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Economic Growth and Agricultural Diversification Matters for Food and Nutrition Security in Ghana

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INTRODUCTION

Ghana is often considered an African development success story. Over the past two decades, the country experienced strong and steady economic growth in a stable and democratic political environment. Broad-based growth over the past two decades—during which the agricultural sector has been an important driver, thanks to its transformation—has led to impressive progress in poverty reduction. Ghana became the first African country to achieve the first Millennium Development Goal (MDG) by halving the poverty rate of the 1990s ahead the targeted year of 2015 (UNDP 2008). It is also among the very few countries in Sub-Saharan Africa with a high probability of achieving the child nutrition-related target of MDG 1 (i.e. halving the prevalence of underweight children—measured by weight-for-height z-scores of children under 5 years of age—between 1990 and 2015).

Our paper analyzes the effects of three basic factors characterizing agricultural transformation on dietary diversity—a key determinant and good proxy indicator of food and nutrition security—among farm households. These factors are:

- Diversification in food production (which tends to decline in the process of agricultural transformation)
- Diversification into off-farm income sources (which tends to increase)
- Household income growth (which tends to increase too)

The effects of these factors on food and nutrition security can substantially differ between subsistence farmers and already market-oriented farmers, given their stage in the agricultural transformation process, as well as between the poor and non-poor. The paper will briefly explore how Ghana's economic growth has been associated with the reduction in poverty and child undernutrition, before providing an in-depth analysis of the effects of agricultural transformation on household food and nutrition security.

ECONOMIC GROWTH AND POVERTY REDUCTION[1]

Ghana's economy grew by 5.8 percent per annum from 2000 to 2010, compared 4.3 percent in 1990–2000. During both decades, the country's average annual growth was above the average rate of Sub-Saharan African countries (4.9 percent in 2000–2010 and 2.3 percent in 1990–2000).

Ghana was more effective in translating economic growth into poverty reduction than Sub-Saharan Africa as a whole, as well as the group of low- and middle-income countries as a whole. Ghana's poverty rate—as measured by the international US$1.25-a-day poverty line—fell from 51 percent in 1992 to 30 percent in 2006. Between 1992 and 2006, each 1 percent of per capita GDP growth in Ghana was associated with a 0.88 percentage point reduction in the prevalence of poverty.[2] The trend in Sub-Saharan African countries has been only a 0.19 percentage point reduction, and only a 0.28 percentage point reduction in low- and middle-income countries.

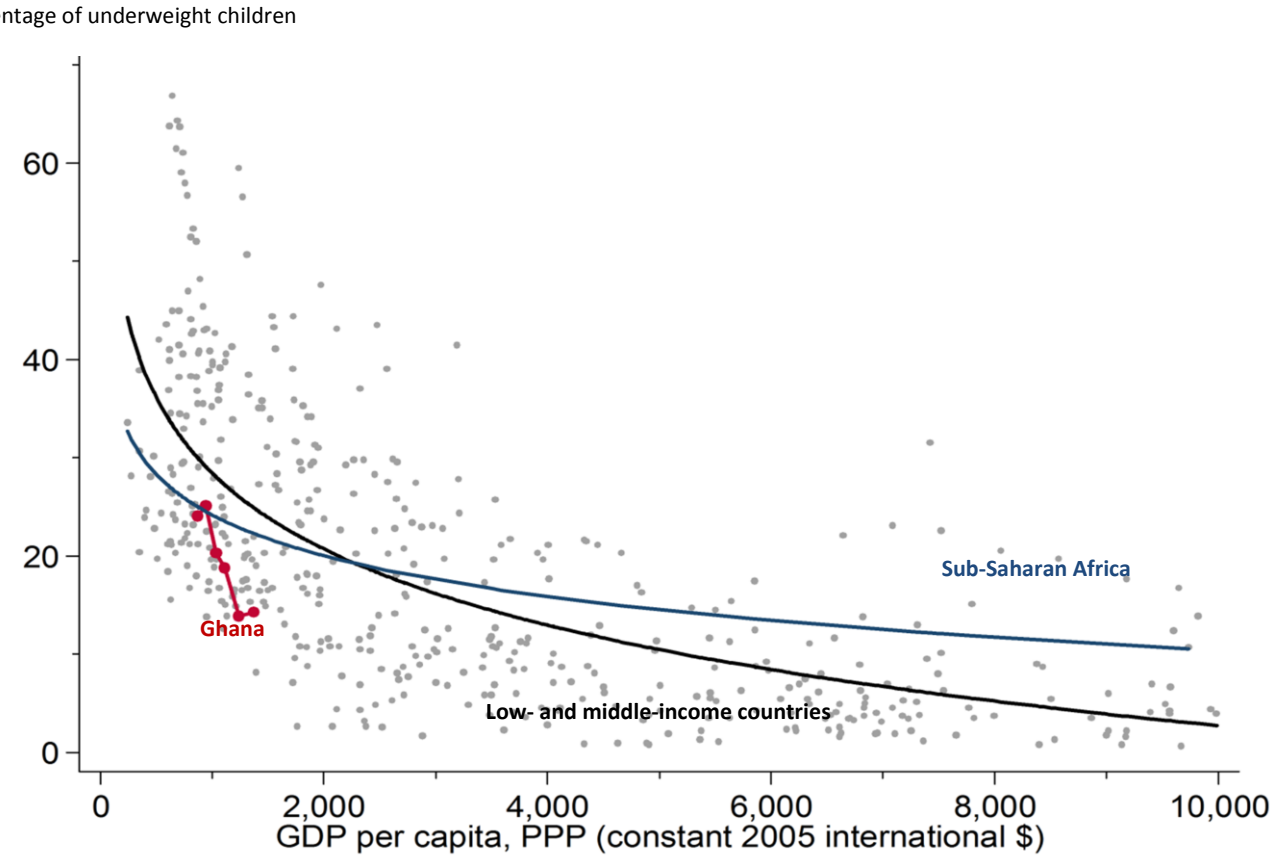
Unlike other western African countries, Ghana has achieved significant reductions over the past two decades in the prevalence of child undernutrition (both acute and chronic). Figure 1 shows that the country has performed better than the average of Sub-Saharan African countries and the average of low- and middle-income countries in utilizing growth for reducing the proportion of underweight preschool children.

In Ghana, 1 percent growth between 1993 and 2008 was associated with a reduction in the prevalence of underweight children of 0.29 percentage points. Over the long term, the same effect was only a fall of 0.06 percentage points for Sub-Saharan African countries and 0.11 for low- and middle-income countries. Malnutrition is more prevalent among children living in rural areas compared to their urban counterparts, while the gap is most pronounced for the severe form of chronic child undernutrition. Undernutrition is reversely associated with household wealth. The probability of a child to become underweight is about 2.2 times higher if she is born in a household of the lowest wealth quintile compared to the highest wealth quintile. Notably, between 2003 and 2008, the prevalence of child undernutrition declined fastest among rural households and among the poor.

[1] Estimates reported in this section are based on data from the World Development Indicators (WDI) database of the World Bank (World Bank 2012).

[2] GDP is measured in PPP at constant 2005 international dollar

Figure 1—Relationships between the prevalence of underweight among children aged 0–59 months and per capita GDP



Source: Authors' estimation based on data from the World Development Indicators (WDI) database of the World Bank (World Bank 2012) and the National Accounts Main Aggregates (NAMA) database of the United Nations' Statistics Division (UNSTAT 2012).

EFFECTS OF AGRICULTURAL TRANSFORMATION ON DIETARY DIVERSITY

At the farm household level, agricultural transformation is characterized by at least two development processes, namely from subsistence to market-oriented and cash crop farming (e.g. cocoa in Ghana) and from agriculture-based livelihood to non-agricultural income generation—a moving-out of agriculture or "deagrarianization" (Bryceson 2002).[3] The former process may go along with a reduction of the diversity (and quantity) of cultivated food crops, since the land area is needed for cash crops, and own-produced foods can be substituted with market purchases. The end of this transformation process is an agricultural sector dominated by highly specialized farmers. The latter process reflects an increasing number of off-farm employment activities for the farm household's members that decouples people's dependency on farming for own food consumption and the associated food security risks. Lay and Schüler (2008) found that the percentage of Ghanaian farm households with at least one source of off-farm income increased by 9 percent from 1991 to 1998.

Analytical strategy and Indicators

The methodological challenge of this study is to separate the two processes of agricultural transformation described above and both from the effect of household income growth (which is usually associated with agricultural transformation) using cross-sectional data. To do so, we divide our sample into different household groups and analyze the effects of food production diversity, income diversity, and household income (measured by household total expenditure per capita) for these household groups separately and compare the results across household groups. We apply comparative statistics, correlation analysis, and regression models on data from the fifth Ghanaian Living Standard Survey (GLSS 5) that covers a period of 12 months in 2005/06.

[3] A third and related process is land aggregation and thus increasing farm sizes.

We first divide our sample into farm and non-farm households, while the group of non-farm households serves as reference group. We define a farm household according to the main occupation of the household head over the past 12 months. Then we divide farm households into two subgroups: market-oriented farmers and subsistence farmers.[4] The total sample includes 3,976 farm households (49.2 percent) of which 1,663 households (41.8 percent) are subsistence farmers and 2,313 households (58.2 percent) are market-oriented farmers.

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In the absence of nutritional status variables such as child and maternal anthropometrics, we use household dietary diversity as an indicator of household food and nutrition security. Dietary diversity is a good proxy of food and nutritional adequacy in terms of both quantity and quality for several theoretical and empirical reasons (Headey and Ecker 2012). For this analysis, we use a micronutrient-sensitive dietary diversity score (MSDDS) which is similar to the dietary diversity score promoted by the Food and Agriculture Organization (FAO) more recently (Kennedy et al. 2011). Households surveyed in the GLSS 5 were visited a total of ten times over a one-month period, mostly at 3-day intervals. We calculated the dietary diversity score for each of these intervals and averaged it over the whole monthly period. We built the food production diversity score most consistently with the dietary diversity score. It gives the number of different food group production activities carried out over the year preceding the survey. The diversity of off-farm income sources is measured as the number of distinct off-farm primary and secondary occupations held by each economically active member of the household over the year preceding the survey.

Table 1—Correlation coefficients between dietary diversity and key deterministic variables

Dietary diversity (MSDDS)	Log of HH expenditures per capita (GHC)		Number of food production activities		Number of HH off-farm income sources	
All	*0.250*	***	*0.146*	***	*0.150*	***
Poor	0.373	***	0.060	***	0.238	***
Non-poor	-0.033	**	0.101	***	0.285	***
Farm HH	*0.470*	***	*0.154*	***	*0.195*	***
Poor	0.442	***	0.100	***	0.177	***
Non-poor	0.164	***	0.206	***	0.297	***
Subsistence farm HH	*0.524*	***	*0.166*	***	*0.177*	***
Poor	0.477	***	0.055	*	0.187	***
Non-poor	0.124	***	0.260	***	0.322	***
Market-oriented farm HH	*0.422*	***	*0.146*	***	*0.233*	***
Poor	0.398	***	0.138	***	0.210	***
Non-poor	0.191	***	0.169	***	0.277	***
Non-farm HH	*0.130*	***	*0.217*	***	*0.177*	***
Poor	0.273	***	0.158	***	0.310	***
Non-poor	-0.042	**	0.222	***	0.231	***

Source: Authors' calculation based on GLSS 5 data.

Coefficient is statistically significant at the following levels:
*** = 1 percent level
** = 5 percent level
* = 10 percent level

Results

Five major findings emerge from our comparative statistics and correlation analysis (Table 1).

1. Dietary diversity generally increases with household expenditure (or income), as expected.

[4] The GLSS 5 occupation codes follow the International Standard Classification of Occupations (ISCO-88) system of the International Labour Organization and have occupation categories of (1) market-oriented (crop) farming and gardening, (2) market-oriented animal production, (3) market-oriented (mixed) crop and animal production, and (4) subsistence agriculture or fishery. If the main occupation of the household head falls into these categories, we consider the household as a farm household. Then, we divide farm households in two subgroups, namely (a) market-oriented farmers and (b) subsistence farmers, while households with household heads engaged in the activities (1)–(3) fall into the former subgroup and engaged in the activity (4) into the latter subgroup.

2. Dietary diversity is slightly but significantly higher among farm households than among non-farm households at the sample mean, although non-farm household are significantly richer and could therefore afford a more diversified diet. It suggests that the direct access to food through farming can indeed contribute to an improved diet. This is consistent with findings from previous studies (e.g. Zezza and Tasciotti al. 2010) and further supports the common practice of interventions for promotion of home gardening, small-scale livestock husbandry, and aquaculture to improve diets (e.g., Faber et al. 2012; Iannotti et al. 2009; Olney et al. 2009).
3. There are no significant differences in the dietary diversity between market-oriented and subsistence farm households on average, although market-oriented farm households have substantially higher income levels.

Table 2. Regression results (dependent variable: household dietary diversity (MSDDS)

	Farm HH		Market-oriented farm HH		Subsistence farm HH		Non-farm HH	
Number of food production activities	0.206	***	0.199	***	0.203	***		
Number of off-farm income sources	0.005		0.026		-0.011		0.086	***
HH expenditure per capita (log)	1.079	***	1.109	***	1.026	***	0.957	***
Household size (log)	0.899	***	0.888	***	0.930	***	1.277	***
Household head (1=female, 0=male)	0.108	***	0.122	**	0.103	*	0.464	***
Farm size (log)	-0.057	***	-0.077	***	-0.018			
Maternal primary education (1=yes, 0=no)	0.065		0.081		0.035		0.079	*
Maternal secondary education (1=yes, 0=no)	0.382	*	0.460	*	0.256		-0.110	
Maternal post-secondary education (1=yes, 0=no)	-0.049		-0.216		1.234	**	-0.525	***
Savannah AEZ (1=yes, 0=no)	-0.526	***	-0.431	***	-0.750	***	-0.024	
Forest AEZ (1=yes, 0=no)	0.053		0.004		0.021		0.267	***
Residential area (1=rural, 0=urban)	-0.017		0.013		-0.076		0.416	***
First quarter	-0.193	***	-0.224	***	-0.122		-0.224	***
Second quarter	-0.400	***	-0.331	***	-0.486	***	-0.430	***
Third quarter	-0.249	***	-0.383	***	-0.065		-0.097	*
Constant	-13.17	***	-13.63	***	-12.27	***	-12.36	***
Observations	3,976		2,313		1,663		4,099	
R-squared	0.478		0.425		0.561		0.344	
Adj R-squared	0.476		0.421		0.557		0.342	
F-value	244.6		107.8		152.5		156.3	

Source: Authors' calculation based on GLSS 5 data.
Coefficient is statistically significant at the following levels:
*** = 1 percent level
** = 5 percent level
* = 10 percent level

[1] The reference is "no education"
[2] AEZ = Agro-ecological zone. The reference is "coast AEZ".
[3] The reference is the "fourth quarter" of the year.

4. Given that dietary diversity increases with household income, the correlation is much stronger among the poor compared to the non-poor, among farmers compared to non-farmers, and among subsistence farmers compared to market-oriented farmers.
5. Dietary diversity also increases with the number of different food groups produced among farmers, and the number of off-farm income sources among all household groups.

These correlations are consistently higher among market-oriented farmers compared to subsistence farmers and among the non-poor compared to the poor. This supports our hypothesis that the effects of agricultural transformation on food and nutritional adequacy are subject to household wealth status and varies with the level of market integration. Yet these correlations fall short of differentiating the intertwined effects of the variables and providing evidence on the magnitude of each effect.

Table 2 presents the coefficients of the regressions of the dietary diversity score on the diversity of food production, off-farm income source, household expenditure (as measure of income), and several control variables by household groups. They

consistently suggest that a household's dietary diversity is essentially determined by its income level, as expected. More interestingly, the effect of income is lower for farm households than for non-farm households that might be explained by the direct and price-steady access to food through own production. Indeed, the diversity in food production is an important determinant of food and nutritional adequacy among farm households, while there is no significant difference between subsistence and market-oriented farmers.

In contrast, the number of off-farm income sources per se has no significant effect on dietary diversity among farm households, while the effect is significant for non-farm households. Hence, the effects of off-farm income generation translate into improved food and nutrition security among farmers only through higher absolute incomes and not through income diversification.

CONCLUSIONS

Our analysis provides several important findings with relevance for agricultural policy making. A diversified agricultural production system is an important determinant of the farming households' dietary diversity, independent of its income level and degree of market integration. In contrast, the diversification in income sources seems to have no significant effect on household dietary diversity other than generating additional income.

Among subsistence farmers and particularly the poor, the dietary diversity correlates most strongly with household income levels, suggesting that growing income among this household group tends to be particularly effective in improving the household diet. On the other hand, the correlation between food production diversity and dietary diversity is surprisingly weak and very low among the poor subsistence farmers, which may be explained by a focus on staple food production for satisfying calorie needs and insufficient means for diversifying production. This finding points to a major challenge of agricultural transformation—the inclusion of poor subsistence farmers, the most backward population group. Satisfying their food and nutrient demands is, however, critical for continuous, rapid progress in reducing malnutrition in rural areas.

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