**POLICY REFORM: THE SOCIAL DIMENSION**

**WEEK 2: DAY 3**

# FOOD SECURITY AND NUTRITION: IMPLICATIONS OF POLICY REFORMS WITH A CASE STUDY FROM GHANA

**by K. Yerfi Fosu, University of Ghana, and Nico Heerink, Wageningen Agricultural University**

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Ghana, 1983-96.

## 1. INTRODUCTION

Food is a basic need for human beings. It contributes to human bodybuilding and provides the energy required for work. Inadequate access to quality food at all times tends to precipitate low intake of the food nutrients required by humanity. Coupled with low access to health services, low nutrient intake tends to precipitate low nutritional status, which in turn leads to low labour productivity, low rates of human capital formation and economic growth and development. Hence, the need for sustained access to nutritionally balanced food at all times in any economy. Ensuring adequate access to enough nutritionally balanced food for all people in an economy at all times for an active healthy life is what is referred to as food security.

As will be discussed in detail in the following sections, there are a number of factors which could foster or constrain the attainment of food security. These factors are directly or indirectly linked to the nature of the economic policy implemented. During the 1980s and 1990s, a number of developing countries embarked on far-reaching macroeconomic and sectoral policy reforms with the support of the International Monetary Fund (IMF) and the World Bank. These multilateral financial institutions provided financial support in the form of the Structural Adjustment Facility (SAF) and the Enhanced Structural Adjustment Facility (ESAF), inter alia. In connection with their financial support, these multilateral institutions have imposed and continue to impose a lending conditionality in the form of the aforementioned package of macroeconomic and sectoral policy reforms. This raises the issue as to the potential and actual effects of these Stabilisation and Structural Adjustment Policies on food security in general and nutrient intake and nutritional status in particular. The present study examines these issues. That these issues are very relevant to domestic and international policy making and political stability cannot be over-emphasised.

## 2. TRADITIONAL DETERMINANTS OF FOOD SECURITY AND NUTRITION

Traditionally, there are a number of factors that affect food security and nutrition levels in an economy. This section examines these by first introducing the concept of food security and discussing its indicators or measures. Next, the factors which enhance or constrain the attainment of food security are examined. The concept of nutrition and its indicators are then presented. Finally, the factors that determine the level of nutrition are identified.

### 2.1. Concept and indicators of food security

Food security is defined as access to a nutritionally-adequate diet by all people at all times for a healthy and active life. “All people” here refers to either all the people in the world, in which case one is dealing with Global Food Security, or people in a given economy, in which case one is dealing with National Food Security. The people in question may also be those in

a region, district, village, household, rural area or urban area, in which case one is dealing with Regional Food Security, District-Level Food Security, Village-Level Food Security, Household Food Security, Rural Food Security and Urban Food Security respectively.

Food insecurity is said to occur when there is little or no access by people to a nutritionally adequate diet. Food insecurity has a time dimension. Where it occurs over the short term and therefore is ephemeral, it is known as Transitory Food Insecurity, whereas if it is persistent and long-lived it is known as Chronic Food Insecurity. Food insecurity may occur periodically, following a cyclical pattern; here, it is called Cyclical Food Insecurity. The cycles may follow seasonal cropping patterns or other seasonal patterns, in which case the insecurity is known as Seasonal Food Insecurity.

Food security or insecurity is a vector quantity in the sense that it has magnitude, space and time dimensions. The two previous paragraphs have briefly examined the space and time dimensions. But, how is the magnitude of food security or insecurity gauged in practice? Indeed, a number of indicators are available for capturing the magnitude or degree of food security. First, there is total food availability. This measure includes the total supply of food commodities like cereals (for example, rice, maize, oats, sorghum and millet), roots and tubers (for example, cassava, yam, cocoyam and potatoes), pulses and nuts (for example, beans, groundnuts and peas), vegetables (for example, onions, tomatoes, pepper, eggplant, okra, carrots, cabbage and cauliflower), fruits like oranges, pineapples and mangoes, as well as animal food products like beef, mutton, goat, pork, eggs, milk, fish and other seafood. Food availability comprises current domestic food production, net food imports and net carryover food stocks. Second, food security is also sometimes gauged by food availability per capita. This is obtained by taking the ratio of total food availability to population size. This essentially captures the quantity of food that is available to each person in the relevant economy, region, district or village, given that it is distributed equally.

A third indicator of food security is actual household food acquisition. This is popular, since it incorporates the behaviour of households. This is captured by the total quantity of food actually consumed by households, or actual food consumption per capita compared with the desired quantity of food required by a normal healthy active person for specified age groups. Where the quantity of food actually consumed is less (more) than the desired minimum quantity, the person or people in question is or are said to be food insecure (food secure).

The “food balance” has also been used to indicate the magnitude of food security (Fosu, Heerink and Iboudo, 1996). The “food balance” is the algebraic difference between the quantity of the actual food supply and the quantity of food needed. The “food balance” is in surplus (deficit) when the supply of actual food is greater (less) than the quantity of food needed by the people in question.

### 2.2. Determinants of food security

As should be clear by now, the food security equation has two sides namely, access to food

and availability of food. Both sides of the equation are equally important since, if food is physically available but households lack adequate access to the food then food consumption will be inadequate, precipitating food insecurity. Similarly, if households have adequate potential access to food but food is not physically available, then the consumption of food is not realised. Indeed, a household cannot eat food that does not actually exist! In identifying the determinants of food security therefore, it is necessary to examine the determinants of food availability as well as those of household access to food. The latter determinant operates on the demand side whereas the former determinant operates on the supply side of the food equation. The factors that cause the effective demand for food to increase (decrease) or the supply of food to increase (decrease) stimulate increased (decreased) access to food and increased (decreased) availability of food respectively. They, therefore, enhance (constrain) the attainment of food security.

In order to derive the determinants of access to food, let us assume that a given household obtains utility U from consuming an aggregate food commodity of quantity $q_f$ , quantity of an aggregate non-food commodity $q_n$ , and quantity of infrastructural services or public goods and services like transport services $q_S$. Then the relevant well-behaved utility function is given by equation 1 (Fosu, 1995):

$$U = U(q_f, q_n, q_s) \tag{1}$$

$$\text{where } \frac{\partial U(\cdot)}{\partial q_j} > 0 \text{ and } \frac{\partial^2 U(\cdot)}{\partial q_j^2} < 0, \qquad j = f, n, s \tag{2}$$

Denote the aggregate food price, non-food price and infrastructural service user cost as $P_f$ , $P_n$ and $P_s$ respectively. Suppose disposable income is denoted as Y and the household is rational, then the household maximises utility in equation (1) subject to the budget constraint in equation (3):

$$Y = \sum_j p_j q_j \tag{3}$$

The problem of the household could be solved using the Lagrangean optimisation procedure. It can be shown that, given that there are N households or consumers, the first order conditions for the solution of this problem yield a system of demand equations, one of which refers to the demand for food:

The direction of the marginal effects of the respective arguments are as follows:

$$q_f = q_f(P_f, P_n, P_S, Y, N) \tag{4}$$

$$\partial q_f / \partial P_f < 0, \quad \partial q_f / \partial P_n < 0, \quad \partial q_f / \partial P_S < 0, \quad \partial q_f / \partial Y > 0, \quad \text{and } \partial q_f / \partial N > 0.$$

The determinants of the demand for food or access to food therefore include the price of food

($P_f$), the price of non-food goods ($P_n$), the user cost of infrastructural services like transport services ($P_s$), the level of household disposable income, and household size or population. The higher (lower) the level of the food price or the higher (lower) the user cost of infrastructural services like transport services the lower (higher) the household access to food. The higher (lower) the disposal income of households and the lower (higher) the price of non-food goods, the higher (lower) the access to food by households, given that non-food goods are complementary to food. Thus, lower price of food, lower price of non-food goods, lower user cost of infrastructural services, and higher levels of disposable incomes tend to enhance food security through their stimulation of increased access to food and food security, ceteris paribus. The contrary precipitates decreased access to food and constrains the attainment of food security.

The determinants of food availability can be derived by understanding that the total quantity of food available $Q_f$ is given by

$$Q_f = Q_d + Q_c + Q_a + Q_v \quad (5)$$

where $Q_d$ denotes domestic food output, $Q_c$ denotes commercial food imports, $Q_a$ denotes food aid imports or grant/concessionary food imports, and $Q_v$ denotes net carryover stocks. $Q_v$ depends upon the going interest rate $R_d$. When the going interest rate increases (decreases), the opportunity cost of food storage increases (decreases) ceteris paribus; therefore, the volume of food storage falls (increases), ceteris paribus

$$Q_V = Q_V(R_d), \qquad \partial Q_V / \partial R_d < 0 \quad (6)$$

Suppose food aid (grant/concessionary) imports are exogenously given as $Q_a$. Commercial food imports $Q_c$ depend upon the world price of food $W_f$, the national income per capita of the importing economy I, availability of foreign exchange or level of foreign reserves A, cost and availability of off-shore financing using the proxy of the international interest rate $R_f$:

$$Q_c = Q_c(W_f, I, A, R_f) \quad (7)$$

where $\partial Q_C / \partial W_f < 0$, $\partial Q_C / \partial I > 0$, $\partial Q_C / \partial A > 0$, and $\partial Q_C / \partial R_f < 0$. The supply of domestically-produced food $Q_d$ could be derived as follows. Suppose the level of food production is given by the following well-behaved production function:

$$Q = Q(H, L, K, Z, M, D, T, G, X) \quad (8)$$

where H, L, and K, denote conventional factors of food production, viz., physical quantities of agricultural land, labour and capital respectively. Z, M, D and T denote vectors of quantities of improved agricultural technologies viz., fertiliser, agro-chemicals, improved varieties of food crops and livestock, and irrigation facilities respectively. G denotes the quantity of infrastructural services. X denotes weather, using the proxy of rainfall in domestic food producing areas. Here $\partial Q / \partial H > 0$, $\partial^2 Q / \partial H^2 < 0$, and so on. Denote the respective prices of the factor inputs as $r_H$, $r_L$, $r_K$, $r_Z$, $r_M$, $r_D$, $r_T$ and $r_G$ and the price of food $P_f$.



$$\max \pi = P_f Q - C(Q, r_H, r_L, r_K, r_Z, r_M, r_D, r_T, r_G) \quad (9)$$

Then the rational domestic food producer will maximise profit:

It can be shown that the first and second order conditions for maximisation, viz., $\partial \pi / \partial Q = 0$ and $\partial^2\pi / \partial Q^2 < 0$ yield the following food supply function:

$$Q = Q (P_f, r_H, r_L, r_K, r_Z, r_M, r_D, r_T, r_G, x) \qquad (10)$$

for which $\partial Q / \partial P_f > 0$, $\partial Q / \partial r_i < 0$ (i = H, L, K, Z, M, D, T and G) and $\partial Q/\partial X > 0$. The supply of domestically-produced food is therefore determined by the own price of food, the prices of the inputs employed in the production of food, the user cost of infrastructural services and weather.

An increase in the price of food stimulates an increase in domestic food supply, and decreases in the unit prices of both conventional factor inputs and improved agricultural technologies, and of user costs of infrastructural services stimulate increases in domestic food supply, ceteris paribus. Substituting for $Q_{d,}$ $Q_c$, $Q_a$ and $Q_v$ in equation (5) gives the following aggregate food availability function:

$$Q_f = Q_d (P_f, r_j, X) + Q_c (W_f, I, A, R_f) + Q_a + Q_v (R_d) \qquad (11)$$

The arguments of each of the functions $Q_d (.)$, $Q_c (.)$ and $Q_v (.)$ in (11) and the volume of food aid therefore constitute the major traditional determinants of food availability. Table 1 summarises the factors and conditions under which increased food availability could be achieved. Therefore, from a food availability perspective, increased food security occurs when the producer price of food rises, conventional factor input prices fall, improved agricultural technology prices fall, user costs of infrastructural services fall, weather conditions improve in food-producing areas, the world price of food falls, national domestic income rises, foreign reserves or foreign exchange availability rises, international interest rates fall, the volume of food aid increases and domestic interest rates fall.

Table 1. Traditional determinants of food availability

| Determinant | Direction of effect | Mode of achieving increased food availability |
|---|---|---|
| Produces price of food | + | increase |
| Agricultural land rent | - | decrease |
| Agricultural wage rate | - | decrease |
| Agricultural capital cost | - | decrease |
| Prices of fertiliser | - | decrease |
| Price of agro-chemicals | - | decrease |
| Prices of agro-biological technologies | - | decrease |
| User cost of irrigation services | - | decrease |

| | | |
|---|---|---|
| User cost of infrastructural services | - | decrease |
| Weather (e.g., rainfall) in food-producing areas | + | increase |
| World price of food | - | decrease |
| National income of domestic economy | + | decrease |
| Foreign reserves or foreign exchange availability | + | increase |
| International interest rates | - | decrease |
| Volume of food aid | + | increase |
| Domestic interest rates | - | decrease |

## 2.3. Concept and indicators of nutrition

The concept of food security presented in Section 2.1. is based on the idea of sustained access to nutritionally-adequate diet. Indeed, food is consumed in order to obtain the elements required to build the human body and to provide calories or energy for a healthy and active life. These elements, known as food nutrients, include carbohydrates, proteins, fats, minerals and vitamins. Specific quantities of the various nutrients are needed for a normal healthy active life. When the quantities of these nutrients actually consumed are lower than the normal requirements, malnutrition is said to occur. The quantity of nutrient actually consumed is known as nutrient intake.

Nutrition is often used as an indicator of human welfare. Nutritional status is indicative of a person's state of health as influenced by the intake of and use of food or nutrients. The ability of the human body to utilise ingested food depends upon the individual's genetic endowment and the prevalence of diseases and parasites. Beaton (1983) has observed that nutritional status is largely the result of the individual's net energy balance; in other words, the individual's energy expenditure and calorie intake.

A number of indicators of nutrition exist. The choice of nutrition indicator depends upon the specific programme or policy under consideration and the availability of data. It also depends upon the cost of generating the requisite information and the time available for examining the effect of specific variables on nutrition. Pinstrup-Andersen (1986) identifies eight indicators of nutrition. First, total food availability. This is ineffective and usually misleading since as already indicated, the mere availability of food does not necessarily translate into adequate nutrient intake and nutritional status. Second, ability of households with malnourished members to acquire food; for example, the income status of households. The limitation of this indicator is that it does not incorporate relationships like household food acquisition behaviour, food distribution, households that are malnourished and those that are well, and health and sanitation issues. Third, actual household food acquisition. This indicator incorporates household behaviour and it is able to track existing malnutrition as well as its distribution in a given population. It is also useful in the evaluation of nutrition in food policies.

A fourth indicator of nutrition, according to Pinstrup-Andersen, is food intake by malnourished members in a given household. Although this indicator is sometimes employed in the evaluation of food supplementation programmes, it is often difficult to obtain the relevant reliable data for computing it. Fifth, anthropometric measures of growth and development employed to indicate nutrition impact on nutritional status of children. Anthropometric measures reflect food intake as well as health-related factors. Hence, it is sometimes difficult to separate nutritional improvement from other factors like genetic variation. Sixth, activity level of an individual. Insufficient energy intake precipitates reduced energy usage by lowering activity level. Lower activity levels may reduce child development and later precipitate reduced labour supply and labour productivity. It should be noted that activity levels are difficult to measure accurately. Seventh, mortality rate is another indicator of nutrition. Eighth, morbidity is also an indicator of nutrition. High mortality rate and morbidity reflect severe malnutrition.

It is important to note that women's nutritional status is measured by Quetlet's body mass index (BMI) defined as the algebraic ratio of body weight (kg) and the square of the person's height measured in metres. When BMI is less than 16.0 the individual is said to suffer severe chronic energy deficiency or severe wasting, whereas if BMI is between 16.0 and 17.0, the individual is said to suffer from mild to moderate chronic energy deficiency (James, Ferro-Luzi and Waterloo 1983). When BMI is between 17.0 and 18.5 the individual is said to be characterised by normal to mild chronic energy deficiency. An individual has normal energy reserves when BMI is between 18.5 and 23.0, whereas when BMI is greater than 23.0 the individual is said to be overweight.

### 2.4. Determinants of nutrition

To derive the traditional determinants of nutrition, assume that there exist a joint household preference function of the following form, a la Rosenweig and Schultz (1983):

$$U = U (C_{fi}, C_{ni}, H_i, L_i, I, a) \quad (12)$$

where $C_{fi}$ denotes the food consumption vector of the i th member of the household, $C_{ni}$ denotes the non-food consumption vector, $H_i$ denotes the health status of the "ith" member of the household. $L_i$ denotes the leisure time of household i, I denotes household size and a denotes tastes and preferences. Assume that there is a health production function for the "ith" member of the household:

$$H_i = H (N_i, B_i, X_i, E_i, M) \quad (13)$$

where $N_i$ denotes the recent nutrient intake vector of the "ith" household member, $B_i$ denotes household use of health services, $X_i$ denotes morbidity episodes: diseases and parasites tend to reduce appetite for food and absorption of nutrient consumed. $E_i$ denotes energy expenditure, and M denotes a vector of commonly fixed factors like the full prices, wages, distance to the nearest clinic, roads, quality of health services, local dietary and customary

practices, potable water quality (the prevalence of disease vectors in the local water supply and environs).

The household is rational and maximises the well-behaved utility function in equation (12) subject to the health production function in (13) and the household's full income budget constraint. Applying the Lagrangean optimisation procedure, it can be shown that the relevant first order conditions yield a system of health input demand functions three of which relate to the nutrient intake, health service use and morbidity:

$$N_i = N(P, Y, M) \qquad (14)$$
$$B_i = B(P, Y, M) \qquad (15)$$
$$X_i = X(P, Y, M) \qquad (16)$$

where P denotes the full vector of prices broadly defined to include money costs and time cost. Y denotes household income that is held as exogenous here. Recall that nutritional status depends upon nutrient intake, access to quality health services, the occurrence of diseases and parasites and the maintenance of sanitation by households.

Now, $\partial N/\partial Y > 0$ and $\partial B/\partial Y > 0$. This implies that higher levels of household income stimulate higher levels of nutrient intake and health service use, and therefore higher levels of nutritional status, ceteris paribus. In addition, $\partial N/\partial P_f < 0$. This implies that higher food prices tend to precipitate lower levels of nutrient intake, ceteris paribus. Finally, $\partial N/\partial M$, $\partial B/\partial M$ and $\partial X/\partial M$ could be positive or negative depending upon the element j of the vector M in question.

## 3. EFFECTS OF POLICY REFORMS ON FOOD SECURITY AND NUTRITION: THEORY

In this section, a brief overview of International Monetary Fund-World Bank economic policy reforms is provided. Next, the mechanisms through which components of these economic policy reforms influence food security, nutrient intake and nutritional status are analysed.

### 3.1. International Monetary Fund-World Bank economic policy reforms

The Fund-Bank economic policy reforms have been a package of sectoral and macroeconomic policy reforms implemented by developing economies particularly during the 1980s and 1990s with the support of the International Monetary Fund and the World Bank. The implementation of these policy reforms originated in the economic crisis experienced by several developing economies during the 1980s and 1990s. The economic crises were caused by both domestic and foreign factors. During this period, commodity prices of the major exports of these economies declined whereas the world prices of their imports increased, precipitating foreign terms of trade declines. In addition, foreign interest rates increased and the debt scenarios of these economies worsened. These economies were therefore plagued

with declining economic growth, falling exports, unsustainable balance of payments, high rates of inflation and low savings rates, to mention just a few difficulties. In order to halt and reverse these dismal scenarios, developing economies sought support from the IMF and the World Bank. The support has largely come in the form of a Structural Adjustment Facility (SAF) and an Enhanced Structural Adjustment Facility (ESAF). Economies benefiting from these financial facilities have had to satisfy the lending conditionality in the form of fairly standard economic policy reforms.

The sectoral reforms include the liberalisation of the agricultural sector. The agricultural product markets in these economies are deregulated through the abolishing of guaranteed minimum prices. The delivery of agricultural credit under concessionary interest rates are also abolished, and agriculture is often expected to compete with other sectors for institutional credit. Similarly, the delivery of improved agricultural technologies like fertiliser, agro-chemicals and agro-mechanical services through subsidy programmes by the public sector are abolished. The subsidies are in a number of cases gradually withdrawn and the delivery of these technologies is privatised.

In industry, the reforms comprise the lowering of import tariff and non-tariff barriers imposed during the period of import substitution industrialisation, and the stimulation of capacity utilisation through improvement in the supply of critical spare parts and plant and equipment. The utilities sector is reformed through the rationalisation of domestic tariffs on utility consumption. The subsidies on the consumption of utilities like electricity, potable water and telecommunications service are abolished. The social sector is reformed through, inter alia, user cost rationalisation, implemented under various cost recovery schemes. For example, the user cost of education and health services are increased significantly as the subsidies on the consumption of these services are withdrawn. The public sector is often restructured through the retrenchment of several thousands of workers, *inter alia*. The policy reforms have also included a wage freeze. Other forms of institutional restructuring are also implemented (see for instance, World Bank 1984 and Fosu 1996).

The macroeconomic policy reforms include the implementation of a restrictive monetary policy. Here, the rate of growth of domestic credit is reduced and interest rates that are liberalised tend to increase, making the credit availability decrease and cost of borrowing increase. In addition, the macroeconomic policy reforms include restrictive fiscal policy. Here, the rate of growth of public expenditure is curtailed whereas the marginal rates on existing taxes are increased. New taxes are introduced and tax administration improved. The government deficit as a proportion of Gross Domestic Product is often to be reduced. A third policy under the macroeconomic reforms is trade liberalisation. Here, import and export taxes are reduced. Both tariff and non-tariff barriers are lowered. Finally, the macroeconomic reforms comprise nominal exchange rate depreciation or devaluation, depending on whether the economy implements a flexible exchange rate regime or a fixed exchange rate regime.

### 3.2. Economic policy reforms and food security: transmission mechanisms

In this section, the mechanisms through which economic policy reforms can translate into changes in food security are examined. The analysis is conducted for food security in general, nutrient intake and nutritional status. Indeed, analysing the effect of macroeconomic and sectoral policy reforms on food security and nutritional status is not an easy exercise. In this section, the effects of various components of the economic policy reforms are analysed. The approach is to examine the extent to which components of the economic reform could influence the traditional determinants of food security and nutrition examined in Sections (2.2) and (2.4) and by implication food security and nutrition.

3.2.1. Monetary policy effects

The restrictive monetary policy implemented under the Fund-Bank economic policy reform could exert effects on access to food. In the first place, such a policy is likely to precipitate a fall in national income that precipitates a fall in household access to food, ceteris paribus. Second, the restrictive monetary policy is likely to precipitate a fall in the rate of inflation. Given that food commodities are exchanged in flex-price markets whereas non-food commodities are exchanged in fix-price markets, as prices fall in response to the restrictive monetary policy, food prices will fall at a faster rate than non-food prices (see for instance, Fosu 1988, 1989), stimulating an increase in access to food *ceteris paribus*. Where the reforms include the privatisation of the delivery of infrastructural services like transport services, the credit crunch associated with the restrictive monetary policy will precipitate reduced access to infrastructural services, as user cost increases. This will precipitate reduced access to food, particularly where households have to commute some distance to purchase food. In a number of economies implementing the economic policy reforms, the delivery of infrastructural services is largely in the domain of the public sector; hence, this transmission mechanism is not likely to be very strong in these economies.

The restrictive monetary policy could also exert effects on the availability of food. In the first place, due to the aforementioned fix-flex price mechanism, the restrictive monetary policy is likely to precipitate a fall in the producer price of food relative to the producer price of non-food commodities. Given that resources are mobile across sectors, resources will shift in favour of non-food production (Fosu, 1989). This will precipitate a fall in the domestic production of food, ceteris paribus. Second, the restrictive monetary policy tends to stimulate a credit crunch including increased levels of interest rates, making the cost of borrowing increase. Given that food production is significantly leveraged, the credit crunch will precipitate reduced levels of the utilisation of improved agricultural technologies and agricultural capital, precipitating reduced levels of productivity and domestic food production, and therefore reduced levels of food availability, ceteris paribus. Furthermore, the private firms delivering improved agricultural technologies may pass the increased cost of borrowing to food producers in the form of higher prices of improved agricultural technologies. This would in turn precipitate reduced utilisation of these technologies and reduced food availability. Where the delivery of infrastructural services are turned into the hands of the private sector, user cost may increase as these firms pass on the increased cost of borrowing to users of infrastructural services which include food producers. This would reduce food availability, ceteris paribus.

Third, a restrictive monetary policy may precipitate a fall in national income. This would precipitate a fall in commercial import demand for foreign food, and a lowering of food availability ceteris paribus. Fourth, one of the central targets of the policy reforms is to boost export earnings. Where this is achieved, foreign exchange availability increases, stimulating increased commercial imports of food and therefore increased food availability, ceteris paribus. Fifth, the increased interest rates associated with the restrictive monetary policy stimulate an increase in the opportunity cost of storage which in turn precipitates a reduction in the volume of storage of food and other commodities (see for instance, Fosu 1989). This in turn precipitates reduced food availability, ceteris paribus.

The restrictive monetary policy could also influence nutrient intake and nutritional status in a number of ways. First, the relative fall in food prices could stimulate an increase in nutrient intake, given that households can distinguish nutritious food from junk food and do know the benefits of the former. The fall in income associated with the restrictive monetary policy would precipitate a fall in nutrient intake, ceteris paribus. The increase in user cost of infrastructural (e.g. transport) services may precipitate reduced nutrient intake.

Second, increased transport and health services user costs tend to precipitate reduced access to health services. Finally, the net effect of the restrictive monetary policy is to reduce both nutrient intake and access to health services. This implies that the restrictive monetary policy precipitates reduced nutritional status.

### 3.2.2. Fiscal policy effects

Fiscal policy may influence food security and nutrition through a number of channels. First, the restrictive fiscal policy necessitates a restrictive monetary policy, giving rise to the transmission mechanisms already discussed in Section 3.2.1. Second, the effect of fiscal policy could largely occur through public expenditure effects on the relevant traditional determinants of food security and nutrition. Other things being equal, a restrictive public expenditure policy reduces national income and the degree of provision and access to infrastructural services. These in turn reduce access to food and therefore precipitate reduced food security. Food availability may be affected adversely by a restrictive public expenditure policy. This may occur through significant cuts in public expenditures that affect public support of food research and extension, irrigation facilities and storage facilities. In addition, the reduced national income that may accompany the restrictive public expenditure policy may precipitate a fall in the import demand for food and therefore reduced food availability.

Fiscal policy may also influence nutrient intake and nutritional status through similar transmission mechanisms.

### 3.2.3. Trade and exchange rate policy effects

As already indicated, the economic policy reforms are characterised by external trade liberalisation. The tariff and non-tariff barriers on import trade and export trade are lowered under the economic policy reforms. The package here includes a reduction of marginal

import tariff rates, the withdrawal of quotas, licences and bans, and the reduction of implicit taxes on exports. The package also includes the depreciation of the nominal exchange rate. The nominal exchange rate is the units of a domestic currency exchanged for one unit of a foreign currency. In this section, the effects of trade policy and exchange rate policy on household access to food, food availability, nutrient intake and nutritional status are analysed.

Trade and exchange rate policies could influence household access to food through a number of mechanisms. First, trade and exchange rate policies influence relative prices in an economy. The effects of these policies depend upon the proportion of the food market that is export-oriented, the proportion which is import-competing and the proportion which is non-traded. The liberalisation of trade on both the import side and export side of the trade equation tends to lower the domestic price of import-competing goods relative to those of export goods which in turn lowers the price of non-traded goods relative to export prices (Dornbusch, 1974; Sjastaad, 1984; Fosu, 1990; Fosu 1992; Fosu,1994). This implies that the prices of non-traded food commodities will fall relative to the price of export food commodities, and the prices of import-competing food commodities will fall relative to the price of export food commodities. Food consumption will tend towards non-traded food commodities and import-competing food commodities but away from export food commodities, as access to non-traded food and import-competing food increases. If in an economy the bulk of food consumed is largely non-traded, then household access to food in general increases, whereas if the bulk of food consumed is largely of the export-oriented type, then access to food as a whole will decline. Furthermore, if all food is considered as non-traded, and non-food commodities are either export goods or import-competing goods, then the trade liberalisation will precipitate a fall in the price of food relative to prices of export goods. This stimulates increased household access to food and therefore increased food consumption, ceteris paribus.

Second, where the provision of infrastructural services (for example, transport services) depends significantly on imported inputs, trade liberalisation may precipitate lower user cost of the services. This in turn stimulates increased access to food and increased food consumption, ceteris paribus. Third, if trade liberalisation stimulates (precipitates) an increase (decrease) in national income then access to food will increase (decrease) accordingly, and food consumption will increase (decrease).

There are several mechanisms through which a liberal external trade regime could influence food availability. First, as already indicated, a liberal external trade regime precipitates a fall in the prices of import-competing food commodities relative to the prices of export goods and therefore a fall in the prices of non-traded food commodities relative to the domestic prices of export goods. Given that resources are mobile across sectors, producers will shift resources from the production of non-traded food commodities and import-competing food commodities to the production of export goods. If the proportion of food in export commodities is not significant then the resource shift will precipitate a fall in the supply of domestically produced food and therefore food availability will fall, ceteris paribus.

Second, where the bulk of improved agricultural technologies like fertiliser, agro-chemicals, mechanical equipment and implements are externally sourced through commercial imports, a nominal depreciation of the exchange rate will stimulate increased prices of these technologies and reduced levels of their utilisation by farmers. Where the food production process significantly uses such technologies, the reduction in improved technology use will lead to reduced productivity and a fall in the domestic production of food. In this case, food availability will decline, ceteris paribus. Third, where the imports of such technologies were taxed (subsidised) before the policy reforms were introduced, a liberal external trade regime in the form of a lowering of the import tax (subsidy) under the policy reform programme will precipitate a fall (rise) in the prices of the agricultural technologies. This would stimulate a rise (fall) in the level of utilisation of these technologies that would in turn stimulate increased (decreased) productivity and increased (reduced) levels of domestic agricultural production including food production, to the extent that food production significantly utilised these technologies before the liberal trade regime was introduced.

Fourth, as already indicated, the liberalisation of import and export trade tends to stimulate an increase in the domestic price of export goods relative to the domestic prices of import-competing goods and non-traded goods. The result of this is a shift of resources into the production of export goods. This stimulates increased foreign exchange earnings or reserves, given that the world prices of these export goods do not fall and debt service obligations are not huge. This increased availability of foreign exchange or reserves will stimulate increased demand for food imports, *inter alia*, and therefore increased availability of food, *ceteris paribus*.

Trade and exchange rate policies could influence nutrient intake and nutritional status through the following linkages. First, where the liberal trade regime leads to increased (decreased) income, nutrient intake is likely to increase (decrease), to the extent that households are aware of the importance and sources of food nutrients. Second, the increased (decreased) income will lead to an increased (decreased) access and use of health services. Coupled with the increased (decreased) nutrient intake this increased (decreased) access to health services stimulates an improvement (deterioration) in nutritional status. Third, trade liberalisation could result in lower (higher) user cost of transport services, to the extent that the bulk of inputs into the provision of transport services is imported and significantly taxed (subsidised) before the liberal trade regime was introduced. Lower (higher) user cost of transport services will increase (decrease) nutrient intake, access and use of health services and potable water. This will result in an improvement (deterioration) in nutritional status.

### 3.2.4. Overall effects of the reform policies

It is clear from the analyses in Sections 3.2.1 through 3.2.3. that the magnitude and direction of the overall effects of the sectoral and macroeconomic policies implemented under the economic policy reforms cannot be ascertained *a priori*. They are indeed empirical issues. This is because, whereas the transmission mechanism pertaining to a given policy say monetary policy, may yield a negative effect on food availability, it may rather yield positive effects on access to food, nutrient intake and nutritional status. Here, the overall effect

depends upon the relative strengths of the relevant effects.

The overall effects of the economic policy reforms on food security and nutrition therefore depend upon the relevant elasticities of the relationships expressed in the transmission mechanisms for the various components of macroeconomic policies and the magnitudes of the changes in the instruments of the macroeconomic policies.

## 4. EMPIRICAL EVIDENCE OF FOOD SECURITY AND NUTRITION EFFECTS OF POLICY REFORMS

The previous section alluded to the fact that the nature and magnitudes of the effects of the sectoral and macroeconomic policies on food availability, access to food, nutrient intake and nutritional status under the economic policy reforms are empirical issues. To examine these on the empirical level would require a multi-equation system that captures all the relevant transmission mechanisms in detail. Unfortunately, such a system is currently very rare. In the present study therefore, existing general empirical evidence pertaining to pieces of the various transmission mechanisms presented in Sections 3.2.1 through 3.2.3 is provided. This is supplemented with empirical evidence on the trends in food availability, food consumption, nutrient intake and nutritional status. Finally, an empirical case study of Ghana is presented. This case study is motivated by the fact that Ghana is one of the economies that has implemented the far-reaching economic policy reforms supported by the International Monetary Fund and the World Bank and is often held up as a model of effective economic policy reform.

### 4.1. General empirical literature

The relevant empirical information presented here pertains to several developing economies in Africa, Latin America and Asia.

#### 4.1.1. Nutrition and nutritional status during the adjustment period

Studies of the experiences of several developing countries demonstrate that generally IMF-World -Bank-supported structural adjustment policies either had a negative effect on human welfare or were not able to significantly offset the negative effects of the economic crises which characterised the period before the implementation of the adjustment policies (Cornia, 1987; Cornia, Jolly and Stewart, 1988). For several economies, there was a worsening of the problems of malnutrition as well as child and infant mortality. The proportion of malnourished children increased, as did the infant mortality per 1000 children (Pinstrup-Andersen, 1989). Even where there appeared to be some easing of the problems, the rate of improvement slowed down during the adjustment period, particularly infant mortality rates (Pinstrup-Andersen, 1989). In Brazil for example, there was a significant decline in the income of the poor during the adjustment period, and this partly caused an increase in the child mortality rate and a decline in maternal nutritional status during the period (Cornia, 1987; Pinstrup-Andersen, 1989). In Sri Lanka, the percentage of pre-school children with

weight-for-height less than 80 percent of standard increased by 100 percent between 1975/76 and 1980/82, showing an increase in nutritional wasting during the period (Sahn, 1986). Similarly, there was a significant increase in malnutrition and hospital admissions due to malnutrition during the period 1978-85 in Jamaica, demonstrating a decline in pre-school child nutritional status (Boyd, 1987).

The nutritional status of pre-school children declined during the period 1982-85 in the Philippines, and in Chile average daily calorie consumption declined from 2587 calories per day in 1969 to 2328 calories per day in 1978, representing a 10 percent decline. In Uruguay, infant mortality rates increased from 28.6 to 31.8 percent during 1983-85 (Cornia, 1987). In Bolivia, nutrition-related infant deaths increased from 33 percent in 1972 to 66 percent in 1982 (Musgrove, 1987). A long term decline in infant mortality rate was experienced in Costa Rica before adjustment; although this decline ceased during the adjustment period, infant mortality rate became constant during the period (Cornia, 1987). In Mexico, food energy consumption among the poor declined by 13 percent during 1982-84 and infant mortality increased from 5 to 5.5 percent during 1981-83; the proportion of deaths of infants due to malnutrition increased (Lustig, 1986).

The negative effects on nutrition and nutritional status have been largely due to a decline in the consumption of nutritious diets and reduced access to health services during the adjustment period. The decline in the consumption of nutritious food has in turn been due to the decline in real wages or real incomes relative to increased food prices during the period.

4.1.2. Real wages and food security during the adjustment period

The poor tend to spend a large proportion of their income on food. Generally, their income and price elasticities of demand for food are large. Therefore, changes in income provide strong indications of changes in food security (Pinstrup-Andersen, 1987a, 1987b, 1988, 1989). In several economies, food consumption of lower and middle-income earners declined during the adjustment period of 1982-85 (Pinstrup-Andersen, 1989). In Zaire, the purchasing power of the minimum wage in 1982 was only 3 percent of that in 1970 (Ntalaja, 1986).

In Latin America, the number of people below the poverty line increased from 130 million to 150 million during 1981-86; during the stabilisation period, real wages fell whereas inflation, unemployment and the price of food relative to the non-food price increased (Pinstrup-Andersen, 1989). In Brazil, the average real wage declined by 32 percent and unemployment and underemployment increased during 1981-83. Per capita gross domestic product declined by 14 percent and the real income of the poor declined by 20-30 percent whereas the percentage of households below the poverty line increased from 40 to 60 percent during the period (Cortazar, 1986).

In Costa Rica, real wages declined by 40 percent, and the percentage of households below the poverty line increased by 17 to 29 percent during 1972-82 but real wages increased to pre-1979 levels by 1985 (World Bank, 1986). In Peru, 70 percent of the population had insufficient income to cover a minimum food basket in 1984, up from 51 percent in 1972

(Lustig, 1986, Pinstrup-Andersen 1989). In Mexico, the cost of a basic diet for one person increased from 8.5 percent of a minimum wage in 1982 to 13 percent of a minimum wage in 1986 (Lustig, 1986). The percentage of workers in Mexico earning one minimum wage or less tripled from 13 percent to 38 percent during 1982-85 (Lustig, 1986). In Sri Lanka, the adjustment programme was initiated during 1977-78 and real wages declined during 1979-84 (UNICEF, Colombo, 1985; Sahn, 1986).

In Uganda, the nutritional situation did not degenerate significantly for the semi-subsistence farmers during the period when food prices increased and incomes declined. This is because the semi-subsistence farmers produced a significant proportion of their own food (Jamel 1985).

In Costa Rica, purchasing power declined during the period of adjustment. In response, households substituted calories for the more expensive nutrients during the period. For example, in urban Costa Rica, energy consumption measured in kcal per capita declined by 3 percent from 1,947 kcal per capita in 1978 to 1,885 kcal per capita in 1982. In a similar manner, the intake of protein and fat declined by 8 percent from 58 grams to 53 grams and by 6 percent from 67 to 63 grams respectively during 1978-1982 (Pinstrup-Andersen, 1987b). The proportion of households below the poverty line increased from 17 to 29 percent during the period.

Raczynski (1988) and Pinstrup-Andersen (1989) have observed that generally, food consumption by lower income groups declined during the adjustment period. In addition, the absolute level of food consumption by the poor declined during the same period, likewise the distribution of food consumption among income strata. As already noted, the poor tend to shift away from protein and fat consumption but towards cheaper calories, viz., carbohydrates during periods of decline in purchasing power as observed during the adjustment period.

Domestic currency devaluation resulting from the policy reform in the mid-1980s had an overall negative effect on food producing regions in Ghana. In addition, child survival in Ghana has been affected by increased food prices. Furthermore, an increase in the maize price precipitated malnutrition in Ghana during the adjustment period of 1983-93. In the next section we present a case study on Ghana.

### 4.2. Case Study of Ghana

In Ghana, purchased food constitutes a significant proportion of food consumption (Ghana Statistical Services, 1995a, 1995b). Rural food farmers have been observed to purchase food, particularly during the off-season period. This implies that in the absence of time series data on food and nutrients actually consumed, the change in household disposable income relative to the change in the food price constitutes an important indicator of household access to food in particular and food security in general. This indicator is therefore employed in the present case study.

The trends in the food component of the Consumer Price Index in Ghana during the structural adjustment period 1983-96 are depicted in Table 2. Apart from 1985 when the food prices declined by 11 percent, food prices in Ghana tended to increase during the structural adjustment period. The least percent food price increases of 9 and 10 percent were recorded in 1991 and 1992. In 1987, 1988, 1990, 1995 and 1996 food prices increased by more than 30 percent. In 1995 food prices increased by a colossal 62 percent. The magnitudes of increases in food prices during the 1990s have been particularly high. Non-food price levels have generally behaved in a similar manner (Table 2).

Data from the Ministry of Food and Agriculture show that during the period 1992-96, the prices of domestically produced food staples generally increased by at least 80 percent per annum. For example, the prices of domestically-produced rice and maize increased by as much as 95 and 80 percent per annum respectively. Similarly, the prices of yam and cassava respectively increased by 85 and 62.5 percent per annum. The prices of cowpea and tomato increased by as much as 112.5 and 97.5 percent per annum respectively during the period.

Unfortunately, real incomes generally did not increase by as much as the colossal increases in food prices during the adjustment period, particularly during 1992-96. This implies that household access to food seems to have generally declined during the adjustment period in Ghana, precipitating food insecurity during the period. The percentage change in the ratio of minimum wage rate to the food price averaged 16.1 percent per annum during 1983-92 but declined to 2.5 percent per annum during the period 1992-96. Whereas the nominal minimum wage rate increased by 41.5 percent per annum during 1992-96, the unit prices of cowpea, tomato and maize increased by as much as 112.5, 97.5 and 80 percent per annum respectively during the period. This trend suggests a decline in household access to cowpea (an important source of protein), tomato and maize during the period. The study therefore underlines the importance of, among other things, employment generation and incomes schemes as well as a fiscal policy to enhance increased household income.

Fosu, Forjoe and Heerink (1995), using the large-scale national living standards survey data set (consisting of 3200 households and 15,648) econometrically demonstrated that household demand for calories in Ghana depends, *inter alia*, on household disposable income and the price of yam. Fosu and Heerink (1994) describe the data set in greater detail. Fosu, Forjoe and Heerink (1995) observed positive and negative effects of household income and the price of yam respectively on household demand for food calories. A fall in household income and a rise in the price of yam that occurred during the policy reform period therefore tended to precipitate decreased household access to calories during the period.

Table 2. Growth in GDP, Food and Non-food Components of Consumer Price Index in Ghana, 1983-96

| Year | Food CPI 1977=100 | Percentage change in Food CPI | Percentage change in Nonfood CPI | Percentage change in Combined National CPI | Percentage change in nominal real minimum wage rate | Percentage change in minimum wage rate | Real GDP growth (%) | Percentage change in the ratio of minimum wage rate and food CPI |
|---|---|---|---|---|---|---|---|---|
| 1983 | 2755 | - | - | - | - | - | - | - |
| 1984 | 3059 | 11 | 79 | 40 | 56 | 41 | 2.62 | 12 |
| 1985 | 2718 | -11 | 29 | 10 | 106 | 132 | 5.10 | 87 |
| 1986 | 3269 | 20 | 25 | 25 | 29 | 7 | 5.16 | 3 |
| 1987 | 4527 | 38 | 38 | 40 | 24 | -10 | 4.85 | -11 |
| 1988 | 6071 | 34 | 30 | 31 | 31 | - 3 | 5.59 | -1 |
| 1989 | 7594 | 25 | 25 | 25 | 16 | - 7 | 5.08 | -7 |
| 1990 | 10,642 | 40 | 37 | 27 | 28 | - 9 | 3.36 | -7 |
| 1991 | 11,598 | 9 | 25 | 18 | 56 | 43 | 5.31 | 32 |
| 1992 | 12,800 | 10 | 10 | 10 | 36 | 23 | 3.88 | 23 |
| 1993 | 15,995 | 25 | 27 | 25 | 0 | -20 | 4.95 | -20 |
| 1994 | 20,135 | 26 | 23 | 25 | 72 | 36 | 3.64 | 38 |
| 1995 | 32,661 | 62 | 56 | 59 | 52 | - 6 | 4.47 | -5 |
| 1996 | 44,345 | 36 | 53 | 47 | 42 | 4 | 5.19 | -3 |

Source: Computed from data obtained from the Ghana Statistical Services, Accra, Ghana.

## 5. CONCLUDING REMARKS

This study has outlined the mechanisms through which the macroeconomic policies implemented under Fund-Bank Structural Adjustment Programmes could influence access to food, availability of food, nutrient intake, nutritional status and food security in general. The study presents empirical evidence on the trends in these food security indicators during the adjustment periods in selected Latin American, Asian and African economies. A case study of Ghana is also presented. The evidence seems to suggest that food prices have tended to increase at a far faster rate than incomes that in a number of economies declined, precipitating declines in household access to food and limiting the achievement of food security. Adjustment programmes should therefore include components that carefully protect target vulnerable groups. Pinstrup-Andersen (1987c, 1988, 1989) makes a number of useful suggestions in this direction.

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**By K. Yerfi Fosu and Nico Heerink**
Department of Agricultural Economics
University of Ghana
P.O.Box LG 323
Legon, Accra Ghana