RISING FOOD PRICES AND UNDERNOURISHMENT IN SUB-SAHARAN AFRICA

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ABSTRACT

Increases in agricultural commodity prices have been a significant factor driving up the cost of food and have increased concern about problems of food insecurity and hunger, especially for developing countries. The global food prices have continued to soar substantially over the years and having debilitating impacts on nutritive abilities across many developing countries. A perusal of the existing literature reveals dearth of studies required to understand the impact of food prices on undernourishment in Sub-Saharan Africa. Hence, this study examines the effects of rising food prices on undernourishment in Sub-Saharan Africa.

The study applied pooled OLS estimator, fixed effects estimator and random effect estimator to panel data set on prevalence of undernourishment, food prices, per capita income and political score for Sub-Saharan African countries from 2001-2012.

The results showed that rising food prices exert significantly on prevalence of undernourishment, thereby undermining the achievement of Goal 1 (eradication of extreme poverty and hunger) of the Millennium Development Goals (MDGs) in the region. Government needs to initiate and facilitate massive investments in agriculture in the region while urgent nutritional support that involved nutrient-rich food items should be provided to young children, pregnant women and lactating mothers to mitigate undernourishment in Sub-Saharan Africa.

Keywords: Inflation; Food Insecurity; Nutrition; Fixed Effects; Random Effects; Africa.

INTRODUCTION

Over the years, food prices are considered to have remained high, particularly since the peak of the global food crisis of 2008, exacerbating hunger and malnutrition around the world. Vulnerabilities to these increases in food prices are diverse across households and societies around the globe. The soaring food prices have been impacting on food security of countries and the nutrition situation of people, especially the net buyers of food (i.e. the households that their purchases of food products are greater than the sales of food). It has led to justifiably increased concern about problems of food security and hunger, especially for developing countries.

Prices of most of the world's key cereals, oil seeds, dairy product and meat have increased tremendously. Between 2005 and 2007, the price of maize increased by 80 percent. Likewise, prices of many other commodities also rose sharply over this period: milk powder by 90 percent, wheat by 70 percent and rice by about 25 percent (Ivanic and Martin, 2008). Moreover, it is evident from the literature that signs of imminent food shortages were glaring in the 20th century and led to historic protests. There were food riots in the streets of New York City in 1917 (tagged spectacle of hunger in the richest country's richest city) and in Japan in 1918 as well as similar protests in Europe and some developing countries (Webb, 2010). Obviously, when food prices increase, they will have ubiquitous and diverse consequences across households and population groups. Even, countries that rely

heavily on food importation will likely suffer terrible balance of payment deficits while net exporters of food tend to witness remarkable and favourable improvement in their terms of trade. In fact, persistent increase in food prices has been described as a major development challenge in the abilities of Sub-Saharan Africa (SSA) nations to attain food and nutritional security (Wodon and Zaman, 2008; Agbonlahor *et al*, 2011).

Many Sub-Saharan African countries are considered to be susceptible to the soaring food price and are thus classified according to their degrees of vulnerability to food prices spikes. Liberia, Mauritania, Senegal and Swaziland are considered to be *most vulnerable* to increase in food prices. Benin, Burkina Faso, Burundi, Cameroun, Central African Republic, Kenya, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Sierra Leone, Tanzania, Togo, Uganda, Zambia, Zimbabwe are *highly vulnerable* while Angola, Namibia and Somalia are found to be *somewhat vulnerable* (Compton *et al,* 2010). Despite the severity of the impact of the food prices and coupled with the prevailing food insecurity in the entire Sub-Saharan Africa region, its effects on malnutrition has not been explicitly provided in the literature using quantitative approach. A perusal of the existing literature reveals dearth of studies required to understand the impact of food prices on undernourishment in Sub-Saharan Africa.

LITERATURE REVIEW

Severe under-nutrition has been reported to be harmful. Lipton (1988), it poses unimaginable threat to height and mental development. Severe height retardation at age 5 had been proven to affect adult work performance while poor mental ability affects school performance. And if weight-for-height is seriously inadequate due to inability to eat right diets, work efficiency may be undermined. Under-nutrition affects pregnant and lactating mothers adversely, particularly in the LDCs. The proportion of life spent in child bearing age-groups is short; the average body weight of mothers is less while the normal levels of female physical work (reducible in pregnancy) is too high (Lipton, 1988). Furthermore, upsurge in food prices brings about the substitution of consumption of more expensive nutrient dense foods for less nutritious food items. Therefore, there is increased prevalence and severity of micronutrient deficiencies, which cause slow cognitive development and growth, thereby contributing to poorer school performance (Brinkman *et al*, 2010). Also, Jensen and Miller (2008) found that increase in prices of food directly led to a decline in real purchasing power and made households worse-off in China. Households were substituting more expensive calories for less expensive sources of nutrition. This involved substitution across broad food categories (e.g. from meat to grains) and substitution across foods within broad food categories (e.g. from rice to lower quality grains like millet). The increases in prices of food usually culminate into high caloric insufficiency rate, particularly among children in the rural areas (Bibl *et al*, 2009).

Using data on Bangladesh, Thorne-Lyman *et al* (2010) revealed that rice prices were indirectly associated with dietary quality while they impacted positively and directly on prevalence of child underweight. They further revealed that the food price increase exacerbated risk of malnutrition in Bangladesh as there was existing little variation in the diet of the rural households prior to the food price crisis. In a similar study on the impact of food prices in Indonesia, Sari *et al* (2010) also found that soaring food prices resulted into rising expenditure on rice and declining expenditure on non-rice foods. The high food prices led to reduction in expenditure on relatively expensive but more nutritious non-rice foods

there resulting into decline in both quality and quantity of diet, as well as increased stunning in children. In another study on Bangladesh, Campbell *et al* (2010) revealed that as food prices increase, per capita rice consumption remained unchanged, with proportionate increase in rice expenditure. Meanwhile, expenditure on more nutritious non-rice foods declined thereby constituting poor dietary quality. They also observed that surging food prices undermined child and maternal nutrition.

Bhattacharya, Currie and Haider (2004) used data from the National Health and Nutrition Examination Survey for the US to examine food insecurity, poverty and nutritional outcomes for household members of different ages. They found that poverty was predictive of poor nutrition among preschool children while food insecurity did not provide any strong predictive influence for this age group. In the case of school age children, neither poverty nor food insecurity was found to be associated with nutritional outcomes. But for the adults and the elderly, both poverty and food insecurity were predictive of nutritional outcomes. They also revealed that nutritional outcomes were more correlated with food insecurity for adults than the children while the outcomes were found to be more correlated with poverty for the young children than the older children. Hadley *et al* (2012) investigated the effects of the surging food prices in Ethiopia through interview conducted in specific locations considered to be inhabited by the urban poor. Quantitative analysis of the data revealed that rising food prices were associated with decline in dietary quality and quantity. It also culminated into situation where respondents devised food based and non-food based coping strategies. The food based coping strategies include fasting (or going hungry), reduced dietary diversity while the non-food strategies include borrowing, selling assets and using savings to buy food. Their results also highlighted the impact of higher food prices on communal activities in Ethiopia such as funerals and coffee ceremonies, thereby also impacting negatively on communal cohesion,

Ampaabeng and Tan (2013) also investigated the long-term cognitive impacts of malnutrition in early childhood. They observed that the cognitive development of the survivors of 1983 famine in Ghana was directly and significantly hampered by early childhood malnutrition. These effects were found to persist well into adolescence and adulthood. This study revealed the negative consequences of malnutrition, which was not only limited to famine but also a major feature of soaring food prices. Anriquez, Daidone and Mane (2013) employed a partial equilibrium technique to examine the short-time effects of increase in staple food prices on nutritional attainment. They found that surge in food prices reduced the mean consumption of dietary energy and also worsened the distribution of food calories while it further deteriorated the nutritional status of the populations. The study made use of household surveys from eight countries-Bangladesh, Guatemala, Nepal, Cambodia, Tajikistan, Vietnam, Kenya and Malawi.

Lee *et al* (2013) examined the impact of food prices on population health for 63 developing countries. They found that the contemporaneous food price inflation rates were positively and significantly associated with three measures of population health-prevalence of undernourishment, infant and child mortality rates. A 1% increase in food price inflation rate was associated with a 0.2% increase in infant and child mortality rate and 0.4% increase in prevalence of undernourishment. When one and two-period lagged food price inflation rates are included in the estimation, undernourishment prevalence was more sensitive to contemporaneous food price inflation, while

infant and child mortality were more responsive to the food price inflation rates of the previous years. When 11 countries (out of which three are from SSA) were classified as LDCs and separately analyzed, the results showed that the LDCs were more susceptible to high food price inflation than other developing countries.

Using longitudinal survey of 1,800 rural households from 12 districts of Bangladesh and the hierarchical logit model, Akter and Basher (2014) also found strong negative impact of food price hike on household food security. The escalating food prices exacerbated food insecurity in the rural areas while these debilitating conditions were experienced by the poor disproportionately. In the same vein, Grace, Brown and McNally (2014) examined the relationship between price of maize and low birth weight using the Kenyan Demographic and Health Survey datasets. They found that the coefficient of pre-pregnancy maize price was negative and significant, implying that an increase in price of maize was related to likelihood of low birth weight of an infant (i.e. the dependent variable). They deduced that the negative impacts of the rising food prices tend to be chronic for the very young children, especially when there are limitations to local agricultural productivity. Using data for eleven European countries and the Heterogeneous Thresholds Ordered Probit Model (HOPIT), Bertoni (2015) also found that a negative long-run association existed between childhood hunger (malnutrition) and the levels of adulthood well-being. He deduced that hunger episodes experienced in earliest phases of life and until early adolescence have persistent negative impacts on education, late-life health and labour market outcomes. He also observed that people exposed to hunger in childhood usually adopted lower standards to evaluate satisfaction in life.

Methodology

In order to the effect of food price inflation on undernourishment, the measure of prevalence of undernourishment (UN) is expressed as a function of food price inflation, per capita income (PCI) and political score (PLT):

UN= f (FPI, PCI, PLT) _____(1)

The model could be specified in the following econometric form:

$$UN_{it} = \beta_0 + \beta_1 FPI_{it} + \beta_2 PCI_{it} + \beta_3 PLT_{it} + \varepsilon_{it} \quad \text{_____(2)}$$

i,t is the panel of *i* countries observed over period *t*. A positive relationship is anticipated between food price inflation and the prevalence of undernourishment. This is because households tend to cut down both the quantity and quality of their food in response to escalating food prices. This culminates into deficiencies in iron, iodine, vitamin A, B and other vital vitamins (Brinkman *et al*, 2010; Christian, 2010). On the other hand, a negative relationship is anticipated between per capita income and prevalence since increase in income accruing to individuals will improve affordability of basic food items. The political score, when tilted towards autocratic control of governing institutions (i.e. negative) is expected to be positively related with prevalence of undernourishment. This implies that the more autocratic the prevailing political environment, the higher would the prevalence of undernourishment. On the other hand, the more democratic the political structure, the lower will be the prevalence of undernourishment.

Data on prevalence of undernourishment (i.e. percentage of the total population that are undernourished) were obtained from

United Nations (UN) Millennium Development Goals (MDGs) Indicators database while data on food price inflation were computed based on information extracted from FAOSTAT (database of the Food and Agriculture Organization of the United Nations). Data on income per capita were obtained from World Development Indicators (WDI) online database of the World Bank while data on political score, an index of political regime which measures the qualities of democratic and autocratic authority in governing institutions, on a 21-point scale ranging from -10 (hereditary monarchy) to +10 (consolidated democracy) were sourced from POLITY 4 database of the Centre for Systematic Peace. Meanwhile, the study covered thirty-one (31) Sub-Saharan African countries:

Sub-Region	**Countries**
West Africa	Benin, Burkina Faso, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Nigeria, Sierra Leone and Togo
Eastern Africa	Burundi, Madagascar, Malawi, Mauritius, Mozambique, Uganda, United Republic of Tanzania and Zambia
Central Africa	Angola, Cameroon, Central African Republic, Chad, Congo and Gabon
Southern Africa	Botswana, Lesotho, Namibia and South Africa

The data covered the period of 2001 to 2012. The linear panel data models were estimated using the pooled ordinary least square (OLS) estimator while the fixed effects and random effects were also used as the data set is assumed to be a priori heterogeneous, given the variations in social, political and economic structure across the countries in the data set. The fixed effect estimator takes into account the individual specific effect of each cross section (unlike the pooled estimator) by allowing the intercept to vary for each cross section while the error variances and slopes are constant. Meanwhile, the random effect model estimates variance components for individuals and error, assuming the same intercept and slopes.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 1 reveals the descriptive statistics on the annual series used in the study. The panel dataset is balanced as there are 372 observations on each of the variables. The annual series show high level of consistency as their mean and median values are within the maximum and the minimum values of these series. In terms of skewness (a measure of the degree of symmetry), all the series have values above 0. Prevalence of undernourishment (UN), food price inflation rate (FPIR) and per capita income (PCI) are all positively skewed while political score (PLT) is negatively skewed. For kurtosis, the degree of peakedness of a distribution, prevalence of undernourishment, food price inflation rate and per capita income are all leptokurtic while the political index is platykurtic.

Table 1: Descriptive Statistics

	UN	FPIR	PCI	PLT
Mean	3.335068	7.959735	1356.326	2.543011
Median	1.900000	6.551498	497.6290	4.000000
Maximum	16.00000	118.7403	6709.073	10.00000
Minimum	0.100000	-69.93635	143.7835	-6.000000
Std. Dev.	3.600096	14.53417	1826.664	4.657056
Skewness	1.643462	1.601814	1.835290	-0.180517
Kurtosis	5.343657	20.82780	4.831522	1.594002
Jarque-Bera	252.5973	5085.450	260.8282	32.66125
Probability	0.000000	0.000000	0.000000	0.000000
Sum	1240.645	2961.021	504553.4	946.0000
Sum Sq. Dev.	4808.415	78370.86	1.24E+09	8046.312
Observations	372	372	372	372

Source: Author's computation using E-Views 9

Correlation Analysis

The degree of association among the variables is shown in **Table 2.** Food price inflation rate has a direct relationship with prevalence of undernourishment while per capita income is inversely related to prevalence of undernourishment in conformity with the a priori expectation.

Table 2: Correlation Matrix

	UN	FPIR	PCI	PLT
UN	1.000000			
FPIR	0.145786	1.000000		
PCI	-0.337126	-0.047148	1.000000	
PLT	-0.112154	-0.043332	0.247065	1.000000

Source: Author's computation using E-Views 10

The political score (a measure of the quality of democratic and autocratic authority in given institutions) is inversely related with the proportion of the population that is undernourished.

Regression Results

This section is on the analysis of the effects of soaring food prices on prevalence of undernourishment in the selected sample of countries in Sub-Saharan Africa using the pooled OLS, fixed effects estimator and random effects estimator. The effects of the control variables- per capita income and political score on undernourishment are also analyzed. The detailed results are presented in **Table 3**.

The coefficient of food prices was found to be positive and highly significant. It implies that an increase in food prices results into an increase in prevalence of undernourishment for the pooled OLS, fixed effects and random effects. Increase in prices of food causes a decline in real purchasing power and makes households worse-off. In response to higher food prices, households adjust or reshuffle their food budgets, by substituting more expensive nutritious food items for cheaper and less nourishing foods, usually staples (Jensen and Miller, 2008; Schnepf, 2013).

Households cut down on both dietary diversity and energy intake. While the consumption of more expensive food items is reduced, the size and frequency of meals are also reduced.

Also, adults (particularly women) may prioritize their children food consumption over their own. Meanwhile, the larger the proportion of total expenditure that is spent on food, the greater the consequences of changes in food price and its affordability on consumption and nutritional status. They therefore subsist on monotonous staple-based diet (like rice, millet, sorghum and maize), and have fettered access to nutritious foods like fruits, vegetables and animal source foods of high nutrient (like beef, egg and fish). Consequently, the intake of specific nutrients is adversely affected. This implies that Sub-Saharan African countries are highly vulnerable to nutritive implications of increasing food prices.

Furthermore, the coefficient of per capita income was found to be negative and significant, except in the case of the fixed effects model. It implies that increase in income improves the capacity to buy food items that enhance nourishment of individuals. It alludes to the fact that average income is also a key predictor of prevalence of undernourishment in Sub-Saharan Africa.

Table 3: Effect of Rising Food Prices on Undernourishment in SSA

Variable	Pooled OLS	Fixed Effects	Random Effects
Food Price	0.03398*** (0.01245)	0.00452** (0.00219)	0.00438** (0.00219)
Per Capita Income	-0.00064*** (0.00009)	-0.00015 (0.00011)	-0.00021* (0.00011)
Political Score	-0.02061 (0.03895)	0.05335*** (0.01828)	0.05165*** (0.01818)
Hausman Test			0.47

Standard errors in parentheses; and *** ***p< = 0.01,*** ** ***p< = 0.05 and*** * ***p< = 0.1. Hausman test statistic is p-value.***
Source: Author's computation

Meanwhile, the coefficient of political score was found to be positive and highly significant based on the fixed effects and random effects models. This vividly shows that the prevailing political environment in the region promotes food insecurity and undernourishment. This is not unconnected with the fact most of the government institutions are not strongly democratized to facilitate a just and egalitarian society required to promote equal access to basic needs of live among the citizenry. Going by the p-value of 0.47 for the Hausman test, the null hypothesis underlying the Hausman test which states that there are no random effects is rejected. Hence, it could be deduced that the random effects model is appropriate and better.

CONCLUSION

Consequent upon higher food prices, poor households subsist on monotonous staple-based diets and lack access to nutritious foods (like fruits, vegetables), animal source foods of high nutrient content (like beef, fish, and eggs). They lack diversity in their diets, which results into inadequate intake and risks of deficiencies of essential micronutrients. The hike in food prices if uncontrolled may aggravate child malnutrition, increase morbidity, reduce the cognitive abilities of children and could pose a long-term threat to the economic development potentials of most African countries. This development could also undermine the little success made so far towards the achievement of the MDGs-

eradication of extreme poverty and hunger (Goal 1). This implies that increases in food prices would further worsen distribution of food calories and deteriorate the nutritional status of households. These inferences are akin to the ones drawn by Thorne-Lyman *et al*, 2010; Hadley *et al*, 2012; Lee *et al*, 2013; Anriquez *et al*, 2013; Campbell *et al*, 2010; Sari *et al*, 2010; Bibl *et al*, 2009, from their studies.

Owing to the foregoing, it is imperative for the government to initiate and facilitate massive investments in agriculture in the Sub-Saharan African region via expanded public spending that will cover rural infrastructural development, extension services, research and development while short-term supply to farmers in terms of basic inputs should be greatly improved. Aside from ensuring improved supply of food items, urgent nutritional support that involved nutrient-rich food items should be provided to young children and specifically for pregnant women and lactating mothers in order to feed and give proper care to their babies. This policy will complement their daily diet and reduce challenges posed by malnutrition in Sub-Saharan Africa.

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