**Women in Agriculture, Migration and Dietary Diversity in Four Agro-Ecological Zones in Ghana**

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**Introduction**

Climate change has significant impact on food production in Africa due to over-reliance rain-fed agriculture (McKune et al., 2015; Lake et al., 2012; Lam et al., 2012; World Bank 2007). This varies across agro-ecological zones due to differences in climatic factors and type of crop produced (FAO, 2008). The poor crop yield has trigged mass migration of the working age population to urban areas, which threatens the food security of those left behind. Though migration is a documented adaptation strategy to climate change, there is limited scholarship on how it affects household food security (IPCC, 2014). It is expected that migrants will send remittances to support the family left behind, and ultimately enhance their food security. Women who stay behind in their communities play a critical role in food production (Danso et al., 2004). Unlike men who mostly cultivate cash crops for income, women are mostly involved in subsistence farming to feed their families (Boakye-Acheampong et al., 2012). However, little is known about their contribution to household food utilization. This study therefore sought to investigate the effect of women involved in agriculture in maintaining dietary diversity of their households. We also examined the role of migrants on household dietary diversity. It is expected that this study will contribute to policies aimed at enhancing household food security amidst changing climate.

**Methodology**

*Study communities*

The study was carried out in four communities- Amansie West, Mfantseman, Techiman and Tolon in the Rainforest, the Coastal Savannah, Transition and Guinea Savannah agro-ecological zones respectively in Ghana. The rainfall and temperature conditions, the types of crops grown and the conditions surrounding agricultural productions vary significant across these zones, and therefore have the tendency of influencing the food availability and choices in these communities.

*Data*

We used data from a cross-sectional survey from the Women, Climate Change and Food Security project conducted at Regional Institute for Population Studies (RIPS) between May and July, 2016.

*Measures*

We computed household dietary diversity (HDD) as proxy for nutritional adequacy of the household. The HDD measure has previously been used by the Food and Agriculture Organization (FAO, 2011), Codjoe, Okutu & Mumuni, (2016) and also Kennedy et al., (2010). The score was computed from responses of household heads on food consumed by household members both at home and outside for seven days preceding the survey, in accordance with the Radimir/Cornell scale. We used ten food categories adopted from the FAO’s food category for West Africa (FAO, 2011), as there is no international consensus on which food categories to include in the HDD score. The score, which was an accumulation of the frequency of food eaten from each category by a member of the household, yielded a range from 0 to 9. The household was explained as *a group of people who eat from the same pot when food is prepared at home and who get money for street food from the same source.*

*Data analysis*

At the univariate level, frequency of consumption was aggregated for each food category. A series of one-way analysis of variance (ANOVA) tests were done to examine which variables significantly explain the variance in HDD at the bivariate level for the categorical variables. Bivariate correlations were done between the continuous variables and the HDD score. Then a multiple linear regression model was done to examine the variables that significantly predict the HDD score.

**Results**

*Univariate*

The HDD score has a minimum of 0 and maximum of 9. It has a normal distribution with mean score of 4.86 and standard deviation of 1.63. The univariate analysis indicates that meat/egg/fish was the most frequently consumed food. The food categories are cereals, tubers/roots crops, fruits, vegetables, fruits, fats/oils, meat/fish/egg, beans/peas/nuts, milk products, and beverages. The most frequently consumed food category was the meat/egg/fish and the least consumed was milk products. These varied across agro-ecological zones.

*Bivariate*

The result from the one-way analysis of variance showed that ecological zone, marital status, sex of household head, ethnicity, occupation and ethnicity and religion significantly explained the variance in HDD. The post hoc test indicated that dietary diversity for respondents in the Guinea Savannah is significantly higher (mean= 5.57, SD=1.98) than all the other ecological zones- Transition (mean=5.05, SD=1.98), Coastal Savannah (mean=4.96, SD=1.62) and Rainforest (mean=4.86, SD=1.63). With regards to religious affiliation, respondents in the other Christian category (comprising Jehovah Witnesses and Seventh Day Adventists) had significantly lower dietary diversity (mean=4.33, SD=1.45) than the Catholics (mean=5.19, SD=1.65), the Protestants (mean=5.12, SD=1.66), the Pentecostals/Charismatics (mean=5.39, SD=1.65) and Muslims (mean=5.54, SD=2.05). This is not unexpected as the other Christians have a number of dietary restrictions. Education level of the household head did not significantly explain the variance in HDD. With regards to ethnicity, Akans have significantly lower HDD (mean=4.67, SD=1.67) than the Mole-Dagbani (mean=5.57, SD=1.57), the Nzema (mean=1.26, SD=1.26) and other ethnic group which comprises the Ewe and Guan (mean=5.26, SD=1.26). Again, female headed households have significantly higher HDD (mean=5.38, SD=1.81) than male headed households (mean=4.71, SD=1.78). This corroborates the literature that argues that females play integral roles in food production, distribution and processing.

*Multivariate*

The multiple linear regression analysis further revealed that social network, ecological zone, occupation of household head, education of household head, wealth category, and ethnicity are significant predictors of HDD (Table 3). With regards to the agro-ecological zone, households in the Rainforest, Coastal Savannah, Transition zones respectively have 0.22, 0.29 and 0.12 less HDD than those in Guinea Savannah. A unit increase in a household’s social network increases the HDD by 0.06. In addition, households with heads involved in farming as their primary occupation have 0.03 lower food diversity than those involved in other occupations. This is due to the subsistence nature of farming in Ghana, where people virtually consume what they grow and do not have the capacity to purchase other food categories. Explaining this point further, the model revealed that rich households had 0.11 higher dietary diversity score than poor household. In households where the head had no education, the dietary diversity score was 0.08 lower than those with higher education; the more educated would want to eat from diverse food categories, due to the knowledge of nutrition. Contrary to what is expected, there was no significant difference between migrant and non-migrant households in terms of their dietary diversity.

**Table 3: Linear regression Model Showing the Relationship between women in Agriculture, Migration and HDD**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables**  | **Standardized coefficient of β** | **Standard error**  | **p-value**  |
| Intercept (α) | .078 | .699 | .000 |
| **Social Network** | .055 | .096 | .054 |
| **Sex of household head**  |  |  |  |
| Female | -.231 | .264 | .437 |
| Male (RC) |  |  |  |
| **Ecological zone**  |  |  |  |
| Rainforest  | -.219 | .402 | .017 |
| Coastal Savannah  | -.285 | .419 | .024 |
| Transition | -.115 | .409 | .003 |
| Guinea savannah (RC) |  |  |  |
| **Occupation**  |  |  |  |
| Farming  | -.029 | .227 | .009 |
| Other occupation (RC) |  |  |  |
| **Marital status**  |  |  |  |
| In Union | .015 | .257 | .653 |
| Not in union (RC) |  |  |  |
| **Religious affiliation**  |  |  |  |
| No religion (RC) |  |  |  |
| Catholic | .055 | .416 | .821 |
| Protestant | .083 | .391 | .444 |
| Pent/ Charismatic  | -.085 | .383 | .300 |
| Other Christian  | .035 | .364 | .306 |
| Islam | .033 | .473 | .770 |
| Other religion  | -.215 | .710 | .469 |
| **Educational level**  |  |  |  |
| No education  | -.081 | .375 | .036 |
| Pre-School/ primary  | -.069 | .406 | .320 |
| Middle/ JHS | -.004 | .373 | .435 |
| Higher (RC) |  |  |  |
| **Migrant household**  |  |  |  |
| Migrant  | .025 | .185 | .915 |
| No migrant (RC) |  |  |  |
| **Ethnicity**  |  |  |  |
| Akan (RC) |  |  |  |
| Nzema | .212 | .355 | .609 |
| other | -.022 | .256 | .000 |
| **Age of household head**  | .078 | .001 | .584 |
| **Wealth category**  |  |  |  |
| Rich  | 0.112 | 0.241 |  .001 |
| Poor (RC) |  |  |  |
|  |  |  |  |

 Source: Women, Climate Change and Food Security Survey, 2016

**Conclusion**

The most frequently consumed food category is meat/egg/fish. Milk products category was the least frequently consumed food category. The variables that significantly explain the variance in HDD are sex of household head, women in the household involved in agriculture, type of agro-ecological zone, marital status and primary occupation of household head. Out of these variables, agro-ecological zones, marital status, household wealth, occupation of household head were significant predictors of the HDD. Household heads in marital union had higher dietary diversity than those not in any union. Households with migrants did not show higher HDD as hypothesized. As hypothesized, households with women engaged in agriculture had significantly higher HDD than those without. Providing the enabling environment for women in agriculture is therefore key to enhancing household food security.