

GRAIN MARKET RESEARCH PROJECT
MINISTRY OF ECONOMIC DEVELOPMENT AND COOPERATION

PART I

MAIN REPORT :
MAJOR FINDINGS & POLICY IMPLICATIONS

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Executive Summary

The Government of Ethiopia took the initiative to setup the Grain Market Research Project (GMRP) in 1995 to strengthen the empirical foundation for grain marketing and food policy decisions. The project, a collaborative effort among the Ministry of Economic Development and Cooperation (MEDaC), the United States Agency for International Development (USAID) and Michigan State University (MSU), has principally been aiming at (a) generating improved knowledge of the performance of grain markets in Ethiopia in order to identify strategies to strengthen and develop the grain market sector; and (b) to suggest design options to enable the grain marketing system to better achieve the objective of food production and household food security.

The main activities of GMRP have been identified by MEDaC and other government agencies through the Project Technical Committee, which has been mandated by the Government to guide and assist the project staff in carrying out the research agenda. The two focus activity areas have been:

- *Strategies to improve grain market performance:* There have been two research activities which involved both policy-relevant analysis as well as the development of a Market Information System to disseminate information to farmers, consumers, traders, and other market actors and to allow government agencies to better monitor and assess on-going trends and developments in the grain sector.
- *Strategies to increase household access to food through improved management of food supplies:* Here also there are two main research activities the first of which tries to help stabilize the food system to promote productivity growth in the agricultural sector and to cost-effectively promote food security at the household level, and the second aims at improving the use of food aid in order to cost-effectively target vulnerable groups and minimize potential adverse effects of food aid on domestic food production incentives and market development objectives.

The main data source of the studies carried out by the project was a Rural Household survey which was conducted in June 1996. A structured questionnaire was used to collect information from about 4,298 households in the whole country.¹ The sample was taken from the Central

¹ According to C.S.A., the sample frame for the entire country was 60,000 census enumeration areas (EAs). Out of this 614 EAs were selected using stratified random sampling. From each of the sampled EAs, 25 households were selected for enumeration under the C.S.A. Annual Agricultural Survey. As a result, (i) 14,736 households were selected for the Annual Agricultural Survey. (ii) A 50 percent sub sample (12 households from the original 25 households in each EA) was randomly selected for the C.S.A.'s Household Budget Survey and Welfare Monitoring Survey. (iii) A total of 4298 households were selected for the Rural household Survey (which is the main data base of this study). The GMRP Survey used a sub-sample of 7 out of the 12 households in the Household Budget

Statistics Authority (C.S.A.) national sampling frame, which is believed to be broadly representative of Ethiopia's rural population. The survey provided detailed information on household structure, purchase and sale of agricultural products, cropping pattern, land cultivated and owned, production, input use, grain storage problems, time and reason for grain sale, labor use, food aid and others. There were also questions regarding farmers' perception of their situation.

In addition to this, a traders survey was conducted in early 1997 which covered 220 wholesale traders operating in 26 regional grain markets spread across the country. Moreover, the project made use of CSA's Agricultural Survey of 1995/96. EGTE historical grain price data, and historical food aid data obtained from DPPC and WFP.

The main line of research activities of the Grain Market Research Project were:

1. Market Structure, Conduct, and Performance: Constraints on Performance of Ethiopian Grain Markets
2. Vertical and Spatial Integration of Grain Markets in Ethiopia: Implications for Grain Market and Food Security Policies
3. Design, implementation and evaluation of a Pilot Grain Market Information System
4. Agricultural Market Performance and Determinants of Fertilizer Use in Ethiopia
5. Grain Price Stabilization in Ethiopia
6. Food Aid Targeting in Ethiopia: A study of Food Insecurity and Food Aid Distributions

The GMRP has also carried out studies which were closely linked to its main line of activities. These included:

1. Evaluation of the 1995/96 Local Grain Purchase by the European Union (EU)
2. Cereal Availability Survey-Round 1
3. Cereal Availability Survey-Round 2
4. Impact Evaluation of the 1995/96 and 1996/97 Local Grain Purchase by the EU.
5. Profitability of the Use of Technological Inputs by Farmers Having relatively Small Holdings

Survey.

The more important findings, conclusions and recommendations of the main research activities are summarized below.

Market Structure, Conduct and Performance: Constraints on Performance Ethiopian Grain Markets

Main Findings

- (1) Wholesale traders are the principal actors in inter-regional grain movement. They, handle about 45% of the estimated 26.4 million quintals of grain sold annually by farmers and state farms.
- (2) At a national level, grain wholesale trade seems to be dominated by a small percentage of merchants; the largest 10% command about 43% of the volume traded at wholesale level.
- (3) The degree of inequality in market share at the local market level varies from market to market and from crop to crop; the computed Four-firm Concentration Ratio (CR4), however, does not indicate a high degree of market domination by large traders. For most markets and crops the CR4 is less than 33%.
- (4) Farmers normally bring their marketable grain to markets that are 5 to 20 km away from their villages and about 79% of their annual grain sales occur immediately after the harvest when they need cash to purchase food, cover wedding expenses, repay outstanding loans, and pay tax.
- (5) Generally, farmers and merchants do not have access to high-quality market information upon which they base their marketing decisions. The information that farmers get in particular does not assist them in deciding what crops to plant and how much. There is practically no market extension service in the present system that guides farmers in their production, storage and marketing decisions. Information on export market is also lacking.
- (6) Grain buying price at the local markets is mostly determined by deducting miscellaneous costs and a net traders' profit margin from the prevailing wholesale price in Addis Ababa; traders provide little advance payment, credit, or other incentives for farmers to sell to them at harvest. Grain prices are rarely negotiated in advance. Decisions regarding grain sales to merchants by farmers also are seldom influenced by such factors as blood, ethnic, or religious relationships.
- (7) Inter-market grain flow is coordinated mainly by the brokers in Addis Ababa who specialize by route and coordinate grain buying, selling, transporting and pricing activities.

- (8) The main constraints identified by traders are 'kella' (grain checkpoint) taxes, lack of financial credit, absence of control on un-licensed traders, unavailability of transport services and high transport tariff, lack of adequate storage facilities at appropriate locations, and lack of market information.
- (9) The variability of the number of 'kellas' and the amount charged between any two markets has caused uncertainty and confusion among merchants, causing a negative impact on grain movement and consequently on producer and retail prices.
- (10) Because of shortage of financial credit and lack of transport services, smaller merchants are subjected to low capital turn-over. These problems have a negative effect on the competitiveness of the market; while smaller traders' capital is tied up in inventory while waiting an average of 1-2 weeks to secure transport, the relatively large merchants may exert considerable influence on grain prices in the absence of any challenge from such alternative buyers.
- (11) Most of the merchants feel that the Government can play an important role in improving marketing facilities including developing new market places, allowing merchants to improve existing buildings which they acquired through rent, constructing and maintaining roads and expanding telephone services.
- (12) Lack of access to working capital and facilities at convenient location in the market place seem to be the most important barriers to entry.
- (13) The existence of barriers to entry, and the constraints facing traders have a negative impact on the performance of the grain marketing system. Comparison of the expected and actual price spreads between Addis Ababa and 19 selected markets shows that in 11 cases out of 19, the price spread can be considered adequate only after attributing non-monetary transaction costs of about 30% over and above the monetary costs. This may be attributed to several factors including risks associated with lack of good market information and sporadic and uncertain costs such as 'kella' charges, variable transportation rates, and other forms of transaction costs.
- (14) Seasonal price variations are also significant. For example in Addis Ababa, the Gross Real Returns to Storage is 3.66% per month for mixed teff, 3.24% for wheat, and 5.18% for white maize. When these figures are compared to the opportunity cost of capital tied up in inventories, which is about 0.83% to 1.17% per month, there seems to be substantial seasonal variation which reflect storage costs only after including a fairly high implicit risk premium for temporal arbitrage.

Main Recommendations

1. Abolishing all grain movement checkpoints and the present sales tax system on grain; conduct a detailed study to evaluate the merits and demerits of different taxation systems with the view to designing an appropriate taxation system that could assist the local governments obtain better tax revenue; promote inter-dependence between producing and consuming areas; enhance smooth grain flow and spatial integration; induce different market participants including, farmers, traders, and consumers; and improve regional food security.
2. Clarifying the regulations governing licensing and participation in the grain trade, and then enforcing these regulations to ensure an equal playing field for all participants;
3. Devising appropriate credit policy to cater for the credit needs of grain traders and providing incentives for private investment in the grain marketing system, such as storage and transport facilities.
4. Strengthening the current market information services by expanding the market and commodity coverage of the MIS and by providing additional information on crop production prospect, temporal and spatial grain flows, food import and export intentions, stock level, world market prices of export crops, etc. To assist and properly guide farmers in their planting, storage, and marketing decisions, dissemination of relevant market information through the agricultural extension system should also be considered.
5. Improving marketing infrastructure and facilities in the major regional markets
6. Conducting research on the different components of the system - farmers, assemblers, brokers, retailers, transporters, warehousing, etc., in order to get a better understanding of the entire marketing system.
7. Although this paper focuses on the organization, conduct, and performance of the small family operated grain businesses, there appears to be an emerging market structure with the rising involvement of incorporated private enterprises such as ‘Ambassel’, Ethiopia Amalgamated, and others. Because of their superior organizational, financial, and physical capability, and oft-alleged connections with government, as well as their diversified business activities and scale economies, these companies may bring about major changes in the structure, conduct, and performance of Ethiopia’s grain marketing system. Therefore, it is recommended that an assessment be made on the positive and negative impacts of the emerging market organization.

Vertical and Spatial Integration of Grain Markets in Ethiopia: Implications for Grain Market and Food Security Policies

Major Findings

1. Within a particular market the share of producer's price as of the retail price averaged 93% for white teff, 91% for white wheat and 86% for maize. As compared to the pre-liberalization period, producer's price share of retail price for white teff, white wheat and maize increased by 32%, 33% and 42%, respectively. In 1995 constant prices, the average producer prices for white teff, white wheat and maize also increased by 63, 60 and 19 birr/quintal, respectively.
2. The average wholesaler and retailer price spread were comparable for the three cereals, the wholesaler spread for the cereals considered varied from 6 to 8 birr/quintal and was found to be higher than the retailer spread which varied from 4 to 5 birr/quintal. The proportion of gross price spread as of retail price was 14%, 9%, and 7% for maize, white wheat and white teff, respectively. Thus, the proportion of gross price spread as of the retail price was found to be the highest for maize. This might be because of the difference in the extent of risk associated with moving the grain across the marketing levels.
3. In general, the spatial wholesale price spreads between Addis Ababa and other selected markets were found to be very high. The proportion of spreads as of wholesale price in Addis Ababa (or other markets with higher wholesale price than Addis Ababa's wholesale price) was found to be greater than 20% in 10 of 30 cases, greater than 15% in 13 of 30 cases and greater than 10% in 26 of 30 cases. Among the surplus markets, for all cereals, the highest spatial wholesale price spread was observed between Addis Ababa and Shambu market which has poorly developed market infrastructure.
4. For a particular market the volatilities of price levels across different marketing levels were found to be very similar indicating that there is integration among different marketing levels. For example, the volatility of white teff price levels across the three marketing levels was either the same or differed only by 1-2% indicating similar level of price volatility across marketing levels in a given market. The coefficient of variation for producers and wholesale price levels are the same in one case and differed by 1% in six of the seven cases. The volatility of white teff price levels at wholesale and retail levels was also found to be very similar in that out of fourteen cases the volatility is found to be the same in seven of the cases, differed by 1% in six of the cases and by 2% only in one case. The volatility of producer and retail prices differed by 1% in four of the six cases and differed by 2% in 2 of 6 cases.
5. The volatility of white wheat price levels across different marketing levels was also found to be very similar, it was either the same or differed by 1-2% indicating similar level of

price volatility across marketing levels. For the six of individual markets considered, the coefficients of variation for producers and wholesale price levels was the same in one of the case, differed by 1% in four of the cases and by 2% in one of the case. The volatility of price levels at wholesale and retail levels was also found to be very similar in that out of twelve cases the volatility was found to be the same in seven cases, differed by 1% in two cases and by 2% only in three cases. The volatility of producer and retail prices differed by 1% in four of the six cases and differed by 2% in 2 of 6 cases.

6. The volatility of white maize price levels across the three marketing levels was either the same or differed by 1-3% indicating similar level of price volatility across marketing levels. For four of the maize markets considered, the coefficients of variation for producer and wholesale price levels differed by 1% in two cases and by 2% in two cases. The volatility of price levels at wholesale and retail levels was found to be the same in one of 12 cases, differed by 1% in seven of 12 cases, by 2% in three of 12 cases and by 3% only in one case. The volatility of producer and retail prices differed by 2% in one of the four cases and differed by 3% in 3 of 4 cases.
7. There was a high level of volatility in price spreads among different marketing levels which indicates that there was high level of risk for the traders in passing grain from one level to another. The average standard deviation of wholesaler and retailer spread varied from 1 birr/quintal to 3 birr/quintal, in terms of the coefficients of variation the volatility of wholesaler and retailer spread varied from 26% to 39%.
8. The volatility of spatial wholesale price spread between Addis Ababa and other selected markets was very high, in terms of the coefficient of variation, the volatility was greater than 10% in all of the cases, greater than 20% in 26 of 30 cases and greater than 50% in 12 of 30 cases. Thus, the high level of volatility of spatial wholesale price spread indicates the high risk involved in moving grain across markets. There are many factors contributing to the high level of volatility in spatial wholesale price spread like the imposition of kella charges which increases the uncertainties of grain movements between markets.
9. There was very strong linkages among the prices of different marketing levels for a particular market, the correlation coefficient for price levels were found to be greater than 0.90 in all of the cases, except in Jimma market between wholesale and retail prices of white teff. The correlation coefficient for the first difference prices (changes) also indicate that there were strong relationships among the cereal price changes at different marketing levels, except for white teff between wholesale and retail price changes in Jimma market and between producer and wholesale price changes for Alamata market.
10. The computed correlation coefficients between the spatial wholesale price levels were significant at a probability of less than 10% in all cases, except for Mekele market in the case of white teff and white maize. The spatial correlation coefficient was greater than 0.60 in 23 of 30 cases, greater than 0.70 in 18 of 30 cases and greater than 0.80 in 12 of

30 cases. However, the correlation coefficient for wholesale price changes was not statistically significant in most of the cases, it was not significant in 11 of 12 for white teff, in 7 of 10 cases for white wheat and in 6 of 9 cases for white maize. The lower price correlation coefficient might be because weekly price changes are too short for prices in different markets to adjust.

11. In general, the correlation coefficients between Addis Ababa and surplus markets wholesale price levels was found to be higher than that of between Addis Ababa and deficit markets. The correlation coefficient between Addis Ababa and deficit markets was found to be lower than 0.80 in all of the cases while the correlation coefficient between Addis Ababa and surplus markets were found to be greater than 0.80 in 11 of 19 cases considered. This indicates that Addis Ababa market was more integrated to the markets in surplus producing areas than to the markets in the deficit areas which also implies that Addis Ababa market was more of a terminal market rather than a center of distribution (transshipment) for the grain marketed in the country.
12. The null hypothesis of no causal relationship between white teff wholesale and producer prices was not rejected for three of the seven markets and in four of the seven markets there was either one-way or two-way causal relationship between wholesale and producer prices. Generally, the causality from producer to wholesale was found to be stronger than that of from wholesale to producer indicating that producer price is the driving force in determining the wholesale price for white teff in individual markets.
13. On the other hand, there was a two-way causal relationship in three of the fifteen markets, one-way causal relationship from white teff wholesale to retail price in four of the fifteen markets and from retail to wholesale price in three of the fifteen markets. In the case of the causal relationship between white teff producer and retail prices there was no causal relationship in two of the six markets considered and there was one-way causal relationship in three of the cases, either from producer to retail or from retail to producer and two-way causal relationship in one case.
14. For white wheat, the null hypothesis of no causal relationship between wholesale and producer prices was not rejected for four of the six markets while in two of the six markets there was one-way causal relationship. The causal relationship between wholesale and retail prices was tested for twelve markets, in five of the cases there was no causal relationship between the wholesale and retail prices and there was a two-way causal relationship in one case. On the other hand, one-way causal relationship from wholesale to retail price was observed in four of the cases and from retail to wholesale in two of the cases. In the case of the causal relationship between producer and retail prices there was no causal relationship in all of the cases considered, except in one case from producer to retail.

15. The null hypothesis of causal relationship between wholesale and producer prices of white maize was not rejected for three of the five markets and there was two-way causal relationship between wholesale and producer prices in one case and one-way causal relationship from producer to wholesale in another case. There was no causal relationship between wholesale and retail prices of maize in six of the thirteen markets, two-way causal relationship in two of the cases, one-way causal relationship from wholesale to retail price in three of the cases and from retail to wholesale price in two of the cases. In the case of the causal relationship between producer and retail prices there was two-way causal relationship in one case, one-way causal relationship from retail to producer in two of cases and no causal relationship in one case..
16. The test of causality in wholesale prices of white teff, white wheat and maize between Addis Ababa and other selected markets involved 28 cases. There was no causality only in one case, Addis Ababa wholesale price caused wholesale prices in other selected markets in 10 of the cases, wholesale prices in selected markets caused wholesale price in Addis Ababa in 3 of the cases and they both caused each other in 14 of the cases. Thus, one-way or two-ways, there was strong causal relationship between the cereal wholesale prices of Addis Ababa and other selected markets.
17. For the three cereals considered, the null hypothesis of symmetric price transmission for a given market between possible pairs of price levels having a causal relationship was not rejected in any of the cases. Thus, the results indicate that there was a high degree of transmission of price changes in one level to another, cereal markets in Ethiopia are vertically integrated. The null hypothesis of symmetric spatial relationship between Addis Ababa and other selected markets wholesale prices was also not rejected in all cases which indicates that there was spatial integration of markets for the cereals considered, for 27 of 28 markets where causal relationship exists the change in Addis wholesale was also reflected in wholesale price changes at different other markets and vice versa.

Policy Implications

1. ***Price stabilization:*** Governments trying to stabilize prices are confronted with budget constraints to undertake the stabilization programs which highlights the importance of designing and implementing cost-effective stabilization programs. In this regard, the knowledge of the extent of vertical and spatial integration of grain markets is very crucial in making decisions regarding which prices (producer, wholesale and retail) and markets (all or few of them) to stabilize. The study indicated that grain markets in Ethiopia are integrated vertically and horizontally. The vertical integration of grain markets implies that if the government stabilizes producer prices the effects of stabilization can also be transmitted across wholesale and retail prices within a market. Under this condition, for example, the government can stabilize producer prices by stabilizing the wholesale prices and vice versa, then the government's decision as to which price level to stabilize depends on cost consideration and ease of implementing the program.

2. On the other hand, the spatial integration of grain market implies that if the government intervenes in a given market the effects of government intervention in that particular market can also be transmitted across the markets which are spatially integrated. The important policy implications of this result is that it is not important for the government to intervene in all markets, by just intervening in a few important markets, the government can stabilize prices in other regions.
3. ***Food aid management:*** Food aid plays a key role in saving lives of people dying from famine resulting from drought or other catastrophes. However, when it is not well targeted to the people with no effective demand, food aid depresses the producer prices in the local markets by increasing the supply of grain. The depressed prices disrupts the producers incentive to use productivity increasing modern technologies which negatively affects the long run development of food aid recipient country. Thus, it is very essential that the governments pay careful attention in managing food aid distribution. In this regard, understanding the nature of grain market integration provides useful insights in devising effective food aid distribution and utilization systems so as to minimize the negative impacts of food aid. In general, grain markets in Ethiopia are spatially integrated which implies the effect of food aid released in a given market can be transmitted across markets which are spatially integrated. In other words, the prices in surplus markets might be depressed to the extent that food aid released reaches people with effective demand in grain deficit areas.
4. ***Improving the integration of grain markets:*** The integration of grain markets plays a crucial role in improving the food security situations of a given country. If the markets are well-integrated, price signals direct the flow of grain, price increases resulting in supply shortfalls in a given market attracts grain flows from other markets where the prices are low thus reliving food shortages. The degree of market integration also determines the level of intervention required by the government to correct the inefficiencies in the grain market, the better the grain market integration the lesser is the intervention required by the government in the market.
5. Even though, the grain markets studied appear to be integrated spatially there were high spatial price differentials. The inadequately developed marketing infrastructure might partly explain for the high spatial price differentials and improving the marketing infrastructure such as the transportation network, provision of storage facilities and market information service improves the spatial integration of markets. The vertical integration of grain markets at the individual markets level can also be improved by relaxing entry barriers to the grain trade and removing information asymmetry among various market participants.
6. It was also observed that the spatial price differentials were characterized by high volatility which increases the risk of spatial arbitrage. The grain movement controls

which have been implemented across different regions with different level of intensity, rules and regulations might explain the high level of spatial price spread volatility by creating uncertainties in the costs of moving grain across markets. Thus, abolishing grain movement controls or making it more transparent and uniform across the regions increases the integration of grain markets in Ethiopia.

MARKET INFORMATION SYSTEM

GMRP has put in place a grain market information system. The system has new data collection and transmission formats and operating manuals. EGTE technical staff from branch offices and headquarters were trained in data collection, recording and transmission techniques in July 1996. Some 28 senior staff were trained in SPSS techniques and in price analysis methods in August 1996. Five major cereals and 26 markets, considered representative of the country's surplus and deficit market areas, were selected for monitoring in the pilot phase.

The processed data have been reaching the target groups and other users in the form of radio broadcast, weekly market information flash and monthly market information bulletin. The radio broadcast is a weekly program and it has been on since December 1996. It provides information on cereal prices at producer, wholesale and retail levels in 14 selected markets covering major grain markets of the country. The target groups of this particular MIS output are farmers and inter-regional grain traders. The transmission is in Amharic through Radio Fana. The weekly flash which carries information on weekly changes in cereal wholesale and producer prices and flow has been reaching users since March 1997. It comes to users in two ways through radio broadcast (in Amharic) and by mail (Amharic & English). Both Radio Ethiopia and Radio Fana broadcast the Amharic text of the flash. It is also faxed to Regional Councils of Amhara, SNNRP and Tigray. The monthly bulletin provides information on cereal prices, flow and market trend. It comes out regularly every month since July 1996. The target groups for the weekly flash and bulletin are the Government regions, donors, NGO's, international organizations, private firms, and other agencies involved in development.

The pilot program was evaluated by an external evaluator in October 1997 about 120 farmers, wholesale and retail traders in 7 MIS markets and 15 government, UN and donor agencies were interviewed using a semi-structured survey instruments.

An external evaluation of the pilot MIS reveals:

1. The system, that is, procedures set up to run the pilot Scheme including data collection and transmission, analysis and dissemination is adequate, sound and replicable. One exception to this is the timing of the radio transmission does not seem to have been studied carefully.
2. Of the interviewed 120 traders and farmers (86 traders and 34 farmers):

- Forty percent of the traders listen to the radio transmission: 60% of these find the information transmitted useful, and they say it helps them to decide when to buy and sell.
 - All of the traders and farmers interviewed expressed interest in the market information provided and they welcome the transmission. The two main reasons given for not listening were (a) lack of knowledge of the existence of such service and (b) very limited ownership of radios. Radio Fana is the medium of the transmission. An audience research carried out by the Radio Fana itself reveals that about 95% of its listeners are under the age of 35 years while nearly all traders as well as farmers interviewed for the purpose of this evaluation are above 40 years. The result of this evaluation is supportive of the finding of Radio Fana. All those interviewed show preference to Ethiopia Radio. In fact, many admit they do not listen to Radio Fana at all.
 - Brokers based in Addis Ababa play a key role in providing price information at the wholesale level to traders operating in important grain markets like shashemene and Dire Dawa. Over 90% of those interviewed said that the information given by the brokers is reliable.
 - Among the interviewed listeners, 96% prefer evening to morning transmission. The evaluation results indicate the morning program has virtually no audience at all.
 - None of the interviewed farmers heard of the transmission directly or indirectly. Two reasons which might be accountable for this are (a) most of the farmers do not have radio sets and (b) those who own do not listen to Radio Fana.
3. The main views of the fifteen interviewed government, UN and donor agencies, and private institutions on the usefulness of the MIS publications (Weekly Flash and Monthly Bulletin) include:
- Market and commodity coverage is limited, and too little is given on the analysis of the data presented. Tables and labels on the graphs are not clearly legible.
 - Most of the interviewed agencies (89% for the Weekly Flash and 93 for the Monthly Bulletin) find the publications useful, refer to the MIS products while assessing vulnerability, local grain purchase.
 - 75% and 47% of the readers of Monthly Information Bulletin and Weekly Information Flash respectively have expressed willingness to pay for the publications.

4. 93% of the respondents favored the establishment of MIS as a public service managed by a public institution. EGTE received the highest rating while MEDAC and MOA are equally favored for becoming home institutions for MIS.

Recommendation:

Based on an assessment the GMRP made to identify a home for the MIS, it is suggested that the Ministry of Agriculture should become the permanent home of the Grain Market Information System. The assessment also noted that the Ministry of Trade and industry could be a feasible choice for placing the MIS.

MARKET PERFORMANCE AND DETERMINANTS OF FERTILIZER USE

Main Findings:

The full benefit of the fertilizer sector reforms have not been realized because of various constraints in the marketing system and institutional issues. Fertilizer retailing is carried out primarily by large distributors/wholesalers with a limited number of sales outlets. As a result, the distribution system at the local level is not as responsive to farmers needs as it could be. Often the market in each wereda, zone or region is controlled by a single firm, thus giving rise to a monopolistic market structure.

At the root of the marketing problem is the inefficient credit system. Because credit was linked (in 1996/97) to particular fertilizer distributors, giving rise to an uneven playing field, firms not favored by the credit system have experienced difficulties in selling their fertilizer stock during a given season. Failure to sell supplies may create serious uncertainty, besides the considerable financial costs created. Since 80% of fertilizer sales are on credit, weaknesses in the credit market not only constrain the growth of fertilizer use and agricultural productivity but also discourage private investment in the agricultural input sector.

Fertilizer credit is administered by local government officials. It is often alleged that there can be a lack of experience, and bureaucratic and sometimes unscrupulous procedures applied in this setting. Suppliers are often nominated by the authorities approving the loan. Administrative measures applied to enforce repayment have exacerbated the marketing problems. The practice of forcing all farmers to pay immediately after harvest can result in a seasonal market oversupply and relatively low grain prices. Harsh penalties on defaulters with genuine problems can induce negative attitudes towards technology adoption and reinforce risk-averse behavior. There are no provisions to protect farmers against the sale of critical assets like oxen in situations of crop failure.

Another important factor militating against expanded use of fertilizer is the sharp decline in its profitability. The return to fertilizer declined sharply between 1992 and 1997. The VCR for teff, for instance, declined by 55% during this period. The decline amounted to 67% in the case maize and 48% for wheat. The ratio fell below the critical threshold of 2 for 71% of the sites/crops in 1997, compared to none in 1992. The main reason for the declining profitability is the rising fertilizer price relative to output price and inadequate efforts to reduce costs by increasing input and output marketing efficiency.

It is evident that the sharp decline in profitability has not led a proportionate decline in fertilizer consumption. It seems that in the absence of alternative options to restore soil fertility, farmers have no choice but continue to invest on chemical fertilizers, although they know that the return is inadequate to cover the risk involved.

Given the recent decline in fertilizer consumption and the ensuing problem of large carry-over stocks being held by importers, it becomes imperative to examine the determinants of demand. The results of this study show that fertilizer use is influenced by variables associated with profitability, financial liquidity, human resources, access to markets, household assets and extension services. A descriptive analysis of the different factors affecting chemical fertilizer use indicated that user households or user weredas tend to allocate more land to some crops like teff (fetches relatively higher prices) and less land to crops such as sorghum (lower prices and more risky production environment). Users apparently realize that fertilizer is more profitable when used with complementary inputs. Fertilizer adoption is also lower in weredas that faced crop damage and required food aid.

The statistically significant factors explaining whether a wereda used or did not use fertilizer were: access to fertilizer, credit, and extension services, area under teff cultivation, number of fertilizer distribution centers and distance from markets. The number of distribution centers and area under teff are highly significant explanatory variables.

The most important factors explaining the quantity of fertilizer used per hectare are average farm size and the amount of livestock owned. As farm size increases and the number of animals owned goes up, so does the intensity of fertilizer use. Households with adequate productive resources may generate more cash to purchase fertilizer (to buy the input on cash or pay for down payment) or they may be less risk-averse compared to resource-poor farmers.

Main Recommendations:

1. The reform process needs to include measures that would effectively allow full participation of the private sector at all levels. In particular, measures are required to increase the number of small, private sector, retailers so as to increase the number of distribution centers or retail outlets and make the retail market truly competitive. Fertilizer dealers must also be able to get fertilizer from whichever supplier is offering lower prices and more favorable terms. In this regard, implementing the plan to license wholesalers and retailers by the government, instead of the current practice (each importer and distributor appointing its own wholesaler

and retailers or principal-agent relationship), deserves particular attention. This, together with the planned deregulation of wholesale prices (December 31, 1997), is expected to widen and deepen the distribution network at the local level and increase demand. In this regard, the generally positive Kenyan experience with fertilizer market liberalization may provide some useful insights for Ethiopia (see for example, Allgood and Kilugo 1996).

2. Farmers benefit from the reform only when there are as many dealers as possible to take part in the importation and distribution of fertilizer. Any practice that may be viewed as discriminatory could discourage entry or limit the number of participants and discourage investment in storage and other infrastructure by the private sector. National, as well as local government officials must be committed to the principles of free market operations.
3. The system of credit allocation needs to be improved to allow farmers to purchase fertilizer from retailers of their choice. Supply conditions and terms of sale would remain unresponsive to farmers' interest and liable to corruption if suppliers are nominated by a third party, the local authorities. The introduction of a coupon system, as suggested by NFIA, is expected to help level the playing field and create a favorable environment for a more competitive marketing system.
4. Although restructuring service cooperatives has been on the agenda of the government for quite sometime, the progress so far is hardly encouraging. Fertilizer loan disbursement and collection will continue to constrain supplies available from a range of distributors, unless effective cooperative institutions- with the power to exert peer pressure to enforce repayment - are created. Such institutions are also required to allow extension agents to use their time for extension purposes. The Senegalese experience on trying to reform cooperatives may be instructive here -- Senegal experienced many reforms of the input distribution system, but as long as the cooperatives were in some way connected to the government/political system, they never worked as effective credit institutions. What appears to be working now is the creation of a new category of legally-sanctioned organizations -- "Groupement d'Interet Economique." Three or more freely associating (and that is the key --- the free association) individuals can form a mini 'corporation' that has a legal status and can therefore apply for credit. These groups got off to a slow start because of onerous bureaucratic application procedures, but over time they have become very popular and have generally been regarded as successful. The evolving system of decentralized local savings and loan associations in Mali may also be a useful model for Ethiopia (FPH,. 1996).
5. The proportion of weredas without bank branches is considerable (79%). Our analysis has shown a link between fertilizer use and the number of banks operating in a particular wereda. Efforts aimed at increasing the number of bank branches by introducing mobile banking services, rural credit schemes, and involving private banks could have a positive impact on demand. Such measure would also help alleviate the financial constraints of small wholesalers and retailers of fertilizer.

6. Complementary inputs such as improved seeds and chemicals and improved farmer management practices are necessary to make fertilizer more profitable and enhance demand at given input and output prices. Measures that improve the effective supply of these inputs are expected to have a positive impact on fertilizer consumption.
7. A favorable impact on fertilizer demand is also expected from measures aimed at building the asset base of poor farmers. Loans for oxen and other animals (with proper consideration for feed and veterinary service) need to be expanded along with the effort to expand fertilizer use. Since fertilizer adoption and intensity of use increases with farm size, further decline and fragmentation of land can adversely affect the intensification process. It is important to note that farm sizes should not decline below a certain minimum level. Ways of consolidating farm sizes may need to be sought in areas where farm sizes are too small to be economically viable.
8. In view of the changing market conditions, variations in the degree of risk faced and differences in the asset base of the farmers, fertilizer recommendation rates need to be flexible. The rates of application need to be lower if fertilizer prices (relative to output prices) are high, the chances of crop failure are high and the asset base of the farmer is weak. Developing several recommendation rates for different categories of farmers and different localities can encourage adoption and ease the debt burden of farmers. Farmers need to be encouraged to use organic fertilizer and practice crop rotation to make up for the reduced application rates of chemical fertilizers. Countries such as Kenya and Malawi have made substantial progress in (1) updating fertilizer (organic and inorganic) trial data, and (2) developing national soil fertility maps and zone/crop specific fertility recommendations which taken into account profitability. Ethiopia might also be able to learn from their experiences (see Allgood and Kilongu 1996; Saka, Green and Ng'ong'ola 1995).
9. Crop failure is a major factor that makes investments in fertilizer a risky venture. In the absence of any protection in the form of crop insurance or government guarantees, farmers are forced to sell assets such as oxen, leading to decapitalization. There may not be an easy solution to this problem, but it is high-time that studies on how best to tackle the problem be initiated. In this regard, the contribution of Disaster Prevention and Preparedness Commission (DPPC) need to be looked at.
10. Further research is also required to investigate the determinants of fertilizer use intensity. The results of our regression analysis suggest that variables which influence intensity of use are different from those affecting initial adoption. Both formal and informal surveys at the farm level will be required if we are to improve our knowledge of factors affecting intensity of use and develop models that provide policy makers with information about the relative importance of the different factors.

GRAIN PRICE STABILIZATION

Main Findings:

1. Given its reliance on weather and other environmental conditions, agricultural production in developing countries is often highly unstable. In Ethiopia, instability in yield is found to be the major source of production instability, accounting for 60 percent to 80 percent of the variance of trend cereal production. Yield variability is mainly caused by fluctuations in weather conditions (irregular rainfall). This study indicates that about 20 to 40 percent of variability in cereal production has also been caused by fluctuations in area cultivated. Fluctuations in area cultivated are typically due to changes in production incentives caused by changes in input and output prices, the structure of credit program, food aid programs, and other variables influenced by government policy.
2. There are also consistent differences across markets in the degree of price instability between maize, wheat and teff. Maize prices exhibit the greatest degree of price uncertainty (as measured by the conditional variance), even though the volume of maize traded was found to exceed that of every other cereal (using household-level data from the 1995/96 crop year). The relatively high variability of maize prices is most likely because most of the maize purchased in Ethiopia is by rural households and there is very little demand for maize in urban areas. Urban demand patterns are relatively stable across years because very little is grown there and consumers thus rely on the market for the large part of their cereal consumption requirements. By contrast, the quantity of commodity demanded in most rural areas is highly contingent on the weather, which determines incomes and whether the household will need to purchase residual grain requirements from the market. As a result, cereal crops that have a high proportion of marketed volume destined for urban consumption enjoy a relatively more stable demand than those cereals which are purchased almost exclusively by rural households.

The instability of maize prices in Ethiopia illustrates a broader point typical in many developing countries that where crop sales and purchases are often determined as the (positive or negative) residual of farm production, weather fluctuations cause shifts in both the crop supply and demand functions. In good production years, selling households will obviously expand marketed output. But importantly, fewer households are in the market as purchasers, and those that are generally require smaller amounts from the market to satisfy their consumption needs. As a result, the demand curve for cereals shifts back. In lean years, supply to the market is reduced, but rural expenditures are generally reallocated from non-food to food reflecting rural production shortfalls and there is a much greater need for purchased food. Hence, the demand curve shifts out although market supply has decreased.

A potential strategy to help stabilize maize prices is to develop maize promotion schemes designed to increase the demand for maize in urban areas. This could be accomplished by

identifying consumer and industrial end-user demand for maize-based products and examining mechanisms to meet this demand in a cost effective manner. In the US, for example, major end-uses of maize include corn syrup (a sugar substitute), starch, ethanol (which is commonly blended with petrol for vehicle fuel), and corn flour. The use of maize flour in bread products is already common in Ethiopia, and further food technology research may give insights into how wheat/maize bread products may be manufactured that meet consumer appeal and are cost competitive.

3. According to the survey results, teff accounted for the largest percentage of production that is marketed by farmers (33 percent) followed by wheat (31 percent), maize (26 percent), millet (25 percent), barley (22 percent), and sorghum (18 percent) in 1995/96. In absolute terms, however, the most widely traded cereal is maize, accounting for about 0.6 million tons sold by farmers out of the total of 2.2 million tons of grain marketed. The total production and marketed supply has been concentrated into three regions of the country in 1995/96 production year. Amhara, Oromiya, and SNNPR produced about 93 percent of the total grain production and marketed 85 percent of the total grain supplied in the country. Ethiopian rural households spend most of their income for consumption goods. About 32 percent of households replied that they sell grain on a specific month for the purpose of buying food. And about 12.3 and 11.8 percent of households in Ethiopia sell their grain for paying loan and to pay taxes, respectively. Paying taxes and loans are results of the government and credit institutions that usually require farmers to pay their loan and taxes immediately after harvest.
4. Based on the 1995/96 season, farmers' sale of cereals were only somewhat concentrated between January and May. Some 70 percent of total grain sales were made during these five months. The remaining 30 percent was sold during the months of May to September.
5. A major determinant of the costs and benefits of price stabilization is the net market position of farmers. The findings revealed that on average about 56 percent of rural households in Ethiopia are net grain buyers and only about 37 percent are net cereal sellers. Attempts were also made to see the relationship between net market position with other related variables. The correlation results indicated that net market position is positively and significantly correlated with grain production, household fertilizer use, and household income (not including livestock revenue, data on this was not available). Household size is only weakly related to net market position. Importantly, net market position is not at all related to whether a household receives food aid.
6. The concentration of marketed grains showed that the distribution of marketed grains by households is highly concentrated among a relatively small proportion of farmers. Forty percent of the families generally make no grain sales of any type, whereas 20 percent of the families receive more than 80 percent of the value of national grain sales. Rural households who are categorized as the top grain sellers also have the highest crop production level (in value terms), and have greater income levels. These top grain sellers also have higher values

of livestock income, more land, and use more fertilizer than the other 80 percent of group of the rural population. These results imply that attempts to raise grain prices through price support/stabilization policies would have highly concentrated benefits among a relatively small and more prosperous strata of the rural sector, and would adversely affect the bottom 50% of the rural population that are net buyers of grain.

7. The contribution of cereals to the total value of crop sales (total crop sales excludes sales from livestock and livestock products) is about 35 percent. This contribution, however, varies from region to region. Cereals contribute about 83, 44, 25, and 30 percent of the total crop sales in Tigray, Amhara, Oromiya, and SNNPR regions, respectively. Each cereal also contributed differently to the total crop sales and production. Teff, maize, wheat and barley contributed 11, 7, 6 and 6 percent, respectively, to the total crop sales in Ethiopia. In terms of values, cereals contributed 65 percent of the total value of crop production in the country.
8. In 1995/96, EGTE purchased at a farmer support price 1 percent of estimated marketed supply of maize from the 1995 meher harvest. EGTE purchased roughly 3 percent of estimated marketed supply of wheat at the 1995/96 support price. It is estimated that Birr 485,347 (US\$76,795) was transferred from EGTE to farmers between December 1995 and June 1996 in connection with the support price policy. If EGTE were to purchase a significant share of the marketed maize output (e.g., 10 percent of the roughly 500,000 tons of maize marketed in 1995/96), the cost of supporting maize prices at the 1995/96 support price would have been substantially higher: Birr 3.41 million (US\$0.54 million). This underscores the point that the costs of the support price policy were limited in the 1995/96 season because only a relatively small part of the marketed maize and wheat output was actually purchased by EGTE. Effectively supporting farmer cereal prices above market levels through a support price policy is estimated to impose large financial losses on the government. This can drain scarce government resource and affects consumers (in a dominantly net-buyer society (61 percent)) negatively through possible increases in cereal prices. The more price is stabilized by EGTE, the more costly it becomes i.e the degree of intervention is very critical in stabilizing producer or consumer prices.
9. The simulation model results indicate that if the price stabilization policy of 1995/96 were fully implemented and price supports on maize and wheat were defended, the following changes in income would be expected: xx

Our main conclusion from the simulation analysis is that a fully implemented price stabilization program would:

- generate concentrated benefits to relatively high-income farmers that sell large volumes of maize and wheat, primarily located in the major maize and wheat surplus-producing zones of the country;

- raise the price of cereals to consumers in the country (both rural and urban), forcing them to pay higher prices for cereals;
- generate costs for grain-purchasing households that exceed the additional revenue to grain-selling households; and
- impose costs on EGTE associated with purchasing and holding large stocks of grain, with an uncertain market for re-sale.
- The simulation results also revealed that benefits of the support program flowed mainly to a relatively small group of smallholders in four producing regions, Amhara (41 percent), Oromiya (33 percent), SNNPR (25 percent), and Beni-Shangul (1 percent) regions. The total income earned from the support prices was estimated to be about Birr 31 million. Of the total benefit (additional income as a result of the support program), 51 percent flowed only to one zone, Jimma.

Stabilization of prices in Ethiopia is complicated and could potentially be a costly endeavour for the following reasons: (a) important commodity, such as teff, are not traded on world markets; (b) a number of grains feature predominantly in the consumption pattern; (c) there is substantial regional variation in cereal production and consumption; and (d) the economy is a subsistence economy where the proportion of net buyers of food grains is high. However, if the existing output and input markets are not functioning optimally owing to a variety of circumstances, certain interventions designed to reduce costs in the production and marketing system would be warranted. The following guidelines may be useful:

1. Introducing a production subsidy on one or two selected cereals may skew food production patterns. Crop production patterns are highly diversified throughout Ethiopia, and support prices on any single commodity are not likely to create a large difference in total farm income, but may encourage shifts in crop composition over time.
2. In Ethiopia, the distribution of cereals showed that there are no single crop dominating the gross value of total crop. This makes crop price stabilization process more complex compared to a case where there was only one or two important staple crops in the country, as there are crop substitution effects in both production and consumption to consider.
3. The review of the experience of many developing countries indicates that many have attempted to intervene in the market to reduce large price fluctuations in agricultural prices, and have tried to create economic stability. While the goals are clearly justified and compelling, the experience of these countries indicates that administered fixed-price stabilization schemes have been costly in terms of depleting scarce government financial resources and have produced undesirable economic and political side-effects on other groups in society.

4. Research findings from other parts of the world indicate that input responsive technology and predictable farm revenues, not necessarily fixed output prices, are important in stimulating profitable use and adoption of fertilizer and other cash inputs. The goal of raising and stabilizing farm revenues can be promoted by improving the efficiency of the grain marketing system. A more efficient marketing system would help pull grain quickly out of surplus areas, thus relieving the localized gluts that depress farm prices, and more quickly deliver grain to deficit areas. Examples of investments that are likely to improve the efficiency of the grain marketing system include more timely and widely disseminated market information, improved road infrastructure, and improvements in the transport sector. The continuation of competitive local purchase operations during large harvest years, guided by timely information on marketed supplies and prices, could also stimulate private investment in the food system, promote competition, and reduce grain and input marketing costs over the longer run. Grain prices can also be stabilized during both surplus and deficit years by improving the potential for trade with regional neighbours through improved road, communication, and market information linkages. These market-oriented approaches may prove to be more cost-effective over the long-run in stabilizing producers' revenues and promoting farm technology adoption and production than administered fixed price policies.
5. More analysis on improving on-farm storage and farmer management of stocks (for both consumption and sale purposes) would have potentially high payoffs in Ethiopia in terms of stabilizing farm revenues. The Ministry of Agriculture is already beginning to work on this issue, which could benefit from further empirical analysis of cost-effective marketing strategies for surplus grain producing households.
6. Reducing food prices has been the key to structural transformation and broad-based income growth in developed countries. The key to making farm cereal production profitable under conditions of low output prices is to focus on making viable cost-reducing technology available to farmers and overcoming the ubiquitous credit-related constraints on their ability to adopt such technology. This underscores the importance of continued investment in agricultural research and the diffusion of viable new technologies generated through research. Through this approach, farmers will be able to reduce the costs of producing cereals, thus retaining profitability under conditions of declining real grain prices. Reductions in the price of cereals can then spread benefits widely through society, in terms of improving food security for low-income consumers, and raising the proportion of incomes that consumers can spend on non-food items, thus fuelling demand in other sectors. It has been through this process that structural transformation has occurred in many high-income countries, and one of the key conditions has been to reduce food prices through the use of cost-reducing technology both on-farm and in the marketing system. Perhaps more than any other single factor, the generation and delivery of productivity-enhancing inputs and farm management practices may enable the farm sector to grow even in an environment of market-oriented, and hence fluctuating grain prices.

7. Market-oriented methods to cope with price uncertainty include the development of viable agricultural commodity exchanges, which have recently been instituted in other African countries such as Kenya, Zimbabwe, Zambia, and South Africa. Ethiopia appears to be well placed to also initiate such a commodity exchange, which would allow farmer groups, traders, and other market participants to forward contract and thus lock-in prices in order to facilitate their production, input use, and marketing strategies. This approach represents a transition from attempting to control market prices per se to developing the institutional mechanisms for farmers, traders, and end-users to successfully cope with the uncertainty of markets and ensure against the attendant risks. The experience to date with the fledgling commodity exchanges in South Africa and Zimbabwe is that they are being utilized more successfully by large-scale farmers and traders with large volumes to trade and with experience in marketing operations. However, by forming groups and service cooperatives to aggregate their marketable quantities into bigger volumes, small farmers can also start to exploit the benefits of commodity exchanges and forward contracting mechanisms. The development of market-oriented institutions to protect against price risks may offer substantial scope for dealing with Ethiopia's agricultural instability problems in the near future if steps are taken to develop these institutions.
8. Many of these measures are medium- and long-term solutions. While they are important components of a more market-oriented approach to addressing problems of price instability in agriculture, they cannot greatly reduce the country's price instability in the short run. One option that can be used in the short-run is as follows:
- (a) In response to forecasts of very high cereal production and low prices, the government can announce "indicative floor prices" for certain commodities. The indicative floor price would not represent a hard-and-fast price at which the EGTE would purchase cereal as a residual buyer. Rather the indicative price would represent a price below which the EGTE would initiate market purchase operations from traders in order to take supplies off the market and put upward pressure on market prices.
- (b) It is very important that the indicative floor prices:
- differ from region to region reflecting market conditions and transport costs to end-use markets (e.g., floor prices established for maize in Jimma should be lower than those for Wolliso);
 - vary over the season to reflect cumulative storage costs;
 - are set low enough so that they are not far out of line in any particular area with prevailing market conditions;
- (c) The EGTE or appropriate government agency would be given adequate financial resources and stand ready to purchase supplies from traders in market areas where market

prices are falling below the floor price established for that particular market area. By taking quantities off the market in this way, the government would be putting upward pressure on market prices at the margin.

(d) The exact volume to be purchased would depend on adequate supply and price information from the GMRP MIS system, which currently collects information on market volumes and the direction of trade between markets. Appropriate volumes to be purchased would also depend on export options, and it would be extremely important for EGTE or other relevant agencies to begin exploring export options and prices in potential importing countries at the outset of any decision to announce indicative floor prices. Based on export options and marketing costs to these destinations, the EGTE would then be in a position to estimate the floor price necessary for it to cover its costs and not suffer losses on its trading account. Therefore, appropriate floor prices would depend both on prevailing market conditions within the country as well as prices in potential importing countries and marketing costs that would be incurred in such export decisions.

(e) It is important to note that this type of price support scheme would generate the same type of adverse distributional effects on net grain purchasers as the specific price support scenario analyzed in Section 6. Any policy that increases cereal market prices would have to take into account the potential hardships created on low-income consumers, including those in rural areas, and the increased need for targeted food assistance.

9. Given that food aid programs will continue to exist for the foreseeable future in Ethiopia, attention is needed to ensure that these programs do not adversely affect local production incentives and the adoption of improved farm technology. This will require greater coordination between the local and international groups involved in food aid and farm production issues. For example, some food aid programs are not specifically designed to distribute grain only to the poorest households with no effective demand. To the extent that households with adequate income to buy food receive food aid, this will reduce effective demand for cereals and reduce local prices, with uncertain effects on cereal production incentives, unless new cost-reducing technologies can be rapidly adopted to compensate for lower output prices. The key point here is that attention must be given to the design of food aid programs to ensure that they are not working at cross-purposes with local farm production and market development strategies.
10. Improvements in the transportation system and marketing system in general would reduce marketing costs which enable producer prices to increase without increase in consumer prices and profit margin of traders. This would push the production possibility frontier outwards and increase the gains of the producers without incurring losses to the consumers (the society as a whole is better off). Moreover, this could even decrease consumer prices. Therefore, the government should support by investing in transport and other forms of market infrastructure in order to increase agricultural production, expand markets, and promote specialization according to comparative advantage. Improving trade linkages with

neighbouring countries such as Kenya, Uganda, Somalia, and the mid-East would help stabilize domestic cereal prices in surplus years by providing a vent for surplus production, rather than having such surpluses absorbed domestically through lower prices.

11. There may be high payoffs to examining the potential for urban and commercial uses of maize products to increase the stability of demand for maize. By cultivating a stable commercial demand for maize and maize derivatives, the annual demand for maize would become more stable, thus passing along benefits to rural producers.
12. Cereal market stability would also benefit from improvements in market facilities in major markets such as Addis Ababa. Some potential improvements would include relocation of the main cereal market to the outskirts of town to benefit from lower land rental costs, reductions in transport time and costs (so that trucks don't need to go to the middle of town in congested traffic to get to market), encourage investment in new and less-costly storage facilities and trader premises, and generally reduce the costs of trading grain. It may also be time to consider the feasibility and desirability of introducing a transparent commodity exchange to facilitate forward contracting, transparent market information, etc. Such innovations in the marketing system would require concomitant improvements in the legal foundations of markets, e.g., commercial law, enforcement, and arbitration procedures. Over time, such market-facilitating investments will provide high payoffs in terms of helping farmers, traders, millers, and consumers to reduce their risks of producing and trading food in Ethiopia's food system.

FOOD AID TARGETING

Main Findings:

1. In this relatively good harvest year of 1995/96, 43.2% of Ethiopia's farm households were food insecure, or had available for consumption less than the minimum nutritional requirement of 1,680 kilocalories in grains. Food aid programs, either in the form of free food or food-for-work have been vital to the health and well-being of these deficit households. Deficit households manage to increase food availability by 59% through the receipt of food aid, from an average of 735 kcal per person-day to 1,217 kcal. However, due to unsuccessful food aid targeting, only 22.3% of these deficit households are selected as beneficiaries. The remaining 77.7% of food insecure households have no safety net.
2. There was no significant association between food availability (vulnerability) and food aid in the sample year, a result of high errors of exclusion and inclusion at both the wereda and household levels. Other things being equal, improved wereda-level targeting would have greater potential for reducing these errors than improved household-level targeting.

3. There are four factors that help explain the **high** level of targeting error and the resulting low correlation between food insecurity and participation in food aid programs.
- The primary beneficiaries of food aid programs are households at the extremes in terms of food availability: those with the least food available and those with the most food available. While targeting efficiencies are enhanced by the provision of food aid to the most vulnerable group, they are seriously reduced by the flow of food aid to the highly food secure beneficiaries. This pattern seems to hold across numerous regions of the country. Multivariate analysis has failed to account for food aid distributions to those in the most food secure households.
 - The Food Security Strategy and the beneficiary selection criteria used by several key NGOs involved in the distribution of food aid underscore the special vulnerability of women and the elderly under conditions of food shortages. Our data show that a disproportionate number of female and aged heads of household received food aid, irrespective of their food needs. We found that households headed by women and those aged 60 years and above are not less food secure than those headed by men or younger farmers. Thus, the practice of targeting women and the aged, to the extent that it is used exclusively in place of truly need-based criteria, has contributed to increased targeting error.
 - The strongest determinant of food aid receipt is the number of years over the past five years that households have received food aid. This is because years of food aid reflects the progressive build-up of “institutional capacity” in the food aid delivery system over time. By this we mean the investments made by government agencies and NGOs in such things as personnel, contacts and knowledge of the area, offices, trucks, and institutional reputation. All of these investments create a compelling reason to continue the flow of food aid to the same areas it has always gone—areas known for chronic drought and food shortfall. Because of the tremendous flow and momentum built up in the food aid delivery system, altering its course to meet the needs of deficit households in other areas that may not benefit from the same extent of infrastructure and institutionalization, is a formidable challenge, one that was not met in 1995-96. Improving the flexibility of the system to extend or shift the safety net when conditions require is a concept that clearly needs greater attention. It is a major cause of food aid mistargeting in Ethiopia.
 - Households in the region of Tigray were far more likely to have received food aid, regardless of need, than households in any other region, thereby decreasing targeting efficiency. Part of the reason for this disproportionate flow of food aid to the region is that Tigray is one of the country’s historically deficit areas in which a significant investment in food aid institutional capacity has been made. The region also has substantial community-based development projects and large public works programs (micro-irrigation, dam construction, soil conservation, etc.) that are implemented as

food -for-work activities. Because of the labor-intensive nature of these projects it is conceivable that a large number of food secure households may have benefitted from participating in them.

4. Multivariate analysis reveals that other factors must also be taken into consideration, factors not measured in this study. As with the finding described above regarding the flow of food aid to the most food secure households, inconsistencies between stated national food aid targeting goals and the delivery system as it is practiced, may be worthy of deeper consideration and further research. Such research should have two objectives: first, to directly test the hypothesis that the institutionalization of food aid can be detrimental to targeting objectives, particularly in harvest years that do not conform to historical patterns; and second, to examine the types of disincentive effects that observed targeting errors may exert on food grain production and marketing in areas where they may occur, and to which the Bellmon Amendment is specifically addressed.

It is important to conclude this report by reiterating that this is a cross-sectional study conducted during a relatively good harvest year. Most regions of Ethiopia reported strong agricultural yields, even the chronically deficit regions such as Tigray and Dire Dawa. It is conceivable that in a more typical year, or even in a particularly bad year, that some of our conclusions would differ from those reported in this study.

It is also relevant to note, however, that most of the improvement during good harvest years seems to accrue to the more productive, surplus households. It is estimated that during the relatively poor production years of the late 1980s, 52% of Ethiopia's population fell below the 2,100 kcal per person-day (FDRE, 1996). By contrast, during the current and relatively good year, with food availability up 30% or more above levels in the late 1980s, the proportion of food insecure households has declined only modestly to 43.2%. This suggests that the size and conditions of the 1995-96 deficit population may not be so different after all. Nonetheless, to answer this question and to strengthen the generalizability of our present findings, there is need to replicate this study during at least one average and one relatively poor harvest year.

INSTITUTIONAL CAPACITY BUILDING

The implementation of the GMRP research agenda has been designed in such a way as to simultaneously assist the Government in developing strong policy analysis capabilities. The research format has featured strong interaction between local Ethiopian analysts supported by professional staff from Michigan State University (MSU), and has been supplemented by in-service training and capacity building activities.

The project has completed reasonably well all of the research activities it set out to accomplish. There is however concern that long-term aspects of the Market Information System and Food Sector

Policy Analysis Capability in the relevant government agencies, particularly at the MEDaC, requires more time. In the meantime, MEDaC has in principle agreed to have a second phase of the Market Information System and other related research activities and has asked the project to prepare a proposal, which is underway.

Two reasons seem to account for lack of adequate results in the area of policy analysis capacity building at MEDaC in particular. The first is that the subject has not been accorded sufficient attention at the project designing stage. An adequate number of MEDaC staff members with suitable qualifications have not been seconded to the project. The second reason is that there has not been sufficient incentive for the MEDaC staff seconded to the project. USAID rules do not allow topping up of salaries of seconded staff. On the other hand the seconded staff, at par in terms of responsibilities with the local consultants in the project, have been paid by far less than the latter causing a serious motivational problem. The GMRP experience clearly shows that it is difficult to team up seconded staff with low government salaries with local consultants who are paid many times higher.

Chapter 1. Introduction

Two objectives are overriding the national development programs of Ethiopia: doubling real per capita income over the next fifteen years and achieving sustained food security at the household level in about the same time frame. Understandably, there are many formidable problems of varied nature yet to address in order to achieve these objectives. The government believes that one such issue is the existence of an inefficient grain market sector which is characterized by poor market integration and market concentration adversely affecting producers as well as consumers. There is therefore need to bring about a competitively operating marketing system in order to stimulate economic growth and food security.

In response to this the Grain Market research Project (GMRP) has been launched in 1995 to strengthen the empirical foundation for grain marketing and food policy decisions in the country. The Project has been a joint collaboration among the Ministry of economic Development and Cooperation (MEDaC)\Government of Ethiopia, the United States Agency for International Development (USAID) and Michigan State University. The project has been designed to bring about a better understanding of cereal market organization and performance, to determine the impacts of food aid imports on domestic grain price and production incentives, to look at the benefits and costs of establishing alternative grain stabilization schemes in Ethiopia, and to assist the government in improving household food security through the design of appropriate food supply and market policies.

1.1 Objectives

There are knowledge gaps about the behavior of farmers, traders, consumers and their interactions which hinder the identification and adoption of empirically supported food policies and targeting programs to promote food security and productivity growth. By closing these knowledge gaps through the generation of critical empirical information on the structure, behavior and performance of grain markets, the project is expected to provide the empirical foundation to inform future government policy, donor programs and other development activities related to grain marketing. Therefore, the overall goal of GMRP has been to better inform government agencies, donors and other partners in Ethiopia's development on issues related to food market development, food targeting efficiency and stabilization of grain markets. Two integrated research and policy questions have been identified for focus in the project:

- To generate improved knowledge of the performance of grain markets in Ethiopia in order to identify strategies to strengthen and develop the grain market sector.

- To suggest design options to enable the grain marketing system to better achieve the objective of food production and household food security.

1.2 Activities

The main activities of GMRP have been identified by MEDaC and other government agencies through the Project Technical Committee, which has been mandated by the Government to guide and assist the project staff in carrying out the research agenda. The two focus activity areas have been:

- *Strategies to improve grain market performance:* There have been two research activities which involved both policy-relevant analysis as well as the development of a Market Information System to disseminate information to farmers, consumers, traders, and other market actors and to allow government agencies to better monitor and assess on-going trends and developments in the grain sector.
- *Strategies to increase household access to food through improved management of food supplies:* Here also there are two main research activities the first of which tries to help stabilize the food system to promote productivity growth in the agricultural sector and to cost-effectively promote food security at the household level, and the second aims at improving the use of food aid in order to cost-effectively target vulnerable groups and minimize potential adverse effects of food aid on domestic food production incentives and market development objectives.

1.3 Project Design and Implementation

The design of the project was completed in early 1995 and some pre-implementation activities (preparation of detail work plan, situational assessment in the main research areas, etc.) began in late 1995. Project Agreement was signed by the collaborating parties in January 1996. Secondment of government staff to the project and recruitment of local consultants took about three months, and most project activities did not start until early 1996.

Although the project was originally scheduled to be completed by the end of August 1997, finalization of the activities has been rescheduled for completion by early 1998 because of delay at the start and also to ensure the continuity of some of the project programs.

1.4 Project Outputs

Results from the project have been coming out fairly regularly in different form. The major ones include :

- **Working Papers:** These are publications containing results from research activities. Upon MEDaC approval the Working Papers are printed for distribution to relevant agencies within the public and private sectors, and also to international agencies with known interest and involvement in development in Ethiopia. Between September 1995 and February 1998, the project has produced **12 Working Papers** on topics of critical importance to food security in Ethiopia.
- **Market Analysis Notes:** These are policy briefs on topical subjects of importance to the grain market sector. The main purpose has been to provide current information on developments of relevance to grain marketing in order to facilitate policy dialogue and decision making. Between July 1996 and February 1998 the project produced **5 Market Analysis Notes**.
- **Market Information Bulletin:** The main purpose of the bulletin is to give cereal price and flow information in selected markets. The project produced its first bulletin in July 1996, and it has been coming out every month since then without fail.
- **Market Information Flash:** Like the bulletin the main purpose of the flash is to provide cereal price and flow information in selected markets. The first *Flash* came out in the second week of March 1997.

The full text of these and other final products of the project are presented together with this main report in part II. This report (Part I) is an abstract of these products. It essentially contains the main findings and recommendations of the main research activities carried out by the **Grain Market Research Project**.

Chapter 2. Data Sources And Research Methods

GMRP studies have been based on data obtained from both primary and secondary sources.

Primary sources: In Ethiopia little quantitative information has been collected about the behavior of the marketing system. The project has, for the first time, attempted to collect data which are widely representative of the major production regions of the country on the marketing behavior of rural households. A **Rural Household Survey** was conducted in June 1996. A structured

questionnaire was used to collect information from about 4,298 households in the whole country.² The sample was taken from the Central Statistics Authority (C.S.A.) national sampling frame, which is believed to be broadly representative of Ethiopia's rural population. The survey provided detailed information on household structure, purchase and sale of agricultural products, cropping pattern, land cultivated and owned, production, input use, grain storage problems, time and reason for grain sale, labor use, food aid and others. There were also questions regarding farmers' perception of their situation.

Another source of primary data was a **Traders' Survey** which the project carried out in 1997. The survey covered about two percent of the 1,100 wholesale traders operating in 26 regional grain markets spread across the country. The markets were selected in such a way that they fairly represent the whole country in terms of geographical location and cropping pattern. About one-fifth of the total number of wholesale grain traders operating in each of the 26 markets were selected using a stratified random sampling procedure. A substantial amount of data was collected relating to traders' ownership of physical assets, access to credit, transportation and market information, buying, storing and selling behavior, etc., using a structured questionnaire. Enumeration was done by the field staff of the Ethiopian Grain Trade Enterprise (EGTE).

The third source of primary data was a **Pilot Market Information System (MIS)** which the project set up in June-July 1996. The MIS has been collecting weekly cereal price data at the producer, wholesale and retail levels and cereal flows in 26 major markets since July 1996. This has been an important data source for almost all of the GMRP research activities.

The fourth source of primary data was the **"Kella" or Checkpoint Survey** which the project carried out in August 1996. Enumerators were hired to ride on trucks carrying grain across five major cereal trade routes: Addis to Harar; Addis to Mekele; Nekempt to Addis; Shashemene to Addis; and Jimma to Addis. Enumerators rode on five different trucks on each route and recorded information on the number of checkpoints encountered, time spent at each checkpoint, and tariff charges incurred (official and unofficial).

Secondary sources used include the 1995\96 C.S.A. Agricultural Survey, EGTE historical grain wholesale prices, historical food aid data of WFP and DPPC.. A number of other sources was used (see the methodology section of each Working Paper).

² According to C.S.A., the sample frame for the entire country was 60,000 census enumeration areas (EAs). Out of this 614 EAs were selected using stratified random sampling. From each of the sampled EAs, 25 households were selected for enumeration under the C.S.A. Annual Agricultural Survey. As a result, (i) 14,736 households were selected for the Annual Agricultural Survey. (ii) A 50 percent sub sample (12 households from the original 25 households in each EA) was randomly selected for the C.S.A.'s Household Budget Survey and Welfare Monitoring Survey. (iii) A total of 4298 households were selected for the Rural household Survey (which is the main data base of this study). The GMRP Survey used a sub-sample of 7 out of the 12 households in the Household Budget Survey.

GMRP attempted to use different economic and statistical methods to arrive at certain conclusions in each of the research activities. This ranged from simple statistical descriptive means to econometric models and simulation analyses. In supporting the available quantitative instruments, some qualitative techniques have also been used.

Chapter 3. Principal Research Activities

The main research activities of the Grain Market Research Project could be categorized into two groups: (1) activities designed to improve the grain market performance; and (2) activities planned to increase household access to food through improved management of food supplies. In the latter the main concern has been cereal price and supply stabilization so that the national effort to increase food production is assisted through more efficiently operating food marketing system. The rationale and main elements of each research activity of GMRP is set out below.

3.1 Improving Grain Marketing Performance

3.1.1 Analysis of Ethiopia's Marketing System and Strategies to Improve Grain Market Performance.

The development of an efficient and equitable food marketing system is a critical component for improving food security in Ethiopia, improving both food availability and food access. Well functioning grain markets benefit both producers and consumers by reducing marketing margins and the transaction costs involved, thereby potentially lowering food prices to consumers while simultaneously raising price incentives to producers. Many factors constrain the performance of the Ethiopian grain marketing system. These include: barriers to entry into the market (e.g. rules on trader "residency", licensing requirements, importing restrictions); lack of competitiveness and fair trade practices in local markets; and grain market checkpoints and taxes.

Information which would be useful to guide policies and interventions to alleviate such constraints and to improve grain market performance in Ethiopia is currently lacking. This study will assist in developing a better understanding of the constraints facing grain market participants, and opportunities for alleviating these constraints.

The objectives of this research have been:

1. To improve our understanding of constraints to improving the efficiency and equity of grain marketing in Ethiopia;
2. To identify policy, regulatory, and other constraints in the grain market system; and

3. To identify unexploited economic opportunities and cost-effective strategies to exploit them which have the potential to reduce real food prices to consumers, improve incentives to producers, and expand gainful employment.

3.1.2 Design, Implementation, and Evaluation of a Pilot Grain Market Information System

The efficient and equitable performance of food markets can be impeded by high uncertainty about prices facing participants in various markets. A lack of timely and accurate information for market participant contributes to poorly functioning food markets and leads many farm households to rely on relatively low-productivity subsistence production for most of their food needs. Access to timely and accurate market information is thus one important element for transforming Ethiopia from a subsistence-oriented, low-productivity, agriculturally-based economy into a modern, exchange-oriented, high-productivity economy.

Reducing uncertainty in grain marketing through the dissemination of timely and accurate information to market participants, may, by reducing marketing risks and margins, serve both to improve production incentives for grain producers, and to drive down prices for grain consumers. Improving farmer and trader awareness of prices in various markets throughout the country promotes grain system efficiency by: (1) encouraging grain flows from relatively surplus to relatively deficit areas, thus helping stabilize prices over space; (2) improving farmer's decisions and confidence regarding what to plant, how much to invest, and where and when to market their produce; and (3) promoting a more competitive marketing system, which will benefit both producers and consumers. In particular, small farmers will benefit from improved access to market information by improving their bargaining position, and increasing their marketing options. Access to timely and accurate grain market information is also crucial for policy makers and food relief agencies, to allow them to understand and effectively address food insecurity problems in Ethiopia.

Analysis of market information can also assist policy makers to understand the evolving structure and performance of the country's agricultural marketing system. This is especially important in a country such as Ethiopia, which is emerging from more than a decade of increasing state control over marketing activities and attempting to reestablish a viable private marketing system.

The Grain Market Research Project was tasked to set up a pilot Market Information System (MIS) with the objectives of:

1. Testing and improve procedures for grain market data collection, analysis, and dissemination;
2. Providing training and support to relevant government agencies operate a public MIS; and

3. Monitoring and evaluating the effects of the pilot MIS on access to grain market information and performance and its impact on the different market participants.

Price and other market information were to be collected using EGTE'S's existing data collection and reporting system, making some improvements where necessary. The Project would use the data collected for two purposes: (1) information on a subset of markets would be broadcast by radio and newspaper to the general public; (2) information on all markets would be analyzed and disseminated for policy makers and other relevant development.

3.1.3. Agricultural Input Marketing, Profitability and Constraints to Availability

Recognizing the seriousness of the soil fertility problems in Ethiopia and the necessity of improving agricultural productivity and food security if general economic growth is to occur, the present Federal Democratic Republic of Ethiopia initiated a broad based Agricultural Development-led Industrialization (ADLI) strategy in 1993. The strategy concentrates on accelerating growth through focusing on the supply of fertilizers, improved seeds and other inputs. Although food production began to improve after 1994, the country is still facing widespread chronic and transitory food insecurity in some areas of the country.

The objective of this research is to examine how the fertilizer sector in general, and farmers' demand for fertilizer in particular, has evolved since the introduction of fertilizer sector reforms in Ethiopia. There is much debate in the agricultural development literature about whether fertilizer use in Africa is constrained primarily by poor input distribution systems, by farmers' lack of knowledge concerning the benefits and correct use of fertilizer, or by lack of effective demand because the product is simply not profitable enough. The research would look at each of these issues in an effort to understand the relative importance of the different constraints and how well current policies are addressing the problems. In the process attempt was made to identify additional policy measures needed to sustain expanded use of fertilizer and thus enhance food security in Ethiopia.

The data for the study come from three principal sources: (1) the Agricultural Survey carried out by the Central Statistical Office (C.S.A.) for the year 1995/96 season; (2) the Food Security Survey (1995/96) conducted by the C.S.A. in collaboration with the Grain Market Research Project of the Ministry of Economic Development and Cooperation; and (3) fertilizer trials conducted from 1989 through 1991 by the Ministry of Agriculture (MOA) and the National Fertilizer and Inputs Unit (NFIU). In addition, observations from several field visits were used to corroborate findings obtained from data analyses.

3.2 Increasing Household Access to Food through Improved Management of Food Supplies

3.2.1 Assessment of Alternative Food Supply Stabilization Strategies

There has been considerable discussion in Ethiopia regarding the consequences of food price and supply stabilization policies to promote food production incentives and household food security. A major goal of price and supply stabilization is to keep food prices at tolerable levels and alleviate transitory food insecurity that might otherwise result from a drastic increase in food prices. Another major concern is that good harvests may create supply gluts that depress producer prices, erode incomes among food-surplus households, and depress food production incentives and investment in farm technology over the long run. In this regard, cost-effective government programs to stabilize food supplies and mitigate downside price fluctuations may promote food grain production and productivity by encouraging investment in farm technology that otherwise might not be forthcoming in a more volatile and risky market environment.

However, the stabilization of food supply and prices is a complicated and potentially costly endeavor, especially in a country such as Ethiopia, where (a) important commodities, such as teff, are not traded on world markets; (b) a number of grains feature prominently in consumption patterns; and (c) there is substantial regional variation in cereal consumption patterns. There is a need for a comprehensive assessment of the costs, benefits, and distributional effects of alternative food supply stabilization programs in order to inform how and whether such a program should be undertaken. There is, furthermore, a need for pragmatic treatment of how such a program might be effectively implemented without causing a major burden on the treasury.

This research tried:

1. To identify alternative food price and supply stabilization strategies for analysis;
2. To evaluate the costs and benefits of the identified food price and supply stabilization strategies, with respect to: (a) household food expenditures by income and region, and effects on food security; (b) food production and revenue from marketed output;

3.2.2 Assessment of Alternative Food Transfer Arrangements: Their effects on Food Production, Market Development, and Household Food Security.

There has been longstanding concern over the possible disincentive effects of food aid, specifically the effects of food aid on market prices and production incentives. Since 1984, Ethiopia has become chronically dependent on food aid. The volume of food aid in Ethiopia in a normal year has often

accounted for 25% or more of the total estimated marketed cereal supply. Depending on the manner in which food aid is distributed and utilized, additional cereal supplies of this magnitude could be expected to exert some influence on food market prices. Concerns have been raised as to whether food aid, while meeting critical short-run needs, is jeopardizing Ethiopia's ability to produce its own food needs over the long run. There is an urgent need to assess the long-run impacts of alternative food aid arrangements on market development and production incentives.

A second important purpose of this research activity is to identify and assess alternative strategies to raise household access to food. This would include analysis of options relying on the market (e.g., those involving potential self-targeted foodstuffs to raise access to food among low-income consumers) as well as administered transfer programs such as employment-based food and cash transfer programs ,etc. The main outcome of the studies under this Focus Area will be the identification of options for improving access to food by vulnerable groups in the short-run in a manner that also promotes long-run agricultural productivity and income growth in Ethiopia. The study tried:

7. To evaluate the effect of alternative food aid arrangements on food prices and production incentives over the short and long run;
8. To evaluate effects of alternative food aid arrangements on trader behavior and performance of Ethiopian grain markets;
9. To identify the costs and benefits of targeting vulnerable groups through various food transfer arrangements, and to assess the implications for food aid policy in Ethiopia; and
10. To consider and evaluate alternative food transfer arrangements in the context of overall food security and development strategies in Ethiopia.

3.3 Associated Studies

The Grain Market Research Project has been carrying out a number of studies closely related to its main line of activities. These included:

1. Evaluation of the 1995/96 Local Grain Purchase by the European Union (EU)
2. Cereal Availability Survey-Round 1
3. Cereal Availability Survey-Round 2
4. Impact Evaluation of the 1995/96 and 1996/97 Local Grain Purchase by the EU.
5. Profitability of the Use of Technological Inputs by Farmers Having Smaller Holdings

3.3.1 Review of the 1995/96 EU Local Grain Purchase

Ethiopia experienced the largest grain harvest on record in 1995/96. The recent production upsurge has been due to a combination of favorable weather, increased use of fertilizers, improved agricultural extension and grain market liberalization. The expectation is that production may continue to increase in years to come.

While there remains a clear need for continued food assistance for vulnerable groups, the typical method of importing food aid from donor countries is viewed as likely to exacerbate the country's existing supply glut and further depress cereal prices to the detriment of agricultural production growth. To address this problem, the Government has arranged with donors to procure food aid from domestic markets through purchase from local traders. In late 1995, some donors such as the European Union (EU) and World Food Program (WFP) agreed to provide cash instead of food aid to facilitate the local purchase of cereals. By procuring grain locally, the program was envisaged to reduce the cost of delivering food aid to distribution areas compared to food aid imports.

The local purchase of food aid may also support the objective of stabilizing farm-gate cereal prices during surplus periods. Another potential objectives of local purchase is to contribute directly to new entry and increased in the grain marketing system, thereby promoting long-term market development objectives. This study tried to identify factors that can improve the ability of local purchase activities to meet key food security and food policy objectives.

3.3.2 Cereal Availability Survey - Round 1.

Estimates of the 1996/97 grain production were higher than the record harvest of 1995/96. Because of this European Union, World Food Program and EURONAIID planned to locally purchase 180,000 tons of cereals by May 1997. In late 1996 contracts were signed for the purchase of 80,000 tons. But bid winning firms and traders failed to deliver grain on grounds of supply shortage. Government and EU agreed to look into the problem, and GMRP was commissioned to carry out a survey of cereal availability in September 1997.

3.3.3 Cereal Availability Survey - Round 2.

There have been indications that grain production in 1997/98 may decline from the level in 1996/97 due to unfavorable rains. EU intends to buy cereals locally this year also, but it is apprehensive of cereal availability, and approached GMRP to carry out another round of cereal availability survey. Upon approval by MEDaC, the project is at present doing the survey.

3.3.4 Impact Evaluation of the EU Local Grain Purchase

European Union sees the need to evaluate the impact of its local purchase programs on domestic production, grain prices, welfare of producers and consumers, and generally on the performance of the grain market sector. GMRP is commissioned by the EU and mandated by MEDaC to carry out the evaluation, which is now underway.

3.3.5 Profitability of the Use of Productivity Increasing Inputs to Small Farmers

The contribution of the new agricultural extension system to the recent Ethiopia's success in increasing food production is believed to be considerable. Determination runs high within and outside of the Government to increase the adoption of the extension packages to further increase production and sustain a higher agricultural growth. For this to occur, the extension packages have to be profitable to farmers including those with relatively smaller holdings.

Not all farmers achieve the same level of yield from the application of the crop production extension package (known as the wet package). Apart from the inter-regional or inter-woreda variations, the variation within the same agro-ecological condition is quite significant. For instance, the best farmer in Arssi Negele was able to produce 3.7 times as much as the least efficient farmer. The question that arises is why some farmers attain lower yield levels. How much of this is attributed to poor management or inadequate extension advice? How much of it is due to micro-climatic or soil differences? What additional elements or modifications need to be incorporated in the package of further enhance the impact of the extension. These and other related questions need to be addressed if the current extension effort is to benefit all users and remain sustainable in the long-run.

One of the best innovations of the new extension drive is balanced use of nutrients. In particular, the use of nitrogenous fertilizer (urea) along with the mainly phosphorous fertilizer (DAP) is reported to be the major secret for the dramatic increase in yield. However, the increase in the national consumption of urea has not been very encouraging. Sales of urea has remained weak according to some suppliers or distributors. The extent to which graduating¹ farmers have continued to use urea and/ or the constraints to the use of the input need urgent attention to maintain the momentum attained in the dissemination of the new extension package.

The objective of this study which GMRP is carrying out in collaboration with SG-2000 is to systematically document the yield and profitability differences across farmers and identify the factors leading to the variation. The study will look into the social, institutional and economic factors constraining or promoting the diffusion process taking the SG 2000 high-potential sites as study areas.

Chapter 4. Improving Grain Market Performance: Main Findings

Under this focus research area, Grain Market Research Project has carried out five studies, excluding cereal availability surveys and profitability of the extension package. These are:

1. **Market Structure, Conduct and Performance** with particular Emphasis on Constraints Restraining the Performance of the Grain Market Sector (the details of this research activity is presented in Working Paper # 8, Annex 6).
2. **The Response of Grain Markets to Liberalization** (the full report of this study appears in Working Paper # 6, Annex 5).
3. **Vertical and Spatial Integration of Grain Markets** with Focus on Implications for Grain Market and Food Security Policies (the full report of this study is found in Working Paper # 9, Annex 7).
4. **Design, Implementation, and Evaluation of a Pilot Market Information System** (Two interrelated reports are available on the MIS, one on the evaluation of the pilot program and the other on assessment of permanent home for the MIS. (The full report on the external evaluation of the MIS is presented in Annex 13, Appendix 4).
5. **Agricultural Market Performance and Determinants of Fertilizer Use** (Working Papers # 5 and #10 in Annexes 11 - 12, part V. provide the full report on the GMRP's work on the implications of grain market performance for the use of productivity increasing inputs, mainly fertilizers).

In this chapter of the report, the main findings of these five studies are presented.

4.1 Constraints on Performance of Grain Markets

Throughout the world, the major share of staple food costs to the consumer is typically accounted for by marketing costs. In Ethiopia, marketing costs account for about 40% to 60% of the total price spread between producer and retail prices (GMRP, 1997). The reduction of these costs represents a major opportunity to improve farm production incentives and simultaneously make food more affordable to low-income consumers.

The market dependent population, that is, the population that depends on the market for all or part of its food supply, is estimated to be about 42% of the total population. Although the consumption

patterns of the different segments of the market dependent population is not known, it has been asserted that the urban population spend about 65% of their income on food; and expenditure on cereals alone constitutes about 21% of total household income. It is clear that an inefficient marketing system entailing substantial costs to consumers will have detrimental effect on the food security and well being of the poor.

Moreover, the potential for future farm-level income and productivity growth in Ethiopia will be intimately tied to productivity growth at the various stages in the marketing system. Abundant worldwide evidence has shown that the incentives and ability for farmers to make investments in productivity-enhancing inputs and production methods depend on the functioning of markets for inputs, credit, and crop distribution.

The theoretical framework applied in analyzing the operation and efficiency of the Ethiopian grain marketing system is what is known as the structure- conduct- performance approach (SCP) which suggests that relationships exist between structural characteristics of a market and the competitive behavior of market participants and that their behavior in turn influences the performance of the market. Typical structure-conduct-performance (SCP) analyses tend to assess market performance largely in terms of (a) whether marketing margins charged by various actors in the marketing system are consistent with costs; and (b) whether the degree of market concentration is low enough (and the number of firms operating in a market is large enough) to ensure competition, which is in turn assumed to drive down costs to their lowest level. The SCP approach postulates that as market structure deviates away from the paradigm of perfect competition as characterized above, the extent of competitiveness of the market will decrease; and consequently a decline in market efficiency will take place.

Of the 1,100 wholesalers identified in the 26 markets covered by the MIS, 219 or 20% were selected using a stratified random sampling procedure for a structured interview. The socio-economic characteristics of these 219 sample merchants are summarized in Table 1 below.

Table 1.-- Characteristics of Wholesale Trades Covered by the Survey

Characteristics	Before Market Liberalization	After Market Liberalization			
Percent owning store	48.0	57.9			
Percent owning vehicle	15.3	12.2			
Percent owning truck	14.3	15.2			
Percent owning weighing scale	95.3	94.9			
Percent having telephone line	44.1	46.0			
Percent engaged in grain trade	59.4	100.0			
Average number of years in grain trade		14.0			
Sex composition (%):					
Males		96.8			
Females		3.2			
Ethnic Composition (%)					
Amhara		42.4			
Oromo		26.7			
Gurage		14.3			
Tigraway		10.6			
Others		6.0			
Level of education (%):					
Illiterate		1.8			
Self-taught		16.0			
Religious school		8.7			
Primary school		35.6			
Secondary school		33.3			
College education		4.6			
Ownership of Business (%)					
Sole proprietorship		98.2			
Partnership		1.4			
Private limited		0.5			
Proportion of Traders Undertaking Different Activities in Addition to Grain Trade (%)					
	First Quartile (lowest)	Second Quartile	Third Quartile	Fourth Quartile	All
None	59.3	65.5	61.1	50.0	58.6
1	25.9	24.1	19.4	22.2	22.7
2	7.4	6.9	13.1	16.7	11.7
3	7.4	3.4	5.6	11.1	7.0
Important business activities including grain trade in terms of revenue generated in 1996					
First important activity	Grain trade (75%)				
Second important activity	Freight transport (27.6)				
Third important activity	Shop (30.3%)				
Fourth important activity	Grain milling (16.7%)				

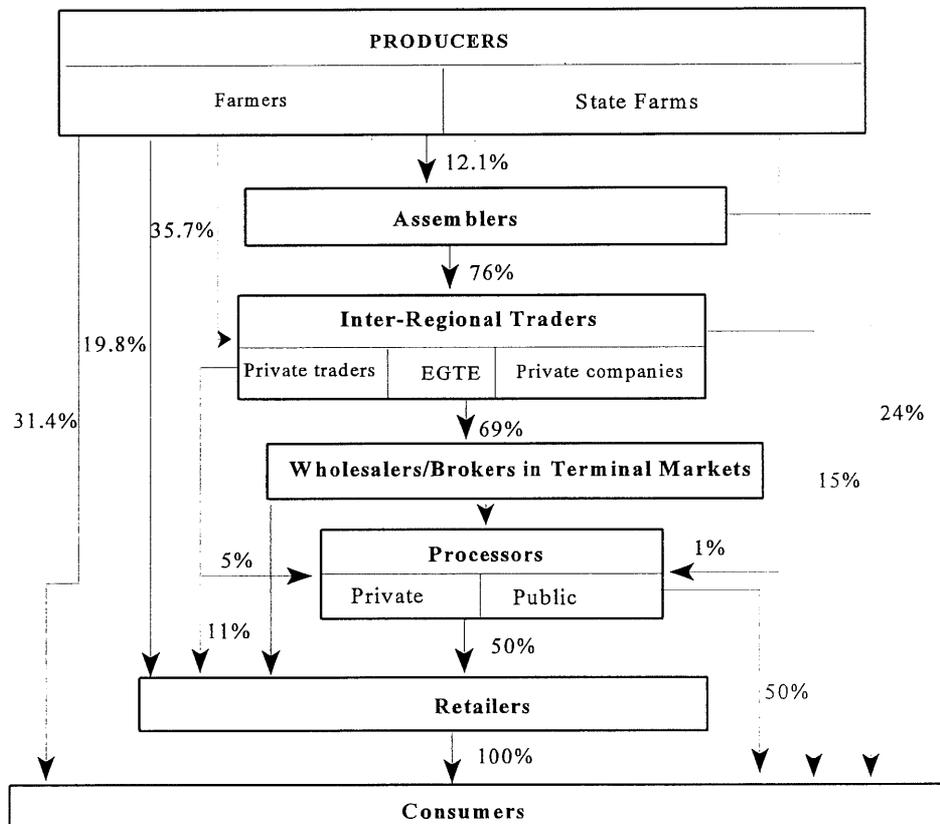
Source: GMRP Traders' Survey

4.1.2 Organization and Conduct of Grain Markets

It is difficult to determine precisely the volume of grain marketed annually in Ethiopia, because it fluctuates from year to year depending on weather and rainfall conditions. However, according to the data obtained from the Rural Household Survey conducted in 1996, a relatively good crop year, it is estimated that the proportion of output marketed by farmers is about 27%. The marketable surplus of state farms is also estimated to be 80% of their produce. Thus, based on CSA production estimate of 1995/96, the total quantity of grain marketed by farmers and state farms was about 26.4 million quintals or almost 28% of total yearly production. The channels of distribution and the relative magnitude of grain flow through the different chains is illustrated in the figure below:

Figure 1.-- Grain Market Structure and Commodity Flows, 1995/96 Crop Year

Domestic Grain Production and Supply							
* Domestic Production = 94.3 million qts (Farmers = 98.4%, State Farms = 1.6%)							
* Marketed Quantity = 26.4 million qts (Farmers = 95%, State Farms = 5%)							
Teff: 21% of Total Marketed Quantity	Wheat: 14% of Total Marketed Quantity	Barley: 10% of Total Marketed Quantity	Maize: 25% of Total Marketed Quantity	Sorghum: 11% of Total Marketed Quantity	Pulses: 12% of Total Marketed Quantity	Oilseeds: 5% of Total marketed Quantity	others 2% of Total marketed Quantity



As can be seen from Figure 1, the inter-regional traders consisting of mainly wholesale traders (also EGTE and private companies) are the principal actors in inter-regional grain movement. The wholesale traders handle about 45% of the total domestic marketed quantity and transport and sell 69% of it in the terminal markets and deficit areas; thus, they play an important role in regional food security by transferring grain from producing to consuming areas of the country.

Analysis of the size distribution of traders at a national level shows that while 90% of the merchants have only 57% share of the total volume purchased, the largest 10% command about 43%. In fact, the bottom 40% have an insignificant share of less than 10%. The degree of inequality in volume handled is also similar for the specific crops. However, the observed inequalities in the volume of total and specific grain purchases by traders may be largely explained by the degree of production concentration in few areas, particularly in the traditionally surplus producing regions of Gojam, Shoa, and Arssi for all crops, Arssi and Bale for wheat and barley, Wellega and East Shoa for maize, Gojam and Shoa for teff.

Unlike the size distribution of traders at the national level, the extent of inequality in market share at the local market level differs from market to market and from crop to crop. However, as can be seen from the four-firm concentration ratio (the share of the largest four traders out of the total volume of grain handled by all the traders operating in a particular market) in Table 2, the results generally do not show the existence of market domination by few traders. Market concentration refers to the number and relative size distribution of buyers/sellers in a market. Many studies indicate the existence of some degree of positive relationship between market concentration and gross marketing margins. Generally believed that higher market concentration implies a non-competitive behavior and thus inefficiency. But, the studies also warn against the interpretation of such relationships in isolation from other determinant factors like barriers to entry and scale economies.

There are a number of measures of market concentration, but the most commonly used is the market concentration index, which measures the percent of traded volume accounted for by a given number of participants. Empirical studies in the fields of industrial organization suggest certain levels of concentration at which non-competitive behavior of market participants begin in different industries. For example, some suggest that a four-firm concentration ratio (CR4) of less than or equal to 33% is generally indicative of a competitive market structure, while a concentration ratio of 33% to 50% and above 50% may indicate a weak and strongly oligopsonies market structures, respectively. However, the CR4 is best regarded as a “rule of thumb”.

Figure 2.-- Size Distribution of Wholesale Grain Traders in the 26 Markets

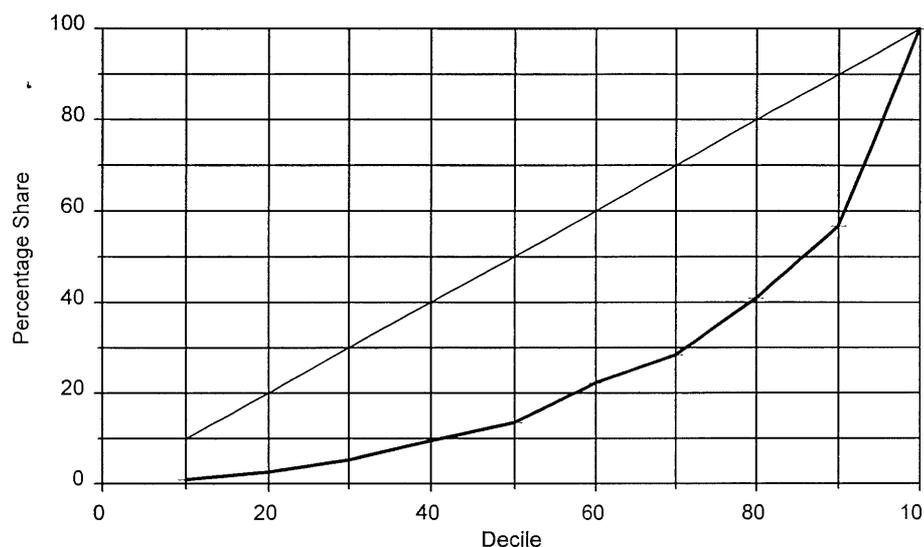


Table 2.-- Estimates of Four-Firm Market Concentration Ratio at Different Markets

Market	Crop	CR4 (%)	Market	Crop	CR4 (%)
Dire Dawa	Maize	56.02	Nazreth	Wheat	47.26
	Sorghum	32.97		Teff	12.89
	Teff	19.49		Maize	28.47
	All Grains	34.70		All Grains	20.16
Mekele	Teff	8.00	Shashmene	Maize	20.6
	Sorghum	7.84		Wheat	49.38
	All Grains	20.35		Barley	55.81
				All Grains	32.56
Addis Ababa	Teff	16.47	Meki	Maize	37.77
	Wheat	16.06		Teff	27.68
	Maize	11.91		All Grains	32.58
	All Grains	3.56			
Gonder	Sorghum	45.26	Enchini	Teff	34.73
	Teff	19.10		Wheat	20.65
	All Grains	44.06		All Grains	27.31
Bahir Dar	Teff	46.15	Hosaena	Teff	20.07
	Maize	42.55		Wheat	11.24
	Sorghum	63.24		All Grains	13.03
	All Grains	33.99			
Assassa	Wheat	20.62			
	Barley	50.79			
	All Grains	20.32			

Source: GMRP, Traders' Survey

Note: Estimates of CR4 were obtained as $(4 * \text{total purchase of the largest trader in the sample}) / (\text{total purchases by all traders surveyed in the market} * \text{total number of traders operating in the market} / \text{number of surveyed traders})$.

Initially, the marketable grain flows to rural markets. Farmers normally bring their marketable grain to markets that are 5 to 20 km away from their villages by carrying it or using pack animals. Most of the grain is sold between January and March when they need cash to purchase food, cover wedding expenses, repay outstanding loans, and pay tax. Similarly, the main grain buying season of wholesale traders is between January and March.

Even though the wholesale merchants collect grain from different places, they normally procure about 60% of their grain supplies at their own warehouses. The traders do not provide advance payment, credit, or any other incentive to farmers as a means of encouraging them to bring the grain to their stores. Grain prices were not also fixed in advance and farmers reported that they did not take any loan from merchants. Decisions regarding grain sales to merchants by farmers also were not influenced by such factors as blood, ethnic, or religious relationships

Traders' grain buying price at the local markets is largely determined by deducting miscellaneous costs and a net profit margin from the prevailing wholesale price in Addis Ababa and other terminal markets, which they get from the brokers. On the sales side, the wholesale merchants' strategy is mainly focused on the terminal markets and deficit areas of the country rather than on the local markets. About 69% of the grain they purchase is transported and sold in the terminal markets, notably in Addis Ababa, and in deficit areas.

Inter-market grain flow is coordinated by the brokers operating in the main terminal markets, particularly in Addis Ababa. There are more than 200 brokers/wholesalers in Addis Ababa, but the most important are not more than 50. The brokers are specialized by route and coordinate grain buying, selling, transporting and pricing activities. The brokers do not interfere in one another's business and most of the regional traders are loyal to their respective "client" broker. Most wholesalers (about 66%) carry out local grain sales by directly selling to consumers and other clients, but grain sales in the terminal markets, particularly in Addis Ababa, is difficult without the involvement of the large brokers. Almost 83% of the interviewed merchants said they cannot sell grain in Addis Ababa without the help of the brokers. Half of the regional merchants reported that they regularly use the services of particular brokers while the others do not. The main reasons for using the services of particular brokers are that they are well known and honest and many merchants depend on them.

The most important services rendered by the brokers are selling grain on behalf of the regional merchants, providing market information, collecting and hauling back grain sacks, collecting and sending back money from the sale of grain, identifying grain buyers from deficit areas, providing temporary storage services, arranging transport for transferring the grain. The regional traders usually pay a fixed commission amounting Birr 0.90 per quintal for local sales agents and Birr 1.42 per quintal for brokers operating in the terminal markets and other deficit areas.

Although the size distribution of regional merchants does not suggest any domination of the business by few traders, there are barriers to entry including lack of access to working capital and facilities at convenient location in the market place.

4.1.3 Constraints to Improved Performance

The main constraints faced by market participants are the following:

1. Grain movement checkpoints or 'Kella' have been identified as the number one problem by 35% of the interviewed merchants. The number of 'kellas' between any two markets varies from 2 to 15 and the most frequently observed number is 2. The official and unofficial amount of money that merchants pay also varies from area to area and from individual to individual, but the average 'kella' charge was Birr 11.25 per quintal. Although the 'kellas' are intended to serve as a mechanism for collecting sales tax on grain, they have a negative impact on grain movement and consequently on producer and retail prices.
2. Moreover, the variability of the number of 'kellas' and the amount charged between any two markets has caused uncertainty and confusion among merchants; this may have contributed to the substantial price differences observed between Addis Ababa and some regional markets. Another problem related to 'kellas' is the transport time wasted at the 'kellas'. According to a recent study conducted by the GMRP, the average time spent at a 'kella' is estimated to be about 8.58 minutes.
3. Another problem identified by merchants is the absence of government control on un-licensed merchants. Although the law requires merchants to have licence in order to engage in trade, mechanisms have not been devised to enforce it; as a result of this, some have returned their licences to continue operating illegally. Although data for all markets is not available, the number of merchants operating without licence is large. As these type of merchants have no obligation of paying sales tax, profit tax, etc., the licensed merchants are at a disadvantage and could not be competitive in buying and selling.
4. Shortage of financial credit was observed to be another limiting factor on operation and business expansion. The problems in acquiring loans seem to occur from lack of collateral and partly from lack of interest to expand business because of uncertainties. Despite the fact that about 65% of the merchants believed that availability of credit has increased since the market liberalization of 1990, 39% of those interviewed reported they did not obtain any credit. The main reasons given for not taking bank credit are varied, but the most common are the lack of collateral to be eligible for bank loan, the high risk associated with grain business, lack of interest to expand the business because of the illegal activities of un-licensed merchants.
5. About 61% of the wholesale merchants covered by the survey reported that they have obtained credit amounting Birr 27.2 million, of which about 95% was for financing grain purchase operations, 2% was for starting up new lines of business, and 2% for investment on transport equipment. About 49% of the loan obtained by merchants

was from commercial banks, 48% was from informal sources, mainly large grain businesses, and the rest was from relatives, friends and 'equb'. Access to bank credit varied by category of merchant; of the total bank credit given the share of the lowest quartile (i.e., the lowest 20% of the traders in terms of volume annually purchased) was 18% and that of the large merchants (the upper 20%) was 34%. The respective shares of the second and third quartiles were 23% and 25%. The share of the large merchants of the total credit obtained, however, was 66%; this is because the credit extended by the large private grain businesses was totally received by the upper quartile. This gave the large merchants additional advantage, because such loans are interest free; while the other type of loans bear 13% to 15% interest per annum. The repayment period for loans obtained from commercial banks is 12 months.

6. Even though 61% reported that they obtained credit, the average amount of bank credit taken was Birr 98,043 for the first quartile, Birr 136,136 for the second quartile, Birr 100,969 for the third quartile and Birr 164,351 for the fourth quartile. The overall mean was Birr 123,750. This amount is too small to enable the merchants to make capital outlays on storage and transport facilities and even to finance a reasonable level of grain inventories. Without such investments, it would be difficult to anticipate operational and technical improvements in the grain marketing system in the future.
7. In the short-run too, a substantial portion of the small traders' working capital is tied up in grain inventory due to delay in obtaining transport service. Thus, as a result of deficiencies in financial credit, the small merchants are subjected to low capital turn-over; and this could have a negative effect on the competitiveness of the market, because the relatively large merchants may exert considerable influence on grain prices in the absence of any challenge from such alternative buyers.
8. Because of the subsistence nature of grain production in Ethiopia, most of the grain produced by rural households is retained on farm for different uses - consumption, seed, and reserve. According to the Rural Household Survey, about 75% of the total grain production is retained for on-farm uses and stored at the farm in traditional storage structures that are mostly inadequate to protect the grain from damage caused by weevils, termite, rodents, birds, moisture, and other pests. Although the extent of crop damage at the farm level due to poor storage is not well documented, the above mentioned survey indicates that most farmers face storage problems. The most serious storage problems faced by farmers are attacks by weevils, termites, rats and rodents; more than 65% of the farmers reported that they face such problems. Some farmers even reported that they sell their grain immediately after harvest because of fear of storage loss at the farm level.
9. Similarly, although storage capacity in the assembling markets is reported to have increased since the market was liberalized in 1990, about 66% of the merchants reported that storage facilities are still inadequate in terms of availability, storage and

premise space, and location. About 19% of the merchants reported that they have tried to obtain storage rental services between December and March, but failed to do so. The facilities are also reported to be vulnerable to damages caused by moisture, rodents and pest. More than 80% of the merchants hold grain stocks for up to 6 months, 13% keep inventories for up to 12 months and only 5% for more than a year.

Most merchants use bagged storage, but sometimes also use bulk storage. Weight loss due to storage problems are estimated to be 3.32% for maize, 2.10% for white wheat and 2.37% for mixed teff, but these figures vary with length of storage; for example, storage loss for mixed teff varies from 1.5% for grain stored for up to two months and 4.2% for grain stored for over a year. The major causes for storage loss in order of degree of seriousness are moisture, rodents, and spillage.

10. Shortage of adequate and appropriate storage facilities in or around the market places results in high marketing cost in the form of transporting the grain from the center of the market to the storage locations and high storage loss and spillage due the susceptibility of the existing poor facilities to damages caused by moisture, rodent, pests as well as due to poor structure and unhygienic condition. Most of the merchants said that the Government can play an important role in improving marketing facilities in their areas of operation including developing new market places, allowing merchants to improve existing buildings which they acquired through rent, constructing and maintaining roads and expanding telephone services.
11. The wholesaler traders normally use trucks to move their grain from the assembling markets to the terminal markets and other deficit areas. About 15% of the wholesalers have their own truck and the rest depend on private and state owned freighters as well as on NGOs. Ownership of truck varies by category of merchant; for example, while only 5% of the lowest 25% of the traders own trucks, 45% of the upper group have their own truck. The wholesale merchants who own trucks transport about 80% of their grain using their own trucks. Merchants who do not own trucks, however, have difficulty of getting transport services; more than 55% said it takes them a week to get trucks on rental and 12% said it even takes them two weeks.
12. Both problems of availability and high transport tariff have been identified as serious by the interviewed merchants. Grain destined for the Addis Ababa Ehil Berenda has to arrive on Sunday, Tuesday, and Thursday evenings for sale the next day before the prevailing wholesale price changes. Normally grain is sold the next morning until 10 a.m. Grain that arrives late has to be sold four to five days later by which time prices could fall substantially and subject merchants to large losses. After 10 a.m, the trucks are normally ordered to leave the central area until the next peak market day. The truckers spend 2-3 days in Addis Ababa with their loads, and if the grain is not sold within these days, it has to be unloaded somewhere near the sheds or the merchants have to pay Birr 100/truck/day. If the grain is not sold on truck within the following 2-3 days, the merchants unload their supplies and are

required to pay Birr 2/quintal/month for storage. As the storage place is not protected against dust, rodents, etc, the merchants could incur additional losses due to color change, spillage, spoilage, etc. The sacks could also be damaged by rodents. For fear of losses and damage, the merchants instruct their brokers to sell the grain at the price quoted by them on cash or credit. In addition to the problem of unavailability and high tariff, weight loss is common in transporting grain; 83% of the merchants interviewed reported that they experience weight loss ranging from 0.1% to 16%. The mean loss reported is about 2.18%.

13. Farmers normally get market information from different sources including neighbors and traders. Their primary source of information is the market place; about 56% said that their first source of information is the market place, 42% mentioned neighbors as the second source of information, and 63% said traders are their third major source of market information.
14. Grain merchants also get market information regarding overall harvest prospect, supply situation in their areas of operation, demand for and supply of grain in Addis Ababa, price of grain in different regional markets, grain buying price of mills, private companies and EGTE and quantity of grain imported. However, not all merchants have equal access to the above mentioned types of market information.

For example, although most merchants believe that information on harvest prospect, supply situation in their areas, and demand for and supply of grain in Addis Ababa is very much valuable for their operations, only about 10% of the merchants reported that they utilize such information. Their sources of information are their own assessment and other merchants. All merchants totally lack information on imported grain.

15. Information on demand and supply situation and grain prices in the main terminal market of Addis Ababa is also unevenly distributed; only about 50% of the interviewed merchants, most of which are in the upper quartile, have access to such information. Their main sources of information are the brokers in Addis Ababa and other merchants. The proportion of merchants who have telephone service is about 46%, but varies from 62% for the fourth quartile to 38% for the lowest quartile.
16. Generally, farmers and merchants do not get a variety of market information upon which they base their marketing decisions. Mostly they depend on the market place, brokers in the terminal markets, and other farmers and traders for price information. The information that farmers get in particular does not assist them in deciding what crops to plant and how much. There is practically no market extension service in the present system that guides farmers in taking production, storage and marketing decisions. Information on export market is also totally lacking.

17. Although the Government has already launched a pilot public market information system, it needs some time before an assessment is made on its impact on the performance of the grain market. The response from non-trading information user institutions, however, is so far positive.

4.1.4 Economic Performance of Grain Markets

Analysis of marketing margin, spatial and temporal aspects of market efficiency show the following results:

1. Comparison of the expected and actual price spreads between Addis Ababa and 19 selected markets shows that in 11 cases out of 19, the price spread is substantially high. This may be attributed to several factors, including lack of adequate market information, institutional barriers to the smooth flow of grain between markets such as the 'kellas', traditional buying and selling practices that condition traders to buy and sell grain only in specific markets regardless of prevailing prices, high market risk in moving grain, market domination by traders, etc.
2. Seasonal price variations are significant; for example in Addis Ababa, the Gross Real Return to Storage is 3.66% per month for mixed teff, 3.24% for wheat, and 5.18% for white maize. When these figures are compared to the opportunity cost of capital tied up in inventories, which is about 0.83% to 1.17% per month, there seems to be substantial seasonal variation which may not reflect storage costs.

4.2 Response of Ethiopian Grain Markets to Liberalization

4.2.1 Reform Measures

Over the past 15 years, the controlled food marketing systems³ of many African countries have been liberalized. In some cases, the reforms have been initiated locally (as in Ethiopia, for the most part). In many other cases, liberalization occurred under pressure from international lenders and donors as part of economy wide structural adjustment programs (see Jayne and Jones 1996 for a survey). Advocates of food market reform have encouraged liberalization as a means to reduce costs in the marketing system, thereby raising and stabilizing farm incomes, promoting farmers' incentives to use productivity-enhancing inputs, and reducing poor households' dependence on food aid for their survival. While food market reform has been subject to contentious and often emotional debate over the last decade in Africa, the debate has generally been over assumptions about how food markets

³ The food system refers to the various stages and modes of coordination required to produce food and put it on consumers' tables, including input supply, farm production, distribution, processing, and retailing (see Shaffer 1980).

work in reality as opposed to theory, and how markets actually respond to particular forms of policy change.

Forced by internal unrest Derg changed radically grain marketing policy in March 1990. Quotas and fixed grain prices were abolished. The Transitional Government of Ethiopia reaffirmed that all controls on interregional grain movement were lifted and the private sector was permitted to operate in a free market environment . Subsidies on wheat for urban consumers were abolished in 1992.

In 1992, the AMC was downsized substantially and renamed the Ethiopian Grain Trading Enterprise (EGTE). The role of the EGTE was revised to stabilize producer and consumer prices and maintain buffer stocks. Yet in actuality, the EGTE has played only a minor role in the grain marketing system since liberalization. The eight zonal offices were closed, the branch offices were reduced from 27 to 11, and the grain purchase centers shrank from 2,013 to 80. Since this own sizing, the EGTE has played only a minor role in procuring grain. EGTE's annual average grain purchases from smallholder farmers and traders has declined from 258,719 tons during the 1984/85 - 1989/90 period to 50,608 tons during the 1990/91 to 1995/96 period. In the 1995/96 seasons, in which EGTE was explicitly mandated to support producers' maize and wheat prices, its combined purchases of these two cereals from farmers at the stated support price was 12,373 tons. EGTE purchased less than 45,000 tons on maize and wheat from traders at negotiated market prices.

Generally, the elimination of delivery quotas, fixed prices, controls on interregional grain movement and the reduction of barriers to entry in grain marketing can be expected to increase competition and reduce costs in the grain marketing system. If the markets are made more competitive, the profit motives of economic agents (farmers, traders, transporters, etc.), which drive them to reduce their costs to the extent possible, are often asserted to increase the overall productivity of the system. However, it is not always true that market liberalization automatically leads to such idealistic situations and it is important to assess how the grain marketing system is responding to the new liberalization policy. Such information provides feedback to policy makers as to where bottlenecks persist and where adjustments are necessary to promote intended national objectives.

4.2.2 Results

1. Summary statistics of real prices of grains for several markets in Ethiopia for the pre-and post-market liberalization periods are provided in Table 3. ⁴ Average grain prices increased for all markets in nominal terms. However, the average real price for maize, white teff and white wheat increased after liberalization for the cereal-deficit markets of Addis Ababa, Mekele, and Dire Dawa, with one exception (maize in Dire Dawa). Across all commodities , real cereal prices increased in the grain-surplus areas in 7 of 7 cases. By contrast, real prices in the grain-deficit areas declined in 8 of 9 cases. Prices in the surplus-producing areas have

⁴ Within-year monthly price variability for different grains over the years from 1985 to 1996 is also given (in working paper # 6, Annex -----). The changes in monthly price variability from year to year is very dramatic for most of the grains and markets.

risen by 12% to 48%, while prices in deficit regions have declined by 6% to 36% in eight of nine cases. An unexpected result is observed for Dire Dawa market in that real maize prices increased by 10% in the post-liberalization period.

The volatility of wholesale cereal prices has generally declined since liberalization. This is especially true for the deficit markets, where the standard deviation (SD) declined in all 9 cases across maize, teff and wheat. In the surplus markets, the SD actually increased from 1% to 11% in 5 cases, and declined in only 2 cases.

The above analysis indicate that the wholesale prices in the surplus producing markets increased since liberalization, but became slightly more variable. Higher cereal prices in these areas have most likely contributed to production growth and incentives to use productivity-enhancing inputs in these areas.

2. Higher prices in surplus-producing areas and simultaneously lower prices in deficit areas indicate that market liberalization has been associated with a reduction in average wholesale price spreads (the difference between wholesale prices in surplus and deficit regions). This is confirmed by direct computation of price spreads for major trade routes in Ethiopia during the pre-liberalization and post-liberalization period (Table 4). Cereal price spreads have declined during the post-liberalization period in 22 of 24 cases for which data is available. The decline in price spreads was especially large for white teff and wheat, the cereals that figured most prominently in the former AMC's forced grain procurement system during the control period. For white teff, average wholesale price spreads across all market pairs declined by 81 birr per quintal (in 1996 Birr) from 149 birr per quintal during the pre-liberalization period, to 68 birr per quintal during the post-liberalization period. White wheat price spreads similarly declined by 41 birr per quintal after liberalization (from 95 birr per quintal to 54 birr per quintal), and maize price spreads declined by 12 birr per quintal⁵.

⁵Refer to Working Paper # 6 pp 10-15 in Annex 5 of part 3 for more information on changes in price spreads and volatility.

Table 3 Summary statistics of real prices of grains for several markets in Ethiopia

Markets	Before market liberalization (85:01 to 90:03)			After market liberalization (90:04 to 96:06)			Change		
	Mean	SD.	CV(%)	Mean	SD	CV(%)	Mean	SD.	CV(%)
Maize									
Surplus areas:									
Bako	61.18	20.79	33.98	90.14	31.95	35.44	28.96	11.16	1.46
Shashamane	66.29	13.89	20.95	97.79	22.17	22.67	31.50	8.28	1.72
Jimma	85.43	37.19	43.53	95.65	28.69	29.99	10.22	-8.50	-13.54
Deficit areas:									
Addis	120.23	48.89	40.66	113.55	24.66	21.72	-6.68	-24.23	-18.95
Dire Dawa	145.08	50.13	34.55	154.63	30.74	19.88	9.55	-19.40	-14.67
Mekele	218.28	63.01	28.87	149.75	17.55	11.72	-68.53	-45.46	-17.15
White Teff									
Surplus areas:									
Bako	142.34	22.10	12.71	173.82	25.55	17.95	31.48	3.45	5.24
Hosanna	155.34	22.97	12.11	189.65	23.93	15.37	33.94	0.96	3.26
Bahir Dar	158.16	15.77	7.60	207.63	25.55	16.15	49.47	9.78	8.56
Deficit areas:									
Addis	281.90	64.05	26.84	238.62	20.29	7.20	-43.28	-43.76	-19.64
Dire Dawa	330.97	68.42	23.99	285.23	26.38	7.97	-45.74	-42.04	-16.02
Mekele	422.32	73.26	27.04	270.94	15.12	3.58	-151.40	-58.14	-23.46
White Wheat									
Surplus areas:									
Hosanna	110.96	20.40	18.39	136.07	16.18	11.89	25.11	-4.22	-6.49
Deficit areas:									
Addis	183.49	55.40	30.19	169.21	20.68	12.22	-14.28	-34.72	-17.97
Dire Dawa	238.97	49.34	20.65	225.70	22.60	10.01	-13.27	-26.74	-10.63
Mekele	270.30	46.06	17.04	197.59	29.05	14.70	-72.71	-17.01	-2.34

Table 4 Summary statistics of monthly grain price spreads between different markets in Ethiopia

Pair of markets	Before market liberalization (85:01 to 90:03)			After market liberalization (90:04 to 96:06)			Change		
	Mean	SD.	CV(%)	Mean	SD	CV(%)	Mean	SD.	CV(%)
Maize									
Addis-Bako	40.57	20.22	49.84	23.40	15.80	67.52	-17.17	-4.42	17.68
Addis-Dire Dawa	35.05	32.46	92.61	41.08	22.33	54.36	6.03	-10.13	-38.25
Addis-Jimma	18.62	26.87	144.31	17.90	14.64	81.79	-0.72	-12.23	-62.52
Addis-mekele	100.60	51.18	50.88	40.34	23.61	58.53	-60.26	-27.57	7.65
Addis-Shashamane	31.92	14.36	44.99	15.76	11.48	72.84	-16.16	-2.88	27.86
Dire Dawa-Bako	76.19	44.17	57.97	64.49	23.51	36.46	-11.70	-20.66	-21.52
Dire Dawa-Jimma	54.82	34.75	63.39	58.98	28.39	48.14	4.16	-6.36	-15.25
Dire Dawa-Shashamane	58.37	19.29	33.05	56.84	23.25	40.90	-1.53	3.96	7.86
White Teff									
Addis-Bako	116.46	41.16	35.34	65.40	19.98	30.55	-51.06	-21.18	-4.79
Addis-Bahir Dar	93.93	22.23	23.67	28.33	18.07	63.78	-65.60	-4.16	40.12
Addis-Dire Dawa	59.01	32.13	54.45	47.72	18.57	38.91	-11.29	-13.56	-15.53
Addis-Hosanna	96.26	36.67	38.10	48.97	17.36	35.45	-47.29	-19.31	-2.64
Addis-Mekele	116.56	58.67	50.34	36.71	22.33	60.83	-79.85	-36.34	10.49
Dire Dawa-Bako	175.12	58.34	33.31	111.52	27.65	24.79	-63.60	-30.69	-8.52
Dire Dawa-Bahir Dar	144.64	33.94	23.47	74.23	21.15	28.49	-70.41	-12.79	5.03
Dire Dawa-Hosanna	146.60	36.19	24.69	95.68	25.52	26.67	-50.92	-10.67	1.99
Mekele-Bako	227.03	74.47	32.80	98.17	32.70	33.31	-128.86	-41.77	0.51
Mekele-Bahir Dar	224.23	45.29	20.20	63.38	32.23	50.85	-160.85	-13.06	30.65
Mekele-Hosanna	239.00	44.04	18.43	83.03	28.08	33.82	-155.97	-15.96	15.39
White Wheat									
Addis-Hosanna	51.96	47.54	91.49	29.13	12.63	43.36	-22.83	-34.91	-48.14
Addis-Dire Dawa	71.62	35.79	49.97	56.49	26.01	46.04	-15.13	-9.78	-3.93
Addis-Mekele	87.17	75.13	86.19	33.12	32.56	98.31	-54.05	-42.57	12.12
Dire Dawa-Hosanna	114.90	36.65	31.90	87.75	24.31	27.70	-27.15	-12.34	-4.19
Mekele-Hosanna	150.10	164.93	109.88	62.67	27.54	43.94	-87.43	-137.39	-65.94

3. The extent to which grain prices at different markets are correlated is important in the design of appropriate market development, stabilization, and food security strategies. For example, if a price increase in one market is not associated with an associated price increase in another market linked by trade, this may (but not necessarily) be because of poor infra structural links between these markets, lack of competition in grain distribution, or other problems that inflate costs in the food system. As an initial step to assess the extent to which grain markets are spatially integrated, correlation coefficients are computed and presented between different pairs of markets which are linked by trade (Table 5). The coefficients are computed

for both prices in levels and first differences.⁶ While there are well-established limitations⁷ of examining market integration through correlation analysis, it can be said that low price correlation between markets is generally indicative of relatively high costs and/or weak transmission of information within the marketing system.

Across all commodities and market pairs, price correlation increased after liberalization in 17 of 24 cases. Of the six cases in which price correlations declined, five of them involved Mekele market. On-going analysis is examining the reason for the apparent disconnection between Mekele, the largest city in Northern Ethiopia, and the rest of the country. Correlation coefficients in the price differences also increased in 17 of the 24 cases. These initial descriptive statistics indicate that cereal market liberalization has generally increased the extent to which prices in the country move together. Such a result generally (but not necessarily) indicates an improvement in market efficiency and reduction in marketing costs, other factors constant. These findings are also consistent with those of Dercon (1994).

⁶The correlation coefficient for levels indicate that to what extent price levels in different markets are related while the correlation coefficient for first differences indicate that how the changes in price levels for different markets are related to each others.

⁷The use of price correlation as a test of market integration is limited in capturing the dynamics of marketing system and in filtering out the common factors like seasonality which gives false indication of market integration. For the discussions on the weaknesses of price correlations and the other methodologies used in testing market integration see Revallion 1986; Delgado 1986; Granger 1986; Johansen 1988; Fackler 1995; Barret 1996. The GMRP is currently involved in more comprehensive assessment of grain market integration in Ethiopia using a cointegration technique.

Table 5 Correlation Coefficients of price levels (first differences) between different markets in Ethiopia

Pair of markets	Levels			First differences		
	Before Liberalization	After liberalization	Change	Before liberalization	After liberalization	Change
Maize						
Addis-Bako	0.85	0.91	0.06	0.34	0.60	0.26
Addis-Dire Dawa	0.42	0.64	0.22	0.44	0.02	-0.42
Addis-Jimma	0.81	0.92	0.11	0.09	0.63	0.54
Addis-mekele	0.28	0.44	0.16	0.43	-0.10	-0.53
Addis-Shashamane	0.03	0.88	0.85	-0.11	0.65	0.76
Dire Dawa-Bako	0.28	0.78	0.50	0.01	0.16	0.15
Dire Dawa-Jimma	0.38	0.61	0.23	-0.21	0.12	0.33
Dire Dawa-Shashamane	0.40	0.64	0.24	0.16	0.28	0.12
White Teff						
Addis-Bako	0.59	0.73	0.14	0.45	0.23	-0.22
Addis-Bahir Dar	0.27	0.75	0.48	-0.08	0.41	0.49
Addis-Dire Dawa	0.44	0.70	0.26	0.51	0.37	-0.14
Addis-Hosanna	0.07	0.79	0.72	0.24	0.42	0.18
Addis-Mekele	0.37	0.23	-0.14	0.07	0.41	0.34
Dire Dawa-Bako	0.08	0.51	0.43	0.18	0.25	0.07
Dire Dawa-Bahir Dar	0.05	0.72	0.67	-0.23	0.35	0.58
Dire Dawa-Hosanna	0.51	0.51	0	0.14	0.19	0.05
Mekele-Bako	0.40	-0.07	-0.47	0.29	0.18	-0.11
Mekele-Bahir Dar	0.40	-0.08	-0.48	0.30	0.48	0.18
Mekele-Hosanna	0.42	0.14	-0.28	0.36	0.18	-0.18
White Wheat						
Addis-Hosanna	-0.73	0.73	1.46	-0.27	0.55	0.82
Addis-Dire Dawa	0.74	0.16	-0.58	0.22	0.12	-0.10
Addis-Mekele	-0.73	0.09	0.82	-0.04	0.04	0.08
Dire Dawa-Hosanna	-0.65	0.25	0.90	-0.26	0.04	0.30
Mekele-Hosanna	0.61	0.38	-0.23	-0.11	0.29	0.40

4. The effects of various factors affecting the maize price levels in six markets (Addis Ababa, Bako, Shashamane, Dire Dawa, Mekele and Jimma) is estimated as a system using Seemingly Unrelated Regression (SURE) model. The results show that for all the maize markets considered except Mekele the signs of the coefficients on the liberalization dummy variable is found to be positive, implying that market liberalization has increased the maize price levels in real terms. However, the increases are significant only in the major surplus-producing areas of Shashamane and Bako markets. In these markets, equilibrium maize prices have been 11 and 4 birr per quintal higher (in constant 1996 birr) in the post-liberalization period. For the deficit market of Mekele, market liberalization was associated

with a significant decline of 28 birr per quintal (constant 1996 birr) in equilibrium maize price levels. These results may also be due to the ending of the civil war.⁸

5. Despite these gains, there remains substantial opportunity to further reduce costs within the grain marketing system. Grain checkpoint (“Kella”) tariffs between five major grain trading routes surveyed in August 1996 ranged from 20% to 33% of the price spreads observed between regional markets and from 5% to 11% of the prices received by producers for these cereals. While these taxes are a source of fiscal revenue for government, they impede grain production, incentives to use productivity-enhancing inputs, and household food security in Ethiopia.
6. The volume of imported food aid wheat since the mid- 1980s has significantly affected cereal prices for wheat and teff in some major wheat-producing areas (e.g., Hosaenna) and in areas where substantial food aid has been distributed (e.g., Mekele, Tigray). The volume of imported food aid wheat has ranged from 0.3 to over 1.1 million tons since 1985, accounting for an estimated 20 to 50 percent of national annual marketed cereal output. Econometric results indicate that food aid released in a particular region was associated with a decline in white teff and white wheat prices in six of 10 cases. In these cases, wholesale prices in a given region and a given month declined by 2 to 5 birr per quintal for every additional 30,000 quintals of food aid released within that region over the prior three-month period. By contrast, the importation of food aid wheat has not significantly affected maize prices in any of the markets examined, presumably due to less substitutability in consumption between maize and wheat. The welfare effects of lower grain prices (due to food aid) on food production incentives, input use, and rural livelihoods are complex and clearly differ among different types of rural household (e.g., those that are net purchasers of cereal vs. those that are net sellers).

4.3 Vertical and Spatial Integration of Grain Markets

4.3.1 Price Transmission Defined

Price transmission is the passing through of prices through either in the vertical or spatial marketing system and is related to the pricing behavior of different market participants. If the marketing system is well-integrated, then price increases should be transmitted to the same extent as the price decreases, i.e., there is no rigidity of price adjustment in the marketing system (Goletti and Babu, 1994). If the conditions of perfectly competitive market prevail the expected relationship between different price levels is that the price change at a given marketing level is also felt, more or less in similar magnitude, at the other marketing levels. In spatially linked markets, the level of price

⁸See Working Paper # 6 pp 13-14 of Annex 5 in part 3 for more information on changes in price levels due to liberalization and food aid releases.

changes in markets located in different locations are also expected to be similar. Any deviation from this norm implies some sort of inefficiencies and the need for investigations. Asymmetric price relationships, in which price change at a given marketing level (location) produces unequal price change at different marketing levels (locations) exists when the market is not competitive.⁹

The prices of agricultural products are influenced by many factors such as the changes in the costs of production and marketing, government marketing policies, and supply and demand situations, structure and concentration of marketing channels, to mention but a few. It is important to see not only why the prices change but also how these changes are felt by different participants at the different levels of the agricultural marketing system. In the contexts of Ethiopian grain markets, there are several reasons for assessing the grain price transmission through the vertical marketing system and across spatially linked markets, in other words, the vertical and spatial integration of grain markets.

Understanding the nature of the existing grain price transmission in the vertical marketing system allows to answer some of the important questions like what are the directions and extent of wholesale and retail prices responses to the changes in the producer price? For example, in Ethiopia, the year 1995/96 witnessed a huge production increase and grain prices were unusually lower, especially, at the producer level. Then, the important question is how and to what extent this price decrease at the producer level was felt at the wholesale and retail levels? Are the wholesale price responses to price increases and price decreases at the producer (or retail) levels equal? Are the consumers benefitting from the producer price decreases through retail price decreases? Thus, the analysis of grain price transmission is used to assess the efficiency of vertical market integration and to identify price response rigidity in the marketing system.

In terms of spatially linked markets, the analysis of price transmission can be used to assess the nature of price relationship and the direction of causal relationship between grain prices in surplus and deficit areas. Which markets, those in grain deficit or grain surplus areas, are very important in determining the grain prices? What is the nature and extent of price responses in the surplus areas to the price changes in major grain deficit or consuming areas and vice versa? Answers to these questions are very important to design and guide effective government market interventions such as price stabilization and food aid distribution policies. For example, in a situation where grain markets in deficit and surplus areas are well integrated the government can minimize the costs of its market intervention and still be effective by concentrating its activity in a fewer important markets. If the markets are very well integrated the effects of government intervention in fewer markets can easily be transmitted to markets in other locations.

⁹ For more discussion on the conceptual aspects of price transmission refer to Working Paper # 9, pp 9-12 in Annex 7 of part 3.

4.3.2 Analytic Results

1. Tables 6 to 8 below for the individual markets the share of producer's price as of the retail price averaged 93% for white teff, 91% for white wheat and 86% for maize. During the Derg period the producers' share of official retail price under the government marketing channel was 61%, 58% and 44% for white teff, white wheat and maize, Thus, compared to the pre-liberalization period producer's price share of retail price for white teff, white wheat and maize increased by 32%, 33% and 42%, respectively. In 1995 constant prices, the average producer prices for white teff, white wheat and maize also increased by 63, 60 and 19 birr/quintal, respectively.

Among the three cereals, the producer's share of retail price was lower for maize as compared to white teff and white wheat. In other words, the share of price spread as a percentage of retail price was the highest for maize. This might be because of the relatively higher storage cost for maize. In terms of the markets considered, the lowest producer price and producer's share of retail price for all cereals was observed in Shambu market which, relatively, as compared to other markets, has weak market infrastructure such as road and communication network.

2. The average wholesaler and retailer price spread were comparable for the three cereals, the wholesaler spread for the cereals considered varied from 6 to 8 birr/quintal and was found to be higher than the retailer spread which varied from 4 to 5 birr/quintal. The proportion of gross price spread as of retail price was 14%, 9%, and 7% for maize, white wheat and white teff, respectively. Thus, the proportion of gross price spread as of the retail price was found to be the highest for maize. This might be because of the difference in the extent of risk associated with moving the grain across the marketing levels.

At the individual market level, especially for Addis Ababa market, the retailer price spread for all the grains considered were found to be very high. The retailer spread was also found to be relatively higher for major consumer markets such as Dire Dawa and Gonder as compared to other markets. This might be due to higher retailing costs or differences in the cost of living in the big consumer markets. The major transfer cost, though the exact estimate is not made, in moving grains across the marketing levels are handling costs such as putting grains in to the bags and storage cost for a very limited period of time.

3. In general, the spatial wholesale price spreads between Addis Ababa and other selected markets were found to be very high. The proportion of spreads as of wholesale price in Addis Ababa (or other markets with higher wholesale price than Addis Ababa's wholesale price) was found to be greater than 20% in 10 of 30 cases, greater than 15% in 13 of 30 cases and greater than 10% in 26 of 30 cases. Among the surplus markets, for all cereals, the highest spatial wholesale price spread was observed between Addis Ababa and Shambu market which has poorly developed market infrastructure. For example, the spatial wholesale price spreads for white teff and white wheat between Addis Ababa and Inchini were higher than that of between Addis Ababa and Nazeret. Addis Ababa market is closer to Inchini market than to

Nazeret by 18 kms, however, the road linking Addis Ababa to Nazeret is by far better than the road linking Addis Ababa and Inchini markets.

Table 6 White teff average real (1995=100) price levels and price spreads in birr/qt for several markets in Ethiopia (August 1996 to July 1997)

Markets	Price levels			Price spreads		Producer's share of retail price(%)
	Producer	Wholesale	Retail	Wholesaler spread	Retailer spread	
Addis Ababa	-	221.77	239.57	-	17.82	-
Nazeret	-	205.39	210.62	-	5.23	-
Ambo	161.44	171.01	177.63	9.57	6.62	91
Inchini	162.84	169.01)	173.53	6.17	4.52	94
Hosaena	138.16	144.39	149.03	6.24	4.63	93
Shambu	112.24	120.35	124.21	8.11	3.86	90
Jima	-	167.25	175.07	-	7.25	-
Shewarobit	179.64	187.08	192.59	7.44	5.51	93
Mekele	-	251.39	256.53	-	5.26	-
Alamata	177.89	190.27	-	13.7	-	-
Shashamane	188.91	194.94	201.34	6.03	6.39	94
Gonder	-	181.60	189.90	-	8.08	-
Nakempt	-	145.34	150.73	-	5.40	-
Ghimbie	-	164.80	167.31	-	2.51	-
Dessie	-	209.14	215.16	-	6.03	-
Dire Dawa	-	260.81	268.89	-	8.08	-
Mean*	157.21	164.46	169.72	7.26	5.26	93

Note: “-” Indicates that the average price levels and price spreads are not calculated for a given market due to insufficient number of observations.

* Indicates the mean is calculated for markets where the price data is available for all the three marketing levels.

Table 7 White wheat average real (1995=100) price levels and price spreads in birr/qt for several markets in Ethiopia (August 1996 to July 1997)

Markets	Price levels			Price spreads		Producer's share of retail price (%)
	Producer	Wholesale	Retail	Wholesaler spread	Retailer spread	
Addis Ababa	-	151.00	163.53	-	12.53	-
Nazeret	-	142.59	149.81	-	7.23	-
Ambo	113.37	121.90	128.01	8.53	6.10	89
Inchini	116.29	122.48	127.38	6.19	4.91	91
Shashamane	123.89	129.51	135.12	5.62	5.61	92
Hosaena	113.44	118.42	122.30	4.98	3.88	93
Shambu	92.79	100.48	104.23	7.70	3.74	89
Jima	-	145.04	152.04	-	7.00	-
Dessie	-	162.05	167.73	-	5.68	-
Dire Dawa	-	196.96	206.26	-	9.30	-
Mekele	225.41	241.77	247.45	16.36	5.68	91
Metu	-	172.16	176.23	-	-	-
Mean*	130.87	139.09	144.08	8.23	4.99	91

Note: “-” Indicates that the average price levels and price spreads are not calculated for a given market due to insufficient number of observations.

* Indicates the mean is calculated for markets where the price data is available for all the three marketing levels.

Table 8 White maize average real (1995=100) price levels and price spreads in birr/qt for several markets in Ethiopia (August 1996 to July 1997)

Markets	Price levels			Price spreads		Producer's share of retail price (%)
	Producer	Wholesale	Retail	Wholesaler spread	Retailer spread	
Addis Ababa	-	80.78	93.44	-	12.65	-
Shashamane	70.34	75.60	81.42	5.26	5.81	86
Hosaenna	-	84.54	88.04	-	3.50	-
Dangila	58.08	62.47	65.11	4.37	2.70	89
Nakempt	-	60.89	65.88	-	5.00	-
Shambu	45.10	52.16	54.85	7.05	2.70	82
Dessie	-	84.99	90.63	-	5.64	-
Shewarobit	75.22	81.93	87.38	6.71	5.45	86
Dire Dawa	-	112.50	120.45	-	7.96	-
Mekele	-	123.29	128.50	-	5.21	-
Gonder	-	89.51	100.66	-	11.05	-
Jimma	-	66.31	72.23	-	5.93	-
Mean*	62.19	68.04	72.19	5.85	4.17	86

Note: “-” Indicates that the average price levels and price spreads are not calculated for a given market due to insufficient number of observations.

* Indicates the mean is calculated for markets where the price data is available for all the three marketing levels.

4. In the case of white wheat and maize, the wholesale price spreads indicate that there are inflows of wheat and maize to Addis Ababa from surplus producing markets and outflows from Addis Ababa market to other deficit areas of Dire Dawa and Mekele markets. Thus, for maize and wheat, Addis Ababa market is both major consumer and major distributing center. However, it is very interesting to note that the maize wholesale price spread between Addis Ababa and Shashamane, one of the most important maize producing area in Ethiopia, was very low. This indicates the fact that maize produced in the Shashemene area was not majority flowing to Addis Ababa market, rather it was consumed in the Southern Region and in addition to this there might be cross-border trading with Kenya.
5. Generally, the markets are linked spatially but the spreads are relatively large. The higher size of spread might be mainly due to under developed market infrastructure and lack of

communication. This highlights the importance of investment in transport sector and provision of market information to improve the spatial integration of grain markets.

6. For a particular market the volatilities of price levels across different marketing levels were found to be very similar. For example, the volatility of white teff price levels across the three marketing levels was either the same or differed only by 1-2% indicating similar level of price volatility across marketing levels in a given market. The coefficient of variation for producers and wholesale price levels are the same in one case and differed by 1% in six of the seven cases. The volatility of white teff price levels at wholesale and retail levels was also found to be very similar in that out of fourteen cases the volatility is found to be the same in seven of the cases, differed by 1% in six of the cases and by 2% only in one case. The volatility of producer and retail prices differed by 1% in four of the six cases and differed by 2% in 2 of 6 cases.
7. The volatility of white wheat price levels across different marketing levels was also found to be very similar, it was either the same or differed by 1-2% indicating similar level of price volatility across marketing levels. For the six of individual markets considered, the coefficients of variation for producers and wholesale price levels was the same in one of the case, differed by 1% in four of the cases and by 2% in one of the case. The volatility of price levels at wholesale and retail levels was also found to be very similar in that out of twelve cases the volatility was found to be the same in seven cases, differed by 1% in two cases and by 2% only in three cases. The volatility of producer and retail prices differed by 1% in four of the six cases and differed by 2% in 2 of 6 cases.
8. The volatility of white maize price levels across the three marketing levels was either the same or differed by 1-3% indicating similar level of price volatility across marketing levels. For four of the maize markets considered, the coefficients of variation for producer and wholesale price levels differed by 1% in two cases and by 2% in two cases. The volatility of price levels at wholesale and retail levels was found to be the same in one of 12 cases, differed by 1% in seven of 12 cases, by 2% in three of 12 cases and by 3% only in one case. The volatility of producer and retail prices differed by 2% in one of the four cases and differed by 3% in 3 of 4 cases.

In general, for the individual markets, for the three cereals considered similar level of price volatility was observed across the marketing levels indicating that there is integration among different marketing levels. Maize price levels were found to be most volatile as compared to white teff and white wheat price levels.

9. Generally, there was a high level of volatility in price spreads among different marketing levels which indicates that there was high level of risk for the traders in passing grain from one level to another. The average standard deviation of wholesaler and retailer spread varied from 1 birr/quintal to 3 birr/quintal, in terms of the coefficients of variation the volatility of wholesaler and retailer spread varied from 26% to 39%.

10. The volatility of spatial wholesale price spread between Addis Ababa and other selected markets was very high, in terms of the coefficient of variation, the volatility was greater than 10% in all of the cases, greater than 20% in 26 of 30 cases and greater than 50% in 12 of 30 cases. Thus, the high level of volatility of spatial wholesale price spread indicates the high risk involved in moving grain across markets. There are many factors contributing to the high level of volatility in spatial wholesale price spread like the imposition of kella charges which increases the uncertainties of grain movements between markets.
11. There was very strong linkages among the prices of different marketing levels for a particular market, the correlation coefficient for price levels were found to be greater than 0.90 in all of the cases, except in Jimma market between wholesale and retail prices of white teff. The correlation coefficient for the first difference prices (changes) also indicate that there were strong relationships among the cereal price changes at different marketing levels, except for white teff between wholesale and retail price changes in Jimma market and between producer and wholesale price changes for Alamata market.
12. The computed correlation coefficients between the spatial wholesale price levels were significant at a probability of less than 10% in all cases, except for Mekele market in the case of white teff and white maize. The spatial correlation coefficient was greater than 0.60 in 23 of 30 cases, greater than 0.70 in 18 of 30 cases and greater than 0.80 in 12 of 30 cases. However, the correlation coefficient for wholesale price changes was not statistically significant in most of the cases, it was not significant in 11 of 12 for white teff, in 7 of 10 cases for white wheat and in 6 of 9 cases for white maize. The lower price correlation coefficient might be because weekly price changes are too short for prices in different markets to adjust.
13. In general, the correlation coefficients between Addis Ababa and surplus markets wholesale price levels was found to be higher than that of between Addis Ababa and deficit markets. The correlation coefficient between Addis Ababa and deficit markets was found to be lower than 0.80 in all of the cases while the correlation coefficient between Addis Ababa and surplus markets were found to be greater than 0.80 in 11 of 19 cases considered. This indicates that Addis Ababa market was more integrated to the markets in surplus producing areas than to the markets in the deficit areas which also implies that Addis Ababa market was more of a terminal market rather than a center of distribution (transshipment) for the grain marketed in the country.
14. The null hypothesis of no causal relationship between white teff wholesale and producer prices was not rejected for three of the seven markets and in four of the seven markets there was either one-way or two-way causal relationship between wholesale and producer prices. Generally, the causality from producer to wholesale was found to be stronger than that of from wholesale to producer indicating that producer price is the driving force in determining the wholesale price for white teff in individual markets.

15. On the other hand, there was a two-way causal relationship in three of the fifteen markets, one-way causal relationship from white teff wholesale to retail price in four of the fifteen markets and from retail to wholesale price in three of the fifteen markets. In the case of the causal relationship between white teff producer and retail prices there was no causal relationship in two of the six markets considered and there was one-way causal relationship in three of the cases, either from producer to retail or from retail to producer and two-way causal relationship in one case.
16. For white wheat, the null hypothesis of no causal relationship between wholesale and producer prices was not rejected for four of the six markets while in two of the six markets there was one-way causal relationship. The causal relationship between wholesale and retail prices was tested for twelve markets, in five of the cases there was no causal relationship between the wholesale and retail prices and there was a two-way causal relationship in one case. On the other hand, one-way causal relationship from wholesale to retail price was observed in four of the cases and from retail to wholesale in two of the cases. In the case of the causal relationship between producer and retail prices there was no causal relationship in all of the cases considered, except in one case from producer to retail.
17. The null hypothesis of causal relationship between wholesale and producer prices of white maize was not rejected for three of the five markets and there was two-way causal relationship between wholesale and producer prices in one case and one-way causal relationship from producer to wholesale in another case. There was no causal relationship between wholesale and retail prices of maize in six of the thirteen markets, two-way causal relationship in two of the cases, one-way causal relationship from wholesale to retail price in three of the cases and from retail to wholesale price in two of the cases. In the case of the causal relationship between producer and retail prices there was two-way causal relationship in one case, one-way causal relationship from retail to producer in two of cases and no causal relationship in one case..
18. The test of causality in wholesale prices of white teff, white wheat and maize between Addis Ababa and other selected markets involved 28 cases. There was no causality only in one case, Addis Ababa wholesale price caused wholesale prices in other selected markets in 10 of the cases, wholesale prices in selected markets caused wholesale price in Addis Ababa in 3 of the cases and they both caused each other in 14 of the cases. Thus, one-way or two-ways, there was strong causal relationship between the cereal wholesale prices of Addis Ababa and other selected markets.
19. For the three cereals considered, the null hypothesis of symmetric price transmission for a given market between possible pairs of price levels having a causal relationship was not rejected in any of the cases. Thus, the results indicate that there was a high degree of transmission of price changes in one level to another, cereal markets in Ethiopia are vertically integrated. The null hypothesis of symmetric spatial relationship between Addis Ababa and other selected markets wholesale prices was also not rejected in all cases which indicates that there was spatial integration of markets for the cereals considered, for 27 of 28 markets where

causal relationship exists the change in Addis wholesale was also reflected in wholesale price changes at different other markets and vice versa.

4.4 A Pilot Market Information System (MIS)

4.4.1. Data Collection and Transmission System

Building on the existing EGTE data collection reporting system, the Grain Market Research Project prepared, new data collection and transmission formats and operating manuals. EGTE technical staff from branch offices and headquarters were trained in data collection, recording and transmission techniques in July 1996. Some 28 senior staff were trained in SPSS techniques and in price analysis methods in August 1996. Five major cereals and 26 markets, considered representative of the country's surplus and deficit market areas, were selected for monitoring in the pilot phase.

The processed data have been reaching the target groups and other users in the form of radio broadcast, weekly market information flash and monthly market information bulletin. The radio broadcast is a weekly program and it has been on since December 1996. It provides information on cereal prices at producer, wholesale and retail levels in 14 selected markets covering major grain markets of the country. The target groups of this particular MIS output are farmers and inter-regional grain traders. The transmission is in Amharic through Radio Fana. The weekly flash which carries information on weekly changes in cereal wholesale and producer prices and flow has been reaching users since March 1997. It comes to users in two ways through radio broadcast (in Amharic) and by mail (Amharic & English). Both Radio Ethiopia and Radio Fana broadcast the Amharic text of the flash. It is also faxed to Regional Councils of Amhara, SNNRP and Tigray. The monthly bulletin provides information on cereal prices, flow and market trend. It comes out regularly every month since July 1996. The target groups for the weekly flash and bulletin are the Government regions, donors, NGO's , international organizations, private firms, and other agencies involved in development.

4.4.2 Evaluation of the MIS

The pilot program was evaluated by an external evaluator in October 1997 about 120 farmers, wholesale and retail traders in 7 MIS markets and 15 government, UN and donor agencies were interviewed using a semi-structured survey instruments.

The major findings of the evaluation indicate¹⁰:

- 1 The system, that is, procedures set up to run the pilot Scheme including data collection and transmission, analysis and dissemination is adequate, sound and replicable. One exception to this is the timing of the radio transmission does not seem to have been studied carefully.
2. Of the interviewed 120 traders and farmers (86 traders and 34 farmers):
 - Forty percent of the traders listen to the radio transmission: 60% of these find the information transmitted useful, and they say it helps them to decide when to buy and sell.
 - All of the traders and farmers interviewed expressed interest in the market information provided and they welcome the transmission. The two main reasons given for not listening were (a) lack of knowledge of the existence of such service and (b) very limited ownership of radios. Radio Fana is the medium of the transmission. An audience research carried out by the Radio Fana itself reveals that about 95% of its listeners are under the age of 35 years while nearly all traders as well as farmers interviewed for the purpose of this evaluation are above 40 years. The result of this evaluation is supportive of the finding of Radio Fana. All those interviewed show preference to Ethiopia Radio. In fact, many admit they do not listen to Radio Fana at all.
 - Brokers based in Addis Ababa play a key role in providing price information at the wholesale level to traders operating in important grain markets like shashemene and Dire Dawa. Over 90% of those interviewed said that the information given by the brokers is reliable.
 - Among the interviewed listeners, 96% prefer evening to morning transmission. The evaluation results indicate the morning program has virtually no audience at all.
 - None of the interviewed farmers heard of the transmission directly or indirectly. Two reasons which might be accountable for this are (a) most of the farmers do not have radio sets and (b) those who own do not listen to Radio Fana.
3. The main views of the fifteen interviewed government, UN and donor agencies, and private institutions on the usefulness of the MIS publications (Weekly Flash and Monthly Bulletin) include:
 - Market and commodity coverage is limited, and too little is given on the analysis of the data presented. Tables and labels on the graphs are not clearly legible.

¹⁰For more information on the evaluation refer to Annex-----

- Most of the interviewed agencies (89% for the Weekly Flash and 93 for the Monthly Bulletin) find the publications useful, refer to the MIS products while assessing vulnerability, local grain purchase.
 - 75% and 47% of the readers of Monthly Information Bulletin and Weekly Information Flash respectively have expressed willingness to pay for the publications.
4. 93% of the respondents favored the establishment of MIS as a public service managed by a public institution. EGTE received the highest rating while MEDAC and MOA are equally favored for becoming home institutions for MIS.

4.4.3 Permanent Home for the Market Information System

An exercise to identify a likely permanent home of the grain market information system has been carried out by the Grain Market Research Project (GMRP). On the assumption that the provision of market information on grain trade would be a public responsibility, five potentially suitable government agencies have been identified for a closer examination. These are: the Ministries of Agriculture and Trade and Industry (MOA and MOTI), Disaster Prevention and Preparedness Commission (DPPC), Central Statistical Authority (CSA), and the Ethiopian Grain Trade Enterprise (EGTE).

Assessment Criteria

The relative strengths and weaknesses of these agencies were reviewed in terms of essential requirements to run an MIS and also against factors considered important at present in Ethiopia in order to successfully manage a market information system in the grain sector. These are:

1. The existing position of each agency as regards staff, facilities and experience to collect, process and analyze data as well as information dissemination.
2. The relevance of information generated to main participants in the grain market.
3. The timeliness of information generated for the purpose of making decisions relating to grain trade.
4. Whether the information produced is readily accessible to principal participants in the grain trade.
5. Whether there are obligations entailing non-MIS data collection, processing and analysis work

that could undermine or negatively affect successful and sustained operation of grain market information by the agency.

6. Whether there is a close linkage between the responsibility of providing grain market information and the main mandate of the agency.
7. The extent to which the prevalence of a successfully operating grain market information system would be a motivation to the agency.
8. Whether the contribution of grain market information to the performance of grain market as well as to the national food security objectives would be optimized.

Potential Government Agencies

The review results of the five government agencies as a permanent home for the MIS based on the factors mentioned above are summarized below.

Central Statistical Authority

- CSA has a respectable capability to collect and process data and disseminate information. It collects producer and retail prices covering more than 500 agricultural and industrial products in 1100 rural markets and 26 urban centers across the country. In terms of manpower and facilities including computers, CSA is reasonably well provisioned. Its analytic experience in grain market conditions is however quite limited.
- CSA provides information on producer and retail prices which are relevant to market participants, provided it is available on time. CSA market information does not provide any data on wholesale prices and grain flow, and this is considered an important limitation.
- It takes CSA on average 3 months to collect, process and disseminate the market information it provides. This is inadequate for making day to day market related decisions by grain market participants, particularly producers and traders.
- The objective of CSA sponsored market information is to facilitate policy and decision making at the macro and sectoral levels. Assisting actors in the grain market (producers, traders and consumers) is incidental.
- It is evident that CSA has ever pressing heavy responsibilities of providing national statistics. Because of this there is concern that placing the proposed MIS within the CSA will deny it the focus of attention it needs, especially in the early stage.
- The principal mandate of CSA is to provide national statistics. The main purpose of grain market information system, on the other hand, is to furnish timely and useful market information to a specific group of clientele engaged in a specific sector. In other words, the

latter is very user specific. Because of this it becomes difficult to draw a strong relationship or linkage between the CSA's main mandate and an MIS that is specifically designed to facilitate grain trade. This weak relationship may not provide sufficient motivation for CSA to be particularly keen about the MIS. The end result of all this might be the institution of an MIS that cannot be effective with little contribution to the food security goals of the country.

Based on the discussion above this assessment ranked CSA the lowest among the five agencies. The conclusion is yes CSA has the potential to serve as the home for the MIS being proposed, but there are limitations suggesting that it may not be the best choice available.

Disaster Prevention and Preparedness Commission

- DPPC through its early warning system collects price and flow data covering main agricultural commodities, particularly important food crops. Data is collected monthly through agricultural development agents in some 329 weredas across the country. It has in its employ 40 staff engaged in data collection, processing and management. DPPC experience in the analysis of data collected as it relates to grain market performance is very limited.
- The price and flow data are collected once a month on a market day at the main wereda market township (often the wereda capital) by the interview method through a single visit at the peak time of the market day. While the data are evidently of relevance to grain market participants, the quality of the data is questionable because of its collection method and frequency. Moreover, price data collection is often at the producer level only which further reduces its relevance as a tool to facilitate grain market performance.
- There are two main outputs from the data collected: (a) a monthly bulletin the main purpose of which is to provide information to government, donors and NGOs on food availability situation in vulnerable areas of the country; and (b) a quarterly report on grain prices the distribution of which is on a request basis, and therefore not readily accessible to producers and traders- the two major actors in the grain market.
- The main purpose of the DPPC sponsored information is to facilitate the mobilization of food aid resources. Its target groups are the government, donors and NGOs. If the grain market makes any use of the information provided, it is only incidental.
- DPPC as an organization is a product of the structural and transitory food shortages Ethiopia has been facing since the 1970's. This means the rationale for the existence of DPPC is food shortage. The Ethiopian Government is bent on removing food shortages through policy, investment and strategies which seek as a matter priority the goals of food self-sufficiency and adequate food security for each household within a short span of time. This implies the existence of DPPC is temporary, unless of course there is a change in its mandate. This fact alone precludes the consideration of DPPC as the permanent home for the MIS, which is expected to play an important role in sustaining food self-sufficiency and household food security.

This assessment believes the existing capacity at the DPPC can further be enhanced to provide grain market information. It is in appreciation of this that DPPC was included in the study, and it is ranked higher than CSA as a possible home. Since the continued existence of DPPC is not certain, it cannot be a realistic choice for placing the new MIS.

Ethiopian Grain Trade Enterprise

- EGTE has the capacity to collect grain price and flow data from about 90 markets including Addis Ababa and to process the data into market information. It has experience and expertise to analyze grain market conditions. It has a branch network covering the entire country. The 90 markets are organized into 60 grain purchasing centers falling under 17 branches.
- Grain prices and flows are collected weekly on a market day at three levels of transaction (producer, wholesale and retail). In the Addis Ababa market, wholesale prices are collected three times a week. The main difference between GMRP and EGTE price data is that while in the case of the former data collection is done by observation, in the latter it is done through interview. It is thus evident that the market information available at the EGTE is relevant to all major participants in the grain market. While admitting there is much room for improvement, the quality of market information produced by the EGTE is reasonably satisfactory.
- It takes about 3 months for EGTE information to reach outside users. This is too long to be helpful to the grain market. It takes however much shorter time, about one month, to make the information ready for internal use.
- EGTE is mandated by the Government to carry on a commercial and a stabilization functions. Although the two seem contradictory, the fact remains that EGTE has been pursuing both functions. Empirical observations indicate that the commercial role is dominant, which will lead to believe that EGTE will have no motivation whatsoever to provide market information to its competitors. EGTE has made it quite evident on several occasions that it is not interested to be responsible for the MIS. Its position is understandable, unless of course it is relieved of its commercial responsibility.

It is the conclusion of this assessment that unless the role of EGTE is limited to stabilization of the grain market with the aim of protecting both producers and consumers against unfair market practices, it will be counterproductive to place the MIS at the EGTE. Since some branch offices are reportedly marked for closure on grounds of poor profitability, it is difficult to envisage that there will be a substantive change in the mandate soon, EGTE cannot be a realistic choice for making it a permanent home for the grain market information system. It is however worth noting that, given no commercial role, EGTE can be a strong contender for the MIS responsibility.

Ministry of Trade and Industry

- MOTI collects wholesale and retail prices on 13 cereals and 10 pulses and oilseeds. It has 7 experts and 1-3 enumerators per wereda town it covers (has presence in 63 weredas distributed in surplus and deficit areas of the country) exclusively for data collection and processing in grain marketing. It is adequately provisioned with computers and printing and communication facilities. It does not include producer price in its market information, which is an important limitation.
- Data collection is done twice a week on a market day in each wereda town. Wholesale and retail prices of a commodity are taken from three traders selected at random on a single visit to each, and the average of the three is taken for the day. Information is obtained by interview. No measurement is involved. Given quality problem inherent in the method MOTI uses to collect data, the information it provides can be useful to the grain market provided it is readily and timely accessible to stakeholders in grain marketing.
- It takes more than three months for MOTI to make the information ready to users. Timeliness problem and the lack of organized system to disseminate the market information generated seem to be the reason behind the reported little or no use of the information by main actors in the grain market such as traders and producers.
- The MOTI market information system seems to have been targeting domestic investors and businesses engaged in the import/export sector in particular. The system has not so far been attentive to reaching the main agents in the grain marketing such as wholesalers, brokers, retailers, and producers and traders in any organized way. Therefore, its contribution to the performance of the grain market sector has not been significant.
- One of the MOTI's mandates is to promote the efficiency and effectiveness of the domestic and international trade. Development of competitively performing grain market is its concern area. Therefore, it is not only that there is a strong linkage between MOTI's main line of responsibility and grain market information system, but also there is reason to believe that the Ministry would welcome to have in its set up a strong, cost-effective and sustainable grain MIS.

The conclusion reached in this assessment is the Ministry of Trade and Industry is a feasible choice to serve as the permanent home of the MIS. Based on the ranking method used in this assessment, MOTI is the second best choice to take up the national responsibility of setting up and managing a grain market information system.

Ministry of Agriculture

- MOA has not previously been engaged in grain market information system per se. In other words, there is not much of MOA past experience to talk about in MIS. However, there seems to exist a new beginning, an awakening, so to say, within the Ministry about agricultural

information, including crop and livestock marketing information. The Ministry has now a relatively new department which is responsible for management information system and data processing services. This department will also be responsible for the National Agricultural Information Systems (NAIS), which at present is in formation. NAIS is tasked with development of policies and guidelines for the establishment of a user-oriented and sustainable agricultural information system, provision of timely and reliable information for policy formulation and evaluation of activities in the agricultural sector, and build national and regional capacity to operate agricultural information systems. The government has officially approved NAIS . It will have a team of 27 experts of whom 10 have already been employed.

- NAIS will have national, regional, zonal and wereda level steering committees, which will primarily be responsible for the coordination of agricultural information. There will also be a number of focal points depending on need. For example, there will be a unit which will specialize in market information on agricultural products. The Ministry has also set up a section within the Agricultural Extension Department which, besides other duties, will handle market information. The relationship between this section and NAIS is not yet clear.
- The focal point of the government for achieving its food self-sufficiency objective is the Ministry of Agriculture. The MOA's main strategy for sustained food self-sufficiency is to increase agricultural productivity. An efficient and competitive grain market is a key component in this strategy. Grain market information is a key component to bring about grain market efficiency and competitiveness. Evidently, the institution and successful operation of a grain market information is vitally important for the MOA to effectively play its assigned role in development.

Of the five agencies reviewed in this study, the Ministries of Agriculture and Trade and Industry are the better choices for placing the MIS permanently. This assessment leans more towards favoring the MOA for two main reasons. First, it provides a much better opportunity for forging a closer relationship and coordination between the MIS and the agricultural extension system, which in turn will further improve producers' access to market information. The logic is the MIS under the MOA will benefit producers and inter-regional grain traders more, and the MIS under MOTI will benefit consumers and big traders more. It is believed that Ethiopia's food self-sufficiency and food security objectives have stronger ties with MOA than with MOTI, and thus the reason for leaning to MOA as the permanent home for the MIS. Second, there is desire to make the MOA a national center for agricultural information, and it is felt that it will be in the interest of long-term growth and development of the MIS to locate it at the Ministry.

4.5 Agricultural Market Performance and Determinants of Fertilizer Use

Agricultural development strategies need to effectively reduce the key constraints to growth. (Hayami and Ruttan (1984), for instance, noted that the constraints imposed on agricultural development by an inelastic supply of land can be offset by advances in biological technology, while the constraints imposed by an inelastic supply of labor can be offset by advances in mechanical technology. The ability of a country to achieve growth in agricultural productivity and output depends on its ability to make an efficient choice among alternative paths of technical change. In this regard, declining farm size will not necessarily translate into underemployment and poverty in Ethiopia if a transition is made to intensive land use and/or rapid growth in non-farm employment.

Recognizing the seriousness of the soil fertility problems in Ethiopia and the necessity of improving agricultural productivity and food security if general economic growth is to occur, the Federal Democratic Republic of Ethiopia initiated a broad based Agricultural Development-led Industrialization (ADLI) strategy in the early 1990s. The strategy concentrates on accelerating growth through focusing on the supply of fertilizers, improved seeds and other inputs. Although food production began to improve after 1994, the country is still facing widespread chronic and transitory in some areas of the country.

There is much debate in the agricultural development literature about whether fertilizer use in Africa is constrained primarily by poor input distribution systems, by farmers' lack of knowledge concerning the benefits and correct use of fertilizer, or by lack of effective demand because the product is simply not profitable enough. GMRP looked at each of these issues in an effort to understand the relative importance of the different constraints in Ethiopia and how well current policies are addressing the problems.

4.5.1 Market Development and the Supply of Credit

Fertilizer demand is heavily influenced by the market structure and credit availability. The recent economic reform has liberalized the fertilizer market and allowed the participation of the private sector with the aim of improving distribution and consumption. Progress has been made to improve the supply of fertilizer credit, but our review of the sub sector suggests that more can be done to increase the efficiency of the fertilizer market and the credit program.

The fertilizer market

Access to fertilizer is thought to have improved as a result of the input market liberalization. However, the full benefit the reform has yet to be realized because of various limitations in the marketing system. There are at least two major problems associated with the existing structure of the fertilizer market which seem to have affected demand directly or indirectly: (1) retail markets are poor developed (most sales to farmers going through a limited number of retail outlets run directly by the major distributors / wholesaler), only one company provides retail services so there is lack of competition at the local level.

Limited participation by small-scale wholesalers and retailers has made the fertilizer market uncompetitive and inaccessible. For instance, about 80% of AISE's (former AISCO's) sales in 1997 were through distributors/wholesalers (mainly Ambassel, Dinsho and Guna). The share going to retailers, individual farmers and the non-peasant sector was 15, 2 and 3%, respectively. In the case of Ambassel, direct sales to farmers and service cooperatives accounted for 52 and 39% of the total sales, respectively, in 1997. Small wholesalers accounted for only 3% of the total sales of the company. The remaining (5%) was sold to state farms. In 1997, most sales of EAL were directed to the large distributors such as Ambassel, Dinsho and Guna which also carried out the retailing operations.

Retailing by the large firms implies that sales or retail outlets are few and concentrated in the towns and along the major roads, and the terms and conditions of sales are not sufficiently flexible. It is often expensive and sometimes unmanageable for the large distributors to maintain several sales centers within a given wereda and provide sales service throughout the year. Often the companies do not have the capacity to sell fertilizer on flexible terms (e.g. on the basis of informal credit arrangements or exchange for grain). A more efficient, flexible and a wider distribution of fertilizer can only be ensured if local traders are allowed to participate fully. Among the major reasons for the lower rate of participation were the manner in which credit is allocated, the removal of subsidy and the unattractive wholesale price fixed by the government, and limited access to credit.

Excess supply was a serious constraint in 1996 and 1997 and the problem was more serious for some than for the other firms. In 1996, for instance, AISCO and Ambassel sold 72.9 and 75.3% of their total supply, respectively. The performance of both firms was well above EAL which was able to sell only 29.2% of its supply.

In 1997, AISE sold only 46% of its total supply. The performance of EAL improved significantly over the previous year, with 69% of stocks sold. EAL sold fertilizer to other distributors such as Ambassel and Dinsho at dumping prices to get rid of its unsold stock from the previous year. The performance of the other dealers, namely Ambassel and Dinsho, was much better than EAL and AISE.

The firms with huge carry-over stocks incur considerable additional costs in the form of storage and interest charges. The extra cost may be covered by the firms themselves or passed on to the farmers. In any case, failure to sell the available supply implies serious uncertainty, besides the financial problems.

Part of the carry-over stocks for all firms can be attributed to incorrect demand forecasts. EAL, however, claims that the exceptionally large size of their 1996 carry-over stocks is due to an uneven playing field caused, in large part, by the structure of the credit program. EAL claims, for example, that all credit sales in the Amhara region are directed to Ambassel. This has permitted Ambassel to progressively dominate the Amhara market so that by 1997 the firm supplied 99% of the total fertilizer sold to farmers, state farms, private commercial farms, and research centers in the region. If EAL's claims are correct, this raises serious questions about the extent to which current fertilizer policy is fostering the development of local monopolies and discouraging private investment in the fertilizer sector.

The fertilizer market in SNNPR is not as monopolistic as that in Amhara, but it was dominated by AISE which accounted for 84% of the total sales in 1997. The remaining 16% was supplied by EAL.

More competition was evident in the Oromiya region, but the competition did not reach all the way down to the wereda level. Three companies supplied Oromiya farmers in 1997, namely AISE (37% of the market), EAL (33%) and Dinsho (31%). Although the market shares are similar, the firms usually operate in different localities so there is no effective competition at the local level. The local authorities direct all credit sales to Dinsho in weredas where the company operates. Dinsho faces no threat of competition from AISE as the farmer is largely recognized as wholesale agent of the latter (except in rare cases like dumping by EAL in 1997). Credit sales by AISE are approved in areas not covered by Dinsho or AISE. Hence, fertilizer buyers in a given wereda do not have the opportunity of choosing among dealers in the region.

Fertilizer distribution is characterized by the principal-agent relationship between importers and wholesalers/retailers. Distributors, wholesalers and retailers are not in a position to call on several suppliers and obtain the best possible deal. They operate as commission agents of the importers and are therefore unable to establish themselves as fully independent and competing operators. If the plan to introduce licensing of fertilizer dealer/a agents by the government becomes effective, dealers will have the opportunity to buy the input from importers, distributors of their choice. This will widen the distribution network and attract new entrants into the market.

Fertilizer demand is also affected by regulated prices. Although retail prices have been deregulated (since February 1997), the wholesale price is still fixed by the government. Although the wholesale price for 1997 was announced earlier than the previous years, dealers took a long time to work out the implications for retail prices for the various regions or sites. For many farmers, sales start long after they have sold their grain, not when their cash constraint is less binding. The market is expected to improve with the deregulation of the wholesale fertilizer prices by December 31, 1997.

The credit program

Fertilizer sales are largely financed through credit in Ethiopia. It is estimated that close to 80% of annual fertilizer purchases are covered by credit from the banks. Historically, fertilizer demand has gone up and down following increases and decreases in the supply of credit.

Although credit repayment has improved under the new arrangement and the volume of credit supply has been increasing in recent years, it appears that the approach suffers from some serious limitations with important implications for fertilizer demand. The system has resulted in direct intervention by the government in the financial market. Credit allocation and collection procedures have deviated from the principles of normal banking operations, leading to distortions, delays in sales and unnecessary strains on the farmers as well as on the administration and extension staff. The allocations of loans are not only bureaucratic but also contrary to market principles. For the most part, only firms favored by the authorities are nominated as suppliers: mainly Ambassel in the Amhara region, Dinsho in Oromiya and AISE (together with its wholesale agents) in the Southern. Administrative measures applied to enforce repayment can also be harsh and inconsiderate of the

farmers' circumstances. For instance, collection begins immediately after harvest in all areas. All farmers are forced to bring their produce to the market at the same time (to pay their fertilizer debts, taxes, etc.). As a result, supply exceeds demand and prices fall sharply whenever farmers are pressed for repayment. The system does not accommodate the interests of farmers who are willing to incur additional interest costs by delaying crop sales in hopes that prices will rise later in the year.

The penalties for all those who failed to repay immediately after harvest may include the sale of assets (e.g. oxen or other animals). Farmers may develop a negative outlook towards fertilizer loans and become more risk-averse. Another commonly practiced measure is to withhold fertilizer credit to cooperatives with defaulting members during the next season. Decisions to withhold credit sales until all members of a given service cooperative have paid their debts are likely to cause unnecessary delays and penalize too many non-defaulting farmers.

Realizing that the marketing and the credit delivery systems are among the major factors contributing to the smooth operation of the market, the government intends to introduce a coupon system. This system would reduce the influence that local officials now have in directing farmers toward particular suppliers. With coupons, farmers will be able to purchase inputs from suppliers of their choice, thereby creating a more competitive distribution network. The coupon system will not, however, resolve the problems associated with the lack of farmers' organizations capable of handling credit allocation and recovery operations.

The absence of an effective peasant institution for credit delivery is the other major problem associated with the existing credit system in Ethiopia. A typical service cooperative has over 5 to 6 member peasant associations or over 1000 member households. It is simply too large to provide effective screening of borrowers, identify genuine defaulters, generate reliable demand information, and/or exert any form of peer pressure on members to make timely repayment of debts. At present, local community participation in screening borrowers and filtering genuine defaulters is minimal. The authorities and the leaders of service cooperatives have no objective means of assessing the extent of the crop loss. Weak cooperatives are also the main reason for the government intervention in the credit market and diversion of valuable extension time to administrative affairs. Hence, the effort to restructure service cooperatives into smaller groups needs to be stepped up.

Finally, unlike loans extended to the non-farm sector, fertilizer credit is not insured. The loan is expected to be paid regardless of the harvest. There are no clear provisions to help those requesting even the postponement of repayment for the next season. The sale of critical assets like oxen becomes unavoidable in situations of crop failure. When risk of crop failure is high, credit programs that do not have flexible repayment terms often fail to provide farmers with adequate incentives to use fertilizer. This is a particularly severe problem for resource- poor farmers.

4.5.2 Optimum Rates of Application and Fertilizer Profitability

One of the major factors affecting demand for fertilizer is profitability. As shown below the profitability of officially recommended levels of fertilizer use has declined in recent years because of changes in both input and output prices.

Higher application rates were recommended to farmers after the Agricultural Development Department/ National Fertilizer and Inputs Unit (ADD/NFIU) conducted four years of fertilizer trials (1988 to 1991). The results of these experiments showed that farmers needed to apply a significantly larger amount of both nitrogen and phosphorous if they wanted to use 'economically optimum application rates'. The ADD/NFIU researchers defined 'economically optimum application rates' as doses that produced a marginal rate of return of 100% (this is approximately the same as saying that the value/cost ratio must equal 2) The optimum rates recommended by ADD/NFIU vary by crop and region but a larger (relative to the recommendation of the MOA) amount needed to be applied in each case. In the case of teff, for instance, farmers in Shoa needed to apply 91 kg of urea and 124 kg of DAP per hectare (an increase of 115 kg of fertilizer over previous recommendation) to get optimum results in 1992. Recommendations for wheat in Shoa increased to 114 kg of urea and 130 kg DAP (a 144 kg increase).

Drawing mainly on these results, the SG 2000 project and the government's new extension program began recommending that farmers use 100kg of urea and 100kg of DAP per hectare for all cereal crops in most areas.

In order to assess recent changes in fertilizer profitability, the value cost ratio (VCR) has been calculated for the years 1992 (the year immediately after the grain market liberalization) and 1997 (after the removal of the fertilizer subsidy) using the fertilizer recommendations and yield responses reported by ADD/NFIU. The results demonstrate that fertilizer profitability declined sharply between 1992 and 1997. Across the country, the VCR for teff declined by 55%, i.e. from 3.74 in 1992 to 1.69 in 1997. The sharpest fall was observed in the case of maize: its VCR declined by 67%. A decline of 48, 47 and 41% was observed for wheat, barley and sorghum, respectively.

In 1997, the VCR fell below the critical threshold of 2 for 71% of the site/crop combinations examined; in 1992 there were no cases less than 2. Among the five crops, only barley came out with a 1997 VCR consistently greater than 2 regardless of site. Wheat was the next most profitable crop, with an average VCR of 2 across all sites; two of the four sites examined attained a VCR greater than 2. The lowest profitability was observed in the case of maize and sorghum (VCRs of approximately 1.5). The VCR for teff, the most fertilized crop, was 1.7. The minimum teff price would have to increase by 19% over the harvest season price of 1997 for farmers to realize a VCR of 2 in the teff production areas of the Shoa region. In general, fertilizer use on barley, wheat and teff was more profitable in 1997 than use on maize and sorghum.

In practice, many farmers tend to reduce their rate of fertilizer application following higher fertilizer prices (relative to output prices). Indeed, the profit maximizing doses estimated using 1997 grain and fertilizer prices are substantially lower than those for 1992. The analysis shows, for example, that the

profit maximizing urea and DAP application rates in 1997 are 22% and 31% lower than those for 1992. This example suggests that fertilizer recommendations should be revised in response to large changes in market conditions; such revisions would be particularly important following the removal/reduction of fertilizer subsidies or changes in output market stabilization policies. Although a sharp decrease in the profit maximizing fertilizer dose suggests that farmers should reduce their fertilizer applications, it does not mean that they should ignore the fact that lower fertilizer, research and extension services need to work harder to promote alternative practices to maintain soil fertility such as the use of crops residues and manure to increase soil organic matter.

Among the main reasons for the declining profitability are the rising fertilizer prices relative to output prices. Fertilizer prices have sharply increased in recent years because of devaluation, removal of subsidies, and imperfectly competitive fertilizer markets following liberalization of the fertilizer sector. The major factors contributing to the drop in grain prices between 1992 and 1997 are abundant harvests and pressure on farmers to market their output immediately after harvest so they can pay off input credit.

4.5.3 Identifying and evaluating the relative importance of factors influencing fertilizer consumption

Fertilizer or adoption decisions are made at the household level, so it is imperative to understand the set of factors influencing household level, so it is imperative to understand the set of factors influencing household decisions. Previous adoption studies in Ethiopia have examined a wide range of factors; results have not always been consistent across studies. The seemingly inconsistent results have not always been consistent across studies. The seemingly inconsistent results for some important variables may be attributed to differences in the area of study, smallness of the sample size and specification of the model. The relevance of the results beyond the districts of the study may also be limited.

Descriptive analysis

By way of conceptualizing the factors influencing fertilizer adoption and intensity of use, the factors influencing fertilizer demand have been grouped into the following seven categories: profitability, risk factors, human resources, extension services, household assets, financial liquidity, and market access and structure. The results obtained with respect to each of these factors are summarized below.

(a). Fertilizer profitability:

The proxy variables used to reflect factors influencing fertilizer profitability were cropping pattern (i.e. share of area planted to different crops), use of complementary inputs, average rainfall and altitude. The fertilizer adoption rate was hypothesized to be higher in the case of more profitable crops such as teff and wheat, usage of complementary inputs, higher rainfall and higher altitude areas.

Across the four major fertilizer consuming regions, the share of teff in total area cultivated is larger for fertilizer-using households (26%) than nonusing households (17%). The difference in percent of area planted to teff by users and nonusers is significant in all regions but Tigray. Wheat is also popular among fertilizer users, with significantly higher percentages of area cultivated by users.

The preference for teff and wheat production among users is partly related to profitability (as shown above). But other factors, such as relatively more stable and higher prices for teff and wheat may also encourage (and enable) teff and wheat farmers to use fertilizer. The tendency for farmers with a large percent of area planted to sorghum to be nonusers can be understood given the lower profitability of fertilizer on this crop and the fact that it is grown in areas characterized by high risk of crop failure due to drought.

The proportion of households using improved seeds, pesticides, and irrigation is generally very small. These practices are, however, more common among fertilizer users than nonusers.

The most interesting finding concerning complementary practices is that weredas using fertilizer have a statistically higher percent (11 to 17) of farmers also using manure in all regions but Tigray. This suggests that manure may be used as a complement to fertilizer as well as a substitute for it. It also suggests that resource-poor farmers who do not have access to chemical fertilizers may also not have access to manure; fewer than 50% of farmers in all the nonusing-wereda reported using manure.

(b). Production Risks:

The degree to which farmers are constrained by risk factors in using fertilizer is assessed using proxy variables such as percent of households which received food aid at least once during 1991-1995 and percent of households reporting crop damage in 1995/96. Overall, 45% of the households in the non-user weredas received food aid, compared to 30% in fertilizer user weredas.

As anticipated, fertilizer adoption is also lower in weredas where a high percent of households reported experiencing crop damage. High risk of crop damage, whether it comes from climatic factors, pests, or disease, makes investment in fertilizer unattractive. This can be particularly true for resource-poor farmers with few assets to fall back on when losses from crop damage are severe.

(c). Extension Services:

Overall, about 59% of the households in the fertilizer using category knew about the new extension program (NEP), compared to only 43% in the non-using group. The difference is statistically significant for all regions but Tigray. A similar statistically significant difference was observed with respect to whether or not the household participated in NEP. For the entire sample, 12% of the households in the user group participated, as opposed to only 3% in the non-user group.

(d) Human Resources

For the overall sample, the literacy rate among the fertilizer using households was 7% higher than among nonusers and the difference was statistically significant. The results generally confirm that literacy has a positive influence on fertilizer adoption.

No significant difference was observed between the two groups with respect to age. Similarly, experience infarming (measured by the number of years the respondent has been operating as a farmer) is not significant for any of the regions. The significance of the experience variable for the overall sample, however, does suggest that users have slightly longer experience in farming than non-users.

The evidence does not support the argument that female headed households have fallen behind their male counterparts in terms of fertilizer adoption. For the entire sample, the percentage of female heads in users group was 15% compared to 13% for nonusers and the difference was not statistically significant.

(e) Household Assets:

Household assets are represented by the number of tropical livestock units (TLU) owned per household and per capital, farm size in hectares, and the number of traction animals owned per household. The results are consistent with the argument that fertilizer users are likely to have more assets. Fertilizer using households on the average own 5 TLU, as opposed to 3.65 in the case of nonusers.

A similar marked distinction between users and non-users was observed with respect to ownership of traction cattle. On the average, fertilizer users owned 1.52 draft cattle, while nonusers owned only 0.99.

Farmers who used fertilizer in Amhara and Oromiya cultivated more total land (.76 to .83 hectare more) and more land per person (0.13 hectares more per person) during the meher season of 1995/96 than farmers who did not use fertilizer. These are large differences given that average farm size for the overall sample is only 1 hectare.

The result that non-users cultivate smaller land than users contradicts the argument that intensification is (or should be) higher on smaller farms (to compensate for land shortage). The reason may be found in the nature of smaller farm in Ethiopia. Households with very small plots seldom produce enough grain to meet their family's consumption requirements. Such families (unless they rely on enset as in SNNPR or food aid as in Tigray) are likely to be dependent on the market for their food. Some families (e.g. poor families with no oxen and very little family labor) may largely rely on income earned from rented-out or sharecropped land and retain only a small plot which is planted without fertilizer. Others are more likely to be involved in various non-farm activities and wage employment (e.g. food for work) to survive. Even with fertilizer, many may not be able to produce for the market.

(f) Financial liquidity:

Financial liquidity of a farmer is proxied by physical proximity to a bank, membership in a service cooperative, and net market position (sales minus purchases of grain) in a year of average rainfall. Indeed, all but the net market position are important determinants of fertilizer adoption. The average number of banks per woreda is 0.32 for user woredas, compared to 0.19 for non-users. The percent of households declaring to be members of service cooperative is also higher and statistically significant for user woredas in SNNPR, Oromiya, Amhara and for the overall sample. Fertilizer credit is generally made available through service cooperatives.

That access to credit in rural areas is a critical bottleneck that can be clearly seen if one looks at the distribution of bank branches by woreda. A total of 294 woredas or 79.2% of the sample woredas have no bank branches at all. There is 1 bank in 54 woredas (14.6%), 2 in 19 woredas (5.1%), 3 in 3 woredas (0.8%) and 4 banks in only 1 woreda (0.3%). Micro-financing schemes are largely non-existent to fill the gap. Limited access to banks has affected both the farmer and the small dealers in the rural areas.

(g) Market access:

The proportion of households located within 10 kms from a place where grains are exchanged is larger for user woredas but the difference is significant only for Amhara. A more important factor in fertilizer use is rather found in the number of fertilizer distribution centres per woreda. Fertilizer using woreda across the four regions have 6 more distribution centers per woreda than nonusing woreda.

Regression Analysis

A total of 361 woredas were included in the econometric analysis, based on data collected from the CSA Agricultural Survey and the GMRP Food Security Survey, both covering the 1995/96 crop year. A selectivity model was used to address the issue.

The results of econometric analysis can be summarized as follows:

- Access to fertilizer, credit, and extension services are of major importance in determining whether fertilizer is used in a given woreda. The following variables were positively associated with woredas where fertilizer was used: number of fertilizer distribution centers, average distance of households from markets, number of commercial and development banks in the woreda, and interaction with extension agents.
- Major teff producing areas were also found to be positively related to fertilizer use at the woreda level. Sorghum area was associated with a negative but not strongly significant impact on the probability of fertilizer use in a given woreda.

- For reasons that are not entirely clear, the percentage of female-headed households was positively related to the probability of fertilizer use.
- Perhaps surprisingly, neither rainfall, elevation, average farm size, nor livestock assts significant affected whether or not fertilizer was used in a given weredas.
- Strong domain-level effects also influenced whether or not fertilizer was used in a givenwereda. The highest use of fertilizer by zone, after accounting for other included variables, is Hadyia, Gurage and Kembata, as well as East and West Hararge.
- The most important factor explaining the quantity of fertilizer used per hectare is average farm size. As farm size increases, so does the intensity of fertilizer use.
The amount of livestock ownership is positively related to fertilizer use intensity.
- Variables such as rainfall, elevation, and membership in service cooperatives were not statistically associated with intensity of fertilizer use.

Chapter 5. Increasing Household Access to Food through Improved management of Food Supplies.

In this section the Grain Market Research Project has carried out four research activities. These are:

1. **Grain Price Stabilization: The Pros and Cons of Alternative Options** (The full report of the study can be found in Working Paper # 11, Annex 9 of part 4.
2. **Food Aid as a Tool for Meeting Price Stabilization Objectives through Local Grain Purchase.** This study was based on the experience of the European Union in local cereal purchase as part of its food aid program. The full report of the study can be found in Working Paper # 7, Annex 8 of part 4.
3. **Efficiency of Food Aid Targeting in Ethiopia.** This is a study of food insecurity and food aid distribution in Ethiopia. The full report of the study appears in Working Paper # 12, Annex 10 of part 4.
4. **The Impact of Food Aid on Market Behavior.** This work is still on-going. Upon completion, the report will come out as GMRP's Working Paper # 13.

In this section of the report, major findings of these four studies are presented.

5.1 Grain Price Stabilization

5.1.1 What is Price Stabilization

Price stabilization is not an objective by itself but a means to achieve objectives. Governments' agricultural policy objectives typically include (1) food production growth; (2) greater use of improved technology to raise rural productivity; (3) improved and more stable access to food for the poor and vulnerable households; and (4) minimizing government budget deficits associated with achieving these objectives. The achievement of these objectives can be critically affected by the manner in which governments address the problem of instability in agriculture.

The reasons for stabilization are often very compelling. In low-income countries such as Ethiopia, the poor spend as much as half their income on food grains (CSA 1997). Any serious instability in prices may severely affect their ability to purchase food, resulting in hunger and even starvation. Also, unstable food prices often have important macroeconomic consequences. Large fluctuations in cereal prices may thus affect general price inflation, interest rates, and other macroeconomic

variables that ripple broadly through the economic system (Delgado 1992; Thamasa and Ravillion). These important effects of price instability often escape measurement when using static economic frameworks (Ahemed 1988).

During the 1960s, 1970s, and 1980s, most African governments have dealt with the problems of food price instability through controlled marketing and pricing systems. In some cases, the controlled food marketing systems were successful in reducing the magnitude of price instability felt by selected producers and consumers. In even more cases, they have actually exacerbated price and supply instability. In almost all cases, they have generated large financial deficits that became increasingly unsustainable. Largely in response to the deficits generated from the stabilization and price control policies of agricultural marketing boards, and under pressure from international aid agencies, almost all African governments had by the mid-1990s reduced the role of state marketing boards and adopted more “market-oriented” grain marketing systems.

5.1.2 Stabilization Issues

Some important conceptual issues to consider in the design of stabilization policies in Ethiopia are:

1. What is it that should be stabilized? Producer prices, consumer prices, producer revenue, or cereal consumption? The design of a program would differ depending on the answer to this question.
2. Should stabilization focus on all cereals or just one or two? In Ethiopia’s case, there are at least four major cereal crops that each constitute the most important staple crop in different areas of the country. If confined to only one or two commodities, stabilization schemes may create shifts in production and consumption patterns through their effects on relative prices (i.e. the price of one commodity compared to others).
3. While it is commonly felt that incentives to use cash inputs on grain crops may be depressed by low grain prices, low prices do not necessarily mean that producers are worse off. If low grain prices occur as a result of favourable weather, and farmers have more to sell than ordinarily, then the resulting revenue from crop sales may actually increase, and improve their ability to finance input purchases in the next season. For example, a farmer that sells in a normal year 5 quintals of grain at 100 Birr per quintal (500 Birr gross revenue) would receive less revenue than in a good year when the price is only 60 Birr per quintal but the farmer had 10 quintals to sell (600 Birr gross revenue). Therefore, low prices do not necessarily mean that producers are worse off.
4. Stabilizing commodity prices does not necessarily stabilize farm revenue. In most cases, revenue stability is more important than price stability in determining whether farmers have the incentives to use cash inputs and expand cultivation. In fact, when the absolute value of

price elasticity of demand is greater than 0.5 and changes in the supply function are the source of price fluctuation, then price stabilization would actually increase the instability in gross farm revenue from a particular crop.

5. Analysis of price stability in Ethiopia requires differentiating among at least three classifications of farm households. The first are the large number of households who produce almost completely for their own use and are not dependent on the market for food. Included are those whose market transactions in grains are so small as to have only a very minor influence on real incomes. Here the question is would more stable prices influence them to (1) invest more in productivity enhancing inputs and (2) specialize in a marketable crop and rely on the market for more of their food?

The second are the large group of farm households, including grain producers, who are net buyers of grain. These households are adversely affected by policies that raise the prices they pay for staple food. Moreover, the ability of net-food-buying farm households to purchase cash inputs is negatively affected as grain prices rise. The higher the price of grain, the more of their scarce income must be spent on procuring grain for household consumption, leaving less money to purchase inputs. The third group is the smaller group of households who are significant net sellers of grains. These are the households most likely to base their decisions about the use of inputs on the price of the inputs compared with the expected value of the output. As mentioned earlier, price stabilization is not necessarily consistent with stabilizing the expected value of output.

6. Concentration of cereal sales by farm households: In (Table 9), the sample rural households are ranked by deciles, according to the amount of yearly gross grain sales.

The 10th decile sold on average some 974 Birr in grain, and that this 10 percent of households accounted for 57 percent of the total grain sold by the smallholder sector in the 1995/96 crop year. About 40 percent of the rural households in Ethiopia sold no grain at all during the 1995/96 year, the best production year on record. The concentration of marketed output in Ethiopia indicates that government expenditures on price stabilization will be captured by a very small segment of farmers. The beneficiary farm households most likely include those with large landholding and farmer/traders who purchase direct from farmers to resell to the market. A major policy issue is how to raise and stabilize incomes for the bottom 50 percent of farm households who sell less than 1 percent of the total grain sold and might even be hurt from a support price policy on cereals.

Table 9. Ranking of Deciles of Smallholder Households According to Gross Grain Sales Over the Period of October 1995 to June 1996.

Decile	Average Value of Gross Grain Sales (Birr)	Cumulative percent of Gross Sales	Average Value of Net Grain Sales (Birr)
1	0	0	-553
2	0	0	-370
3	0	0	-315
4	0	0	-168
5	10	0.5	-290
6	66	3.3	-144
7	141	9.5	-37
8	277	21.5	18
9	484	42.6	249
10	1317	100	974

Source: Food Security Survey, Grain Market Research Project/CSA Household Survey (1995/96).

7. Not all price instability is "bad." Some part of price instability is predictable and indeed necessary to the proper functioning of a market. For example, intra-seasonal price rises are necessary to provide the incentives for traders to store grain until the hungry season. If prices were totally stabilized through the season through purchases at a fixed price by a marketing board, then private traders would have no incentive to buy grain for temporal arbitrage and by default the marketing board would accumulate a much larger share of the total grain sold by farmers.
8. It is useful to distinguish between instability and unpredictability. Unpredictability may be regarded as the unanticipated component of price instability, in contrast to that part of price fluctuations that are predictable (e.g., seasonal price patterns). (See Working Paper # 11, Section 4, for more discussion on price unpredictability).
9. If the main intention during a good harvest year is to support producer revenues, the question arises whether this should be done through a support price policy, food aid, local procurement through donors contracting with private traders, or some other form. If it is decided that a marketing board will offer support prices to farmers, then the level of the support price is a major issue. In general, the higher the support price (or lower the ceiling price) relative to prevailing market prices, the greater the financial burden. In the case of the Ethiopian price stabilization effort in the 1995/96 season, the target price was reportedly based on the cost of production. Yet there are clearly great differences in costs of production among farms in different situations. Other factors to be considered in the setting of marketing board price supports include the expected price at which the marketing board can sell its acquired stocks without loss. This raises the issue of prices in potential importing countries, and the importance of trade links as a vent for surplus production, as well as to acquire food commercially at lowest cost during production shortfalls.
10. The potential benefits of price stabilization must be weighed against the costs. The most important cost of price stabilization is the foregone investment in cost-reducing infrastructure, agricultural research, and other public investments that contribute to farm productivity growth

and national food security. Costly price stabilization schemes can also have potentially destabilizing macroeconomic effects. In Zambia during the late 1980s, the state food marketing board accumulated annual budget losses equal to 15 percent of GDP (Howard 1994). These deficits clearly influenced the general price level and other macroeconomic indicators. The case of Zambia illustrates that price instability can be exacerbated both by what the state does as well as doesn't do in the sphere of price stabilization. Smallholder farm productivity in Africa will be tied to the *cost-effectiveness* of future approaches to stabilize the food system.

5.1.3 Main Findings

Price Support program

In response to the forecasts and reports of low grain prices in 1995/96 , EGTE responded with a policy intended to ensure minimum prices of selected grains for farmers. Farmers were to receive 70 Birr per quintal for maize and 116 Birr per quintal for wheat (white or mixed) delivered to EGTE depots. These prices were higher than the prevailing prices at the time. Prices were fixed through the season and were uniform with respect to location. Traders delivering maize and wheat to EGTE could sell at the prevailing market price. The farmer beneficiaries were concentrated in Nekempt, Hosanna, Jimma, Bahir Dar, and Debre Markos (for maize support payments) and in Assela, Hosanna, and Bale Robe (for wheat support payments). Considering the volume actually purchased by EGTE at the support price, the amount transferred to farmers per ton was Birr 6.81 for maize and Birr 1.94 for wheat. If EGTE were to purchase a significant share of the marketed maize output (e.g., 50,000 tons, or roughly 13 percent of the 391,000 tons marketed in 1995/96 , the cost of supporting maize prices at 70 Birr per quintal is estimated at Birr 3.41 million (US\$0.54 million). This underscores the point that the costs of the support price policy were limited in the 1995/96 season because only a relatively small part of the marketed maize and wheat output was actually purchased by EGTE. Substantially higher budget costs would have been incurred if a large portion of the marketed maize output would have been purchased at the support price by EGTE.

Export Option

Ethiopia's position to competitively export grain (when the situation presents itself as in 1996) has been enhanced by policy measures the Government has taken such as .. simplification of licensing procedure, reducing import tariff, eliminating export tax, reducing custom duties, reducing effective protection, introducing an auction system of foreign exchange, devaluing the Birr, introducing of foreign exchange retention scheme, etc. in order to liberalize foreign trade. This was evidenced in the effort Ethiopia has made to export maize to kenya and other countries in 1996/97.

Local Grain Purchase

Food aid has potential to stabilize producer prices of cereals. Without the EU's local purchase of maize, wheat and sorghum estimated at about 8.3 percent, 10.3 percent, and 18.4 percent of the total

volumes marketed of these three commodities in the 1995/96 meher season, producer prices would have been lower than they were.

The choice Between Input Subsidy and the Output Subsidy in the Price Support Program

Using the value cost ration (VCR) indicator and input/output prices (with and without subsidy) of 1995/96, five scenarios have been considered to compare the options between input and output subsidies. The scenarios are

- . Scenario 1 No subsidy (input or output)
- . Scenario 2 Fertilizer subsidized
- . Scenario 3 Output subsidized (EGTE 1995/96 price support program)
- . Scenario 4 The price support program increased by Birr 10/qt.
- . Scenario 5 Using output price that provided a VCR of 2 to produces (risk return)

In all cases, the input subsidy and the producer price support program (output subsidy) have improved the returns to input use (VCR) as compared to the unsubsidized base case. The per unit input subsidy resulted in higher return or increased the VCR in most of the cases. However, in two cases (Limu Kosa and Mana in Jimma), the price support program brought higher return to farmers than the input subsidy.

In most of the cases in Table 10, since the unit rate of input subsidy (I/f) is higher than the unit rate of output subsidy, producer's return fertilizer is higher than in a price support program. It is only in two cases where the unit rate of input subsidy is less than the unit rate of output subsidy, thus stabilizing producer prices is more useful to producer compared to input subsidy. Thus, it is useful to policy makers, to know VCR's in the four scenarios and make their decision on their choice between input and output subsidy. The size (number of producers) of the household using fertilizer and the number receiving it in each region and other non-economic variables also influence the decision to use an input or output subsidizing policy. There could be a situation where the government has stopped subsidizing outputs and inputs but there is an increase in fertilizer consumption. This could be a result of farmers who previously were non-fertilizer users deciding to adopt an input even if there is not output or input subsidy.

The results are presented in Table 10 for selected production areas (zones).

Table 10: VCR for Different Scenarios (Unsubsidized, Input Subsidy, Output Subsidized, and Input and Output Subsidized) for Maize and Wheat in Selected Areas.

Region	Zone	Crop type	Output price	VCR unsubsidized	VCR with input subsidy	VCR with output subsidy	VCR with higher output subsidy	Support price VCR=2
				Scenario (1)	Scenario (2)	Scenario (3)	Scenario (4)	Scenario (5)
S. Tigray	Ambalgie	wheat	215	2.24	2.88	1.21	1.31	192
N. Shoa	Kay Gebriel	wheat	141	1.88	2.41	1.54	1.68	150
W. Gojjam	Jabi Tahnan	maize	70	1.62	2.08	1.62	1.85	86
Arsie	Bale Gesgar	wheat	101	4.22	5.41	4.84	5.26	50
	Diksis	wheat	106	2.4	3.08	2.62	2.85	88
	Hitso	wheat	106	4.23	5.43	4.63	5.03	50
	Limu Bilbilo	wheat	106	1.56	2.01	1.71	1.85	136
	Tana	wheat	106	2.25	2.89	2.46	2.67	94
E. Shoa	Shashemene	maize	66	2.02	2.59	2.14	2.44	65
E. Wellega	Sibu Sire	maize	56	1.5	1.92	1.87	<u>2.14</u>	75
Jimma	Dedo	maize	52	0.65	0.83	0.87	<u>1</u>	160
	Limu Kosa	maize	52	1.32	1.69	<u>1.77</u>	<u>2.03</u>	80
	Mana	maize	52	1.61	2.07	<u>2.17</u>	<u>2.48</u>	64
Guraghe	Dalocha	maize	64	2.88	3.69	3.14	3.56	45
	Lemo	wheat	105	2.82	3.62	3.11	3.38	75
Kembata	Alaba	maize	64	1.91	2.45	2.09	2.39	67
North Omo	Damote	maize	64	1.45	1.8	1.58	<u>1.81</u>	88
	Kindo Koyish	maize	64	2.47	3.18	2.71	3.09	52
Sidamo	Aleta Wondo	maize	66	1.84	2.36	1.95	2.23	72
	Dale	maize	66	2.39	3.08	2.54	2.9	55
	Shebedino	maize	66	1.79	2.28	1.89	2.16	2.16

Note: Incremental yields (under farmer's management), estimated from group discussions with farmers in each farmer, are from KUAWAB/DSA, Fertilizer marketing survey, 1995. See Mulat Demeke, Ali Said, J.S Janyne (1997), Promoting fertilizer use in Ethiopia: The implications of improving grain marketing performance, input marketing efficiency, and farm management, GMRP/MEDAC/MSU, Working paper 5. Addis Ababa.

Cereal Production and Price Instability in Ethiopia

Analysis done to determine sources of instability in crop production in Ethiopia using 1973-1997 CSA production estimates (Table 11 below) shows:

Table 11. Sources of Instability in Crop Production, Ethiopia, 1973 - 1997.

	Production (a=b+c+d)	Area (b)	Yield (c)	2 * covariance (Area, Yield) (d)
Cereals	0.0386	.0118 (31 percent)	.0255 (66 percent)	.0013 (3 percent)
Teff	0.0422	.011 (26 percent)	.0346 (82 percent)	-.0033 (-8 percent)
Maize	0.1012	.0361 (36 percent)	.0669 (66 percent)	-.0017 (-2 percent)
Wheat	0.0952	.02 (21 percent)	.0829 (87 percent)	-.0078 (-8 percent)
Sorghum	0.135	.0424 (31 percent)	.0858 (64 percent)	.0069 (5 percent)
Barley	0.0424	.0346 (82 percent)	.0309 (73 percent)	.0231 (-55 percent)
Pulses	0.0654	.0161 (25 percent)	.0392 (60 percent)	.0101 (15 percent)
Oilseeds	0.2071	.0682 (33 percent)	.1344 (65 percent)	.0045 (2 percent)
Grain	0.0322	.0122 (37 percent)	.0284 (86 percent)	-.0073 (-23 percent)

Source : Central Statistical Authority National Production Estimates, different years.

1. Oilseed crops are subject to the greatest degree of relative production instability in the Ethiopia grain sector. Maize and sorghum exhibit the greatest degree of production instability among the cereal crops. Maize and sorghum production has been 2-4 times more unstable (in relative terms) than teff and barley.
2. Yield variations account for the majority of production instability in the Ethiopia grain sector (ranging from 60 to 87 percent). However, the results indicate that weather is not the sole source of crop production instability in Ethiopia. Fluctuations in area cultivated also account for 37

percent of the overall production fluctuation in Ethiopia. Note that there is a negative covariance (23 percent) which would imply that area and yield variations offset one another, reducing the magnitude of production instability (column d in the table). Fluctuations in area are typically due to changes in production incentives caused by changes in input and output prices, the structure of credit programs, food aid programs, exchange rate fluctuations, and other variables influenced by government policy.

3. Overall grain production instability is quite low compared to that of other developing countries. Using an identical procedure, grain production instability in Zimbabwe, Kenya, and South Africa is 3-4 times higher than in Ethiopia. Ethiopia's highland areas are blessed with relatively reliable weather, resulting in relatively small grain yield fluctuations from one year to the next. Ethiopia's recent famines have occurred during relatively small changes in overall production levels. This highlights the importance of purchasing power (which declines in a poor crop season) in addition to the absolute availability of food in determining the country's food security situation.

Analysis of the conditional variance¹¹ of grain prices in selected markets using the January 1986 - May 1990 (Pre- Liberalization) and May 1990-December 1996 data show the following results

1. Price unpredictability was generally lower during the pre-liberalization period than in the post-reform period for teff, for wheat and for maize. These results held for all markets studied except Addis Ababa and Mekele. In Addis Ababa the conditional variance of teff and wheat prices has decreased in recent years. Teff prices have also become less risky in Mekele, which may be related to the ending of civil disturbances in that region after 1991.
2. The conditional variance of wholesale maize prices has increased in recent years for all the markets studied. In particular, 1994 seems to have been characterized by a high degree of maize price uncertainty in the markets. While price stabilization has become a major policy issue in 1995/96 due to depressed prices, the results of this analysis indicate that such price drops were largely predictable based in part on good rains, and hence were not a major source of price unpredictability.
3. Comparing price variances across commodities, there appear to be consistent differences between maize, wheat and teff. The variance of maize prices is higher than that of teff and wheat, and the variance of teff prices is higher than that of wheat. As maize is now the most important cereal crop in Ethiopia in terms of production, the relatively high degree of price unpredictability of maize may be contributing to a more unstable market environment for producers. Research is currently being conducted to assess the reasons for the apparently greater unpredictability in the maize market relative to other crops in Ethiopia.

¹¹ The term "conditional" variance is meant to distinguish that component of instability that can be predicted conditional on available information vs. that component of instability that cannot be predicted.

Grain marketing and stabilizing behaviour of rural households

In Ethiopia little quantitative information has been collected about the behaviour of the marketing system and how it would be affected by government intervention through price stabilization. For instance, information has been lacking on household level decision making, such as quantity sold, time of sales, reasons for sale, distribution of sales, and also on household marketing behaviour, such as the household's actual position as net buyers or net sellers by crop and region and the like. GMRP has attempted, for the first time, to collect data that is widely representative for the major production regions of the country on the marketing behaviour of rural households. Hence, this section is mainly based on the rural household survey of the Grain Market Research Project (FSS - GMRP, 1996).

Produced and marketed grain in Ethiopia

It is important to clarify between *marketed surplus* and *marketed output*. The marketed surplus refers to the residual surplus of the farm family after meeting the requirement of seed, payment in kind, and consumption by the household. The marketed output on the other hand refers to the amount actually sold by the household irrespective of the needs for home consumption and other requirements. In this section we confine our analysis to the marketed output as there are major conceptual difficulties in measuring the true marketable surplus of households.

In relative terms the marketed grain in Ethiopia is very limited. The FSS-GMRP survey indicates that only about 25 percent of cereal production was sold in 1996 by small farmers in Ethiopia. Teff exhibited the highest level of commercialization for cereals (33 percent of production was sold). Sorghum was the most subsistence-oriented cereal, with only 17 percent of production sold. Pulses and oilseeds tended to be grown more for commercial purposes, with over 73 percent of oilseed production was sold.

Table 12. Marketed Production

Crop	Total Sales by Households (Oct '95 to Sept. '96)** (Quintals)	Meher + Belg Production (1995/96) (Quintals)	% of Grain Sold from Meher + Belg Production (3)=(1)/(2)
	-1	-2	
Maize	6,020,000	23,500,000	25.62
Wheat	2,960,000	9,570,000	30.93
Teff	4,720,000	14,100,000	33.48
Barley	2,580,000	11,400,000	22.63
Sorghum	2,690,000	15,300,000	17.58
Millet	574,584	2,290,000	25.09
Cereals	19,544,584	76,160,000	25.66
Pulses	2,600,000	6,880,000	37.79
Oil seeds	1,140,000	1,550,000	73.55
Others*	1,925,990	17,710,000	10.88
Total	25,210,574	102,300,000	24.64 (27.50***)

Source: Food Security Survey, Grain Market Research Project, 1995/96.

*Others= Kocho and Other Food Crops.

** data from October 1995 to June 1996 based on farmer recall of actual quantities sold; sales between July 1996 and September 1996 based on farmer estimates of anticipated sales during this period.

*** number in parentheses is grain only and excludes kocho and other food crops.

According to the survey about 64 percent of the grain is marketed in markets above 5 km from the homestead. The major means of transport is human herd loading (52.3 percent) and pack animals (43.7 percent).

Reasons for Sale

The main reason for selling grain in the country is to buy food, 31.4 percent. Next to food paying for investments and paying for loans accounts for 18.4 and 12.3 percent, respectively. Although the pattern of the purpose of sales is similar in most regions, there are variation between regions. In Afar, for instance, households are dominantly nomads, and hence income derived from grains either goes to investment or to other purposes. There is also a special pattern seen surrounding Addis Ababa where 51 percent of grain sales goes to paying loans. The reason for why paying loan took the third share may be that in Ethiopia the government loan system usually requires that farmers are expected to pay their loan immediately after harvest (between February and March). According to the Survey the main sources of income to pay taxes were from crop sales (41.7 percent), livestock sales (15.5 percent), non-food crop sales (14.7 percent) and non-farm income (9.5 percent).

Timing of Sale

The pattern of the cereal disposal of households is important in order to identify the specific months when the government might expect to receive the bulk of sales from farmers under a price stabilization program. Based on the 1995/96 season, farmers' sale of cereals were only somewhat concentrated between January and May. Over 65 percent of total grain sales were made during these 5 months. The bulk of farmers sales start in January since the main meher harvest occurs one to two months previously in most areas of the country.

Net-buying and Net-selling of Grain

Net grain sellers are defined as households that sell (for cash or barter) more grain than they buy (through barter or cash). Information on the proportion of rural households that are net grain buyers is extremely important in understanding how food policy decisions affect rural welfare. For example, if the majority of rural households in Ethiopia were found to be net buyers of grain, then a price support program that raises the price of grain in the market may adversely affect a much greater number of households than it would benefit. But this is an empirical question that can only be understood through a representative household-level survey that records each household's various inflows and outflows of grain over the course of a crop year.

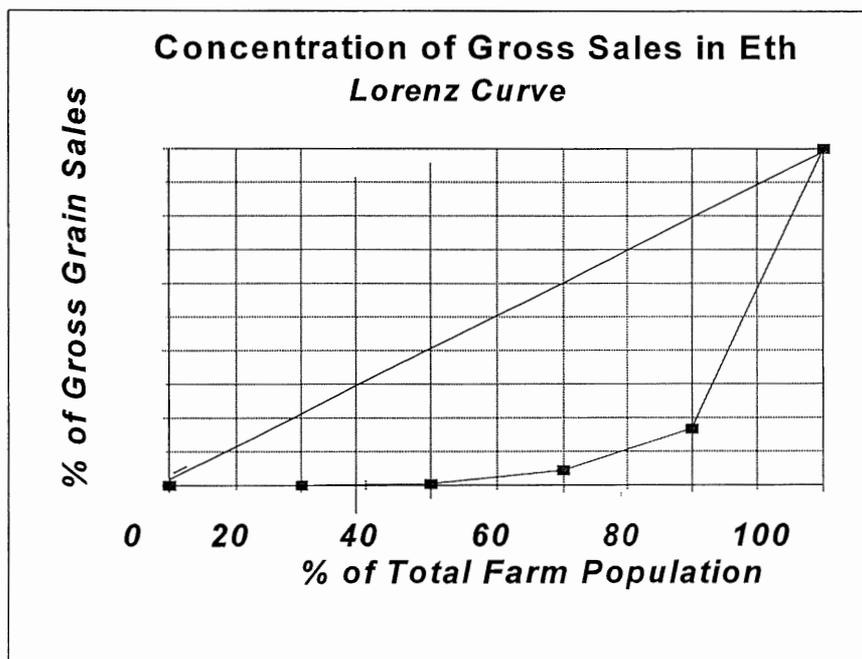
Households' grain net-buying or net-selling position depends on a number of factors that determine household grain production and consumption, such as land size, income (farm and non-farm income), family size, level of commercialization, production of cash crop, input use, etc. Net market position in this study is defined as actual sales that took place from the beginning of the 1995 meher harvest (October 1995 in most cases) to June 1996, when the survey took place, plus sales that the household stated that it intended to make between July and September 1996, minus actual purchases between October 1995 - June 1996 and anticipated purchases between July and September 1996. Sales and purchase both include monetary and non-monetary transactions.

The findings reveal that net market position is positively and significantly correlated with grain production and household landholding. Household size is only weakly related to net market position. Perhaps surprisingly, the extent to which the household is a net seller of grain is unrelated to the amount of food aid that the household receives.

Concentration of Marketed Output for Grain

The distribution of the marketed grain by households is highly concentrated among a relatively small proportion of the farmers. The lowest 20 percent of the families generally make no grain sales of any type, whereas the highest 20 percent of the families receive more than 80 percent of the income derived from grain sales.

Thus, if there is a price support program, for all grain sales only some 20 percent of farm population will gain. However, one needs to investigate the characteristics of the farmers who marketed grain.



The Effect of Price Stabilization on Household Income

The contribution of cereals to the total value of crop sales (total crop sales excludes sales from livestock and livestock products) is about 62 percent. Grains in general contribute about 75 percent of the total value of crop sales. This contribution, however, varies from region to region. Cereals contribute about 86, 74, 60, and 55 percent of the total crop sales in Tigray, Amhara, Oromiya, and SNNPR regions, respectively. Each cereal also contributed differently to the total crop sales and production. Maize, sorghum, and teff contributed 17, 15.6 and 14.8 percent, respectively, to the total crop sales in Ethiopia. Cereals contributed more than 80 percent of the total value of crop production in the country.

In response to the forecasts and reports of low grain prices, the government of Ethiopia and donors has been attempting to ensure minimum prices of selected grains (maize and wheat) for farmers. The efforts to stabilize cereal prices included (a) a price support policy implemented by EGTE since November 1995; (b) exporting to neighbouring countries and Middle East (the government was successful in stabilizing maize prices by exporting to Kenya), and (c) EU's local purchase program was successful in meeting its main objective, to procure food aid from domestic market for the emergency food reserve. Moreover, it has also contributed to stabilizing produce prices of cereals.

This paper has examined the potential effects on rural households of the EGTE's price support program in 1995/96 had it been effectively implemented so as to raise market prices of maize and wheat to the announced support price of Birr 70 per quintal for maize and Birr 116 per quintal for white and mixed wheat. According to the simulation exercise, the price support program, if fully

implemented, would have resulted in a net cost to Ethiopian households, i.e., the additional revenue generated by the support prices would have been offset by additional expenditures on maize and wheat by grain purchasing rural and urban households. These results are shown in Tables 14 through 17.

The simulation results also revealed that benefits of the support program flowed mainly to a relatively small group of smallholder in four producing regions, Amhara (41 percent), Oromiya (33 percent), SNNPR (25 percent), and Beni-Shangul (1 percent) regions. The total income earned from the support prices was estimated to be about Birr 31 million. Of the total benefit (additional income as a result of the support program), 51 percent flowed only to one zone, Jimma

a. Our main conclusion from the simulation analysis is that a fully implemented price stabilization program would:

- generate concentrated benefits to relatively high-income farmers that sell large volumes of maize and wheat, primarily located in the major maize and wheat surplus-producing zones of the country;
 - raise the price of cereals to consumers in the country (both rural and urban), forcing them to pay higher prices for cereals;
 - generate costs for grain-purchasing households that exceed the additional revenue to grain-selling households; and
 - impose costs on EGTE associated with purchasing and holding large stocks of grain, with an uncertain market for re-sale.
- The simulation results also revealed that benefits of the support program flowed mainly to a relatively small group of smallholders in four producing regions, Amhara (41 percent), Oromiya (33 percent), SNNPR (25 percent), and Beni-Shangul (1 percent) regions. The total income earned from the support prices was estimated to be about Birr 31 million. Of the total benefit (additional income as a result of the support program), 51 percent flowed only to one zone, Jimma.

Policy Implications

In recent years, concerns have been raised over the impact of historically low domestic grain prices on farmer production incentives and the use of purchased inputs. These concerns have given rise to alternative proposals for stabilizing domestic cereal prices, including (1) floor price policies to be implemented by government; (2) procuring food aid resources from domestic markets rather than importing it; (3) cultivation of cereal export market options; and (4) reducing food production and marketing costs in the food system.

Stabilization of prices in Ethiopia is complicated and could potentially be a costly endeavour for the following reasons: (a) important commodity, such as teff, are not traded on world markets; (b) a number of grains feature predominantly in the consumption pattern; (c) there is substantial regional variation in cereal production and consumption; and (d) the economy is a subsistence economy where the proportion of net buyers of food grains is high. However, if the existing output and input markets

are not functioning optimally owing to a variety of circumstances, certain interventions designed to reduce costs in the production and marketing system would be warranted. The following guidelines may be useful:

1. Introducing a production subsidy on one or two selected cereals may skew food production patterns. Crop production patterns are highly diversified throughout Ethiopia, and support prices on any single commodity are not likely to create a large difference in total farm income, but may encourage shifts in crop composition over time.
2. In Ethiopia, the distribution of cereals showed that there are no single crop dominating the gross value of total crop. This makes crop price stabilization process more complex compared to a case where there was only one or two important staple crops in the country, as there are crop substitution effects in both production and consumption to consider.
3. The review of the experience of many developing countries indicates that many have attempted to intervene in the market to reduce large price fluctuations in agricultural prices, and have tried to create economic stability. While the goals are clearly justified and compelling, the experience of these countries indicates that administered fixed-price stabilization schemes have been costly in terms of depleting scarce government financial resources and have produced undesirable economic and political side-effects on other groups in society.
4. Research findings from other parts of the world indicate that input responsive technology and predictable farm revenues, not necessarily fixed output prices, are important in stimulating profitable use and adoption of fertilizer and other cash inputs. The goal of raising and stabilizing farm revenues can be promoted by improving the efficiency of the grain marketing system. A more efficient marketing system would help pull grain quickly out of surplus areas, thus relieving the localized gluts that depress farm prices, and more quickly deliver grain to deficit areas. Examples of investments that are likely to improve the efficiency of the grain marketing system include more timely and widely disseminated market information, improved road infrastructure, and improvements in the transport sector. The continuation of competitive local purchase operations during large harvest years, guided by timely information on marketed supplies and prices, could also stimulate private investment in the food system, promote competition, and reduce grain and input marketing costs over the longer run. Grain prices can also be stabilized during both surplus and deficit years by improving the potential for trade with regional neighbours through improved road, communication, and market information linkages. These market-oriented approaches may prove to be more cost-effective over the long-run in stabilizing producers' revenues and promoting farm technology adoption and production than administered fixed price policies.
5. More analysis on improving on-farm storage and farmer management of stocks (for both consumption and sale purposes) would have potentially high payoffs in Ethiopia in terms of stabilizing farm revenues. The Ministry of Agriculture is already beginning to work on this issue, which could benefit from further empirical analysis of cost-effective marketing strategies for surplus grain producing households.
6. Reducing food prices has been the key to structural transformation and broad-based income growth in developed countries. The key to making farm cereal production profitable under

conditions of low output prices is to focus on making viable cost-reducing technology available to farmers and overcoming the ubiquitous credit-related constraints on their ability to adopt such technology. This underscores the importance of continued investment in agricultural research and the diffusion of viable new technologies generated through research. Through this approach, farmers will be able to reduce the costs of producing cereals, thus retaining profitability under conditions of declining real grain prices. Reductions in the price of cereals can then spread benefits widely through society, in terms of improving food security for low-income consumers, and raising the proportion of incomes that consumers can spend on non-food items, thus fuelling demand in other sectors. It has been through this process that structural transformation has occurred in many high-income countries, and one of the key conditions has been to reduce food prices through the use of cost-reducing technology both on-farm and in the marketing system. Perhaps more than any other single factor, the generation and delivery of productivity-enhancing inputs and farm management practices may enable the farm sector to grow even in an environment of market-oriented, and hence fluctuating grain prices.

7. Market-oriented methods to cope with price uncertainty include the development of viable agricultural commodity exchanges, which have recently been instituted in other African countries such as Kenya, Zimbabwe, Zambia, and South Africa. Ethiopia appears to be well placed to also initiate such a commodity exchange, which would allow farmer groups, traders, and other market participants to forward contract and thus lock-in prices in order to facilitate their production, input use, and marketing strategies. This approach represents a transition from attempting to control market prices per se to developing the institutional mechanisms for farmers, traders, and end-users to successfully cope with the uncertainty of markets and ensure against the attendant risks. The experience to date with the fledgling commodity exchanges in South Africa and Zimbabwe is that they are being utilized more successfully by large-scale farmers and traders with large volumes to trade and with experience in marketing operations. However, by forming groups and service cooperatives to aggregate their marketable quantities into bigger volumes, small farmers can also start to exploit the benefits of commodity exchanges and forward contracting mechanisms. The development of market-oriented institutions to protect against price risks may offer substantial scope for dealing with Ethiopia's agricultural instability problems in the near future if steps are taken to develop these institutions.
8. Many of these measures are medium- and long-term solutions. While they are important components of a more market-oriented approach to addressing problems of price instability in agriculture, they cannot greatly reduce the country's price instability in the short run. One option that can be used in the short-run is as follows:
 - (a) In response to forecasts of very high cereal production and low prices, the government can announce "indicative floor prices" for certain commodities. The indicative floor price would not represent a hard-and-fast price at which the EGTE would purchase cereal as a residual buyer. Rather the indicative price would represent a price below which the EGTE would initiate market purchase operations from traders in order to take supplies off the market and put upward pressure on market prices.
 - (b) It is very important that the indicative floor prices:

- differ from region to region reflecting market conditions and transport costs to end-use markets (e.g., floor prices established for maize in Jimma should be lower than those for Wolliso);
- vary over the season to reflect cumulative storage costs;
- are set low enough so that they are not far out of line in any particular area with prevailing market conditions;

(c) The EGTE or appropriate government agency would be given adequate financial resources and stand ready to purchase supplies from traders in market areas where market prices are falling below the floor price established for that particular market area. By taking quantities off the market in this way, the government would be putting upward pressure on market prices at the margin.

(d) The exact volume to be purchased would depend on adequate supply and price information from the GMRP MIS system, which currently collects information on market volumes and the direction of trade between markets. Appropriate volumes to be purchased would also depend on export options, and it would be extremely important for EGTE or other relevant agencies to begin exploring export options and prices in potential importing countries at the outset of any decision to announce indicative floor prices. Based on export options and marketing costs to these destinations, the EGTE would then be in a position to estimate the floor price necessary for it to cover its costs and not suffer losses on its trading account. Therefore, appropriate floor prices would depend both on prevailing market conditions within the country as well as prices in potential importing countries and marketing costs that would be incurred in such export decisions.

(e) It is important to note that this type of price support scheme would generate the same type of adverse distributional effects on net grain purchasers as the specific price support scenario analyzed in Section 6. Any policy that increases cereal market prices would have to take into account the potential hardships created on low-income consumers, including those in rural areas, and the increased need for targeted food assistance.

9. Given that food aid programs will continue to exist for the foreseeable future in Ethiopia, attention is needed to ensure that these programs do not adversely affect local production incentives and the adoption of improved farm technology. This will require greater coordination between the local and international groups involved in food aid and farm production issues. For example, some food aid programs are not specifically designed to distribute grain only to the poorest households with no effective demand. To the extent that households with adequate income to buy food receive food aid, this will reduce effective demand for cereals and reduce local prices, with uncertain effects on cereal production incentives, unless new cost-reducing technologies can be rapidly adopted to compensate for lower output prices. The key point here is that attention must be given to the design of food aid programs to ensure that they are not working at cross-purposes with local farm production and market development strategies.

10. Improvements in the transportation system and marketing system in general would reduce marketing costs which enable producer prices to increase with out increase in consumer prices and profit margin of traders. This would push the production possibility frontier outwards and increases the gains of the producers without incurring losses to the consumers (the society as a whole is better off). Moreover, this could even decrease consumer prices. Therefore, the government should support by investing in transport and other forms of market infrastructure in order to increase agricultural production, expand markets, and promote specialization according to comparative advantage. Improving trade linkages with neighbouring countries such as Kenya, Uganda, Somalia, and the mid-East would help stabilize domestic cereal prices in surplus years by providing a vent for surplus production, rather than having such surpluses absorbed domestically through lower prices.
11. There may be high payoffs to examining the potential for urban and commercial uses of maize products to increase the stability of demand for maize. By cultivating a stable commercial demand for maize and maize derivatives, the annual demand for maize would become more stable, thus passing along benefits to rural producers.
12. Cereal market stability would also benefit from improvements in market facilities in major markets such as Addis Ababa. Some potential improvements would include relocation of the main cereal market to the outskirts of town to benefit from lower land rental costs, reductions in transport time and costs (so that trucks don't need to go to the middle of town in congested traffic to get to market), encourage investment in new and less-costly storage facilities and trader premises, and generally reduce the costs of trading grain. It may also be time to consider the feasibility and desirability of introducing a transparent commodity exchange to facilitate forward contracting, transparent market information, etc. Such innovations in the marketing system would require concomitant improvements in the legal foundations of markets, e.g., commercial law, enforcement, and arbitration procedures. Over time, such market-facilitating investments will provide high payoffs in terms of helping farmers, traders, millers, and consumers to reduce their risks of producing and trading food in Ethiopia's food system.

Future analysis in the coming months will focus on a range of market-oriented strategies to reduce the potential price instability in Ethiopia's cereal sector and to stimulate productive investments throughout the food system that will reduce the costs of producing food and putting it on consumers' tables.

5.2 Review of Local Grain Purchase by EU

Following the 1995/96 bumper crop in Ethiopia and in response to the government appeal, the EU decided to purchase locally 75,000 tons of grain to increase the emergency food security reserve and 35,000 tons for relief and rehabilitation activities in Tigray. Competitive tenders were launched in March 1996 in four regions creating great interest and participation of traders. Contracts were awarded to 14 winners in March and April, 1996. A total of 97,283 tons of grain or about 90 percent of the plan was purchased and delivered.

The project reviewed the experience primarily to understand the extent to which local purchase affects market conditions and trader behavior.

The findings of the study reveal:

1. The EU local purchase program has been clearly successful in meeting its primary objective: building up emergency food reserves. Almost 100,000 tons of grain were procured under the program in 1996, at an average cost of \$251 per ton. This cost was slightly below the landed import cost of comparable quality grain at most of the specified delivery sites.
2. There appear to be opportunities to significantly reduce the procurement cost of local grain purchase in the future. Several aspects of the program inflated the costs of grain procurement and hence reduced the amount of grain that could have been procured for relief and stabilization purposes with the amount of funds devoted to the Program. This include (a) the issuing of tenders of fixed lot sizes that were too large to enable most Ethiopian grain traders to participate in the program; (b) stringent grain quality specifications; © regionalization of the tender/auction process; and (d) segmenting the auction process for individual lots. Segmenting the auction process for individual lots is estimated to have caused the EU to pay 9.8% more than it would have had the tenders not been segmented by region.
3. The evidence suggests but does not prove a lack of competition in the bidding process in 1996. The 1996 Program paid about 12% more for the grain it purchased than prevailing market values for comparable quality at the specified delivery markets. To some extent, this result may also be the consequence of an unpredictable market environment. The costs of local purchase programs can be potentially reduced in the future through improved market information and forecasting systems that are widely disseminated through radio and newspapers.
4. The local purchase of 108,000 tons of grain in 1996 amounted to about 5.4% of the marketed grain output from the 1995/96 meher season. Program purchases of maize, wheat, and sorghum are estimated at about 8.3%, 10.3%, and 18.4% of the total volumes marketed of these three commodities. It is difficult to estimate the effect of the program on producer prices. Grain prices generally remained atypically flat through most of the 1995/1996 marketing year. However, it is likely that producer prices would have been even lower than they were without EU's intervention.
5. Traders submitting bids under the local purchase program in 1996 appeared to differ in some important respects from the broader cross-section of Ethiopian grain traders. Traders able to submit bids were generally more diversified in their business activities, had greater access to bank credit, and were more likely to own their own trucks than the typical grain wholesaler. This may provide an indication of the types of entry barriers to participation in the 1996 program.

5.3 Efficiency of Food Aid Targeting

5.3.1 Food Aid Targeting: Policy and Practice

Quantity of food aid delivered to Ethiopia has fluctuated from year to year, depending on the availability of food supply from domestic sources. The major food aid commodities delivered to Ethiopia are cereals (93%). The annual volume of cereal food aid has ranged from 200,000 metric tons to about 1.2 million metric tons or between 3.5% and 26% as a proportion of total domestic food grain production over the 1985-1996 period (Figure 4). Even in an average year, the volume of cereal food aid in a given region can account for up to 25% or more of the total marketed supply of grain, and up to 50% in drought years. Depending on the manner in which the food aid is distributed, an injection of cereal food aid of this magnitude could affect grain market prices and/or domestic production incentives. This concern has been felt both by the government and donors and the objective of limiting food aid distributions to the most needy and in ways that do not negatively impact long-term

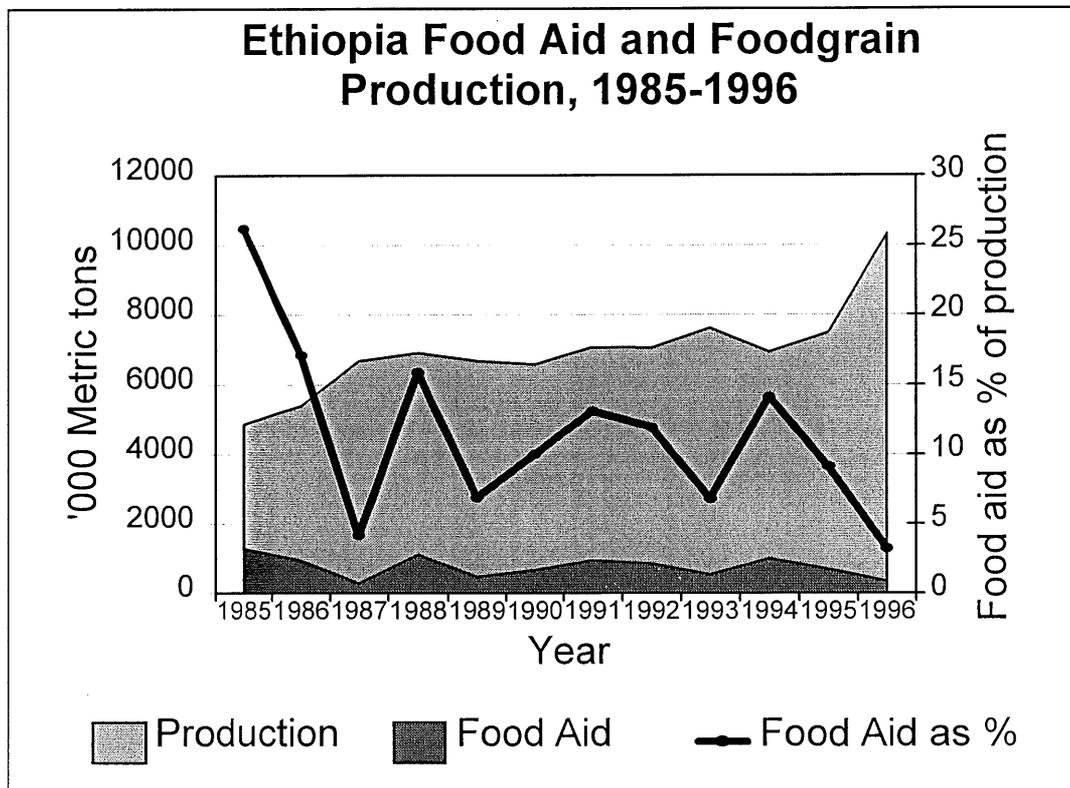


Figure 4

development objectives has become a priority. Changes in donor foreign aid and agricultural policies (abolition of the Common Agricultural Policy in Europe and reduction of support to farmers in the United States, for example) also mean that food aid resources will likely become more scarce in the future and may not be available in large quantities as it was in the 1980s and early 1990s.

Ethiopia's official food aid policy states that no able-bodied person should receive food aid without working on a community project in return. This is complemented by targeted free food aid for those who cannot work. The goal, as described above, is to expand work-based food aid to the point where

it accounts for 80% of all distributions, while the remaining 20% is distributed free for those unable to work (WFP, 1995).

While emphasizing the need to give priority to disaster prevention programmes in all development endeavours, the National Policy on Disaster Prevention and Management (NPDPM) states that disaster relief should ensure adequate income transfer for disaster affected households, promote self-reliance among the beneficiaries, preserve assets to promote speedy recovery, be geared to eliminate the root causes of disaster vulnerability, and contribute to sustainable development. The policy advocates: community participation, giving priority to the most at-risk areas, coordination of efforts, and no free distribution of aid to the able-bodied among the affected population.

According to the NPDPM, the institutional responsibility for selecting beneficiaries of free relief lies with the wereda administration, which in turn is assisted by a committee of elders and community representatives at the kebele or Peasant Association (PA) level. Neither NGOs, nor the DPPC have control over the selection of beneficiaries for food assistance. A list of beneficiaries is prepared and submitted to NGOs or the DPPC by the wereda committee in which representatives from PAs, the wereda Ministry of Agriculture office, and a representative of the wereda administrative council are members.

Fully efficient food aid targeting, as defined above, includes only those intended to benefit from an intervention and excludes all those who are not intended to benefit from the intervention (i.e., no errors of *inclusion* or *exclusion*).

5.3.2 Findings

How does Ethiopia's experience in food aid targeting relate to the official policy and the efficiency measure mentioned above? Research main findings are briefly discussed below.

1. Nature and Scope of Household-level Food Aid Participation and Need.

Results indicate that approximately 5.0 million households (56.8%) are food secure households (have available 1,680 or more kilocalorie per person per day), while the remaining 3.8 million (43.2%) are deficit households (Figure 5).

The deficit households show a total food gap of 1.4 million metric tons (difference between food available and food needs at 1,680 kilocalorie per person per day requirement). Food aid distributions reduced this deficit by approximately 8% to 1.3 million metric tons. If food aid distributed to secure households had instead been given to deficit households (through better targeting), it would have reduced the food gap by another 9%. There is sufficient food available in the country, before food aid imports, to meet the nutritional needs (1,680 kcal PPD) of the entire population. Yet because food is unevenly produced and traded, a large segment of the population, the food deficit population, lacks access to the minimum nutritional requirement. The Gini ratio of food availability in Ethiopia, based on these data, is 0.44, indicating high inequality in food access.

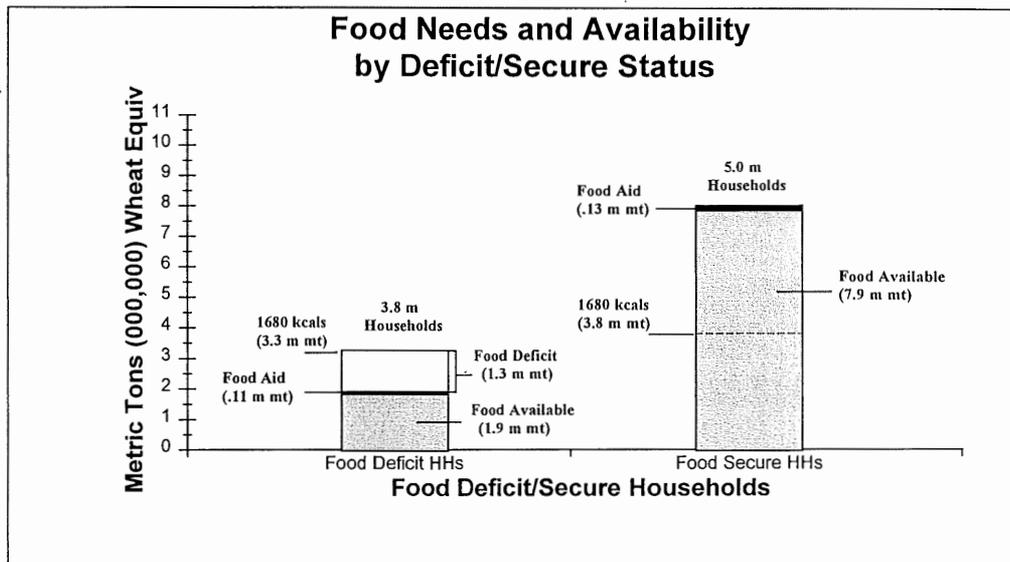


Figure 5

When expressed in terms of kcal per person-day, food aid distributions in 1995-96 are found to be highly concentrated in Tigray, a historically food deficit region (Figure 6). Tigray received approximately 8 times the national average food aid distribution of 104 kcal per person-day. All other regions received food aid distributions at or below the national average. In absolute terms, households in Tigray and Amhara regions were the beneficiaries, in roughly equal proportions, of over 70% of all food aid distributed in the country.

2 Targeting Weredas

Our analysis of food aid targeting efficiencies begins with a look at the selection of weredas relative to the magnitude of their food deficit. Wereda selection is the first stage in the DPPC's efforts to target food aid deliveries. Their goal is to assess the food needs of all weredas in the country and eventually to identify those areas of greatest vulnerability, those in need of food aid intervention.

How efficient was wereda targeting in 1995-96? Did the most vulnerable weredas receive food assistance? Answers to these questions can be gleaned from Table 1. Overall, 41.5% of the weredas in our sample contained one or more households reporting they received food aid during the past year.¹²

Efficient wereda-level targeting would mean that those weredas containing a large food deficit population would be the recipients of food aid programs. Table 13 shows the inefficiency in the current

¹² Undoubtedly, food aid programs reached more weredas than this but, by chance, none of our sample households were among the beneficiaries in these weredas and thus they are classified here as non-food aid weredas. Nonetheless, it is reasonable to assert that not all weredas received food aid and that the targeting process, however effectively it has been applied, has resulted in the distribution of food aid to certain weredas and not to others, largely as reflected in the food aid receipts of our sample households.

system's ability to target the most needy weredas. Sampled weredas are classified into quartiles according to the percentage of the sampled households in each wereda that are food deficit (<1680 kcal per person-day). For the first quartile (the most food secure), less than 19% of sampled households in each wereda in this group fall short of their daily food needs. For the fourth quartile, at the high extreme, 71 to 100% of households in each wereda are found to be food insecure. If weredas were reasonably well targeted, one would expect a higher percentage of weredas falling in quartile 4 to receive food aid. However, there are no significant differences across these quartiles in terms of the percentage of weredas that are beneficiaries of food aid programs; all are within a single percent of the national average of 41.5%. A linear correlation between wereda percent deficit households and percent of households receiving food aid confirms the lack of statistically significant association between these two variables ($r = .07$, $\text{sig} = .19$).

Table 13. Percentage of Weredas Receiving Food Aid by Level of Food Deficiency in Warialda for the 1995-96 Season.

Food Aid in Warialda	Warialda Food Deficit Quartiles				All weredas
	Quartile 1 Low deficit weredas (0-19% of hhs are deficit)	Quartile 2 Moderately low deficit weredas (20-41% of hhs are deficit)	Quartile 3 Moderately high deficit weredas (42-70% of hhs are deficit)	Quartile 4 High deficit weredas (71-100% of hhs are deficit)	
Weredas Not Receiving Food Aid	59.3%	57.6%	59.3%	57.6%	58.5%
Weredas Receiving Food Aid	40.7%	42.4%	40.7%	42.4%	41.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
N	91	92	91	92	366

$\chi^2 = .113$ Sig = .99

Given the significant effort invested by the DPPC national and regional committees in assessing food insecurity and estimating "affected populations" in these areas, it was a bit unexpected to find no positive association between need and food aid deliveries at the warialda level. We suspect that the absence of association is linked to the long-term build up and inflexibility of the food aid delivery system, an issue taken up in our concluding discussion.

3. Targeting Households

The second stage of food aid targeting occurs at the household level. As described in Section 3, household-level targeting can take on various forms. Self-targeting, administrative targeting,

community-based targeting, and their many hybrid variations are all methods used in Ethiopia. The purpose of this section is not to compare these methods, but to assess the effectiveness of local-level targeting overall. We look first at regional variations in household food availability and food aid receipts, then at the age and gender of the household head as criteria for food aid eligibility.

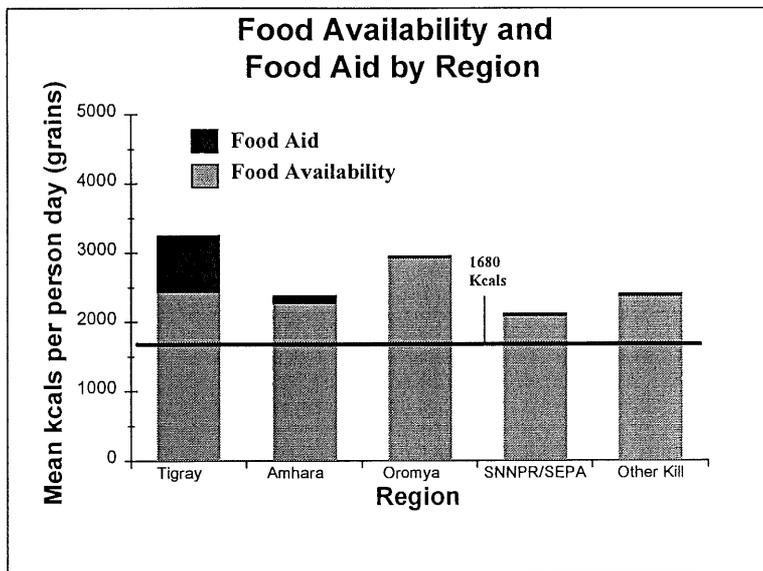


Figure 6

There is significant regional variation in the amounts of food available to households through their own production and net transactions, and, most of all, through food aid receipts (Figure 6). In the aggregate, households in all five regions meet the 1,680 kcal requirement for food availability per person-day, even without the help of food aid. Because the 1995-96 harvest was unusually strong, it departs from the historical trend of deficit food production. In terms of food aid distributions, the region of Tigre stands out, despite food security comparable to other regions.

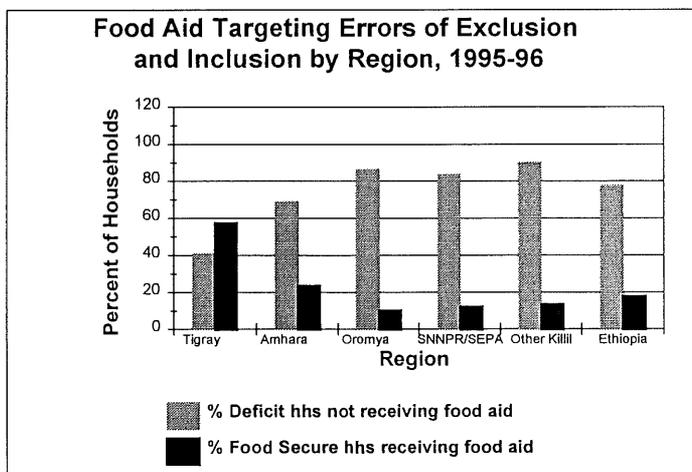


Figure 7

Given our earlier finding that food aid distributions in Ethiopia are sufficient to reduce the country's rural food gap by only 17%, even if perfectly targeted, it is not surprising that errors of exclusion would far surpass errors of inclusion in the distribution of food aid. Indeed, almost 80% of Ethiopia's deficit households are excluded from the system (Figure 7). Errors of inclusion, however, are significant as indicated by the nearly 20% of food secure households that are food aid beneficiaries.

To varying degrees, most regions of the country conform to this national pattern. The one exception is Tigre, where errors of inclusion actually exceed errors of exclusion: approximately 40% of Tigre's deficit households are not on the food aid rolls, while nearly 60% of the food secure households are. This unusual pattern of targeting errors in Tigre is undoubtedly linked to the high per capita flow of food aid to the region. More food aid will nearly always decrease exclusion errors while increasing inclusion errors.

Findings do not support the commonly-held notion that female and elderly-headed households have less food available than male-headed households. Similarly, net food availability is higher in households headed by persons aged 60+ years than in younger households. Despite their strong food availability, female and elderly-headed households received more than 4 times the level of food aid received by male- and younger-headed households. In other words, female- and elderly-headed households are being successfully targeted, but this targeting may not be appropriate. However, this does not imply that gender and age inequalities do not exist *within* households.

4. Wereda-Level Versus Household-Level Targeting

Food availability varies more between weredas (77.1% variation) than within weredas (22.9%, Table 14). This suggests that targeting of food aid at the wereda-level would have a greater payoff (all else equal) than targeting done within weredas, i.e., at the household level.

Variation in food aid distribution follows the same pattern of greater variation between weredas (84.3%) than within weredas (15.7%). This implies that food aid targeting in Ethiopia does give more weight to targeting weredas than to targeting households within them, which is consistent with the variation in food availability.

Thus, the problem is not one of not giving appropriate attention to targeting weredas, but, as our results show, of failing to target the right weredas. Though 77.1% of the variation in food availability can be accounted for by targeting the right weredas, household targeting is also important. Here, too, there has been little success at finding the most vulnerable households in the weredas selected. If we are interested in optimizing food aid distribution, there is clearly much room for improvement at both levels.

Table 14. Comparison of Between-Wereda and Within-Warialda Variation in Food Availability and Food Aid Distributions

	Food Availability (‘000 Kcal per person-day)		Food Aid (‘000 Kcal per person-day)	
	Mean Squares	Percent of Variance	Mean Squares	Percent of Variance
Between-Warialda Variation	37,141	77.1%	6,855	84.3%
Within-Warialda Variation	11,088	22.9%	1,278	15.7%
<i>F ratio</i>	3.35		5.37	
<i>F probability (sig.)</i>	0.0000		0.0000	

Turning our focus to the 1,801 food deficit households in our sample (Table 15), we can begin to understand the impact of our targeting successes and failures. As indicated above, only 22.3% (column a) of Ethiopia’s deficit households were food aid beneficiaries in 1995-96. Another 53.4% did not receive food aid because their weredas were not targeted, and the remaining 24.3% of deficit households were not selected as beneficiaries even though there were food aid programs in their weredas. Column (b) indicates that those who were targeted differed little from those who were not in terms of the degree of food deficit they faced; deficits ranged from 722 to 765 kcal per person-day.

The “success story” in this table is of course the deficit households that were selected as food aid beneficiaries. Their average deficit of 765 kcal per person-day was reduced by 313 kcal, or 59.1%. To households living on the margin and so badly in need of assistance, such an increase can have a substantial impact on health and well-being. For these households there is a safety net in place and undoubtedly it is making a difference. When broken out by region, our data reveal that these households are disproportionately located in Tigre and Amhara regions.

Table 15. Deficit Households: Success/Failure of Targeting, Mean Size of Deficit and Importance of Food Aid to Eliminating Food Deficit.

Targeting Success/Failure	Percent of Food Deficit Households (N=1,801) (a)	Mean Size of Deficit Before Food Aid (kcal PPD) (b)	Mean Food Aid Received (kcal PPD) (c)	Mean Food Deficit After Food Aid (kcal PPD) (d)	Percent of Deficit Reduced by Food Aid (e)
Wereda not targeted	53.4	722	0	722	0
Warialda targeted but household not	24.3	734	0	734	0
Warialda and household targeted	22.3	765	452	313	59.1
Total	100	735	101	634	13.2

6. Determinants of Food Aid Distribution and Targeting Errors

The absence of association between food insecurity and food aid receipts, causes us to probe at the reasons for this unexpected finding and the food aid targeting errors from which it arises. By breaking out food aid distributions by level of food availability, region, and historical pattern of food aid receipts, we hope to shed light on this question. To estimate the independent effects of key food aid determinants, this section concludes with a multivariate analysis (ANOVA and OLS regression) of household-level food aid receipts.

Food Aid distribution by Household Food Availability and Region

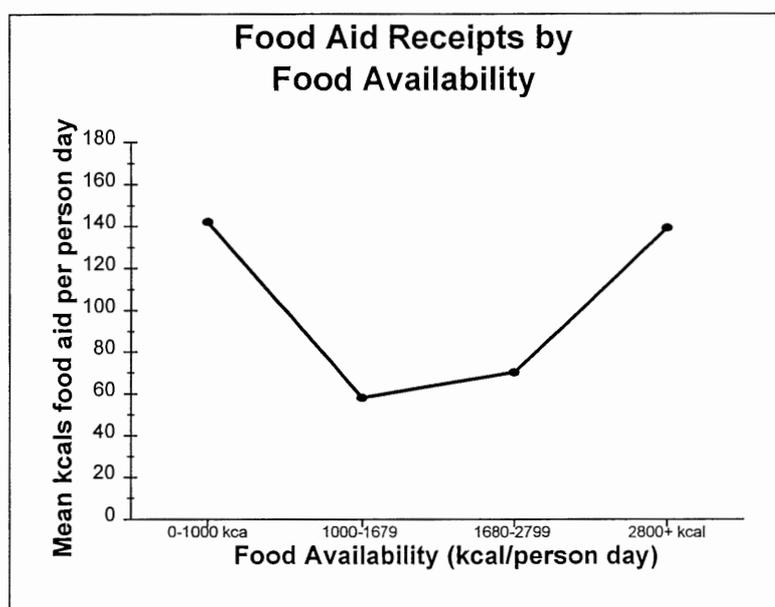


Figure 8

To further examine the association between food availability and food aid distributions we have grouped food availability into four groups (Figure 8). The lower two availability groups are comprised of food deficit households: the <1,000 kcal per person-day group isolates the “extreme deficit” households, many of whom consume less than half the required minimum 1,680 kcal required from grains. The other is the “moderate deficit” group that ranges from 1000 to 1,679 kilocalorie per person-day. The remaining two groups enjoy, respectively, moderate and high food security, with the “high food security” households consuming, on average, twice the minimum kcal requirement.

An important feature of this figure is the concentration of food aid among households in the two extreme categories of food availability. While this is desirable for the extreme deficit group, we must question why it appears among the high food security households.

Broken down by region, concentrations of food aid among the two extremes, the least and most food secure groups, is found in most, but not all of Ethiopia’s major regions. Tigray stands out in this regard with disproportionately large distributions going to its most food secure households, those with 2,800

or more kilocalorie available per person-day. Amhara and Oromiya follow the same pattern, though less dramatically. The Southern region differs from the others in that its extreme groups receive less food aid than the two middle groups. Only the combined “other” group begins to conform to the goal of providing relief to households that need it most.

Thus, these findings suggest that the absence of association between food need and food aid distributions may be due in large measure to the high volume of food aid flowing to the most food secure households.

Food Aid Distribution in 1995-96 by Historical Pattern of Food Insecurity

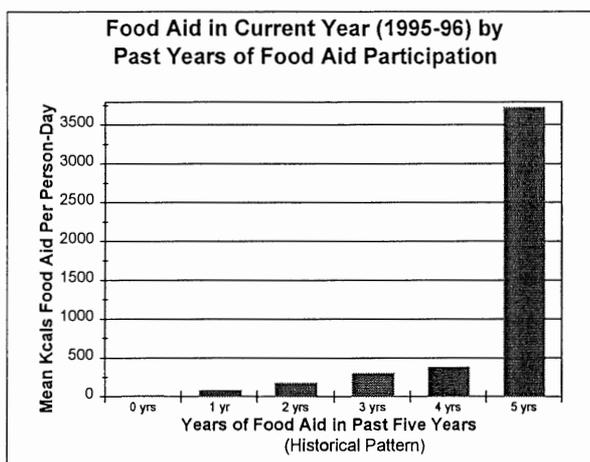


Figure 9

Food aid distributions in 1995-96 closely followed the historical pattern of food insecurity in Ethiopia. Figure 10 shows that households are more likely to receive food aid in the current year if they received food aid in the past five years. The relationship is strong and significant: food aid distributions grow increasingly higher as the number of past years of food aid increases. Households with 5 or more years of food aid in the past five years receive more food aid than all others by a wide margin.

Years of past food aid is an indicator of the extent to which the food aid system has build up presence and infrastructure over time. The existence of such a build-up is a powerful predictor of ongoing food aid deliveries. Households in the regions of Tigray and, to some degree, Amhara are the most likely of all to have received food aid in past years, a reflection of the severity of drought and famine known to those areas.

Food Aid Receipts: Analysis of Variance

To further examine the finding that food aid is concentrated at the two extremes of the food availability continuum and to test whether the distribution holds up when other influences are held constant, we conducted an analysis of variance and multiple classification analysis of food aid receipts using total kilocalorie of food available per person-day as the primary factor. The model also tests the independent effects of region as a determinant of food aid distributions, and of other variables discussed in this study. Table 16 reports the results of these analysis; we discuss them in the order reported.

Food Availability. The unadjusted means in column (a) repeat earlier observations that households in the extreme deficit and high food security categories tend to be the primary beneficiaries of Ethiopia's food aid programs. Column (b) adjusts for the influence of region on this distribution. Our conclusion from the previous discussion is that the relationship between food availability and household food aid receipts is not conditioned by region. Nor is it significantly affected by a battery of covariates thought to have a potential impact (column c).

Table 16. ANOVA and Multiple Classification Analysis of Food Aid Distributions by Food Availability and Region, Controlling for Covariates*

	Mean Kcal Food Aid Received per person-day			Sig. of main effects
	Unadjusted (a)	Adjusted for Factors (b)	Adjusted for Factors and Covariates ©	
<i>Food Availability (kcal) per person-day</i>				0.484
Extreme Food Deficit HHs (<1000 kcal)	141	117	97	
Moderate Food Deficit HHs (1000-1679 kcal)	58	72	71	
Moderate Food Security HHs (1680-2799 kcal)	70	76	75	
High Food Security HHs (2800+ kcal)	133	135	152	
Eta/beta	0.02	0.02	0.02	
<i>Region</i>				0.000
Tigray	829	824	455	
Amhara	99	102	64	
Oromya	23	22	80	
SNNPR or SEPA	30	29	86	
Other killil	35	38	79	
Eta/beta	0.13	0.13	0.06	

*Covariates (sig.): Age (.024) and sex (.023) of head; food aid in wereda (.763); land (.696); TLU (.523); off-farm income (.976); household labor (.181); years of food aid (.000); and rainfall (.776).

Region. The powerful effect of region on food aid receipts remains strong and significant, even when controlling for food availability (column b) and our set of covariates. The flow of food aid to Tigray is shown to be exceptionally high at all levels, though it is reduced from 829 to 455 kcal per person-day when adjusted for the influence of the covariates. The covariate primarily responsible for this reduction is previous years of food aid. In other words, part of the reason why food aid receipts in Tigray are so high in this particular year (1995-96) is because they have been high there in past years

and the aid continues to flow. Remaining differences in the amount of food aid received by households in Tigray compared to all other regions are due to factors not measured in this study.

OLS Regression Model of Food Aid Receipts by Food Availability and Other Determinants

The results of this linear regression (Table 17) reinforce what we have learned from the preceding analysis of variance. In short: Food aid receipts are not determined by need (food available per person-day). Rather, they are determined by: 1) past participation in food aid programs, 2) regional residence effects, and 3) characteristics of the head of household—women and aged heads are targeted independent of their need. Other variables such as off-farm income, livestock ownership, rainfall and elevation, and residence in regions with relatively low food aid flow have no effect on household participation in food aid programs.

Table 17. OLS Regression Model of Food Aid Receipts by Food Availability and Other Determinants

Independent Variables	Descriptive Statistics Mean /percent	Food Aid Receipts (Kcal) Per Person-day (beta)
Food availability per person-day (Kcal)	2,499 kcal	0.01
Nbr years of food aid received over past 5 yrs	0.46 years	0.17*
Food aid in wereda (% other hhs in wereda w/ food aid)	20.0%	0.01
Livestock ownership (TLU)	1.68 TLU	-0.01
Tigray region (dummy)	1 = 6.6%	0.06*
Amhara region (dummy)	1 = 30.2%	-0.01
Oromya region (dummy)	1 = 37.8%	0.00
SNNPR region (dummy)	1 = 22.6%	0.00
Land holdings (ha)	1.2 ha	0.00
Adult family labor (>14 yrs)	2.3 persons	-0.02
Years living in community	6.8 years	0.01
Education of head of hh (scale: 1=illiterate to 8=post sec)	1.6	0.02
Age of head of household (years)	44.4 years	0.04*
Sex of head of household (1=male, 2=female)	1 = 81.1%	0.05*
Off-farm income (Birr)	86 birr	0.00
Avg rainfall in wereda (mm)	1,170 mm	0.00
Avg elevation in wereda (m)	2,041m	0.00

*Significant at .05 level.

Chapter 6. Summary and Recommendations

Sections 4 and 5 summarized the main results of findings from a range on research activities the Grain Market Research project has carried out over the last two years.

Many policy implications (suggestions) have been made by the studies. The major ones are summarized in this section¹³. For convenience, areas suggested for a further study or research are italicized.

6.1 Policy Implications pertaining to Grain Market Structure, Conduct and Constraints.

The pertinent recommendations made in this study include:

1. **Abolish grain movement control and the present sales tax system on grain:** The kella is not an appropriate means of collecting sales tax. It is doubtful whether it has been effective in terms of the amount of revenue generated by local administrations. There are indications that some of the merchants are able to pass the check points by paying much less than the official rate to individuals assigned at the 'kellas'. The varying rates applied at different places to different individuals has resulted in uncertainty about the cost of moving grain from one place to another.

Thus, it is recommended that the grain movement check points and the present sales tax system on grain be eliminated. *It is further recommended that a detailed study be conducted to evaluate the merits and demerits of different taxation systems with the view to designing an appropriate taxation system* that could assist the local governments obtain better tax revenue; promote inter-dependence between producing and consuming areas; enhance smooth grain flow and spatial integration; induce different market participants including, farmers, traders, and consumers; and improve regional food security.

2. **Enforce control on illegal trade:** A large number of merchants have continued to operate without a license. This has put the legally operating traders at a disadvantage when competing in the market. If this trend is not addressed, the grain trade will be carried out by an anonymous people and may be detrimental to the efficient functioning of the market. The local administrations should review and improve the grain trade licensing and control procedures without setting any limit on the number of licenses to be issued at each market. The enforcement of the licensing and control procedure may require a lot of time and energy if it is done by the administration alone. Therefore, the administration, in collaboration with

¹³ The full text of the GMRP recommendations can be found in Working Paper 5-12, Annexes 5-12 volumes 3 and 4.

representatives of traders, should devise means of controlling those who attempt to engage in illegal trade.

3. **Devise special credit policy to assist grain traders:** Grain merchants need a considerable amount of fund to invest on storage and transport facilities and to finance seasonal grain inventories. The present credit policies of commercial banks, are not encouraging to meet the credit needs of small merchants who play a crucial role in the marketing system. It is recommended that a special long-term fund be instituted with the assistance of donors in order to create an enabling environment for the gradual development of the Ethiopian grain marketing system. Such a fund is critical in view of the country's present drive for self sufficiency in food. The anticipated growth of marketable grain surplus needs to be accompanied by improvements in market infrastructures - development of market places, upgrading of storage and transport facilities, skills in grain storage and marketing, etc. Appropriate credit policies have also to be formulated and implemented to provide long term credit to grain merchants and other market participants that may provide transport and warehousing services.
4. **Strengthen the current market information services:** Market information is regarded as the "lifeblood" of markets. comprehensive, accurate and timely information is essential for the efficient functioning of the marketing system.

It is proposed that the market and commodity coverage of the GMRP MIS be expanded and additional information regarding crop production prospect, temporal and spatial grain flows, food import and export intentions, stock level, world market prices of export crops, etc., be provided to different users.

5. **Improve marketing infrastructure and facilities:** Marketing infrastructure - roads, storage facilities, telephone services, parking areas, open trading spaces, etc., including in the terminal and regional markets are inadequate, poor, and unhygienic. Most of the grain traders believe that the government could play a significant role in the development of infrastructure. The lack of adequate storage facilities is also a barrier to potential entrants. Therefore, in view of the importance of marketing infrastructure to an efficient marketing system, the Government should take appropriate action to develop such infrastructure and facilities at least in the main grain markets of Ethiopia.
6. **Conduct research on the different components of the system:** *The present study is confined to regional wholesale grain traders; it does not cover the other participants operating at different levels of the marketing system - farmers, assemblers, brokers, retailers, transporters, warehousing, etc. In order to get a better understanding of the entire marketing system - its problems and constraints- specialized studies should be carried out in the future. Given the producer price 'crash' for maize and wheat in 1996, a systematic analysis of how the grain marketing system is coordinated and whether high marketing costs are impeding growth of effective demand in consuming/deficit regions could be a first priority in this endeavor.*
7. **Conduct an appraisal on the impact of the emerging market structure on producers' and traders' incentives:** This paper entirely focuses on the organization, structure, and conduct of the individual wholesale grain traders, that is, the family operated independent grain

businesses. Recently, however, as a result of the economic liberalization, a number of incorporated businesses including already established and newly formed private companies have entered into grain trade. Among these are, 'Ambassel', 'Guna', 'ODA', Ethiopia Amalgamated, 'Dinsho', Ethio-Trade, etc. Some of these private companies have substantial experience in trade and they carry out a multiple of business activities including agricultural inputs distribution, distribution of industrial commodities, banking and insurance, transportation, milling, import, and export trade, etc.

The private companies are better organized in terms of skilled manpower, financial and physical resources, and they have easy access to financial and other credit facilities. Their participation in grain trade has shown an increasing trend in the past two years. For example, the private companies have been awarded a bulk of the EU local grain purchase contracts in 1996 and 1997. The emergence and involvement of these private companies in the grain business could have considerable impact on the structure, conduct, and performance of the Ethiopian grain marketing system. Because of their superior organizational, financial, and physical capability compared to the small family owned and operated independent grain businesses, as well as their diversified business activities and scale economies, the incorporated enterprises may bring about considerable changes in the SCP of the grain market and may also affect producers' and traders' incentives in the long run.

It is, therefore, recommended that an in-depth appraisal of the emerging market structure be conducted to look into the impact of their involvement on producers, traders, and consumers.

6.2 Effects of Grain Market Liberalization

The main recommendations of this study include:

1. **Nurturing the political and legal foundations of marketing systems** (e.g., strengthened mechanisms of specifying and enforcing contracts, raising the costs of contract non-compliance, and more pluralistic procedures for developing the rules governing market activity). A well-functioning legal and political framework for market activity reduces the risks and transactions costs of private trade. These measures are important adjuncts to developing reliable markets, and inherently involve strengthening the regulatory abilities of the state rather than "getting the state out of market regulation." In general, this means a reorientation of the state from "control" activities to "facilitation" activities designed to reduce farmers' and traders' costs of transacting across inputs, credit, and commodities.
2. **Invest in local analytical capacity:** Lasting policy change depends critically on governments' actual belief in the analysis supporting the reforms. There is ample evidence that governments that have reluctantly undertaken reform programs have reversed them and reimposed the old system on price and trade controls as soon as a drought or other shock has occurred. Local analytical units are often seen as more neutral and sensitive to domestic policy concerns than analysis conceived and driven by donor interests using expatriate analysts. The demand for, and credibility of, food policy analysis to guide market development is enhanced by a collaborative research process driven by local researchers and government analysts who take "ownership" of the research agenda and findings.

6.3 Vertical and Spatial Grain Market Integration

Major policy implications of this study include:

1. **Price stabilization:** Governments trying to stabilize prices are confronted with budget constraints to undertake the stabilization programs which highlights the importance of designing and implementing cost-effective stabilization programs. In this regard, the knowledge of the extent of vertical and spatial integration of grain markets is very crucial in making decisions regarding which prices (producer, wholesale and retail) and markets (all or few of them) to stabilize. The study indicated that grain markets in Ethiopia are integrated vertically and horizontally. The vertical integration of grain markets implies that if the government stabilizes producer prices the effects of stabilization can also be transmitted across wholesale and retail prices within a market. Under this condition, for example, the government can stabilize producer prices by stabilizing the wholesale prices and vice versa, then the government's decision as to which price level to stabilize depends on cost consideration and ease of implementing the program.
2. On the other hand, the spatial integration of grain market implies that if the government intervenes in a given market the effects of government intervention in that particular market can also be transmitted across the markets which are spatially integrated. The important policy implications of this result is that it is not important for the government to intervene in all markets, by just intervening in a few important markets, the government can stabilize prices in other regions.
3. **Food aid management:** Food aid plays a key role in saving lives of people dying from famine resulting from drought or other catastrophes. However, when it is not well targeted to the people with no effective demand, food aid depresses the producer prices in the local markets by increasing the supply of grain. The depressed prices disrupts the producers incentive to use productivity increasing modern technologies which negatively affects the long run development of food aid recipient country. Thus, it is very essential that the governments pay careful attention in managing food aid distribution. In this regard, understanding the nature of grain market integration provides useful insights in devising effective food aid distribution and utilization systems so as to minimize the negative impacts of food aid. In general, grain markets in Ethiopia are spatially integrated which implies the effect of food aid released in a given market can be transmitted across markets which are spatially integrated. In other words, the prices in surplus markets might be depressed to the extent that food aid released reaches people with effective demand in grain deficit areas.
4. **Improving the integration of grain markets:** The integration of grain markets plays a crucial role in improving the food security situations of a given country. If the markets are well-integrated, price signals direct the flow of grain, price increases resulting in supply shortfalls in a given market attracts grain flows from other markets where the prices are low thus relieving food shortages. The degree of market integration also determines the level of intervention required by the government to correct the inefficiencies in the grain market, the better the grain market integration the lesser is the intervention required by the government in the market.

5. Even though, the grain markets studied appear to be integrated spatially there were high spatial price differentials. The inadequately developed marketing infrastructure might partly explain for the high spatial price differentials and **improving** the marketing infrastructure such as the transportation network, provision of storage facilities and market information service improves the spatial integration of markets. The vertical integration of grain markets at the individual markets level can also be improved by relaxing entry barriers to the grain trade and removing information asymmetry among various market participants.
6. It was also observed that the spatial price differentials were characterized by high volatility which increases the risk of spatial arbitrage. The grain movement controls which have been implemented across different regions with different level of intensity, rules and regulations might explain the high level of spatial price spread volatility by creating uncertainties in the costs of moving grain across markets. Thus, abolishing grain movement controls or making it more transparent and uniform across the regions increases the integration of grain markets in Ethiopia.

6.4 Market Information System

The major recommendations of internal and external evaluations of the Market Information System include:

1. GMRP MIS provides only current and historical market information services and products lacking price forecasting service. To address the missing link, capturing detailed information and analysis on market prices, pre- and post-harvest production, etc. are required. Therefore, it is essential to incorporate procedures that enable the MIS to organize and provide price forecasting service.
2. About 28% of 120 interviewees are producers. None of them have ever listened to the Radio Fana's grain price transmission. MIS services has missed one of the major market participants. Therefore, continuous promotional activities, linking market information to agricultural extension, transmitting price information in major local languages and moderate reading speed during air time should be employed to reach the producers.
3. Most of the interviewed market agents preferred Radio Ethiopia to Radio Fana with regard to clarity of transmission, credibility and popularity. Therefore, it is suggested that future price broadcasts be made with Radio Ethiopia.
4. Evening program transmission is favored by 96%. And 92% of the listeners found it convenient. The Morning program has almost no audience. This can be due to the nature of the existing marketing system requiring a day to day physical appearance of traders during the day time. It means they give more attention to listen to the evening program. The morning program should be changed to evening to cover more market day(s).
5. Both Monthly Information Bulletin and Weekly Information Flash publications received on time delivery acceptance by 70% and 67% respectively. There is still a need for efficient

telecommunications services combined with computer based information transmission and dissemination to be considered to improve timely delivery. In view of this, the potentials of VSAT system and Internet services such as electronic mail for augmenting the medium of dissemination and on-line access to the databases should be facilitated and promoted. Fax could be considered if users pay for it.

6. Evaluation analysis shows 75% and 47% of Bulletin and Flash users, respectively, are willing to pay for quality products. It could be considered to improve the content, coverage, presentation and dissemination. However, wide coverage assessment should be made whether or not users are really willing to pay. The assessment should target the users in the mailing list and then be implemented during the dissemination of the products.
7. 93% of the respondents favoured MIS be a public good and managed by a public institution. EGTE has been supported as a host institution for the MIS by 28.6% of the respondents. As a matter of principle, MIS should be provided by an institution not primarily involved as a market participant (grain trader). Therefore, EGTE can not be the home institution of MIS. On the basis of closeness to the market participants, experience, capability, willingness, mandate etc. MoA or MEDAC can be selected as a home institution for the MIS. There are a few respondents who have indicated the MIS should be operated by the private sector in the long run but advised to remain public until it will have strong footing. This is a good decision to be considered and promoted.
8. GMRP assessed five government agencies to recommend a permanent home for the MIS. Based on some selected the Ministry of Agriculture or the Ministry of Trade and Industry can be selected to be responsible for the MIS.

6.5 Grain Price Stabilization

Policy Implications

In recent years, concerns have been raised over the impact of historically low domestic grain prices on farmer production incentives and the use of purchased inputs. These concerns have given rise to alternative proposals for stabilizing domestic cereal prices, including (1) floor price policies to be implemented by government; (2) procuring food aid resources from domestic markets rather than importing it; (3) cultivation of cereal export market options; and (4) reducing food production and marketing costs in the food system.

Stabilization of prices in Ethiopia is complicated and could potentially be a costly endeavour for the following reasons: (a) important commodity, such as teff, are not traded on world markets; (b) a number of grains feature predominantly in the consumption pattern; (c) there is substantial regional variation in cereal production and consumption; and (d) the economy is a subsistence economy where the proportion of net buyers of food grains is high. However, if the existing output and input markets are not functioning optimally owing to a variety of circumstances, certain interventions designed to reduce costs in the production and marketing system would be warranted. The following guidelines may be useful:

1. Introducing a production subsidy on one or two selected cereals may skew food production patterns. Crop production patterns are highly diversified throughout Ethiopia, and support prices on any single commodity are not likely to create a large difference in total farm income, but may encourage shifts in crop composition over time.
2. In Ethiopia, the distribution of cereals showed that there are no single crop dominating the gross value of total crop. This makes crop price stabilization process more complex compared to a case where there was only one or two important staple crops in the country, as there are crop substitution effects in both production and consumption to consider.
3. The review of the experience of many developing countries indicates that many have attempted to intervene in the market to reduce large price fluctuations in agricultural prices, and have tried to create economic stability. While the goals are clearly justified and compelling, the experience of these countries indicates that administered fixed-price stabilization schemes have been costly in terms of depleting scarce government financial resources and have produced undesirable economic and political side-effects on other groups in society.
4. Research findings from other parts of the world indicate that input responsive technology and predictable farm revenues, not necessarily fixed output prices, are important in stimulating profitable use and adoption of fertilizer and other cash inputs. The goal of raising and stabilizing farm revenues can be promoted by improving the efficiency of the grain marketing system. A more efficient marketing system would help pull grain quickly out of surplus areas, thus relieving the localized gluts that depress farm prices, and more quickly deliver grain to deficit areas. Examples of investments that are likely to improve the efficiency of the grain marketing system include more timely and widely disseminated market information, improved road infrastructure, and improvements in the transport sector. The continuation of competitive local purchase operations during large harvest years, guided by timely information on marketed supplies and prices, could also stimulate private investment in the food system, promote competition, and reduce grain and input marketing costs over the longer run. Grain prices can also be stabilized during both surplus and deficit years by improving the potential for trade with regional neighbours through improved road, communication, and market information linkages. These market-oriented approaches may prove to be more cost-effective over the long-run in stabilizing producers' revenues and promoting farm technology adoption and production than administered fixed price policies.
5. More analysis on improving on-farm storage and farmer management of stocks (for both consumption and sale purposes) would have potentially high payoffs in Ethiopia in terms of stabilizing farm revenues. The Ministry of Agriculture is already beginning to work on this issue, which could benefit from further empirical analysis of cost-effective marketing strategies for surplus grain producing households.
6. Reducing food prices has been the key to structural transformation and broad-based income growth in developed countries. The key to making farm cereal production profitable under conditions of low output prices is to focus on making viable cost-reducing technology available to farmers and overcoming the ubiquitous credit-related constraints on their ability to adopt such technology. This underscores the importance of continued investment in agricultural

research and the diffusion of viable new technologies generated through research. Through this approach, farmers will be able to reduce the costs of producing cereals, thus retaining profitability under conditions of declining real grain prices. Reductions in the price of cereals can then spread benefits widely through society, in terms of improving food security for low-income consumers, and raising the proportion of incomes that consumers can spend on non-food items, thus fuelling demand in other sectors. It has been through this process that structural transformation has occurred in many high-income countries, and one of the key conditions has been to reduce food prices through the use of cost-reducing technology both on-farm and in the marketing system. Perhaps more than any other single factor, the generation and delivery of productivity-enhancing inputs and farm management practices may enable the farm sector to grow even in an environment of market-oriented, and hence fluctuating grain prices.

7. Market-oriented methods to cope with price uncertainty include the development of viable agricultural commodity exchanges, which have recently been instituted in other African countries such as Kenya, Zimbabwe, Zambia, and South Africa. Ethiopia appears to be well placed to also initiate such a commodity exchange, which would allow farmer groups, traders, and other market participants to forward contract and thus lock-in prices in order to facilitate their production, input use, and marketing strategies. This approach represents a transition from attempting to control market prices per se to developing the institutional mechanisms for farmers, traders, and end-users to successfully cope with the uncertainty of markets and ensure against the attendant risks. The experience to date with the fledgling commodity exchanges in South Africa and Zimbabwe is that they are being utilized more successfully by large-scale farmers and traders with large volumes to trade and with experience in marketing operations. However, by forming groups and service cooperatives to aggregate their marketable quantities into bigger volumes, small farmers can also start to exploit the benefits of commodity exchanges and forward contracting mechanisms. The development of market-oriented institutions to protect against price risks may offer substantial scope for dealing with Ethiopia's agricultural instability problems in the near future if steps are taken to develop these institutions.
8. Many of these measures are medium- and long-term solutions. While they are important components of a more market-oriented approach to addressing problems of price instability in agriculture, they cannot greatly reduce the country's price instability in the short run. One option that can be used in the short-run is as follows:
 - (a) In response to forecasts of very high cereal production and low prices, the government can announce "indicative floor prices" for certain commodities. The indicative floor price would not represent a hard-and-fast price at which the EGTE would purchase cereal as a residual buyer. Rather the indicative price would represent a price below which the EGTE would initiate market purchase operations from traders in order to take supplies off the market and put upward pressure on market prices.
 - (b) It is very important that the indicative floor prices:
 - differ from region to region reflecting market conditions and transport costs to end-use markets (e.g., floor prices established for maize in Jimma should be lower than those for Wolliso);

- vary over the season to reflect cumulative storage costs;
- are set low enough so that they are not far out of line in any particular area with prevailing market conditions;

(c) The EGTE or appropriate government agency would be given adequate financial resources and stand ready to purchase supplies from traders in market areas where market prices are falling below the floor price established for that particular market area. By taking quantities off the market in this way, the government would be putting upward pressure on market prices at the margin.

(d) The exact volume to be purchased would depend on adequate supply and price information from the GMRP MIS system, which currently collects information on market volumes and the direction of trade between markets. Appropriate volumes to be purchased would also depend on export options, and it would be extremely important for EGTE or other relevant agencies to begin exploring export options and prices in potential importing countries at the outset of any decision to announce indicative floor prices. Based on export options and marketing costs to these destinations, the EGTE would then be in a position to estimate the floor price necessary for it to cover its costs and not suffer losses on its trading account. Therefore, appropriate floor prices would depend both on prevailing market conditions within the country as well as prices in potential importing countries and marketing costs that would be incurred in such export decisions.

(e) It is important to note that this type of price support scheme would generate the same type of adverse distributional effects on net grain purchasers as the specific price support scenario analyzed in Section 6. Any policy that increases cereal market prices would have to take into account the potential hardships created on low-income consumers, including those in rural areas, and the increased need for targeted food assistance.

9. Given that food aid programs will continue to exist for the foreseeable future in Ethiopia, attention is needed to ensure that these programs do not adversely affect local production incentives and the adoption of improved farm technology. This will require greater coordination between the local and international groups involved in food aid and farm production issues. For example, some food aid programs are not specifically designed to distribute grain only to the poorest households with no effective demand. To the extent that households with adequate income to buy food receive food aid, this will reduce effective demand for cereals and reduce local prices, with uncertain effects on cereal production incentives, unless new cost-reducing technologies can be rapidly adopted to compensate for lower output prices. The key point here is that attention must be given to the design of food aid programs to ensure that they are not working at cross-purposes with local farm production and market development strategies.
10. Improvements in the transportation system and marketing system in general would reduce marketing costs which enable producer prices to increase with out increase in consumer prices and profit margin of traders. This would push the production possibility frontier outwards and increases the gains of the producers without incurring losses to the consumers (the society as

a whole is better off). Moreover, this could even decrease consumer prices. Therefore, the government should support by investing in transport and other forms of market infrastructure in order to increase agricultural production, expand markets, and promote specialization according to comparative advantage. Improving trade linkages with neighbouring countries such as Kenya, Uganda, Somalia, and the mid-East would help stabilize domestic cereal prices in surplus years by providing a vent for surplus production, rather than having such surpluses absorbed domestically through lower prices.

11. There may be high payoffs to examining the potential for urban and commercial uses of maize products to increase the stability of demand for maize. By cultivating a stable commercial demand for maize and maize derivatives, the annual demand for maize would become more stable, thus passing along benefits to rural producers.
12. Cereal market stability would also benefit from improvements in market facilities in major markets such as Addis Ababa. Some potential improvements would include relocation of the main cereal market to the outskirts of town to benefit from lower land rental costs, reductions in transport time and costs (so that trucks don't need to go to the middle of town in congested traffic to get to market), encourage investment in new and less-costly storage facilities and trader premises, and generally reduce the costs of trading grain. It may also be time to consider the feasibility and desirability of introducing a transparent commodity exchange to facilitate forward contracting, transparent market information, etc. Such innovations in the marketing system would require concomitant improvements in the legal foundations of markets, e.g., commercial law, enforcement, and arbitration procedures. Over time, such market-facilitating investments will provide high payoffs in terms of helping farmers, traders, millers, and consumers to reduce their risks of producing and trading food in Ethiopia's food system.

6.6 Food Aid and Price Stabilization

The result of the project's review of the EU local grain purchase in 1996 indicates that it is likely that producer prices would have been lower than they were at the time without the intervention.

Since local grain purchase by donors is expected to be not a one-time affair, this study made the following recommendations to improve the implementation of such programs in the future:

1. There is need to increase competition in bid process through reduced contract lot size;
2. It is suggested to hold one auction rather than a set of localized auctions;
3. That is need to critically review the costs and benefits of requiring stringent grain quality standards; and
4. Changing the timing of local purchase activities to earlier in the marketing season when greater proportion of farmers are selling their crops and can potentially benefit from the increased demand of local purchase activities could be more productive.

6.7 Market Performance and Determinants of Fertilizer Use

The results of this study indicate that the full benefit of the fertilizer sector reforms have not been realized because of various constraints in the marketing system and institutional issues. Fertilizer retailing is carried out primarily by large distributors/wholesalers with a limited number of sales outlets. As a result, the distribution system at the local level is not as responsive to farmers needs as it could be. Often the market in each wereda; zone or region is controlled by a single firm, thus giving rise to a monopolistic market structure.

Fertilizer sales do not start until the price for the year is announced by the government. Late announcement of the wholesale price in 1997, for instance, resulted in delays in sales for the belg season. Moreover, sales start long after farmers have sold their grain, not at a time when their cash constraint is less binding.

At the root of the marketing problem is the inefficient credit system. Since 80% of fertilizer sales is on credit, distortions in the credit market have serious implications for the use of fertilizer and farm productivity. Fertilizer credit is administered by local government officials. It is often alleged that there can be a lack of experience, and bureaucratic and sometimes unscrupulous procedures applied in this setting. Suppliers are often nominated by the authorities approving the loan. Administrative measures applied to enforce repayment have exacerbated the marketing problems. The practice of forcing all farmers to pay immediately after harvest can result in a seasonal market oversupply and relatively low grain prices. Harsh penalties on defaulters with genuine problems can induce negative attitudes towards technology adoption and reinforce risk-averse behavior. There are no provisions to protect farmers against the sale of critical assets like oxen in situations of crop failure.

Another important factor militating against expanded use of fertilizer is the sharp decline in its profitability. The return to fertilizer declined sharply between 1992 and 1997. The VCR for teff, for instance, declined by 55%, i.e. from 3.74 in 1992 to 1.69 in 1997. The decline amounted to 67% in the case maize and 48% for wheat. The ratio fell below the critical threshold of 2 for 71% of the sites/crops in 1997, compared to none in 1992. The main reason for the declining profitability is the rising fertilizer price relative to output price.

The results of this study have shown that fertilizer use is influenced by variables associated with profitability, financial liquidity, human resources, access to markets, household assets and extension services.

The fact that lack of resources can be a serious constraint to fertilizer use was confirmed as fertilizer using households on the average own 5 tropical livestock units (TLU), as opposed to 3.65 in the case of non-users. User groups also owned more draft cattle. The difference between users and nonusers wa equally pronounced with respect to farm size: farmers who use fertilizer cultivate more land than farmers who did not use fertilizer. The higher resource base and the larger the size of cultivated land, the higher are the chances that a household will use chemical fertilizer.

The statistically significantly factors affecting fertilizer demand are the indicates that access to fertilizer, credit, and extension services, area under teff cultivation, number of fertilizer distribution

centers and distance from markets. The number of distribution centers and area under teff are highly significant explanatory variables. The results also indicated that there are significant regional or zonal factors affecting fertilizer adoption.

Many of the variables that were statistically significant in explaining whether or not fertilizer was used in a given wereda become relatively unimportant in explaining variations in the intensity of fertilizer use across weredas (average kg used per hectare in the wereda).

The most important factors explaining the quantity of fertilizer used per hectare are average farm size and the amount of livestock owned. As farm size increases and the number of animals owned goes up, so does the intensity of fertilizer use. Households with adequate productive resources may generate more cash to purchase fertilizer (to buy the input on cash or pay for down payment) or they may be less risk-averse compared to resource-poor farmers.

Based on these study findings the following recommendation are suggested.

First, the reform process needs to include measures that would effectively allow full participation of the private sector at all levels. In particular, measures are required to increase the number of small, private sector, retailers so as to increase the number of distribution centers or retail outlets and make the retail market truly competitive. Fertilizer dealers must also be able to get fertilizer from whichever supplier is offering lower prices and more favorable terms. In this regard, implementing the plan to license wholesalers and retailers by the government, instead of the current practice (each importer and distributor appointing its own wholesaler and retailers or principal-agent relationship), deserves particular attention. This, together with the planned deregulation of wholesale prices (December 31, 1997), is expected to widen and deepen the distribution network at the local level and increase demand.

Second, farmers would benefit from the reform only when there are as many dealers as possible to take part in the importation and distribution of fertilizer. Any practice that may be viewed as discriminatory could discourage entry or limit the number of participants and discourage investment in storage and other infrastructure by the private sector. National, as well as local government officials must be committed to the principles of free market operations.

Third, the system of credit allocation needs to be improved to allow farmers to purchase fertilizer from retailers of their choice. Supply conditions and terms of sale would remain unresponsive to farmers' interest and liable to corruption if suppliers are nominated by a third party, the local authorities. The introduction of a coupon system, as suggested by NFIA, is expected to help level the playing field and create a favorable environment for a more competitive marketing system.

Fourth, although restructuring service cooperatives has been on the agenda of the government for quite sometime, the progress so far is hardly encouraging. Fertilizer loan disbursement and collection will continue to constrain supplies available from a range of distributors, unless effective cooperative institutions- with the power to exert peer pressure to enforce repayment - are created. Such institutions are also required to allow extension agents to use their time for extension purposes.

Fifth, the proportion of weredas without bank branches is considerable (79%). Our analysis has shown a link between fertilizer use and the number of banks operating in a particular wereda. Efforts aimed at increasing the number of bank branches by introducing mobile banking services, rural credit

schemes, and involving private banks could have a positive impact on demand. Such measure would also help alleviate the financial constraints of small wholesalers and retailers of fertilizer.

Sixth, complementary inputs such as improved seeds and chemicals and improved farmer management practices are necessary to make fertilizer more profitable and enhance demand at given input and output prices. Measures that improve the effective supply of these inputs are expected to have a positive impact on fertilizer consumption.

Seventh, a favorable impact on fertilizer demand is also expected from measures aimed at building the asset base of poor farmers. Loans for oxen and other animals (with proper consideration for feed and veterinary service) need to be expanded along with the effort to expand fertilizer use.

Eighth, since fertilizer adoption and intensity of use increase with farm size, further decline and fragmentation of land can adversely affect the intensification process. It is important to note that farm sizes should not decline below a certain minimum level. Ways of consolidating farm sizes may need to be sought in areas where farm sizes are too small to be economically viable.

Ninth, in view of the changing market conditions, variations in the degree of risk faced and differences in the asset base of the farmers, fertilizer recommendation rates need to be flexible. The rates of application need to be lower if fertilizer prices (relative to output prices) are high, the chances of crop failure are high and the asset base of the farmer is weak. Developing several recommendation rates for different categories of farmers and different localities can encourage adoption and ease the debt burden of farmers. Farmers need to be encouraged to use organic fertilizer and practice crop rotation to make up for the reduced application rates of chemical fertilizers.

Tenth, crop failure is a major factor that makes investments in fertilizer a risky venture. In the absence of any protection in the form of crop insurance or government guarantees, farmers are forced to sell assets such as oxen, leading to decapitalization. There may not be an easy solution to this problem, but it is high-time that studies on how best to tackle the problem be initiated. In this regard, the contribution of Disaster Prevention and Preparedness Commission (DPPC) need to be looked at.

Last but not least, further research is also required to investigate the determinants of fertilizer use intensity. At present, not much is know about the factors influencing the rate of fertilizer application.

6.8 Food Aid Targeting

The study has examined food aid targeting efficiencies and the determinants of food aid distributions during the 1995-96 agricultural year. Even in this relatively good harvest year, 43.2% of Ethiopia's farm households were food insecure, or had available for consumption less than the minimum nutritional requirement of 1,680 kilocalories in grains. Food aid programs, either in the form of free food or food-for-work are vital to the health and well-being of these deficit households. Deficit households manage to increase food availability by 59% through the receipt of food aid, from an average of 735 kcal per person-day to 1,217 kcal. However, due to unsuccessful food aid targeting, only 22.3% of these deficit households were selected as beneficiaries. The remaining 77.7% of food insecure households did not have a safety net.

There was no significant association between food availability (vulnerability) and food aid receipts during this sample year, a result of high errors of exclusion and inclusion at both the wereda and household levels. Other things being equal, improved wereda-level targeting has greater potential for reducing these errors than does improved household-level targeting.

Our analysis identifies four factors that help explain the high level of targeting error and the resulting low correlation between food insecurity and participation in food aid programs. They are as follows:

First, the primary beneficiaries of food aid programs are households at the extremes in terms of food availability: those with the least food available and those with the most food available. While targeting efficiencies are enhanced by the provision of food aid to the most vulnerable group, they are seriously reduced by the flow of food aid to the highly food secure beneficiaries. This pattern seems to hold across numerous regions of the country.

Second, the Food Security Strategy (1996) and the beneficiary selection criteria used by several key NGOs involved in the distribution of food aid underscore the special vulnerability of women and the elderly under conditions of food shortages. Our data show that a disproportionate number of female and aged heads of household received food aid, irrespective of their food needs. We found that households headed by women and those aged 60 years and above are not less food secure than those headed by men or younger farmers. Thus, the practice of targeting women and the aged, to the extent that it is used exclusively in place of truly need-based criteria, has contributed to increased targeting error.

Third, the strongest determinant of food aid receipt is the number of years over the past five years that households have received food aid. This is because years of food aid reflects the progressive build-up of “institutional capacity” in the food aid delivery system over time in such things as personnel, contacts and knowledge of the area, offices, trucks, and institutional reputation. All of these investments create a compelling reason to continue the flow of food aid to the same areas it has always gone—areas known for chronic drought and food shortfall. Because of the tremendous flow and momentum built up in the food aid delivery system, altering its course to meet the needs of deficit households in other areas that may not benefit from the same extent of infrastructure and institutionalization, is a formidable challenge, one that was not met in 1995-96. Improving the flexibility of the system to extend or shift the safety net when conditions require is a concept that clearly needs greater attention. It is a major cause of food aid mistargeting in Ethiopia.

Fourth, households in the region of Tigray were far more likely to have received food aid, regardless of need, than households in any other region, thereby decreasing targeting efficiency. Part of the reason for this disproportionate flow of food aid to the region is that Tigray is one of the country’s historically deficit areas in which a significant investment in food aid institutional capacity has been made. The region also has substantial community-based development projects and large public works programs (micro-irrigation, dam construction, soil conservation, etc.) that are implemented as food-for-work activities. Because of the labor-intensive nature of these projects it is conceivable that a large number of food secure households may have benefitted from participating in them.

But only about half of Tigray’s success in attracting food aid can be accounted for by such built up capacity and infrastructure. Multivariate analysis reveals that other factors must also be taken into consideration, factors not measured in this study. As with the finding described above regarding the flow of food aid to the most food secure households, *inconsistencies between stated national food aid*

targeting goals and the delivery system as it is practiced, may be worthy of deeper consideration and further research. Such research should have two objectives: first, to directly test the hypothesis that the institutionalization of food aid can be detrimental to targeting objectives, particularly in harvest years that do not conform to historical patterns; and second, to examine the types of disincentive effects that observed targeting errors may exert on food grain production and marketing in areas where they may occur.

The following recommendations are made in the context of the findings of this study:

1. More emphasis should be given to the identification of the most food insecure weredas (area targeting) as the first step in food aid targeting. Of course, identification of the most food insecure households within the identified weredas is secondary but important to improving food aid targeting in Ethiopia.
2. Current efforts by the DPPC to prepare vulnerability profiles for disaster-prone areas should continue and be expanded to cover more areas. Vulnerability profiles facilitate needs assessment and the identification of appropriate interventions in the areas they cover.
3. On going efforts by the DPPC to improve its early warning capacity and methodology should be strengthened, results be tested and implemented. A more accurate and efficient early warning system constitutes an important element of improved food aid targeting in Ethiopia.
4. Current efforts by the DPPC for the preparation of food aid targeting guidelines at the federal and regional levels and for the various socio-economic systems (sedentary agriculture, pastoralists, cash-crop producing areas, etc.) should be finalized and implemented.
5. Currently, there are various, often contradictory sources of crop harvest estimates in Ethiopia (Central Statistical Authority, Ministry of Agriculture, Food and Agriculture Organization Crop Assessment Missions, etc). As crop harvest estimates largely constitute the basis on which needs assessments are made, joint methodologies should be developed and assessments be made collaboratively by the various institutions.
6. The authority for the selection of beneficiaries of food aid programs currently rests with warialda and Peasant Association officials. However, there is general lack of awareness of the National Disaster Prevention and Preparedness Policy at lower levels of government and presumably the source of its misinterpretation. Therefore, sensitization and awareness creation should be pursued aggressively to facilitate a better understanding of the National Policy among those who implement it.
7. Consistent with the National Policy on Disaster Prevention and Preparedness, priority should be given to involve the most food insecure and poorest of the poor households in emergency (Employment Generation Schemes) as well as development (Food for Work) food aid projects.

However, the project has carried out a number of capacity-enhancing activities. These include:

1. Training in SPSS techniques and in price analysis was given to 28 senior staff members of the Ethiopian Grain Trade Enterprise (EGTE) in August 1996.
2. Some 70 EGTE Middle level staff level staff mainly from branch offices, were trained in data collection, recording and transmission techniques in June and July 1996.
3. The most common types of non-standard units (NSU) of measure used in selected cereal retail markets were identified and then a procedure was put into place for the volumes of grains held in observed NSUs into standard units.
4. To facilitate systematic and uniform data collection and transmission, a set of standard terms and instruction manuals was developed and tested.
5. Two staff members of MEDaC seconded to the project and one member of the Technical committee were trained inappropriate statistical analysis software packages and identification of statistical/simulation methods of data analysis.