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**POLICY RELEVANCE SUMMARY**

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**Ensuring Food Security in Ghana – The Role of Maize Storage Systems.**

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## Research Findings and Policy Relevance-Summary

### 1. Research Framework and Objectives

Ghana is about 99% self-sufficient in the production of maize (Nyanteng and Asuming-Bempong, 2003), the major staple for many low-income Ghanaians, yet the aggregate staple maize availability projections in Ghana does not take into account insecurity problems in the post-harvest season caused by poor storage, distribution difficulties, high prices and low incomes. This study uses the concept of food "security-storage" relationship or "availability-gap" to refer to the ability of poor Ghanaians to access maize available in the post-harvest season from storage. This estimated "availability gap" therefore measures available maize needed to raise food consumption of the poorest Ghanaians to the minimum nutritional requirement during the post-harvest season. Unfortunately, the price of maize is usually highest in the post-harvest season when maize is not easily available. As a result, Ghanaians with increased poverty levels have insufficient purchasing power to access a minimally healthy maize diet in the post-harvest season. Therefore, ensuring easy availability of maize to the poor can scarcely be accomplished without sufficient maize stored in the post-harvest season to stabilize prices.

The focus of this collaborative research is to provide information on how to develop effective national storage policies to overcome chronic maize shortages and high prices in the post harvest season in order to ensure security in staple maize for low income Ghanaians.

### 2. Data Set

The data set used for this study is based on the survey of maize farmers and traders as well as secondary data collected from public institutions in July and august 2004. A systematic data was collected from the maize production and marketing system using participant observation techniques; semi-structured interviews; questionnaire

surveys of traders, transporters, and farmers; and price monitoring in various major producing and consuming markets. About 243 randomly selected maize traders were interviewed in major maize consuming markets from Western, Central and Greater Accra regions. 375 farmers were randomly selected for interview in Techiman, Nkoranza and Kintampo agricultural districts that had been stratified into 13 zones with 48 operational areas. The data used included seasonal wholesale maize prices for major maize producing and consuming regions as well as estimated storage costs for traditional storage cribs.

## 3. Results

### a. Maize Availability and Price Variability in Post-Harvest Season.

Analysis of maize prices showed wide variations between the producing and consuming regions as well as between the harvest and post-harvest seasons. Monthly maize prices are generally very low during the major season's harvesting period and

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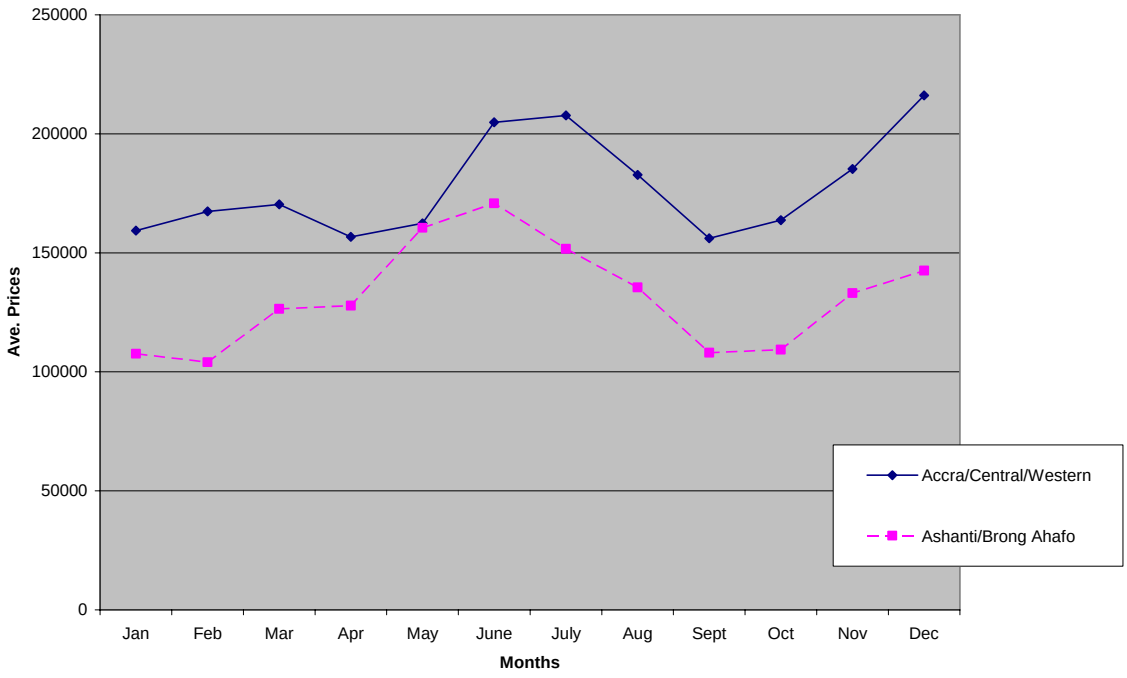
increase steadily to a peak just before the minor season's harvesting period, Figure 1. It is estimated that Ghana is about 99% self-sufficient in domestic maize production and

**Figure 1: Graph of Ave Maize Prices for Major Consuming and Producing Regions: 1998-2003**




Source: Wholesale prices from Ministry of Agriculture

therefore, inadequate storage may be considered as the major cause of maize price variability in Ghana. Indeed, over 78% of the "long-distance" traders interviewed indicated that not having a crib or secured warehouse in the marketplace for storage purposes. This greatly limits their ability to store maize even for short periods. Most "long-distance" traders generally do not see long-term maize storage in anticipation of

high future price as part of their business or as a means of earning profit. Furthermore, given the general situation of capital shortage in Ghana, long-term maize storage is relatively unprofitable to attract the interest of small-scale "long-distance" traders who mostly buy on cash but have to sell to prepared food sellers and retailers on credit. "Long-distance" traders therefore engage almost exclusively in short-term storage in the normal course of their business and their operations rarely influence the maize "security-storage" relationship or "availability-gap".

Maize has minor and major harvesting seasons in the major producing regions. Maize prices continue to be lowest during the major harvesting season as farmers generally sell their output immediately after harvest (August to October) to meet cash needs. However, most farmers also reported storing much of their minor season's crop harvested in January and February for sale between May and July when prices are high. Therefore, the amount of the minor season's crop and length of period stored largely influence the maize "security-storage" relationship or "availability-gap". However, the amount of maize farmers store from the minor season is insufficient to eliminate the availability-gap or stabilize prices in the post-harvest season. As a result, inadequate maize storage in the post-harvest season continues to be the major underlying cause to high prices or insecurity in staple maize.

**b. Storage Cost Analysis**

To overcome the poor maize "security-storage" relationship or "availability-gap" in the post-harvest season in order to enhance security in staple maize, the government initiated a buffer stock policy in 2001 with a goal of 15,000 metric tons of locally produced maize and rice. The main goals of the 2001 buffer stock policy for maize include:

- to put to use some modern storage facilities located in strategic places in the country belonging to the defunct GFDC,
- to reduce the high post-harvest maize losses,
- to reduce the extent that producer prices collapse in the immediate post harvest periods,
- to reduce the high maize prices in the post-harvest season etc. (Nyanteng and Asuming-Bempong, 2003).

A survey of storage facilities available in Ghana revealed that none of the defunct GFDC's warehouses or silos was functioning or had buffer stocks of maize. Indeed, all were idle or have become rusting monuments to inappropriate technology transfer. None of the other public storage facilities owned by MofA, FASCOM, CMB, Action Aid, etc. was being used to implement the government maize "buffer stock" strategy. Despite the government's buffer stock strategy in maize, national maize storage capacity problems continue to be ignored or overlooked. The absence of public storage facilities including those of the GFDC from the national maize "buffer-stock" storage program has adversely affected Ghana's maize security reserves in the post-harvest season. Therefore, the private sector including farmers and traders now have the responsibility of storing maize to overcome the "availability-gap" and prevent high prices in the post-harvest season.

The major storage problems reported by over 85% of the farmers surveyed include:

- uncertain returns from storage as a result of future price unpredictability.
- lack of working capital to construct cribs and store maize

- physical losses of stored maize

Furthermore, most farmers who have farms proximity to GFDC silos reported lack of access to GFDC drying and storage facilities as their other storage concerns. The survey results also show that maize farmers will only store maize unless their storage benefits outweigh their costs or future prices rise enough to cover storage costs. In deciding how long to store in the post-harvest season, the benefits from storage (Pf –Pc) must be balanced with the storage costs (S) involved and is represented by:

$$\sum_{t1}^{tn} S = \sum_{t1}^{tn} P_f - P_c$$

Where S represents monthly maize storage cost, $P_f$ for future monthly prices at which maize is sold and $P_c$ for current monthly price at which maize is stored.

Table 1 shows the results of the model applied to farmers' estimated monthly maize storage costs and corresponding monthly price spreads in the major maize producing districts of Brong-Ahafo. It is expected that farmers will have greater opportunities of increasing their earnings by storing maize immediately after harvest in order to sell when prices are high. However, Table 1 indicates that short-term storage does not increase farmers' earnings or there is no opportunity for farmers who store for less than three months after harvest. While farmers generally benefit from long-term

**Table 1: Monthly Maize Price Spreads and Estimated Storage Costs for Traditional Cribs - Brong Ahafo (Cedis)**

| | Price Change | Storage Cost | Margin | |
|---|---|---|---|---|
| **2003** | **Pf - Pc** | **S** | **(Pf - Pc) - S** | **Action** |
| February | 0 | 4123 | -4123 | Loss |
| March | 4000 | 6306 | -2306 | Loss |
| April | 6000 | 8514 | -2514 | Loss |
| May | 54000 | 13072 | 40928 | Profitable |
| June | 71868 | 16946 | 54922 | Profitable |
| July | 43379 | 17791 | 25588 | Profitable |
| August | 10604 | 17548 | -6944 | Loss |
| September | -3720 | 18331 | -22051 | Loss |
| **2002** | | | | |
| February | -9463 | 5253 | -14716 | Loss |
| March | -1003 | 7690 | -8693 | Loss |
| April | -2323 | 9816 | -12139 | Loss |
| May | 25898 | 13465 | 12433 | Profitable |
| June | 21648 | 17470 | 4178 | Profitable |
| July | 34248 | 18614 | 15634 | Profitable |
| August | -33620 | 16905 | -50525 | Loss |
| September | -6269 | 16165 | -22434 | Loss |

Source: 2004 Farmer's Survey and Ministry of Agriculture

storage of their minor season's crop harvested in February and sold between May and July, further storage costs analyses indicate that farmers do not benefit from storing their major season's maize from August to December. The implication is that there is opportunity in long-term maize storage but not in short-term storage – i.e. only long-term storage of the minor season's maize crop for sale between May and July is beneficial. The policy implication is that access to inventory capital will encourage farmers to engage in long-term storage of their minor season's maize crop.

Notwithstanding the opportunities in long-term maize storage, maize prices and unavailability are at their highest during May and July. Future price unpredictability and losses are cited by most farmers surveyed as some of the factors preventing them for storing maize till the post-harvest season. It is important that the moisture content of fresh maize intended for long-term bag storage is low to reduce the incidence of discoloration. Reduction in losses due to discoloration in bag storage can be attained through rapid drying before storage. Unfortunately, most farmers who store their maize in bags do not have access to drying facilities. While it is now generally accepted that traditional local storage systems such as the cribs are usually well adapted to local conditions, and losses from grain storage are generally low and acceptable to farmers (Compton 1992), farmers surveyed estimated losing 5% to 20% of maize stored in cribs. Maize storage losses therefore affect the quantity and quality of maize available for sale during the post-harvest season and hence its price. Thus any program that encourages farmers to increase on farm storage must stress the need for appropriate market information and access to effective drying and storage facilities.

## 4. Conclusions

The study shows that maize prices are at their highest in the post-harvest season both in major consuming and producing regions. This suggests that maize storage is inadequate and that there is poor maize "security-storage" relationship or "availability-gap". Given the general situation of capital shortage, long-term maize storage is relatively unprofitable to "long-distance" maize traders who mostly buy maize on cash but have to sell on credit. Long-distance maize traders therefore engage almost exclusively in short-term storage in the normal course of their trading activities and their operations rarely influence the maize "security-storage" relationship or "availability-gap".

The absence of public storage facilities for the national maize "buffer-stock" storage program implies that the public sector is not directly involved in overcoming the maize "availability-gap" in the post-harvest season. Therefore, storing maize in the post-harvest season to overcome the "availability-gap" and prevent high prices in order to ensure food security to the poor has to a larger extent become the responsibility of traditional small-scale maize farmers and to a lesser extent on long-distance traders. While there is opportunity in long-term maize storage, however, farmers and traders continue to face many constraints including uncertain returns from storage as a result of future price unpredictability, lack of working capital to construct cribs and store maize, and physical losses of stored maize. Programs designed to eliminate these constraints can encourage farmers and traders to increase maize storage in the post-harvest season.

## 5. Policy Recommendations

In spite of the government's buffer-stock policy initiated in 2001 to enhance staple maize security, the most relevant ingredient to ensuring increased maize storage or overcoming the "availability gap" are incentive public programs that can encourage maize farmers and traders to engage in long-term maize storage. It is clear from this study that the private sector will store more maize till the post-harvest season only in respond to positive incentives or opportunities in storage. The successful implementation of the government buffer-stock strategies or programs will therefore require helping farmers and traders overcome the constraints they face as well as creating incentives that will encourage them to change their current storage practices in order to eliminate the maize availability-gap in the post harvest season. While most of the interventional activities may be provided by local farmers and traders themselves, there will be a need for a complementary role of the government. Access to drying and storage facilities at strategic maize producing and consuming areas, easy access to inventory capital, and improvements in communication infrastructure to assist in effective dissemination of market information and predicting future prices, are areas where national policies can play a key role in encouraging maize storage among farmers and traders.

**a. Market Information Constraints**

Uncertainty of storage costs, future prices, and benefits from storage appear to be major constraints affecting farmer's maize storage. Inability to predict post-harvest maize prices has meant a reduction in maize storage or made farmers and traders engaged in maize storage vulnerable. Furthermore, as GFDC's influence on maize prices in the post harvest season has ended, the value of future maize prices has become an important factor to increasing maize storage. Therefore, improvements in government's collection and dissemination of maize prices to both consuming markets and producing regions will potentially be a valuable service to farmers and traders engaged in maize storage but lack access to future price information. The improved communication or dissemination of future maize prices may therefore offer significant potential benefits to the private sector's decision on maize storage.

**b. Storage Constraints**

The study shows that trader's and farmer's access to drying and storage facilities is critical to increasing maize storage as well as overcoming maize losses and "availability-gap" in the post harvest season. Until now, large-scale maize storage in Ghana has been carried out by GFDC with financial assistance form the government and private banks. This resulted in the building of large numbers of silos and warehouses located in both the major maize consuming and producing regions. However, GFDC is now defunct because of poor management, and inappropriate designed and location of storage and drying facilities. Greater emphasis is now needed in designing a positive complementary role for the government in assisting farmer's and trader's access to storage and drying facilities in order to increase maize storage. One such possible role for the government is the evaluation of the available or idle public silos, drying and warehouse facilities and making them available to the traders and farmers (at a fee) for maize storage, and this may improve their access to storage facilities and provide the possibilities for reducing storage costs. Another possible area of proactive intervention to encourage traders in long-term maize storage is the involvement or collaboration of

traders, central and municipal governments in the design, construction and management of secured warehouses or storage spaces in marketplaces for use by long-distance traders. Indeed, improved government and private sector arrangements involving the management and use of the public drying and storage facilities (e.g. easy access to GFDC's idle drying and storage facilities to farmers and traders) may allow some reductions in storage cost and encourage more farmers and traders to store maize.

**c. Capital Constraints**

Easy access to inventory capital by both farmers and traders appears to be a critical component to increasing maize storage over long periods of time. Public policies and programs that encourage easy credit access from financial institutions to maize traders and farmers to finance stored maize or to hold maize stocks till the post-harvest season may be an appropriate means of promoting or encouraging maize storage among traders and farmers.

While Ghana is self-sufficient in maize production, however, the management of staple maize security in the post-harvest season requires effective policies on storage practices and information dissemination to deal with the shortages, surpluses and corresponding price variability. Furthermore, it is the poor Ghanaians who are prone to maize food insecurity in the post-harvest season as a result of unavailability and inaccessibility. Addressing the maize "availability gap" is therefore the central policy issue of maize insecurity problems in the post-harvest season. The strategic focus on increasing maize storage and ensuring maize security to the poor in the post-harvest season will only be attained through complementary public policies and programs that can assist the private sector's access to market information, capital and storage facilities. Therefore, the creation of an enabling environment to encourage farmers and trader to store maize till the post-harvest season is considered as a major complementary role for the government in ensuring security in staple maize to the poor.

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