa	-8.549006	3.114267	-2.75	0.006	-14.66267	-2.43534
ngoni	-3.520645	3.030161	-1.16	0.246	-9.469199	2.427909
tumb	-5.842468	3.136446	-1.86	0.063	-11.99967	.3147362
lomw	-2.174514	3.20833	-0.68	0.498	-8.472836	4.123808
yawo	-11.26153	2.884113	-3.90	0.000	-16.92337	-5.599681
disthq	.050386	.0339201	1.49	0.138	-.016203	.1169751
distroad	-5.831359	1.800754	-3.24	0.001	-9.366446	-2.296272
radio	3.810443	1.610169	2.37	0.018	.6494954	6.97139
tv	4.265325	7.769137	0.55	0.583	-10.98639	19.51704
bike	.4245998	1.595324	0.27	0.790	-2.707205	3.556404
mbike	-11.78547	19.98368	-0.59	0.556	-51.01574	27.44479
reg1	-2.282312	2.854494	-0.80	0.424	-7.886012	3.321388
reg2	.9312547	2.496832	0.37	0.709	-3.970314	5.832823
_cons	-.3217848	13.69521	-0.02	0.981	-27.20706	26.56349

Table 5.39 – Percent use of types of buyers by crop

Crops	Private trader/IB	ADMARC	Relative/friend	Auction Floor	Consumers
Maize	28	40	3	4	25
S. Potato	23	0	4	0	72
Cassava	61	0	4	0	72
Rice	29	44	3	0	25
Beans	49	12	12	0	26
Sorghum	15	0	5	0	81
Groundnuts	44	18	3	0	35
Vegetables	33	1	9	0	57
Tobacco	26	16	4	52	2
Cotton	5	95	0	0	0
Soybeans	41	43	2	5	9
Average	35	19	5	11	30

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.40 – Summary of expenditure by region

	Region			
	Northern	Central	Southern	Total
Household expenditure:				
Purchased food (MK/year)	6,005	5,815	4,609	5,249
Home-produced food (MK/year)	6,052	4,921	3,355	4,272
Non-food purchases (MK/year)	5,603	3,609	2,563	3,299
Rental equivalent (MK/year)	1,975	1,214	1,358	1,360
Total (MK/year)	19,636	15,570	11,901	14,193
Per capita expenditure (MK/percap/year)	3,874	3,054	2,945	3,083
Share of expenditure on food	61%	69%	67%	67%
Share of food home produced	31%	32%	28%	30%

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.41 – Summary of expenditure by gender

	Gender		
	Male	Female	Total
Household expenditure:			
Purchased food (MK/year)	5,790	4,181	5,249
Home-produced food (MK/year)	4,690	3,450	4,272
Non-food purchases (MK/year)	4,041	1,841	3,299
Rental equivalent (MK/year)	1,331	1,418	1,360
Total (MK/year)	15,849	10,923	14,193
Per capita expenditure (MK/percap/year)	3,233	2,787	3,083
Share of expenditure on food	66%	70%	67%
Share of food home produced	30%	32%	30%

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.42 – Summary of expenditure by expenditure group

	Expenditure quintiles				
	Poorest	**2nd**	**3rd**	**4th**	**Richest**
Household expenditure:					
Purchased food (MK/year)	2,506	3,684	4,819	5,919	9,859
Home-produced food (MK/year)	2,343	3,558	4,515	5,129	6,049
Non-food purchases (MK/year)	1,145	2,027	2,852	3,046	8,045
Rental equivalent (MK/year)	811	1,091	1,197	1,668	2,124
Total (MK/year)	6,805	10,359	13,383	15,763	26,077
Per capita expenditure (MK/percap/year)	1,079	1,890	2,650	3,648	6,550
Share of expenditure on food	71%	70%	70%	70%	61%
Share of food home produced	34%	34%	34%	33%	23%

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.43 – Summary of expenditure by farm size

	Farm size quintiles				
	Smallest	**2nd**	**3rd**	**4th**	**Largest**
Household expenditure:					
Purchased food (MK/year)	4,078	4,918	4,749	5,493	7,798
Home-produced food (MK/year)	2,709	3,360	4,195	5,702	6,501
Non-food purchases (MK/year)	1,859	2,557	2,869	3,001	7,581
Rental equivalent (MK/year)	1,200	1,221	1,660	1,340	1,509
Total (MK/year)	9,873	12,056	13,473	15,535	23,389
Per capita expenditure (MK/percap/year)	2,626	2,935	2,965	3,120	4,088
Share of expenditure on food	69%	69%	66%	72%	61%
Share of food home produced	28%	28%	31%	37%	28%

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.44 – Summary of food expenditure patterns

	Expenditure (MK/household)	Expenditure (MK/person)	Percentage of total	Percent of households consuming
Maize	3,123	706	32	99
Potatoes	389	81	4	77
Cassava	232	49	2	71
Rice	426	86	4	52
Beans/Pulse	438	98	5	83
Sorghum	82	20	1	15
Groundnuts	497	109	5	81
Wheat and prod	72	12	1	14
Other legumes	56	13	1	18
Leafy vegetables	558	133	6	83
Tomatoes	417	84	4	92
Onion	69	15	1	53
Other vegetables	34	8	0	18
Fruits & Nuts	35	7	0	26
Beef	347	74	4	61
Chicken	77	18	1	84
Other Meat	265	52	3	45
Fish	805	173	8	93
Eggs	662	138	7	65
Dairy products	102	20	1	25
Sweets	30	6	0	21
Sugar	320	70	3	86
Cooking Oil	202	44	2	63
Food away from home	38	9	0	17
Other food	1	0	0	3
Coffee/tea	170	32	2	56
Soft drinks	56	12	1	34
Alcohol	221	46	2	17
Other beverage(s)	2	1	0	1
Total	9,727	2,115	100	

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.45 – Food consumption by source (percent of commodity total)

	Percent purchased	Percent home produced	Total
Maize	30	70	100
Potatoes	34	66	100
Cassava	38	62	100
Rice	41	59	100
Beans/Pulse	41	59	100
Sorghum	51	49	100
Groundnuts	27	73	100
Wheat and prod	100	0	100
Other legumes	100	0	100
Leafy vegetables	100	0	100
Tomatoes	92	8	100
Onion	98	2	100
Other vegetables	100	0	100
Fruits & Nuts	100	0	100
Beef	93	7	100
Chicken	68	32	100
Other Meat	63	37	100
Fish	100	0	100
Eggs	12	88	100
Dairy products	100	0	100
Sweets	100	0	100
Sugar	100	0	100
Cooking Oil	100	0	100
Food away from home	100	0	100
Other food	100	0	100
Coffee/tea	100	0	100
Soft drinks	100	0	100
Alcohol	100	0	100
Other beverage(s)	100	0	100
Total	56	44	100

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.46 – Percent of households obtaining food from different sources

	Percent buying	Percent producing for own use	Percent of households consuming
Maize	73	96	99
Potatoes	47	35	77
Cassava	46	27	71
Rice	44	8	52
Beans/Pulse	54	35	83
Sorghum	5	11	15
Groundnuts	39	46	81
Wheat and prod	14	0	14
Other legumes	18	0	18
Leafy vegetables	83	0	83
Tomatoes	86	7	92
Onion	52	1	53
Other vegetables	18	0	18
Fruits & Nuts	26	0	26
Beef	60	3	61
Chicken	22	70	84
Other Meat	43	7	45
Fish	92	1	93
Eggs	21	50	65
Dairy products	25	0	25
Sweets	21	0	21
Sugar	86	0	86
Cooking Oil	63	0	63
Food away from home	17	0	17
Other food	3	0	3
Coffee/tea	56	0	56
Soft drinks	34	0	34
Alcohol	17	0	17
Other beverage(s)	1	0	1

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.47 – Percent of households consuming each food by region

	Region		
	Northern	**Central**	**Southern**
Maize	93	99	100
Potatoes	85	81	72
Cassava	79	67	72
Rice	61	44	57
Beans/Pulse	79	79	87
Sorghum	27	6	19
Groundnuts	82	84	77
Wheat and prod	11	19	11
Other legumes	11	20	16
Leafy vegetables	68	80	88
Tomatoes	81	93	93
Onion	57	54	50
Other vegetables	12	18	19
Fruits & Nuts	29	36	17
Beef	77	66	53
Chicken	89	88	80
Other Meat	43	51	41
Fish	92	90	95
Eggs	74	69	60
Dairy products	43	23	23
Sweets	16	31	13
Sugar	91	87	84
Cooking Oil	73	64	61
Food away from home	25	24	9
Other food	2	5	2
Coffee/tea	67	58	51
Soft drinks	51	33	31
Alcohol	29	21	12
Other beverage(s)	0	1	0

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.48 – Food consumption by region (percent of household total)

	Region		
	Northern	**Central**	**Southern**
Maize	20	35	32
Potatoes	6	4	4
Cassava	5	2	2
Rice	11	3	5
Beans/Pulse	4	4	5
Sorghum	1	1	1
Groundnuts	4	6	4
Wheat and prod	0	1	1
Other legumes	1	0	1
Leafy vegetables	4	5	7
Tomatoes	6	4	4
Onion	1	1	1
Other vegetables	0	0	1
Fruits & Nuts	0	0	0
Beef	4	3	4
Chicken	1	1	1
Other Meat	2	3	2
Fish	8	7	10
Eggs	8	8	5
Dairy products	1	1	1
Sweets	0	0	0
Sugar	3	3	4
Cooking Oil	2	2	3
Food away from home	1	0	0
Other food	0	0	0
Coffee/tea	1	3	1
Soft drinks	1	0	1
Alcohol	5	3	1
Other beverage(s)	0	0	0
Total	100	100	100
Value (MK/household)	11,827	11,346	7,915

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.49 – Percent of households consuming each food by gender of household head

	Gender	
	Male	**Female**
Maize	99	98
Potatoes	80	72
Cassava	71	69
Rice	54	48
Beans/Pulse	81	87
Sorghum	13	18
Groundnuts	80	81
Wheat and prod	18	7
Other legumes	17	19
Leafy vegetables	82	85
Tomatoes	92	90
Onion	57	45
Other vegetables	19	15
Fruits & Nuts	28	23
Beef	67	49
Chicken	85	82
Other Meat	48	40
Fish	93	93
Eggs	69	58
Dairy products	27	21
Sweets	21	22
Sugar	90	78
Cooking Oil	66	58
Food away from home	18	14
Other food	3	4
Coffee/tea	58	52
Soft drinks	38	26
Alcohol	25	2
Other beverage(s)	1	0

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.50 – Percent of households consuming each food by expenditure category

	Expenditure quintile				
	Poorest	**2nd**	**3rd**	**4th**	**Richest**
Maize	97	100	100	99	100
Potatoes	65	79	77	81	86
Cassava	58	65	70	77	85
Rice	28	45	58	63	70
Beans/Pulse	77	88	83	79	88
Sorghum	8	21	13	13	19
Groundnuts	67	78	84	85	91
Wheat and prod	3	12	21	20	16
Other legumes	13	12	24	17	22
Leafy vegetables	85	80	75	91	83
Tomatoes	90	94	94	91	91
Onion	26	54	57	61	67
Other vegetables	14	15	20	21	20
Fruits & Nuts	23	19	21	36	32
Beef	45	43	71	77	72
Chicken	64	82	92	90	94
Other Meat	27	46	49	52	55
Fish	92	88	95	94	95
Eggs	32	61	73	78	86
Dairy products	12	16	27	32	39
Sweets	19	16	15	30	26
Sugar	73	79	92	96	92
Cooking Oil	44	52	61	75	89
Food away from home	12	13	13	21	27
Other food	3	6	1	2	5
Coffee/tea	41	41	57	66	73
Soft drinks	15	23	35	44	56
Alcohol	17	14	23	16	18
Other beverage(s)	0	0	1	1	2

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.51 – Food consumption by expenditure category (percent of household total)

	Expenditure quintile				
	Poorest	**2nd**	**3rd**	**4th**	**Richest**
Maize	47	40	33	28	26
Potatoes	3	5	4	5	3
Cassava	4	2	2	2	2
Rice	1	3	3	6	5
Beans/Pulse	5	5	4	6	4
Sorghum	0	1	1	0	2
Groundnuts	6	5	6	5	4
Wheat and prod	0	0	1	1	1
Other legumes	1	1	0	0	1
Leafy vegetables	8	7	5	6	5
Tomatoes	4	5	6	4	3
Onion	0	0	1	1	1
Other vegetables	0	0	0	0	0
Fruits & Nuts	0	0	0	0	0
Beef	2	2	3	4	5
Chicken	1	1	1	1	1
Other Meat	1	2	3	4	2
Fish	8	8	8	8	9
Eggs	3	5	6	7	9
Dairy products	0	0	1	1	2
Sweets	0	0	0	0	0
Sugar	3	3	4	3	3
Cooking Oil	1	1	2	2	3
Food away from home	0	0	0	0	1
Other food	0	0	0	0	0
Coffee/tea	1	0	1	2	3
Soft drinks	0	0	1	0	1
Alcohol	1	2	2	1	4
Other beverage(s)	0	0	0	0	0
Total	100	100	100	100	100
Value (K/household)	4945	7,310	9,379	10,828	17,148

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.52 – Summary of non-food expenditure patterns

	MK per household	**MK per person**	**Percentage of Total**
Clothing	556	119	17
Housing	36	8	1
Household goods	1,046	234	32
Energy	351	74	11
Health	67	14	2
Education	66	12	2
Transportation	444	104	13
Social events	80	17	2
Leisure and other	662	116	20
Total	3,308	697	100

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.53 – Non-food expenditure patterns by region

	Name of Region		
	Northern	**Central**	**Southern**
Percentage of non-food expenditure spent on:			
Clothing	13	17	18
Housing	1	1	1
Household goods	21	32	35
Energy	25	8	8
Health	2	2	2
Education	3	2	2
Transportation	24	9	15
Social events	3	3	2
Leisure and other	7	27	18
Total	100	100	100

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.54 – Non-food expenditure patterns by sex of head of household

	Gender	
	Male	**Female**
Percentage of non-food expenditure spent on:		
Clothing	17	17
Housing	1	1
Household goods	30	37
Energy	10	11
Health	2	3
Education	2	2
Transportation	14	13
Social events	2	3
Leisure and other	22	13
Total	100	100

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.55 – Non-food expenditure patterns by expenditure category

	Expenditure quintiles				
	Poorest	**2nd**	**3rd**	**4th**	**Richest**
Percentage of non-food expenditure spent on:					
Clothing	24	21	19	18	11
Housing	1	1	2	1	1
Household goods	43	36	35	36	23
Energy	10	9	10	9	13
Health	3	3	2	2	2
Education	4	4	3	1	1
Transportation	3	13	15	16	15
Social events	4	3	3	3	1
Leisure and other	10	11	11	16	34
Total	100	100	100	100	100

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.56 – Determinants of per capita consumption expenditure

Regression estimating log exppc

Source	SS	df	MS
Model	152.770093	38	4.0202656
Residual	188.78579	749	.252050454
Total	341.555882	787	.433997309

Number of obs	= 788
F(38, 749)	= 15.95
Prob > F	= 0.0000
R-squared	= 0.4473
Adj R-squared	= 0.4192
Root MSE	= .50205

lnexppc	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
hhsize	-.1070494	.0077921	-13.74	0.000	-.1223464	-.0917525
under15p	-.6436896	.0903874	-7.12	0.000	-.8211325	-.4662467
over65p	.3371403	.2139862	1.58	0.116	-.0829437	.7572242
femhead	-.0706999	.0656685	-1.08	0.282	-.199616	.0582163
agehead	.0066535	.0082306	0.81	0.419	-.0095043	.0228114
age2	-.0001434	.0000942	-1.52	0.129	-.0003284	.0000416
edhd1	.0310149	.0648142	0.48	0.632	-.0962242	.1582541
edhd2	.1459812	.1062637	1.37	0.170	-.062629	.3545913
lithead	.0368738	.0611134	0.60	0.546	-.0831	.1568477
edsp1	.0110099	.0464999	0.24	0.813	-.0802758	.1022956
edsp2	-.0947672	.1455555	-0.65	0.515	-.3805126	.1909782
litsps	.0000233	.068969	0.00	1.000	-.1353722	.1354189
fsize	.1267754	.0199986	6.34	0.000	.0875154	.1660353
tobgrow	-.0204916	.0476492	-0.43	0.667	-.1140335	.0730503
irrig	-.2123971	.0957901	-2.22	0.027	-.400446	-.0243481
connect	.0499387	.0391208	1.28	0.202	-.0268606	.1267381
club	-.0036265	.0495189	-0.07	0.942	-.100839	.0935859
coop	.1710959	.0779682	2.19	0.029	.0180337	.3241581
extcont	.0990275	.0451478	2.19	0.029	.0103961	.1876588
chewa	-.1250325	.0810241	-1.54	0.123	-.2840939	.0340289
ngoni	-.0463218	.0774297	-0.60	0.550	-.1983269	.1056832
tumb	.0961033	.0796416	1.21	0.228	-.060244	.2524506
lomw	-.0901606	.0806181	-1.12	0.264	-.248425	.0681037
yawo	-.0852992	.0741856	-1.15	0.251	-.2309356	.0603372
goodflor	.0032711	.1003011	0.03	0.974	-.1936337	.2001758
goodwall	.0560855	.0632834	0.89	0.376	-.0681485	.1803195
goodroof	.165033	.0770481	2.14	0.033	.0137771	.3162889
goodwatr	.0004287	.0375396	0.01	0.991	-.0732666	.074124
electric	-.0349358	.2131323	-0.16	0.870	-.4533436	.383472
reg1	.0065846	.0732282	0.09	0.928	-.1371723	.1503416
reg2	.0975216	.0641322	1.52	0.129	-.0283786	.2234218
chair	.1232313	.055304	2.23	0.026	.0146621	.2318006
bed	.1182959	.0487621	2.43	0.016	.0225692	.2140227
table	.0641259	.0586352	1.09	0.274	-.0509831	.1792349
radio	.1507284	.041699	3.61	0.000	.0688676	.2325891
tv	.0878288	.2004457	0.44	0.661	-.3056734	.4813309
bike	.0639864	.0417402	1.53	0.126	-.0179553	.1459281
mbike	.4962157	.5161258	0.96	0.337	-.5170095	1.509441
_cons	8.096815	.189939	42.63	0.000	7.723939	8.469691

Table 5.57 – Ownership of household assets

	Percentage of households that own the asset	Number of assets (including zeros	Number of assets (without zeros	Age of the most recent asset	Value of assets in MK (calculated with zeros	Value of Assests in MK (calculated without zeros)
Household assets	Mean	Mean	Mean	Mean	Mean	Mean
Chairs	47	1.9	4.1	2.6	63	146
Tables	41	0.5	1.2	2.6	45	119
Beds	31	0.4	1.3	2.1	59	211
Other furniture	8	0.2	2.1	0.4	21	352
Electric fans	0	0.0	.	0.0	0	.
Radio,cassette, CD player	55	0.7	1.2	2.1	271	501

Television,VCR	1	0.0	1.0	0.0	7	919
Sewing Machine	4	0.0	1.1	0.5	22	908
Stove,oven	1	0.0	1.1	0.1	3	251
Bicycle	41	0.5	1.1	1.8	387	966
Motorcycle	0	0.0	1.0	0.0	28	11,000
Car	1	0.0	1.0	0.0	294	52,022

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.58 – Percent of households owning household assets by region

	Name of Region		
Household assets	**Northern**	**Central**	**Southern**
Chairs	63	37	52
Tables	57	33	44
Beds	53	23	33
Other furniture	19	4	9
Electric fans	0	0	0
Radio,cassette,CD player	58	53	57
Television,VCR	0	1	1
Sewing Machine	6	4	3
Stove,oven	0	3	0
Bicycle	47	43	39
Motorcycle	0	0	1
Car	2	0	1

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.59 Percent of households owning household assets by gender of household head

	Gender	
Household assets	**Male**	**Female**
Chairs	54	35
Tables	45	33
Beds	35	24
Other furniture	8	6
Electric fans	0	0
Radio,cassette,CD player	64	39
Television,VCR	1	0
Sewing Machine	5	1
Stove,oven	2	0
Bicycle	49	26
Motorcycle	0	0
Car	1	0

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.60– Percent of households owning household assets by farm size

	Farm size quintiles				
Household assets	**Smallest**	**2nd**	**3rd**	**4th**	**Largest**
Chairs	42	41	44	51	65
Tables	23	42	35	51	59
Beds	20	30	27	35	49
Other furniture	5	7	3	7	19
Electric fans	0	0	0	0	0
Radio,cassette,CD player	50	54	58	60	58
Television,VCR	0	2	1	0	1
Sewing Machine	1	3	3	6	7
Stove,oven	0	1	0	4	2
Bicycle	26	40	40	54	51
Motorcycle	0	1	0	0	0
Car	0	1	1	1	0

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.61 – Percent of households owning household assets by expenditure group

	Expenditure quintiles				
Household assets	**Poorest**	**2nd**	**3rd**	**4th**	**Richest**
Chairs	36	41	47	51	63
Tables	26	39	42	43	56
Beds	21	20	35	33	48
Other furniture	6	2	9	10	12
Electric fans	0	0	0	0	0
Radio,cassette, CD player	41	50	59	66	62
Television,VCR	1	0	1	0	2
Sewing Machine	0	4	6	2	8
Stove,oven	0	1	1	3	1
Bicycle	27	43	43	45	49
Motorcycle	0	0	0	0	1
Car	0	0	0	1	1

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.62 – Characteristics of the Dwelling

	Expenditure Quintile				
	Poorest	**2**	**3**	**4**	**Richest**
Average value of dwelling (in MK)	4,238	5,173	6,664	7,081	7,162
Percent of houses with the following dwelling characteristics					
Brick/stone walls	10	9	9	17	18
Mud & brick walls	48	60	55	44	52
Mud & wood or pure mud walls	43	31	35	38	30
Earth floor	98	94	94	93	90
Cement floor	2	5	6	7	10
Tile/slate roof	2	0	1	0.5	3
Sheet metal roof	8	12	12	8	19
Straw/thatch roof	90	88	87	91	78
With electricity	2	0	1	3	0.5
Use Gas/oil/kerosene for lighting	92	95	94	95	97
Use firewood for lighting	6	5	5	2	2
Distance to nearest source of drinking water (in kms)	0.44	0.46	0.54	0.45	0.52
Distance to nearest telephone (in kms)	8	9	8	8	7
Distance to closest road accessible by truck (in kms)	0.33	0.36	0.30	0.26	0.35
Distance to District headquarters	34	33	36	32	32

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.63 – Perceptions about changes in crop profitability since 1995

Crop	More profitable	No change	Less profitable	Don't know
Maize	91	2	6	1
Potatoes	74	12	12	2
Cassava	75	10	12	3
Tobacco	71	2	4	23
Groundnuts	79	11	7	3

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.64 – Perceptions about changes in input availability since 1995

Input	More available	No change	Less available	Don't know
Modern seed varieties	68	16	14	2
Labor	49	27	15	9
Fertilizer	39	23	37	1
Pesticide/herbicide	23	19	16	42

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.65 – Perceptions about markets and infrastructure changes since 1995

	Has gotten better	Has not changed	Has gotten worse	No opinion
Number of input sellers	43	26	21	10
Number of crop buyers	65	19	15	1
Information about crop prices	43	42	12	3
Information about crop production methods	40	45	12	2
Roads	11	21	68	1

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.66 – General welfare perceptions by farm size

	Farm size quintile					
	Smallest	2nd	3rd	4th	Largest	Total
Better off	18	20	27	25	25	24
No change	15	15	6	13	14	13
Worse off	66	65	66	61	50	62.5
No opinion	0	0	1	1	0	0.5

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.67 – General welfare perceptions by expenditure group

	Expenditure group					
	Poorest	2nd	3rd	4th	Richest	Total
Better off	17	18	27	19	42	24
No change	11	15	7	19	11	13
Worse off	72	67	65	61	46	62.5
No opinion	0	0	1	1	0	0.5

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.68 – Determinants of perceived changes in household well-being

```
Regression estimating satisfaction.
Ordered probit estimates                          Number of obs   =        788
                                                  LR chi2(33)     =      83.03
                                                  Prob > chi2     =     0.0000
Log likelihood = -678.93772                       Pseudo R2       =     0.0576

------------------------------------------------------------------------------
      change |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lnexppc |    .406353   .0895039     4.54   0.000     .2309285    .5817775
     mktsurp |   .0077803    .002283     3.41   0.001     .0033056    .0122549
      hhsize |   .0438986   .0212457     2.07   0.039     .0022577    .0855394
    under15p |    .187578   .2275164     0.82   0.410     -.258346    .6335019
     over65p |   .1204971   .5276684     0.23   0.819    -.9137139    1.154708
     femhead |  -.1383869   .1595446    -0.87   0.386    -.4510886    .1743148
     agehead |  -.0328966   .0202036    -1.63   0.103    -.0724949    .0067018
        age2 |   .0003559   .0002306     1.54   0.123    -.0000961    .0008079
       edhd1 |   .1191716   .1600222     0.74   0.456    -.1944662    .4328094
       edhd2 |   .3187311   .2563323     1.24   0.214    -.1836709    .8211332
     lithead |  -.2556237   .1496329    -1.71   0.088    -.5488987    .0376513
       edsp1 |   -.052409   .1152886    -0.45   0.649    -.2783705    .1735524
       edsp2 |   .2994468   .3565671     0.84   0.401    -.3994119    .9983054
      litsps |   .0161757   .1689754     0.10   0.924    -.3150099    .3473614
       fsize |  -.0246789   .0494431    -0.50   0.618    -.1215855    .0722277
     tobgrow |   -.257568    .137516    -1.87   0.061    -.5270945    .0119585
       irrig |   .4312811   .2342161     1.84   0.066    -.0277741    .8903363
     connect |  -.1826518   .0965741    -1.89   0.059    -.3719335    .0066299
        club |   .1380023   .1222276     1.13   0.259    -.1015595     .377564
        coop |   -.040205   .1930921    -0.21   0.835    -.4186586    .3382486
     extcont |   .1762547    .112696     1.56   0.118    -.0446255    .3971349
       chewa |  -.1470395   .1988246    -0.74   0.460    -.5367285    .2426496
       ngoni |  -.0761561   .1917863    -0.40   0.691    -.4520504    .2997382
        tumb |   .0176262   .1942392     0.09   0.928    -.3630756     .398328
        lomw |   -.089999   .1965554    -0.46   0.647    -.4752405    .2952426
        yawo |  -.1152073   .1831193    -0.63   0.529    -.4741145       .2437
    distroad |   .0500577   .1181076     0.42   0.672    -.1814289    .2815443
       radio |   .0918288   .1022771     0.90   0.369    -.1086306    .2922883
          tv |   .0515057   .4801151     0.11   0.915    -.8895026    .9925141
        bike |  -.0342985   .1013302    -0.34   0.735     -.232902     .164305
       mbike |   7.760963   296879.7     0.00   1.000    -581865.7    581881.3
        reg1 |  -.1653387   .1783722    -0.93   0.354    -.5149418    .1842644
        reg2 |  -.1702906    .157538    -1.08   0.280    -.4790594    .1384783
-------------+----------------------------------------------------------------
       _cut1 |   3.042196   .8603625          (Ancillary parameters)
       _cut2 |   3.432705   .8616464
------------------------------------------------------------------------------
      change |      Probability            Observed
-------------+-----------------------------------
           1 |   Pr(      xb+u<_cut1)        0.6117
           2 |   Pr(_cut1<xb+u<_cut2)        0.1282
           3 |   Pr(_cut2<xb+u)              0.2602
```

Table 5.69 – General information for the average EPA by region

	Region			
	South	**Center**	**North**	**Total**
Average number of villages per EPA	122	214	100	160
Average number of farming households per EPA	22,865	17,320	15,215	18,736
Average number of residents per EPA	102,874	76,878	81,406	86,894
Average total area (in hectares) per EPA	49,857	49,851	51,077	49,965
Average total arable area (in hectares)	18,748	30,957	26,981	25,624
Average population density (person/ha)	2.06	1.54	1.59	1.74

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.70 – Average volume of production per EPA in the 1997/98 cropping period (in tons)

	Region			
Crop:	**South**	**Center**	**North**	**Total**
Maize	16,652	12,398	4,007	12,297
Irish Potato	0	1,881	1,587	1,797
Sweet potato	23,126	6,296	3,085	11,371
Cassava	12,303	4,053	18,488	9,209
Rice	1,670	2,644	4,310	2,325
Beans/pulse	2,719	789	660	1,282
Sorghum	1,441	69	360	877
Groundnuts	442	1,014	328	728
Vegetables	12,145	3,766	250	7,516
Fruits & Nuts	96,436	544	150	48,424
Tobacco	550	1,204	459	881
Cotton	668	169	0	383
Sugar	0	0	210	105
Tea	0	0	0	0
Coffee	0	300	0	300
Chile/paprika	316	103	18	105
Sunflower	0	107	88	102
Soybeans	17	488	204	389

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.71 – Average yields per crop

Crop	Yield per hectare (ton/ha)
Maize	2,249
Irish Potato	5,369
Sweet Potato	12,528
Cassava	7,064
Rice	1,650
Bean/pulse	741
Sorghum	921
Groundnuts	998
Vegetables	18,377
Fruits & Nuts	11,837
Tobacco	1,724
Cotton	545
Sugar	100
Tea	0
Coffee	15
Chilli/paprika	472
Sunflower	350
Soya Beans	630

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.72 – Average length of road network by region (in kms)

	Region			
	South	Center	North	Total
Average length of paved roads per EPA	26	36	26	32
Average length of gravel roads per EPA	35	66	35	56
Average length of dirt roads per EPA	95	137	84	113

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.73 – Changes in road infrastructure since 1995

	Region			
	South	Center	North	Total
Percentage of EPAs reporting on changes in road length:				
New Roads	25	11	25	18
No change	58	78	62	68
Some roads have become unusable	17	11	12	13
Percentage of EPAs reporting on changes in road quality:				
Improved	18	50	37	38
No change	27	17	25	22
Worse	54	33	37	40

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.74 – Availability of transportation services for agricultural products per EPA

	Current Number of vehicles privately owned	Number of vehicles privately owned in 1995	Current number of vehicles operated by ADMARC	Number of vehicles operated by ADMARC in 1995
Trucks of 1 ton of less	10	5	0.67	0.61
Trucks of more than 1 but less than 10 tons	4	2	0.09	0.11
Trucks bigger than 10 tons	2	1	0.03	0.09
Minibuses, vans, cars	5	2	0	0

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.75 – Frequency of operation by types of markets

	Frequency (percentage within market type)				
Type of Market:	**Daily**	**Once a Week**	**Twice a Week**	**3 Times a Week**	**Total**
Input Market	100				100
Crop Buying Market	100				100
Crop Selling Market	22.2	38.9	38.9		100
Crop Buying and Selling Market	38.5	28.2	30.8	2.6	100
Input & Crop Buying and Selling	94.7	5.3			100
Input & Crop Buying	100				100
Input & Crop Selling	100				100

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.76 – Change in frequency and volume of operation since 1995 by market type

	Reported Change (percent of EPAs)			
	Increased	**No Change**	**Decreased**	**Total**
Input Market (change in trade volume)	78	9	13	100
(change in frequency)	42	58	.	100
Crop Buying Market (change in trade volume)	.	67	33	100
(change in frequency)	.	100	.	100
Crop Selling Market (change in trade volume)	76	18	6	100
(change in frequency)	39	61	.	100
Crop Buying and Selling Market (change in trade volume)	62	14	24	100
(change in frequency)	54	39	7	100
Input & Crop Buying and Selling Market (change in trade volume)	60	19	21	100
(change in frequency)	16	84	.	100
Input & Crop Buying (change in trade volume)	50	.	50	100
(change in frequency)	.	50	50	100
Input & crop Selling (change in trade volume)	.	100	.	100
(change in frequency)	.	100	.	100

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.77 – Changes in the availability of input and output traders since 1995

	Category of Trader	Number of traders that operate within the EPA			Number of Months in a year the traders buy in EPA			Number of Months in a year the traders sell in EPA		
		North	Center	South	North	Center	South	North	Center	South
Output	Assemblers	0	14	5	0	4	4	0	5	3
	Wholesalers	6	3	14	5	5	3	8	7	4
	Retailers	23	17	10	5	5	4	9	8	8
	ADMARC Markets (buying points + markets)	3	3	3	6	6	4	12	12	11
Input	Subsidiary of manufacturer	.14	.40	.55	3	0	2	.	6	4
	Wholesalers	1	.50	.78	0	6	1	12	8	8
	Retailers	1	3	1	0	5	6	11	11	10
	ADMARC Markets	3	3	3	0	5	3	11	12	10

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.78 – Changes in the number and type of traders since 1995

	Reported Change (percent of EPAs)			
	Increased	No Change	Decreased	Total
Output Markets:				
Number of assemblers since 1995	14	64	21	100
Number of wholesalers since 1995	59	32	9	100
Number of retailers since 1995	81	19		100
Number of ADMARC markets since 1995	18	71	10	100
Inputs Markets:				
Number of subsidiary of manufacturers since 1995	15	85		100
Number of wholesalers since 1995	46	54		100
Number of retailers since 1995	70	26		100
Number of ADMARC Markets since 1995	17	72	11	100

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.79 – Availability of formal and informal sources of credit

	Region			
	South	Center	North	Total
Average number of money lenders	4.3	0	5.6	2.5
Average number of commercial banks	0.45	0.38	1.2	0.60
Average number of MRFC branches	3.2	1.3	1	1.9
Average number of SACCO	0.18	0.18	0.25	0.19
Average number of NGOs	2.5	1	0.88	1.6

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.80 – Changes in availability of credit services since 1995

	Reported Change (percent of EPAs)			
	Increased	No Change	Decreased	Total
Number of Moneylender	60	33.3	6.7	100
Number of commercial banks	16.7	83.3		100
Number of MRFC branches	25.7	62.9	11.4	100
Number of SACCO	6.7	93.3		100
Number of NGOs	65.6	31.3	3.1	100

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Table 5.81 – Availability of storage facilities

	Region			
	South	Center	North	Total
Number owned by ADMARC	2.2	.22	2.2	1.3
Number owned by association	.25	0	0	0
Number privately owned	1.4	.33	1.6	0.95

Source: IFPRI/APRU Malawi Smallholder Farmer Survey, 1998.

Figure 5.1 Distribution of households by farm size

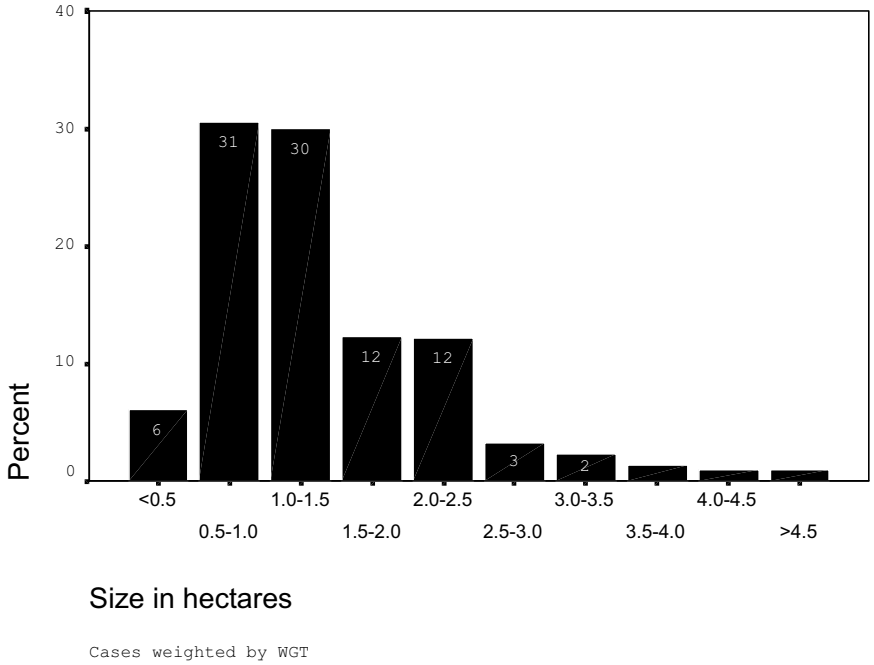


Figure 5.2 - Farm Size, household size, and farm size per capita by expenditure group

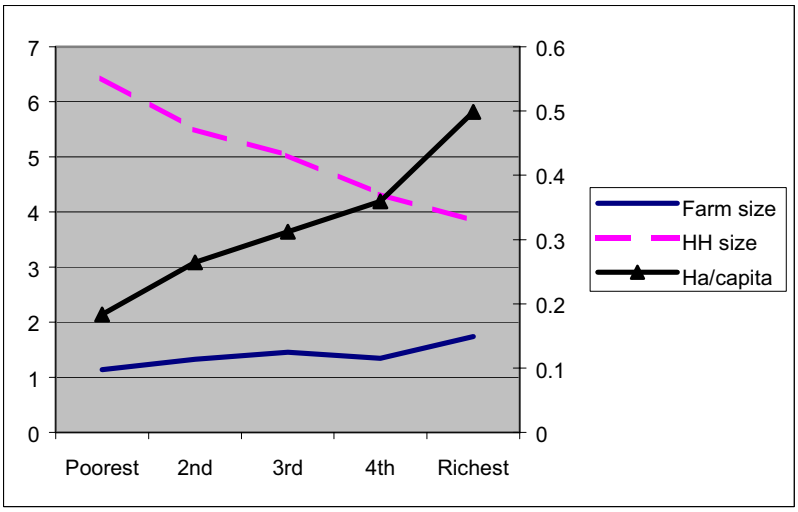


Figure 5.3 - Percentage of households that use fertilizer by region

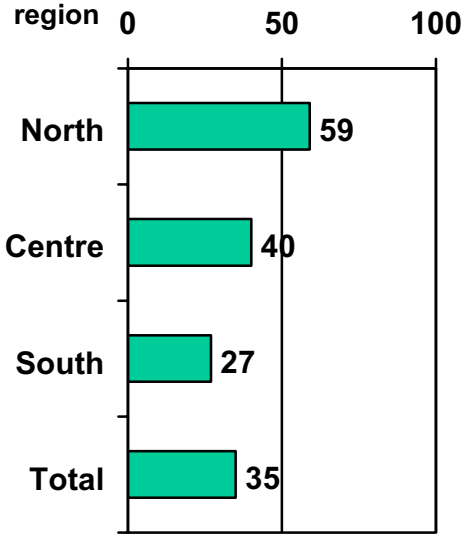


Figure 5.4 - Percentage of households that use fertilizer by gender

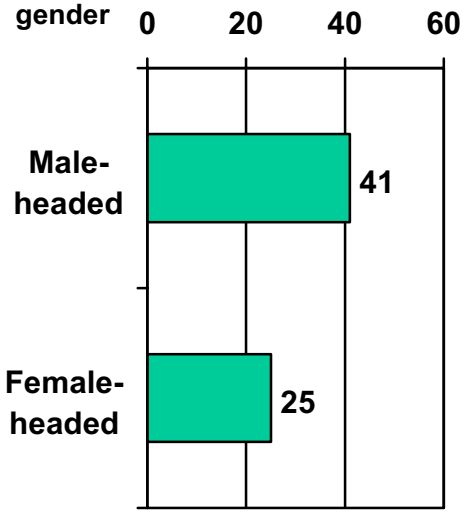


Figure 5.5 - Percentage of households that use fertilizer by farm size

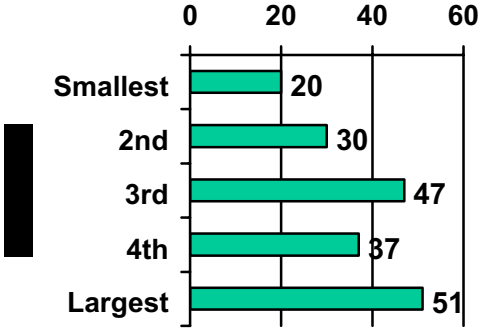


Figure 5.6 - Percentage of households that use fertilizer by expenditure group

Figure 5.7 - Percentage of Households that use different types of seeds

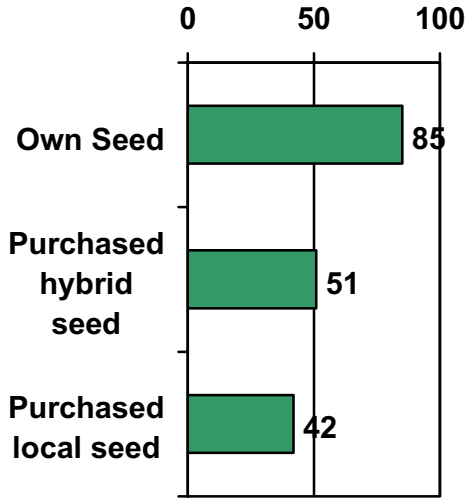


Figure 5.8 - Percentage of Households that use hybrid seed by farm size

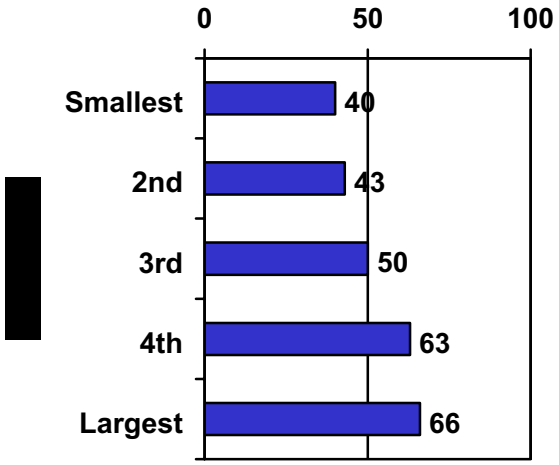
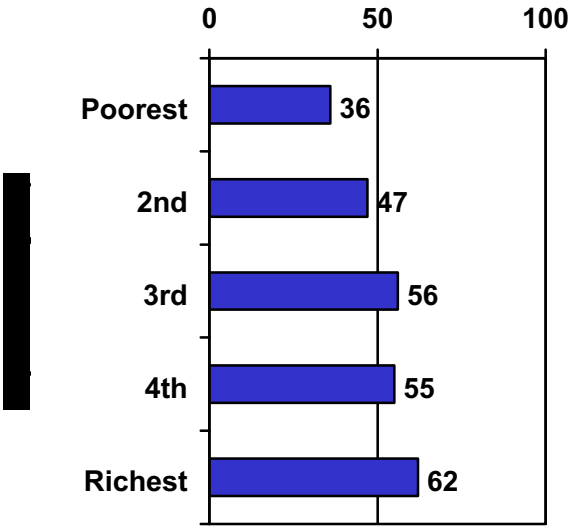


Figure 5.9 - Percentage of Households that use hybrid seed by expenditure goup



CHAPTER 6 – SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

As described in Chapters 2 and 3 of this report, both Benin and Malawi have undergone significant reforms to liberalize agricultural production, marketing, and international trade. These reforms include price decontrol, phasing out input subsidies, large devaluations to stimulate tradable goods production, and legalization of private sector participation in crop marketing and international trade. In both countries, however, a state enterprise continues to play a significant role in crop marketing (cotton in Benin and maize in Malawi) and input distribution. In order to determine the impact of these reforms on the smallholder farm sector, in Chapters 4 and 5, statistical results from surveys of farmers and communities were analyzed for both countries. In this final chapter, we provide a summary of these results and derive conclusions and policy implications.

6.1 Summary of Results for Benin

As part of the project, a survey of 899 farm households was carried out in Benin using a stratified random sample. The results of this survey, called the IFPRI-LARES Small Farmer Survey, can be summarized as follows:

Household characteristics and income sources

- The average household size in rural Benin is relatively large (8.8 members)
- Female-headed households are relatively rare (5 percent), although this may reflect problems with the lists of the Pre-Recensement Agricole from which our sample was drawn.
- Education levels are quite low, the average adult having just 1.4 years of schooling.
- Women have less education than men, but the gender gap is smaller in school attendance.
- School attendance is lower in the North and among poor households.
- Forty-two percent are members of a *groupement villageois* (GV) (more in the North).
- A large majority of households (92 percent) have income from crop sales, and crop sales account for over half of cash income.
- More than half the households earn income from non-farm self-employment, and this source contributes 17 percent of cash income.

Land use

- The average farm size is 3.3 hectares, with the largest farms in Borgou.
- The average sown area per capita is 0.54 hectares, the highest average being in Zou.
- Farm size is only weakly related to household well-being.
- Land rental and land sales are not common, but land markets are more active in the south than the north.
- Ninety-six percent of the cultivated area is rainfed.

Time allocation

- Women spend more time on household work (2.8 hours/day) and collecting wood and water (2.2 hours/day), while men spend more time on agriculture and on leisure.
- Rainy season activities focus on agriculture, while dry season activities concentrate on post-harvest and non-farm work.
- Households report spending more time on agriculture than in 1992, particularly in the North.

Use agricultural inputs

Seeds

- Over half of the farm households buy some of their seed requirements. Eighteen percent of seed requirements are bought, more for vegetables and cowpeas.
- Cotton farmers are no more likely to buy seed than other farmers.
- Almost all seed purchases are on a cash basis. Little input credit is available.
- Forty percent report that the availabilty of high-yielding seed has improved, while just 7 percent said it has gotten worse.
- The use of purchased seed has increased markedly in the case of rice and to a lesser degree in yams, sorghum/millet, and vegetables. But there is no trend toward increased use of purchased maize seed.

Fertilizer

- Half of the farm households in Benin use fertilizer.
- Fertilizer use is highest in the cotton zones of Borgou and Zou and lowest in Atlantique.
- The percentage of households using fertilizer does not vary by income level.
- Almost all (97 percent) cotton growers use fertilizer, and 24 % of other farmers.
- Growing cotton facilitates fertilizer use on other crops. Maize is fertilized by 59 percent of cotton growers, but just 18 percent of other farmers.
- About 87 percent of the fertilizer is bought by cotton farmers, but only 65 percent is used on cotton field. Thus, 25 percent of the fertilizer bought by cotton farmers is "diverted" to other crops, mainly maize.
- In the cotton zone, fertilizer is purchased on credit from SONAPRA through the GV. Elsewhere, fertilizer is purchased on a cash basis from traders and others.
- Farmers are evenly split on whether the availability of fertilizer has increased or decreased. Positive assessments tend to come from the cotton zone.
- More farmers report increased fertilizer use than report declining use. Use appears to have increased on cotton, maize, and vegetables, but declined on yams and manioc.

Pesticides

- About 42 percent of farm household use pesticides.
- Almost all (87 percent) of the pesticides are used on cotton, and 7 percent on cowpeas.
- Growing cotton facilitates pesticide use: cotton growers are more likely to apply pesticides to their cowpeas than other farmers are.

Access to credit

- About one third of the farm households received a loan in the 12 months before the survey, half from the formal sector (mainly CLCAM) and half from the informal sector (mainly friends and family). The average loan is 115 thousand FCFA.
- The most common purpose of the loan was to pay hired laborers.
- Most households (73 percent) report no change in availability of credit, but those seeing an improvement (17 percent) exceeded those seeing deterioration (7 percent).

Crop production and storage

- Maize is the most important crop in terms of the share of farms growing it (89 percent), the share of farmland allocated to it (37 percent), and the value of production (27 percent).
- Cotton is grown by 35 percent of the farmers and accounts for 18 percent of the area and 22 percent of the value of output.
- Production is more diversified in the North, with farms growing an average of 6-7 crops, compared to less than 4 in the South and 2.6 in Atlantique.
- Cropping patterns do not differ much between male- and female-headed households.
- Sorghum/millet and yams are more important in the crop mix of poor households.
- Larger farms allocate a smaller share of the area to staple foods and vegetables compared to small farms.
- Almost two-thirds of the farms own graineries (more in the North) and half use their houses (less in the North).
- Grains are generally stored for 6-9 months for consumption or (less often) for sale.

Agricultural marketing

Marketed surplus

- In spite of the small size and limited technology of farms in Benin, a large share (almost two thirds) of the output is sold on the market. About half the households sell more than 50 percent of their crop production.
- The marketed surplus is 100 percent for cotton, 84 percent for manioc, and 40-50 percent of the maize, cowpeas, and rice.
- The marketed share is highest in Atlantique (82 percent) and lowest in Atacora and Borgou (43 and 50 percent). Although Northern farmers often grow cotton, they also grow yams and sorghum/millet, little of which is marketed.
- Female-headed households appear to be more market oriented than male-headed households.
- The relationship between marketed surplus and farms size is positive but weak, because small farms often grow vegetables for sale.
- Private traders handle 85-95 percent of all foodcrop marketing.
- Only 1 percent of the cotton is sold outside the SONAPRA/GV system.

- Regression analysis indicates that high market surplus ratios are related to small households, large farms, cotton production, irrigation, GV and tontine membership, and radio ownership. Even after controling for these factors, Atacora and Borgou have lower ratios, while Atlantique has the highest.

Perceived changes in marketing patterns

- Farmers report that the volume of crop sales has increased since 1992, particularly for manioc, yams, and "other crops". Poor farmers and female-headed farmers were less likely to report increased sales.
- Most farmers (85 percent) have seen no change in the composition of buyers, but most of those that do see a change say that the role of private traders has increased.
- About half the farmers say that the number of crop buyers has increased since 1992, while 8 percent say it has fallen.
- Farmers believe that the volatility of agricultural prices is better or no different than in 1992.
- Thirty-seven percent report an improvement in the availability of market information, while 8 percent say it has gotten worse.
- More households say that roads have deteriorated than say they have improved.

Consumption expenditure

- Average per capita expenditure, including the value of home produced food, is 105 thousand FCFA (US$ 167).
- Per capita expenditure is highest in Atlantique and lowest in Atacora and Mono.
- Per capita expenditure is only slightly higher (6 percent) among male-headed households.
- Per capita expenditure does not increase with farm-size, although home production is a larger share of the total for large farms.
- Food accounts for 53 percent of expenditure, and half of the food comes from home production.
- The diets of farm households are relatively diversified: households consume an average of 16 of the 21 food categories examined.
- Maize represents 19 percent of food expenditure or 10 percent of total expenditure.

- Poor households devote a larger share of their budget to food and get a larger proportion of their food from own production.
- As incomes rise, households spend a smaller share of their food budget on grains and root crops and a larger share on animal products, beverages, and meals outside the home.
- Regression analysis indicates that poverty is associated with large families with a high proportion of children, uneducated heads of household, small farms, mud-brick walls, and not owning tables, radios, and motorbikes. Even after controling for these factors, households in Atlantique are less poor than those in other departments.
- Adopting the same poverty line and definitions of a 1994-95 household survey, we estimate the poverty rate to be 22 percent. This is significantly lower than the rate estimated by the earlier survey, suggesting that rural poverty has declined. Using the World Bank's international poverty line of US$ 1/day, however, practically all (95 percent) of Benin's farm households are poor.

Sources of information

- Just 19 percent of farmers reported contact with an extension agent in the past year.
- Extension contact does not appear to be biased against poor or small farms, but female-headed household report fewer contacts than male-headed households.
- Friends and family are the main source of information on seed varieties, production methods, and agricultural markets.
- Extensions agents are slightly more important than friends and family as a source of information on fertilizer, pest control, and agricultural policies.

Perception of changes in overall well-being

- Farmers are generally positive about changes in the standard of living of their household since 1992. Slightly more than half the households (52 percent) reported improved conditions and 28 percent reported poorer conditions.
- Regression analysis indicates that perceived improvements in household well-being are more common among poor households with televisions and contact with extension agents. In addition, households located near *sous-préfecture* centers and those in Atacora and Borgou are significantly more positive than those in other departments.

- Among those seeing improvement, the main reasons given were better crop prices, changes in the price or availability of food, and increased off-farm income.
- Among those reporting deterioration, the main reasons were family health, poor weather, and declining soil fertility.

Because of their key role in distributing inputs and marketing cotton in Benin, the project carried out a survey of village-level farmer organizations called *groupements villageois*. The IFPRI-LARES Survey of *Groupements Villageois* (GVs) interviewed a random sample of 189 GVs involved in cotton marketing. The main results are summarized below:

General characteristics of GVs

- One quarter of the GVs were formed in the early 1970s and another quarter in the early 1990s.
- The average GV has 350 members, more in Borgou and Atacora and fewer elsewhere.
- Almost all GVs have increased signficantly in membership, fertilizer use, and cotton output.
- Most GVs have a president, a secretary, a treasurer, with no other permanent employees.
- The secretaries have an average of nine years experience with the GV and four years as secretary. Most (88 percent) have a CM2 certificate.
- GVs own scales and storage facility but rarely any other equipment.

Commercial activities and budget

- All GVs supply fertilizer on credit, distribute cotton seed, and market cotton. Only some supply herbicide/pesticide and provide cash credit to members.
- The GVs report high satisfaction with suppliers of fertilizer and seed, but general dissatisfaction with suppliers of pesticides.
- A number of GVs report much higher fertilizer use than would be expected given the cotton area of their members.
- Cotton marketing is the main source of income, accounting for 80 percent of the total. Member dues are less important, except in Atacora.
- The largest expenditure items are schools, storage, and travel costs.

Perceived problems of GVs

- Few GVs report problems getting the desired quantity of inputs ordered.
- The quality of seed and fertilizer is seen as good, but over half the GVs complained about the quality of the pesticides.
- Less than 10 percent of the GVs report that members do not pay for their orders, but among those reporting the problem, almost a third of the members were implicated.
- About half the GVs have members that default on loans, but normally this affects just 5 percent of the members. The GV usually attempts to collect from relatives or other members.
- Most GVs report improvement in input availability, the timing of delivery, and input quality since 1992.
- On the other hand, a majority of GVs report deterioration in pesticide quality, extension services, and the timing of payment.
- Although the system of weighing and grading cotton has improved somewhat since 1992, 85 percent cite problems with weighing and two-thirds cite problems with grading. The most common complaint is that the weight and grade can be "changed" if bribes are offered.

The IFPRI-LARES Community Survey involved interviews with the leaders of 98 randomly selected villages in Benin. A summary of the main results is given below:

Transportation infrastructure

- Villages have an average of 6 km of all-season road and 1 km of paved road.
- The length of the road network has increased marginally: 12 percent of the villages report an increase and 2 percent a decrease, the remainder report no change.
- But road quality has declined: almost half (45 percent) report that village roads have deteriorated, while just 27 percent said they are better.
- Over 80 percent of the villages report increased numbers of bicycles and motorbikes in the village. There is also evidence of increased number of cars and pick-up trucks.

Agricultural markets

- Three quarters of the village leaders report increased volume of trade in nearby markets since 1992.
- Village leaders report improvements in market infrastructure including more storage space, a larger number of stores, and improved water access, but no change in the number of telephones.
- The number of traders has increased in every region and every type of market.

Access to credit

- In the North, 50% of villages say all farmers get input credit, while in the South two-thirds of them say no one receives credit.
- Although few villages have a *Caisse Locale de Crédit Agricole Mutuel* (CLCAM), 44 percent of the village report improved availability of credit while only 10 percent say it has declined.

Groupements villageois

- GVs are found in 91 percent of Northern villages but just 39 percent of Southern ones.
- GVs in the North distribute inputs and market cotton, dominating those activities in each village, while GVs in the South focus on food crop marketing and handle a small share of village output.
- Village leaders confirm the GVs have expanded input distribution, cotton marketing, and maize marketing.

Agricultural production and extension

- One-third of the villages say the number of extension agents has declined, while almost none report an increase.
- Deficit and surplus maize village co-exist in every region, suggesting a complex pattern of marketing flows.
- Most villages are deficit in rice and beans, reflecting national deficits in these commodities.

- For manioc, most of the surplus villages are in the South, for yams, in the North.

6.2 Conclusions for Benin

Based on the results of the surveys of farmers, communities, and GVs, as well as secondary sources of information, we can draw the following conclusions regarding the economic reforms in Benin and their impact on small farmers.

Agricultural reforms in Benin have been extensive. In the cotton sector, the importation of inputs has been privatized, cotton ginning has been opened up to the private sector, and one private firm has been allowed to export directly. In food markets, regulations of food marketing and food prices (although never fully enforced) have been eliminated, state enterprises involved in food marketing have been restructured or closed, and a number of state-owned food processing enterprises have been privatized. In agricultural input markets, subsidies were eliminated in the 1980s and private firms are now allowed to import fertilizer.

But the state still plays a key role in cotton marketing and input distribution. SONAPRA manages the importation of fertilizer by private firms in a system that discourages competition and investment. Although fertilizer imports outside the cotton system are legal, a 20 percent import duty makes it uneconomical. SONAPRA maintains a monopoly on farm-level cotton marketing and allocates seed cotton to the cotton gins in a non-competitive basis. It also maintains a virtual monopoly on the marketing of cotton lint.

Macro-economic reforms have had a significant impact on agriculture. At least as important as reforms in agricultural policy have been reforms outside the sector. The 1994 devaluation of the CFA improved the incentives for cotton and other export crops, as well as for crops that compete with imports such as rice. Macroeconomic reforms (including the devaluation, state enterprise reform, and fiscal balance) have stimulated economic growth, now averaging 4-5 percent per year. This has expanded opportunities for farmers to supply urban consumers with high-value commodities such as vegetables and animal products. The recovery of the financial sector after the 1988-89 bank failures has made credit more available. The dramatic growth of deposits and lending by the CLCAMs is a key part of this recovery.

The economic reforms have boosted per capita production of almost all the major crops. The 1994 devaluation improved the incentives for production of cotton and other export crops, as well as increasing the real price of maize and rice. Over the 1990s, cotton production grew at almost 10 percent per year and rice at 13 percent per year. Other important food crops including maize, manioc, yams, and groundnuts grew at 4.5 – 8 percent per year over the decade. Per capita production of sorghum/millet was stable, while that of beans declined slightly.

Most farmers in Benin say that their household's standard of living has improved since 1992. Slightly more than half report improvement while 28 percent complain of deterioration. Improved economic conditions are cited as the main reason for improvement, while those perceiving a deterioration usually cited non-policy factors such as family health and weather.

Reforms have probably reduced poverty and regional imbalances. Although urban households may have been adversely affected by privatization, higher import prices, and contraction of the state, the survey suggests that rural household feel their lives have improved since 1992. Even within rural areas, the perceived gains are greatest in the poorest department (Atacora) and least in the richest one (Atlantique). Indeed, comparing our results with those of a rural household survey carried out in 1994-95 suggests that the rural poverty rate has fallen markedly. The cotton boom has almost certainly also reduced the income gap between the North and the South.

Agricultural marketing is characterized by increasing volume and greater competition. Village leaders report larger volumes of trade at nearby agricultural markets, increased numbers of traders, and improved market facilities (number of shops and storage facilities). The GV survey confirms national trends on the growth of fertilizer use and cotton production. And farmers report that they sell more than they used to and that the number of crop buyers has increased. Furthermore, these improvements are reported by all income groups.

The SONAPRA/GV system has been successful in providing input on credit to an estimated 165 thousand small-scale cotton farmers. This system has facilitated the impressive growth of Benin's cotton sector. Improvements in the quality, quantity, and timing of delivery may be attributable to the partial privatization of input delivery. One key to the success of the system is the SONAPRA monopoly on cotton marketing which facilitates the recovery of input credit at harvest.

Furthermore, the system facilitates input use on other crops. As a result of being able to obtain inputs on credit, cotton farmers are much more likely to apply fertilizer to their maize and to use pesticides on their cowpeas. The survey suggests that 25 percent of the fertilizer passing through the SONAPRA/GV channel is used on crops other than cotton.

Nonetheless, GV managers report a few key problems in the cotton system. Although many aspects of input delivery and cotton marketing were rated good and improving, three areas were cited frequently as problems: low quality or ineffectiveness of pesticides, late payment for cotton, and arbitrary or corrupt practices in weighing and grading cotton. The first two problems are getting worse, according to GV managers, and the last is improving but remains an issue.

Extension services have deteriorated markedly in recent years. Only one farmer in five had any contact with an agent in the previous year. This may explain why farmers say that their main source of information on production methods is friends and family. Both GV managers and village leaders complain that the quality of extension services has declined. This does not appear to be the result of the Programme de Restructuration du Secteur Agricole (PRSA), but rather due to attrition, related to poor incentives for extension agents.

There is a widespread impression that rural roads have deteriorated. Among both village leader and farmers, more respondents felt that roads in their area had deteriorated than said they had improved. Problems with road infrastructure will limit the supply response of farmers to improved incentives for agricultural production.

Female-headed household do not seem disadvantaged. Female-headed households do have smaller farms, fewer household assets, and less frequent contact with extension agents. On the other hand, the survey indicates that they have the same poverty rate as male-headed households, they are more market-oriented, and they have similar access to modern inputs and credit. On the other hand, female-headed farmers were more likely to report a decline in welfare since 1992. The results should be treated with some caution, however, because of the relatively small number of female-headed households in the sample (5 percent or 39 households).

The reforms have not discriminated against small, remote, or non-commercial farmers. Small farmers show the same level of satisfaction with changes in economic conditions as large farmers. The farmers with the highest approval of economic changes are those in Atacora, the most remote

department. The farms with very little marketed surplus showed the same approval ratings as those marketing a large share of their output.

Farm size is only weakly related to household well-being. Several factors help explain this surprising result. First, small farmers depend more on non-farm income, diluting the effect of farm size. Second, small farmers are more likely to grow crops with high revenue per hectare, such as vegetables or *piment*. Third, small farmers in Benin are more likely to have two seasons of production, so that differences in sown area across farms are smaller than differences in farm size. And finally, household size is correlated with farm size, so that large farms generally have more "mouths to feed".

Farmers in Benin, even small farmers, produce largely for the market. Almost two-thirds of the value of crop production is marketed. Even small farms and poor household sell, on average, over half of their output. This means that agricultural prices matter to all farm households, and trends in agricultural prices should be closely monitored by the government and any other organization concerned about rural poverty.

6.3 Policy implications for Benin

Continue efforts to expand competition and private-sector participation in agriculture. National statistics indicate that economic reforms undertaken over the last decade have restored fiscal balance, low inflation, solid economic growth, and expansion in agricultural production, but questions have been raised about their impact on poor and vulnerable households. The results of the IFPRI-LARES Small Farmer Survey reveal that agricultural households, who make up the bulk of the population and the overwhelming majority of the poor, have a positive assessment of the changes in their well-being. Just 12 percent of the rural households feel worse off than in 1992 for reasons related to the economy.

Increase competition in cotton marketing. Competition could be increased at three levels: export marketing, cotton ginning, and farm-level collection. At the first level, SONAPRA could allow cotton gins and trading companies to export cotton lint directly. At the second level, SONAPRA could allocate seed cotton to gins by auction. This may result in the closure of the least efficient cotton gins, but the current system keeps all the gins only by "subsidizing" them through lower seed cotton prices for farmers. The third level is the most difficult because the SONAPRA monopoly on cotton collection facilitates recovery of input credit. Farm-level collection should only be liberalized if institutions are created to ensure recovery of input credit and thus the sustainability of the credit system.

Address problems of corruption in weighing and grading of cotton. The GV survey reveals that many participants in the cotton system have lost confidence in the impartiality of the systems for weighing and grading cotton. Whether or not the problem is widespread, the perception of unfairness undermines the incentives of farmers to produce higher quality cotton. One strategy would be to increase the anonymity and the distance between inspectors and sellers, making it more difficult for sellers to reward higher grades and weights. Another would be to introduce an independent verification service that would make random checks of the quality and quantity of batches of cotton.

Make input marketing more competitive by eliminating discriminatory import tax treatment. Private-sector participation in the distribution of fertilizers is inhibited by the higher import duty on fertilizer imported outside the SONAPRA cotton system. There is no reason to favor fertilization of cotton over fertilization of other crops, particularly since the survey reveals that one-quarter of the fertilizer passing through the SONAPRA cotton system is actually used on other crops. One option would be to eliminate the import duty on all fertilizer. If the government feels it cannot lose this revenue, then a small import duty, say 2-3 percent, on all fertilizer imports would generate the same revenue as the current system. An additional advantage would be that prices outside the cotton system would provide a means of testing the efficiency of the SONAPRA input delivery system.

Change the rules for SONAPRA input delivery to make it more competitive. SONAPRA could make its system of input delivery more competitive by allowing prices to vary by region and having the importer-distributors compete to provide inputs for each sous-prefecture or department. Under this system, importer-distributors would be paid according to their winning bid price, rather than according to the national price set by SONAPRA.

Facilitate the "diversion" of inputs provided by SONAPRA to crops other than cotton. In the past, SONAPRA has discouraged the use of inputs delivered via the GVs on crops other than cotton. SONAPRA should, instead, encourage the use of fertilizer and pesticides on other crops by allowing farmers to buy more inputs that they need for their cotton production. The upper limit on the sale of inputs on credit to each farmer should be determined by the ability of the farmer to repay the input credit with cotton sales rather than the amount of inputs needed based on cotton area. If the discriminatory treatment of inputs were eliminated, neither SONAPRA nor the government would feel that farmers were abusing the terms of their duty-free status.

Strengthen the extension service by maintaining the staffing levels in the *Programme de Restructuration des Services Agricole* (PRSA). The results of the surveys undertaken by this project indicate that farmers have little contact with agents, that village leaders see declining numbers of agents, and that a deteriorating extension service was one of few complaints by GV managers. Increasing staffing levels may require a study of the reason for attrition and an improvement in the incentives for extension agents.

Broaden the mission of the extension service to include the provision of marketing information. The Small Farmer Survey indicates that almost two thirds of the crop production is destined for sale. Yet, farmers rely on friends and family for information about markets. Given the growing importance of markets in determining the returns to agricultural production, extension agents should receive training and information to allow them to assist farmers in this way.

Improve the market information system. Farmers report that the marketing information system has improved, a sign of approval of the work of ONASA. At the same time, they say that the most important source of information about prices and markets is still friends and family. A study of users of ONASA data would help identify ways in which it could be made more useful to traders and farmers. Establishing a link between ONASA and the extension service would provide another method of dissemination for ONASA as well as helping the *Centre d'Action Régionale pour le Développement Rural* (CARDER) expand the range of services it provides to Benin's farmers.

Focus greater resources and attention to quality of rural road network. According to the surveys, farmers are generally positive about various changes in agricultural marketing and village leaders report improvements in market infrastructure, but both complain about the deterioration of rural roads. Often the solution lies not in merely investing more money in road building or maintenance, but in establishing institutional arrangements by which local resources can be mobilized and spent efficiently on local infrastructure.

6.4 Summary of Results for Malawi

In Malawi, the survey of the 800 randomly selected smallholder farmers, also called the IFPRI/APRU Smallholder Farmer Survey, reveals the following information.

Household Characteristics and Income Sources

- The average household size is 5 including about 2 children.
- About one-third of the farm households are headed by a female, with a higher share in the South than in other regions.
- Only 56 percent of the household heads are literate, and less than 10 percent have gone beyond primary school. Farmers in the North are more likely to be literate.
- Female heads of households have higher illiteracy rates than their male counterparts (only 33 percent are literate).
- Over 90 percent of farmers consider farming their primary activity; the most important secondary activity is service sector employment.
- The most important sources of cash income for small farmers are crop sales (providing 40 percent of the value of total cash income), non-farm self-employment (22 percent), and wages from non-agricultural work (17 percent).
- Although 37 percent of the households earn wages from working in agriculture, the contribution of these wages to their cash income is very low, providing only 5 percent of total cash income.
- Only about 5 percent of the households belong to a cooperative or association, while around 20 percent belong to a farmers' club (mainly tobacco clubs).

Land Use

- Average farm size is 1.4 ha, with the largest farms in the North and the smallest in the South.
- Female-headed households have smaller farms (1.1 ha compared to 1.5 for male-headed households).
- Each household owns about 3 plots and only 6 percent of the plots are irrigated.
- Richer households tend to have larger farm sizes per capita.

Use of Agricultural Inputs and Assets

Labor

- Smallholder farmers rely mainly on family labor; only about one-third hire labor.
- Women spend 16 percent more time on crop production activities than men.

- The most time-consuming agricultural activities are land preparation (one-third of total family labor), followed by weeding (29 percent), and harvesting (19 percent).
- The most-labor intensive crops are tobacco, followed by cotton, maize and rice.

Fertilizer use

- Only about 35 percent of the households use fertilizers. The main reasons for non-use are high costs and the feeling that fertilizer is not needed.
- Most of the fertilizer purchased is used either on maize or tobacco, but given the large area devoted to maize, about 61 percent of the tobacco area is fertilized compared to 27 percent of the maize area.
- Tobacco farmers are three times as likely to use fertilizer on maize than non-tobacco farmers.
- Holding everything else constant, the probability of using fertilizer increases with household expenditure, education level of the household head, membership in a club or cooperative/association, plot size, the maize price, the use of purchased seeds, and if the household is in the Northern region.

Seed use

- Most households use their own seeds, only about half use hybrid seeds and around 40 percent purchase local seeds.
- Use of hybrid seeds increases with expenditures levels, farm size, in male-headed households and in the Northern region.

Input Purchases

- The most important source of inputs is ADMARC, followed by other farmers, private traders, and private companies.
- About 90 percent of input purchases are cash-based; use of input on credit is limited. The Malawi Rural Finance Corporation (MRFC) is the most important supplier of input on credit.
- Only 16-18 of the farmers reported that their use of purchased seeds and fertilizer had decreased since 1995.

Use of credit

- A little less than 20 percent of farmers applied for credit, and only two-thirds of the applicants were granted a loan.
- The most important sources of credit are informal, including friends and family (57 percent) and moneylenders (10 percent). Formal credit sources constitute only about 30 percent of all loan applications.
- About 15 percent of the households reported an increase in their access to credit since 1995 while about 10 percent reported a decrease.

Crop production and storage

- Maize remains the most important crop both in terms of the proportion of households that grow it (99 percent) and in the percent cultivated area allocated to it (67 percent).
- Tobacco is the most important cash crop and is grown by about a quarter of all households
- Cropping patterns do not vary much between poor and non-poor farmers.
- Average maize yields are a little less than 1 metric ton per hectare (in principle, yields from hybrid maize can go up to more than 3 metric tons per hectare).
- About 90 percent of households use their own house to store their produce and about 56 percent use a granary.
- The longest stored item is maize, which is stored for about 6 months to be consumed through-out the year.

Crop Marketing

- Except for cotton and tobacco, most crops are grown for subsistence (especially maize). About half the households sell less than 10 percent of their output and only 18 percent sell more than half their output.
- The most important crop buyers are traders (35 percent of sales), consumers (30 percent), and ADMARC (19 percent).
- Depending on the crop, crop sales occur either at the market, at the farm, at ADMARC, or at the auction floor.

- Most common means of transport to the point of sale are by foot, by bicycle, or by animal and cart.
- When other factors are held constant, marketed surplus is higher for households with a smaller number of children, literate households heads, larger farm size, those that grow tobacco, those that belong to a club, those that own a radio, and the shorter the distance of the farm to a road.

Expenditure patterns

- Average per capita expenditures (including food and non-food) are MK 3.1 thousand.
- Food purchases absorb 37 percent of total expenditures, while home produced food accounts for another 30 percent. Maize alone accounts for 32 percent of the food budget.
- Other important food items consumed are fish, tomatoes, sugar, chicken, leafy vegetables, beans and groundnuts.
- Holding everything else constant, higher levels of per capita expenditures are associated with smaller families, fewer children, larger farms, membership in a cooperative/association, more frequent contacts with extension agents, houses with a cement roof-top, and ownership of assets such as chairs, beds, and radios.

Sources of information and access to extension services

- Smallholder farmers receive most of their agronomic information from extension agents.
- Other sources of information, especially for prices and changes in policies, are the radio and family and friends
- Farmers have contacts with extension agents about 17 times a year.

Perceptions about the reforms

- For most crops, farmers believe that their profitability had increased since 1995.
- About two-third of the households noted that seeds had become more available since 1995 but only 40 percent noted that fertilizer had become more available.
- Forty-five and 65 percent of the farmers reported an improvement in the number of input sellers and crop buyers respectively since 1995.
- Two-third of the households complained about a deterioration in road conditions since 1995.

- About 62 percent of the households felt worse off in 1998 than in 1995. The main reason for this change was the higher cost of fertilizer.
- Another one-quarter of the households felt better off, mainly because they were growing more cash crops or earning money from non-farm work.
- The regression analysis of perceived changes in well-being suggest that the likelihood of feeling better off increases with expenditure levels, higher marketed surplus, larger family size, younger farmers and illiterate household heads.

The most pertinent results from the community survey of 40 EPAs can be summarized as follows.

- Between two-thirds and three-quarter of the EPAs reported higher agricultural production and higher marketed surplus since 1995.
- Road, communication and transport infrastructure are still poorly developed and road quality has deteriorated since 1995 for 40 percent of the EPAs.
- For most EPA markets, the frequency of operation, the volume traded, and the number of private traders has increased since 1995.
- ADMARC is still the dominant input supplier but private traders are now considered more important in crop marketing.

6.5 Conclusions for Malawi

Based on the above results, general observations from field work and review of other research, the following conclusions can be derived on the status of the smallholder sector following the reforms of the early to mid-1990s.

The reforms have provided a boost to agricultural production. Both the survey results and figures from secondary sources indicate that agricultural production in the 1990s has increased significantly because of an expansion in land area cultivated and to a lesser extent, because of higher yields for some crops. Although maize and tobacco remain the dominant food and cash crop in Malawi, some diversification into other crops (such as cassava, potatoes, beans, and horticultural crops) has occurred. Burley tobacco production has also taken off since its production and marketing restrictions by smallholder farmers were lifted in the mid-1990s.

Small farmers in Malawi are mainly subsistence farmers. The extent of commercialization of agricultural commodities by small farmers is quite limited in Malawi. Only a few cash crops such as tobacco, cotton, soybeans, vegetables, and a few horticultural crops are grown to be sold in the market. And these cash crops are grown by less than 50 percent of the households. The rest of the crops are mainly grown for household consumption. Market orientation is limited by markets that are still a bit risky in terms of availability and competitiveness; small and fragmented farms; poor road infrastructure; low agricultural input use and productivity; limited access to pertinent market information except through the radio; low levels of education; and limited organization of farmers into groups.

Low use of fertilizer and hybrid seeds. Only one-third of the households used fertilizer and about a half used hybrid seeds. These numbers are low and explain the low levels of agricultural productivity and declining soil fertility reported in Malawi. Average maize yields have stagnated at about 1 metric ton per hectare for the past two decades. Low levels of input use are due to the high cost of the input relative to the output (mainly maize) and poor access to credit to purchase inputs. Because of their low levels of working capital and inability to ensure loan repayment, private traders are not willing to extend input on credit to small farmers. The MRFC seems to be the most active provider of input on credit. However, most small farmers are not eligible for MRFC credit, because the MRFC extends loans only to tobacco clubs or farmers that grow cash crops, and charges commercial interest rates which are exorbitant for a small farmer.

The single most important complaint about the reforms is the higher cost of fertilizer. A little less than two-thirds of the farmers indicated that they felt worse off since the reforms of 1995. Of those, more than half explained that they felt worse off because fertilizer had become more expensive. This response may have been a strategic answer by the farmers because during the interviews, both the Starter Park Scheme (SPS) and the Agricultural Productivity Investment Program (APIP) were about to be launched, and farmers may have thought that this was an assessment of whether they should be included for the distribution of free inputs. Furthermore, despite their complaints about the high cost of fertilizer, only 18 percent of the farmers reported a decline in fertilizer use since 1995. Nevertheless, although farmers' complaints may have been exaggerated, it remains a fact that the high cost of fertilizer is an important concern for small farmers in Malawi.

Low use of rural credit. Less than twenty percent of the farm households applied for credit in Malawi and farmers rely mainly on family and friends to secure some credit. As a result, farmers cannot smooth out their consumption needs and do not have enough resources to buy inputs. This very low rate

of credit use highlights a market failure in the provision of rural credit in Malawi and begs for a re-examination of the role of the public and private sector in developing institutions to address the credit needs of the rural population.

Growing tobacco increases the likelihood of using fertilizer. Tobacco growers are three times as likely to apply fertilizer to their maize fields than non-tobacco growers. Growing tobacco increases the cash income of farmers thereby allowing them to purchase fertilizer. It is also possible that the residual of the fertilizer purchased for tobacco production is used on the farmers' maize plot. This demonstrates that production of a tradable cash crop (where fertilizer use is still profitable) has positive spill-over effects on the production of non-tradable food crops.

Tobacco farming is not restricted to non-poor farmers. Growing tobacco cuts across all expenditure groups in Malawi. This means that growing tobacco is not restricted to the non-poor. However, tobacco growers have better access to credit and inputs because of their membership in clubs and their access to cash income which allows them to purchase inputs.

Agricultural wages contribute very little to rural income. Although a little more than one-third of the farm households supply agricultural labor, the contribution of agricultural wages to their total income is only about 5 percent. Furthermore, the poorest farmers are those that rely the most on agricultural labor to supplement their cash income. Non-farm employment seems to be more remunerative than agricultural sector employment, and is associated with better off farmers. But because the majority of the farmers are illiterate, they often do not have an opportunity to work outside the agricultural sector -- employment in other sectors of the economy requires a basic level of education and additional skills besides farming.

Female-headed households have equal access to input and output markets but are less well-off than male-headed households. Although the descriptive statistics of the IFPRI/APRU small farmer survey suggest that female-headed households have smaller farms, lower per capita expenditures, lower marketed surplus, and use less purchased inputs, the regression results fail to show these trends. The advantage of regression analysis is that it allows one to look at the effect of a separate variable while all other variables are held fixed. Therefore, when we conduct the regression analysis, we do not find a relationship between fertilizer use, expenditure levels, marketed surplus, and perceptions about well-being on the one hand, and gender of the household head on the other. This indicates that there is no systematic bias against women in the agricultural sector of Malawi. However, it is a fact that because female-headed

households have less assets and less family labor to rely on to generate income, they are usually less well-off than male-headed households.

Extension services are widely available in rural areas. The majority of farmers still rely on extension agents to obtain information about agricultural production and marketing. Contacts between extension agents and farmers are frequent and farmers seem to benefit from them. It is a good sign that public extension services have not been curtailed with the economic liberalization efforts.

Markets have become more competitive and marketed surplus has increased. Both the smallholder farmer and the community survey results indicate that the number of private input and output traders has increased since 1995. Furthermore, the frequency of market operating days has also increased. A higher number of traders and more frequent trading days should result in more competitive markets and better choices for farmers and consumers. As a result of both higher production and more farmers selling their produce, the volume of marketed surplus has also increased since the reforms.

ADMARC remains a significant player in input and output markets. The survey data suggests that ADMARC is the most important supplier of inputs to farmers, and comes second after private traders as a wholesale buyer of smallholder crops. The sheer size of ADMARC's infrastructure and financial resources means that it will continue to be a major force in agricultural marketing in Malawi. Whether the presence of ADMARC is beneficial to the country as a whole or whether it dampens the response and investment behavior of a more efficient private sector has not been addressed by this study, but is an important issue to be investigated further.

Rural transportation and communication infrastructure is poor. Most farmers have complained that road infrastructure has deteriorated in recent years. Transportation costs are very high in Malawi and services are lacking. Furthermore, public telephone networks are still absent in many rural areas. Unfortunately, the market liberalization efforts have also been accompanied by budgetary cuts and a reduction in public investment in infrastructure. Rural road, transportation, and communication infrastructure is crucial to facilitate the access of small farmers to markets, especially those that reside in remote and less accessible areas.

More market-oriented and less poor farmers have benefited most from the reforms. Not surprisingly, market reforms have provided more opportunities for farmers that could take advantage of and participate in more competitive markets, i.e. those that are more market-oriented. Furthermore,

because reforms have also been accompanied by the elimination of input subsidies, better-off farmers were probably more capable of weathering the higher costs of inputs. This is not to say that fertilizer subsidies in the past benefited the poor necessarily. In fact, there is a lot of evidence that fertilizer subsidies were not very effective because subsidized fertilizer was often rationed, of the wrong type, arrived late, and was not targeted to the poorest farmers. In many instances, subsidized fertilizer was leaked to the estate sector.

6.6 Policy Implications for Malawi

Find institutional solutions to provide rural credit. The market failure in the provision of rural credit has negative consequences on household consumption and the adoption of technology with direct consequences on food security and agricultural productivity. The existing credit institutions in Malawi have serviced some segments of the population (such as SACCO, MRFC, NABW, DEMATT) but obviously no universal solution has emerged to service the small and poor farmers with no collateral. Contract farming and out-growers schemes could provide some remedy by linking the supply of input on credit with crop buying. However, interlocking transactions are usually more successful under certain circumstances such as when there are a few buyers and market demand for the crop is strong. Furthermore, these schemes are more applicable to export crops than to non-tradable domestic crops. Both the private and the public sector should come up with solutions to supply rural credit to farmers on a sustainable basis.

Promote the development of farmers' organizations, clubs, or cooperatives. Farmers that organize themselves into groups (such as tobacco clubs) have usually better access to credit and inputs. This is mainly because credit institutions such as MRFC are more willing to lend to a group of farmers. Farmer groups are also able to benefit from economies of scale in marketing their crops (such as marketing tobacco at the auction floor) and obtaining information on agricultural production and marketing.

Encourage the production of cash crops. Tobacco growers have more access to cash to smooth their consumption needs and to buy inputs such as fertilizer. They are also more likely to use fertilizer on their food crops. The production of cash crops should therefore be encouraged because of its positive spill-over effects on food production and cash-income generation.

Place more serious efforts to improve maize yields. The SPS and APIP are donor funded short term programs that do not provide a long-term solution to the low agricultural productivity and declining soil fertility in Malawi. A more serious and long-term effort is needed to improve maize yields by encouraging farmers to adopt hybrid maize seeds and use fertilizer. This includes national awareness campaigns about the benefits of using hybrid maize; allowing more private companies to compete in seed marketing; standardizing the seed production and marketing processes vis-à-vis testing, multiplication, and quality control to prevent fraud in hybrid seed marketing; and providing the necessary infrastructure and adequate policy environment to reduce the financial risk of hybrid maize adoption.

Continue the agricultural diversification strategy. The diversification into more drought-tolerant crops such as cassava and other tuber crops was a successful strategy that needs to be continued. Diversification into legume crops such as beans and pulses should also be encouraged as legumes need less fertilizer and can fix nitrogen in the soil thereby improving soil fertility. Diversification into horticultural and other crops for exports needs to be explored further as world demand for tobacco continues to decline.

Invest in rural roads, transportation and communication infrastructure. The government should place a priority on improving rural roads, transportation services and telecommunications. Transport and information infrastructure are crucial for the commercialization of agriculture and are needed if small farmers are to move from subsistence farming to more market-oriented agriculture.

Continue the reform efforts and avoid policy reversal. The government and donors in Malawi should continue on the liberalization path they have adopted, but they should place more emphasis now on the institutional and structural bottlenecks that are preventing the agricultural sector from reaping the full benefits of the reforms. Reverting back to fertilizer subsidies is not a long-term solution to low agricultural productivity. Furthermore, reversing policies creates a climate of uncertainty and reduces farmers' faith in the commitment of the government to the reforms. If the government loses credibility, than it will meet more resistance from the population to continue on the reform path.

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