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Structural Differences in Rural Food Poverty between Female and Male-Headed Households

Ceren Gürkan[a] and Issa Sanogo [b]

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This article explores differences among female-headed households (FHHs) and male-headed households (MHHs) in terms of food poverty in Cameroon, Laos, Madagascar, Mauritania, and Tanzania. Stochastic dominance analysis shows that FHHs are more likely to be food poor related to MHHs, though this trend is less clear when looking only at food poor households. This ambiguity was clarified using discriminant function analysis. The results show that both female and male food poor households face the same obstacles to rural employment across the countries; barriers to access to land, productive assets, education, remittances and over-dependence on subsistence agriculture. Although further research is required to account for gender differences in social, cultural, political and economic status, these results suggest that greater attention should be paid to long-term policies in ensuring access to quality education, land and other assets to all food insecure households, not only to FHHs to the possible detriment of food poor MHHs. In the short-term cash or food-for-assets and school feeding programmes can also provide important springboards for larger scale changes in national policies that are central to escaping the food poverty trap.

1. Introduction

Currently, agriculture is still the single largest source of employment in rural areas, though non-farm activities are becoming increasingly important (Overseas Development Institute (ODI), 2007). Rural employment is a critical means for the eradication of poverty and hunger, especially for rural women who make up the majority of the poor in rural areas (ECOSOC, 2008). Country case studies consistently show that gender-based inequality acts as a constraint to growth and poverty reduction (World Bank, 2001). They point to patterns of disadvantage women face, compared with men, in accessing the basic assets and resources, differences in labour remuneration and labour productivity.

However, gender-based inequalities are overwhelmingly built on comparisons of income poverty levels of female-headed households (FHHs) and male-headed households (MHHs) (Quisumbing, Haddad and Pena, 2001). Evidence indicates

that poverty is a major driver of food insecurity, but the two are not always linked (World Bank, 2008). The difference is mainly due to lack of economic (social and physical) access to food at national and household levels and inadequate nutrition (or hidden hunger). Food security not only requires an adequate supply of food but also entails availability, access, and utilization by all — men and women of all ages, ethnicities, religions, and socioeconomic levels. The concept of 'food poverty' as discussed in this analysis focuses on a particular use of 'income' that has direct bearing on food security. In addition, food poverty encompasses a variety of factors that are embedded in the concept of food security including cultural (such as intra-household allocation decisions and cultural assignations of identities and activities), social (social norms that might lead to exclusion), and economic (income, and access to assets among many others) factors. These are all factors which combine through various processes to determine the status of food security of different households.

This article presents new evidence of gender-based inequalities from the perspective of food poverty proxied by food consumption. The aim of this research, in particular, is to identify whether or not female-headed households face greater food poverty in relation to male-headed households as a result of constraints to rural employment, and livelihood opportunities.

The article brings together a number of household surveys across Sub-Saharan Africa and Asia to analyse the difference in the distribution of food poverty between MHHs and FHHs using stochastic dominance analysis. Then it identifies the factors that differentiate between FHHs and MHHs using discriminant function analysis. The empirical analysis uses datasets from the World Food Programme (WFP) - the WFP's comprehensive food security and vulnerability analyses (CFSVA). CFSVA survey data include a wealth of information on household characteristics (e.g. size, composition, age, sex and level of education of household head), main livelihood activities, incomes sources, assets owned, land ownership and type of tenureship, access to credit, remittances, food sources and consumption patterns and household expenditures. Section 2 provides further insight into concepts and the methodology. Section 3 discusses whether or not FHHs have poorer food consumption compared to MHHs. Section 4 attempts to identify the structural differences between FHHs and MHHs that could explain the demonstrated gender inequality in food consumption. Section 5 discusses the relevance of the findings in terms of policy implications, and provides concluding remarks.

2. Analyzing Food Poverty Using Stochastic Dominance and Discriminate Approaches

The Food Consumption Score as a Proxy of Food Consumption
There is no single way to measure food security as the concept of food security is rather elusive. Analysis of food security generally uses food consumption measured in kilocalories which is considered to be one of the most theoretically

grounded indicators of food security (Abuelhaj, 2007). However, the collection of detailed food intake data can be difficult and resource demanding. There are several alternative ways to collect and analyse food consumption information using proxy indicators for actual caloric intake and diet quality. Such proxies generally include information on dietary diversity and food frequency. Dietary diversity is defined as the number of different foods or food groups eaten over a reference time period, not regarding the frequency of consumption. Food frequency, in this context, is defined as the frequency (in terms of days of consumption over a reference period) that a specific food item or food group is eaten at the household level (WFP, 2008).

WFP has adopted this data collection tool measuring dietary diversity and food frequency, using an indicator known as the food consumption score (FCS). The FCS is a frequency weighted diet diversity score calculated using the frequency of consumption of different food groups consumed by a household during the 7 days before the survey. The FCS provides three typical thresholds: below a score of 21, between 21.01 and 35 and above 35 to profile households as poor, borderline and acceptable food consumption respectively. However, these thresholds can be modified based on the context and dietary patterns of the population in question.

In addition to capturing both dietary diversity and food frequency, the FCS enables comparison between datasets. However, it is worth noting some limitations of the FCS (WFP, 2008). A major limitation of the FCS is the assumption of the applicability of the analysis across time, context, location and population. Furthermore, the food group weights and food consumption group thresholds, although standardized, are based on inherently subjective choices and the analysis can mask important differing dietary patterns that have an equal FCS. Finally, this proxy is only based on current consumption, and does not account for seasonality or vulnerability to future shocks which could threaten future consumption and food security status. In order to validate the profiling of households based on FCS, comparisons are made generally with other proxy indicators of food consumption, food access, and food security such as cash expenditures, percentage of expenditures on food, food sources, income sources by livelihood type including labour, coping strategy, wealth and assets indices.

Whether the FCS is a strong proxy for food intake and hence food security or not is still in debate. Abuelhaj (2007) raises strong reservations on the techniques applied by WFP to estimate the FCS. This research refutes the correlations between dietary diversity and dietary energy consumption (availability) and the use of principal components analysis to identify the main dimensions of food consumption. However, a validation study by Wiesmann et al (2008) suggests the FCS exhibits a moderate positive correlation with household dietary energy (kcal) intake and a high positive correlation with other food security indicators. The study shows that the FCS predicts better results on the food poor segment of the population, which is the group of interest in this article. The next section discusses the methodological approach that will apply the FCS indicator to provide evidence on the gender dimensions of food security.

The Stochastic Dominance Analysis (SDA)

This section describes the first step in the empirical approach based on the stochastic dominance methodology. A very common application of stochastic dominance is the analysis of income distributions and income inequality. A gender perspective of the concept is proposed by Quisumbing, Haddad and Pena (2001).

The idea is to compare two distributions of food consumption score, one for female-headed households (FHH) and the other for male-headed households (MHH). The stochastic dominance, in relation to food consumption, defined in this article as the food consumption dominance (FCD), relates to the ranking of the FCS distribution, i.e. it examines whether one distribution has unambiguously higher or lower FCS than another over a range of potential FCS thresholds. The FCD is a cumulative distribution function of the cumulative proportion of households that have a specific FCS. In other words, the vertical axis gives us the cumulative percentage of households graphed against the FCS on the horizontal axis.

Figure 1: First-order food consumption dominance curves
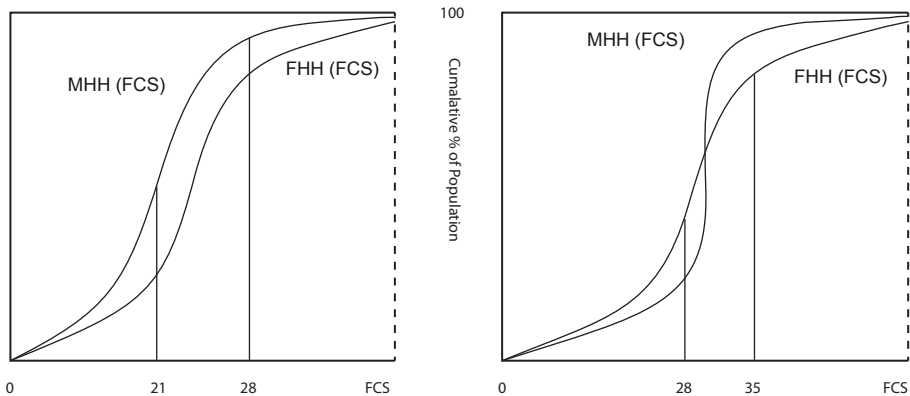
Even if the precise FCS is not known, but it is assumed to be a monotonic transformation of an additive measure, it can be shown at any given threshold below which FCS is considered to be poor, that FCS is higher among FHH if the cumulative FCS curve for FHH is below and nowhere above that of MHH (Figure 1). This is because the proportion of households that have a low FCS among FHHs would be lower than the proportion of MHHs that fall under that particular FCS threshold. Alternatively, the distribution FHH dominates MHH. This is known as the first order stochastic dominance condition (FSD). If the curves intersect as in the right side of Figure 1, then the ranking is ambiguous. In this case, we could restrict the range of the FCS over which we search for dominance, i.e. look for dominance in an interval that fulfills the hypothesis of the first-order dominance (Madden and Smith, 2000). Alternatively, we could explore the possibility of second-order food consumption dominance (SSD). This will consist of calculating

a 'food consumption gap ratio' (FCG), i.e. the ratio of the difference between a defined FCS threshold and the actual FCS of each household over the threshold value. The cumulative FCG curves of both FHH and MHH are then compared with each other following the same dominance principle enounced for the first-order dominance. If the distribution of FCG curve of FHH is somewhere below and nowhere above the FCG curve of MHH, then the distribution FHH dominates MHH. It is demonstrated in the literature that second-order stochastic dominance (SSD) is a concept that is weaker than first-order stochastic dominance (FSD) but not vice versa (Atkinson, 1987; Foster and Shorrocks, 1988; Madden and Smith, 2000; Davidson, 2006).

The Discriminant Function Analysis (DFA)

The multi-faceted nature of food security and employment means that the most insightful analysis to understand the differences between FHHs and MHHs as related to these two concepts will be multivariate. This section discusses the second step in the empirical approach based on discriminant function analysis (DFA). DFA is typically used to determine which variables discriminate between two or more naturally occurring groups, and in addition can serve as a predictive model for classification. This analysis is used in various contexts, but has been scarcely used in the realm of gender analysis directly. Rather it has been used relatively more prominently in poverty profiling, with gender differences being highlighted as a result of the analysis (Shinns and Lyne, 2005; Thompson and White, 1983). The main objective of this article however is the opposite: to identify the structural characteristics related to rural employment factors that separate or discriminate FHHs from MHHs according to their food poverty status.

Though discriminant analysis is used for both classification and predictive purposes, in this case the analysis will be used for classification purposes only. This will allow us to highlight whether any statistically significant differences exist between the average score profiles of food secure FHHs and MHHs, and food insecure FHHs and MHHs. Furthermore, this analysis will highlight which factors underlying employment status account most for the structural differences that are likely to be highlighted among MHHs and FHHs.

The computational approach of the DFA is very similar to the analysis of variance (ANOVA/MANOVA). The similarities between DFA and MANOVA extend to the assumptions that underpin a robust analysis. These are that unequal sample sizes are acceptable as long as the sample size of the smaller group exceeds the number of predictor variables. There is normal distribution of data. There is homogeneity of variances/co variances – within-group variances should be homogenous. There are no outliers: DFA is particularly sensitive to outliers in the sample. In fact, it is often said that the normal distribution of variables will not impact the analysis as much as the presence of outliers. And lastly, there is non-multicollinearity: if independent variables are correlated, then the matrix will not have a unique discriminant solution.

Discriminant function analysis consists of finding a transform which gives the maximum ratio of difference between a pair of group multivariate means to the multivariate variances within the groups (Davis, 1986). Accordingly, an attempt is made to delineate the groups, based upon maximizing between-group variance while minimizing within-group variance. As such, the basic idea underlying DFA is to determine whether groups differ with regard to the mean of a particular variable.

Data sources and limitations

We use household survey data from the WFP's CFSVAs. These surveys are conducted in countries that are vulnerable to shocks (natural disasters, conflicts, etc.) over regular intervals. CFSVAs provide a baseline understanding for structural food insecurity and vulnerability issues at household, community and national level in a given country. This analysis aims to answer very specific questions related to who the food-insecure are, where the food insecure people are, and why they are food insecure with a spotlight shown on structural issues related to employment status.

As such, there is a wealth of data that is specifically useful towards this study including: household characteristics (size, composition, age, sex and education level of household head), main livelihood activities, incomes sources, assets owned, land owned, type of tenureship, access to credit, remittances, food security profiling, food and income sources, consumption patterns and household expenditure data.

Out of a dozen developing countries, only five, namely Madagascar, Laos PDR, Tanzania, Cameroun and Mauritania, were selected for the analysis. This was due to the fact that the CFSVA datasets have yet to be standardized. This means that while certain datasets contained the full list of indicators that were of interest to this study in particular, some datasets only had partial information related to employment status, asset ownership, access to credit, and type of tenureship. In addition, there were certain issues related to data cleaning and variable coding that made it difficult for the authors to include a fuller list of countries in the analysis. Thus to avoid problems of continuity of analysis and comparability across countries, we chose the datasets that presented the fullest information.

The sampling of the households for the CFSVAs is random and representative. All of the CFSVAs used a two-stage clustering sampling methodology. In general, the sampling frames for the CFSVAs are determined by the province/state level. This is typically used as administrative decisions are made at this level, though may not always be used if there is no coherence with household food security. However, typically a further two-stage cluster sampling approach is applied for the selection of villages and of households. In the first stage, a number of villages are randomly selected in proportion to population size (PPS). In the second stage, a predetermined number of households are randomly selected. Typically, an extra 5% of households are interviewed in order to compensate for any possible problems with the questionnaires, or other data problems related to primary data collection. The table below provides details of the

sampling procedures in each country under analysis. Furthermore, the communities and households included in the CFSVAs are exclusively rural communities and households.

Table 1: CFSVA Sampling

Country	Provinces	Villages selected per province	Total Number of Households
Cameroon	10	25	2,020
Laos	16	29	4,000
Madagascar	12	20-30	2,200
Mauritania	10	20	1,953
Tanzania	22	14-17	2,772

The model specifications in relation to the DFA had to be adjusted given the relatively few FHHs in the full sample of the country datasets. The DFA analysis had been designed to look specifically at the differences between food poor, or food insecure, MHHs and FHHs, while using the food secure MHHs and FHHs as a control group. However, once the observations were disaggregated, we found that we did not have sufficient observation points among the food insecure households to conduct a meaningful DFA. Accordingly, the DFA was conducted with the full sample of food secure and food insecure MHHs and FHHs. This is due to the fact that the sampling design of the CFSVAs did not necessarily take into account gender disaggregation of the household heads. This means that even when sampling weights were used according to the original sample design they made little difference to the results. However, we cannot a priori exclude that there may be an unknown sampling bias exactly because the original sample design was not done according to gender stratification. Furthermore, oftentimes population census data do not offer a basis to actually evaluate the representativeness of FHHs as opposed to MHHs. Thus, FHHs in a particular sample might be fewer, because there actually are fewer FHHs. Specifically, a multivariate canonical discriminant analysis was conducted with Stata 10 statistical package.

Though the CFSVA might provide a less than perfect sampling frame for gender analysis, it does provide access to data related to structural factors that are important in the determination of employment status. In this instance the variables which have been identified to help differentiate the 4 groups are: level of education of the household head, age of household head, main livelihood activities, income sources (mainly including unskilled wage labour, skilled wage labour, remittances, regular employment through salary, and subsistence agriculture), assets owned (including livestock and other productive assets), amount of land owned, type of tenureship, and access to credit. Variables were generated so as to ensure the maximum amount of continuous and rank variables to ensure a reliable discriminant function analysis. In particular, a weighted average was created to represent livestock assets, and a very simple 'index' was created to represent productive assets.

These variables represent various structural factors that measure rural employment status both directly and indirectly. As such, these indicators will provide an understanding of which employment issues are similar or differ across gender and food poverty groups, and across countries.

3. Are FHHs Overrepresented Among the Food Poor?

In current development discourse it is often asserted that poverty for women is deeper, longer and more difficult to get out of. In fact, the dynamic of impoverishment between men and women are analysed differently. For men impoverishment has been linked with the loss or deteriorating quality of employment, whereas for women the dynamics arise fundamentally from the constraints imposed by their family life on their ability to enter employment (Anderson 1993; Economic Commission for Latin America and the Carribean (ECLAC) 2004), or in other words the intra-household dynamics, the family life-cycle and age-structure. Women are more likely to be poor if they are recently widowed or divorced, or if they have a greater burden of care-taking for children, the elderly and the disabled. These are all factors that have been expounded in development literature, pushing forward the 'feminisation of poverty' and that the great majority of the poor are in fact women (United Nations Development Programme (UNDP) 1995); (Department for International Development (DFID) 2000); (African Development Bank (ADB) 2000). This has however been little supported by data and evidence to a lack of gender disaggregated poverty data sets available over time (United Nations Development Fund for Women (UNIFEM) 2002: 60).

This analysis cannot look at the trend for gender gaps in poverty terms; however it is one step in the direction towards understanding a snapshot of the characteristics of female and male poverty as seen through the prism of food poverty and rural employment and livelihood factors.

Food Poverty in Selected Countries

The CFSVAs are meant to provide a comprehensive profiling of households vulnerable to food insecurity. The indicator that is used to determine whether or not a particular household is food poor or not, is the FCS as previously explained. The cut-off that is taken for food poor households in the rest of the analysis is the FCS of 21. This may seem arbitrary, and in fact the actual meaning of the cut-off is different in each context. In Laos, the value comes from an expected daily consumption of staples and vegetables. Thus essentially these households are vegan, though not by choice and have marginal diversity in food consumption, and eat foods with low nutrient density. While in Mauritania the cut-off of 21 means that the households consume mainly staples, with oil and sugar. They also consume milk and eggs frequently, but do not consume meat or pulses. Thus, the meaning of food poor in each context differs according to the food security situation in each country. Table 2 below provides the meanings of the food poor category for each country, with the percentage of households that fall in that category.

Table 2: Description of Food Poverty and Prevalence by Country

Country	FCS cut-off	Description of Food Poverty	Percentage of Food Poor HHs in total sample
Laos	21	Vegan, but not by choice. Marginal diversity and foods with low nutrient density	2.1%
Mauritania	21	Consume mainly cereals with oil and sugar. Milk and eggs frequently consumed. No meat or pulses in diet	7.0%
Cameroon	21	Mainly cereals accompanied with vegetables (in form of sauces) and oil. Meat is consumed a maximum of 2-3 times a week. No pulses.	2.6%
Madagascar	21	Daily consumption based on rice with vegetables and sugar consumed a maximum of 4 days a week. Low protein intake.	39%
Tanzania	1.5	Consumption mainly based on staples – cereals, sometimes integrated with tubers. Only half of households frequently consumed vegetables.	17.7%

Table 2 shows us the range of food insecurity prevalence among the populations of the 5 countries under study. There are also differences in relation to the proportion of FHHs that are surveyed as seen in the table 3 below.

Table 3: Distribution of the Proportion of FHHs Surveyed.

Country	Percentage of FHHs in sample
Laos	7%
Madagascar	19.4%
Cameroon	16%
Mauritania	22%
Tanzania	20.4%

The only country which may present problems of statistical representativeness is Laos, which has a very low percentage of FHHs. However, this may also be due to the fact that there are fewer FHHs in Laos than elsewhere. Unfortunately, census data is not available to confirm this. Nonetheless, the sample size with which we are presented does show a possible bias towards MHHs. Though this dataset may not provide the optimal sampling framework for gender analysis, it is a first step and should be taken as such.

Patterns of the food consumption dominance

The presence of a strong dominance of female-headed food poverty is something that would be widely supported by the literature rooted in gender discourse, where female-headed households are assumed to be more vulnerable to food insecurity

than their male counter-parts (Valenzuela, 2003; Chant, 2006)]. In fact, our initial profiling of FHH and MHHs in relation to food poverty using the full sample of the 5 country datasets supports this assertion. In all 5 countries (see figures 2 through 6), there seems to be an unambiguous dominance of the food poverty of FHHs over MHHs at the greater levels of food poverty, while the patterns seem to converge at the more food secure end of the spectrum across all 5 countries.

Figure 2: Gender and Food Poverty Stochastic Dominance in Laos
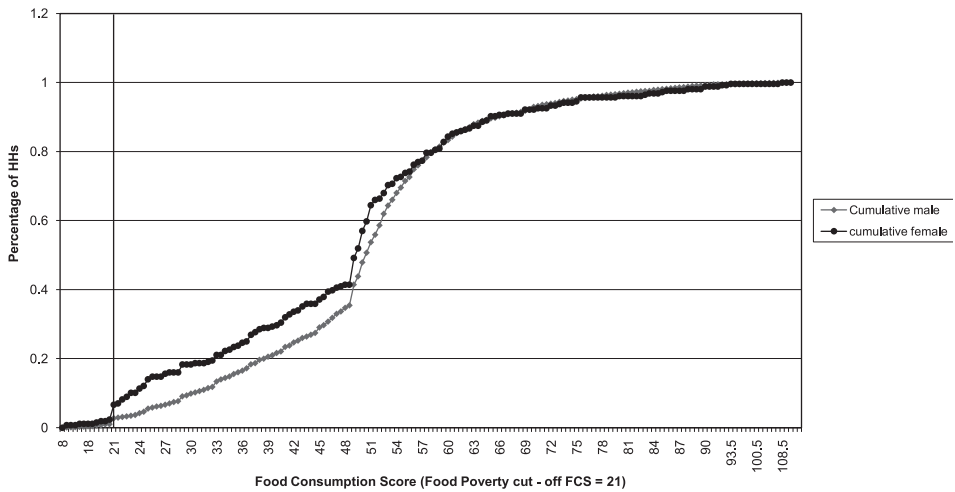
Figure 3: Gender and Food Poverty Stochastic Dominance in Madagascar
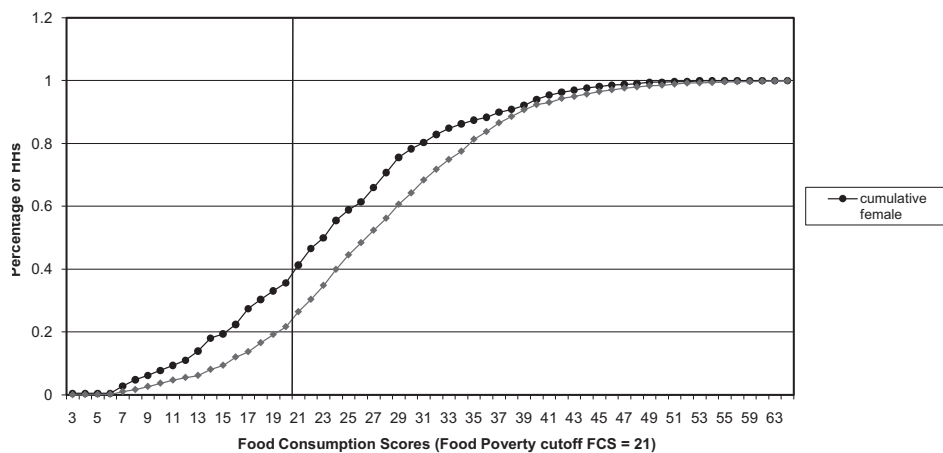
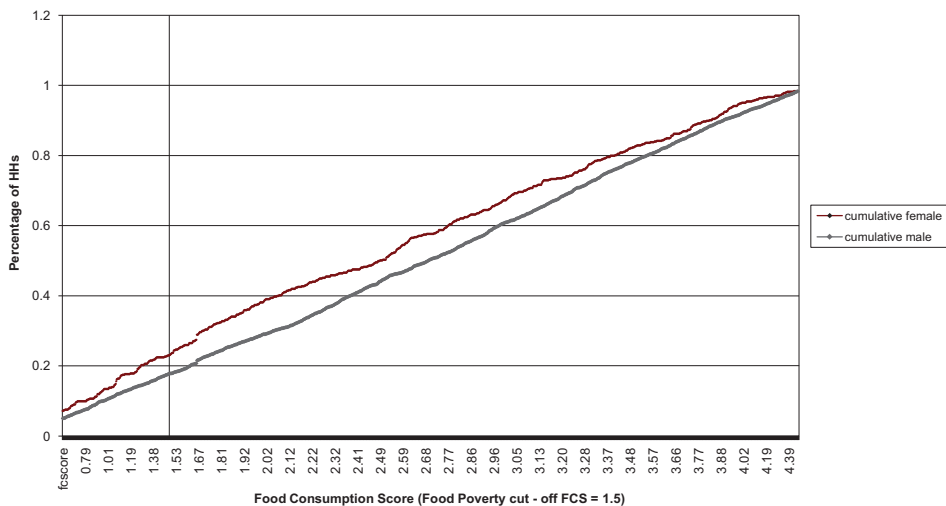Figure 4: Gender and Food Poverty Stochastic Dominance in Tanzania

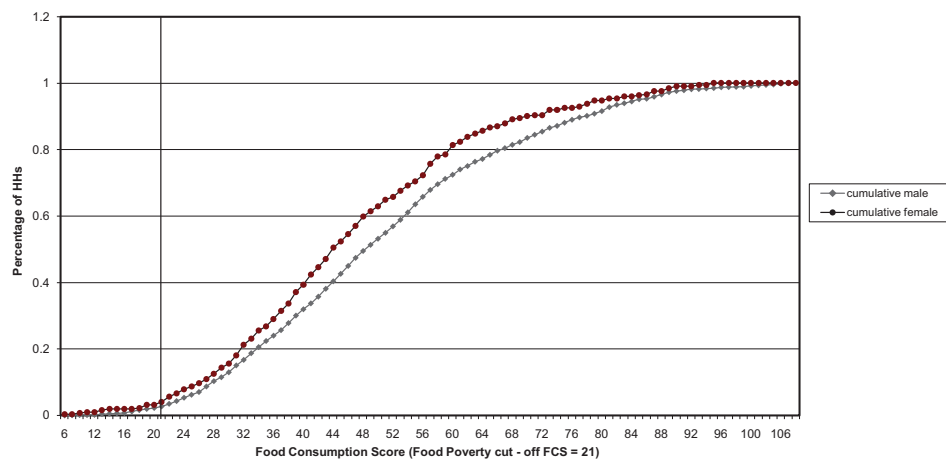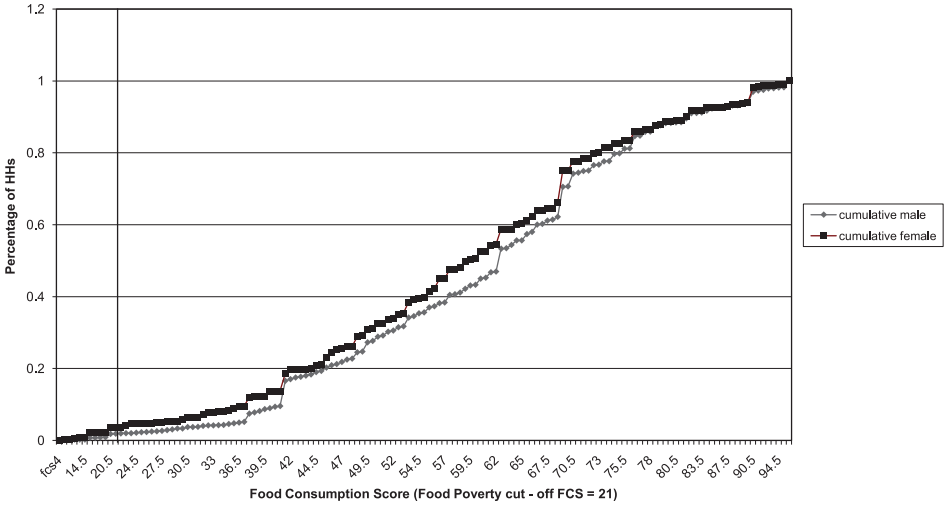Figure 5: Gender and Food Poverty Stochastic Dominance in Cameroon

Figure 6: Gender and Food Poverty Stochastic Dominance in Mauritania

Given the corroboration of this evidence in relation to the greater prevalence of poverty among FHHs when looking at the full population sample, it will be interesting to see whether this trend continues to hold when looking uniquely at food insecure households. In this way, we are putting a magnifying glass on a particular sub-set of the full sample present within our country datasets.

Figure 7: Gender and Food Poverty Stochastic Dominance for Food Insecure HHs in Cameroon
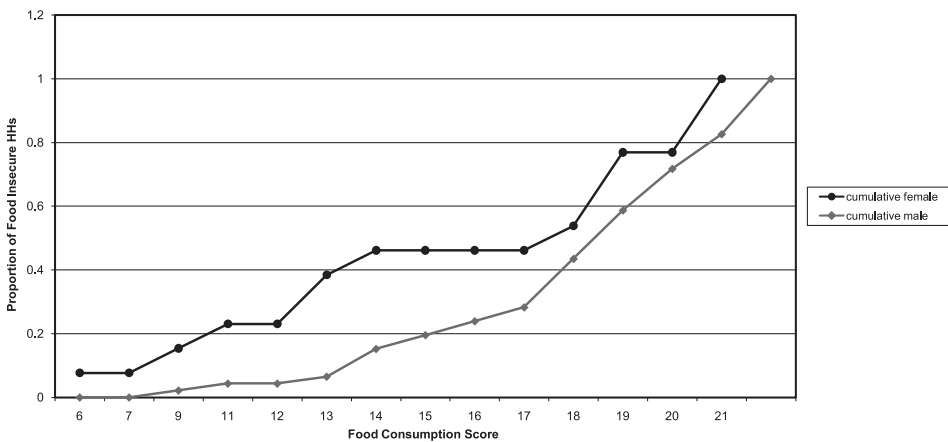
The seemingly unambiguous trends we saw in dominance of food poverty in FHHs compared to MHHs with the full sample can be misleading as the focus on food poor households shows that the pattern is ambiguous and country specific. Madagascar and Cameroon show very clearly the higher prevalence of food poverty among FHHs in relation to MHHs (see Figures 7 and 8).

Figure 8: Gender and Food Poverty Stochastic Dominance for Food Insecure HHs in Madagascar
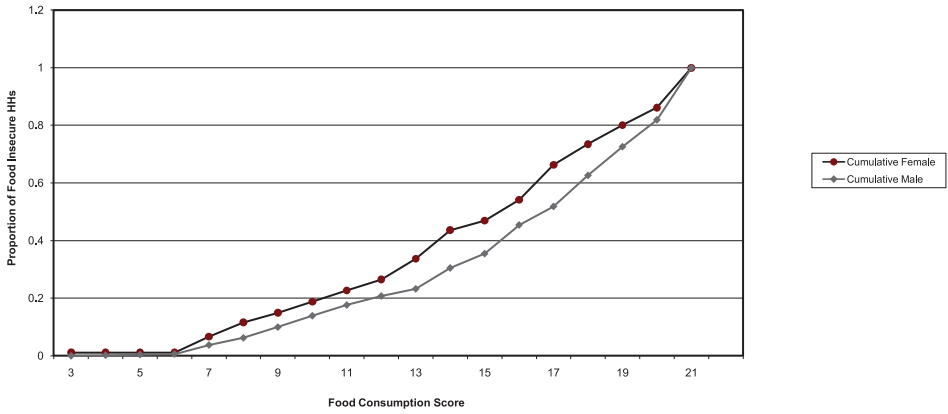
Tanzania, Mauritania and Laos display a more ambiguous story in relation to the observed trends of food poverty incidence for FHHs as opposed to MHHs. All of the latter countries do not demonstrate either first-order stochastic dominance (FSD) or second-order stochastic dominance (SSD), with the cumulative distribution of the food consumption gap ratio of FHHs and MHHs crossing at several points for the sample of food insecure, or food poor households (see figures 9 through 14). However, it remains true that a greater proportion of FHHs in the sample fall into food poverty than do MHHs.

Figure 9: Gender and Food Poverty Stochastic Dominance for Food Insecure HHs in Laos

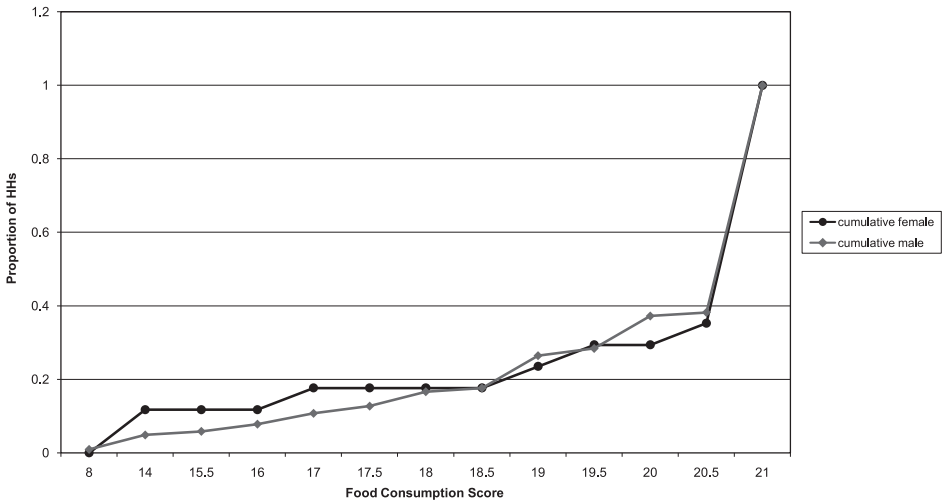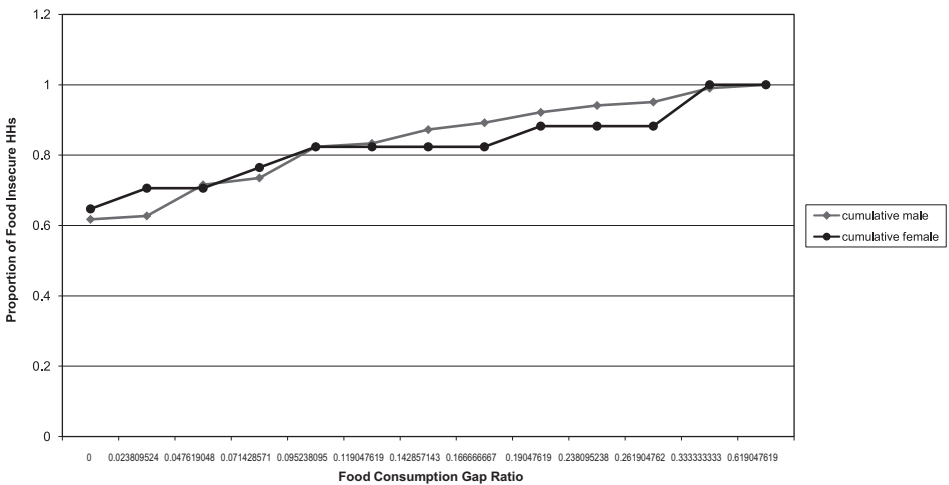Figure 10: Gender and Food Poverty Gap Stochastic Dominance for Food Insecure HHs in Laos.

Figure 11: Gender and Food Poverty Stochastic Dominance for Food Insecure HHs in Mauritania
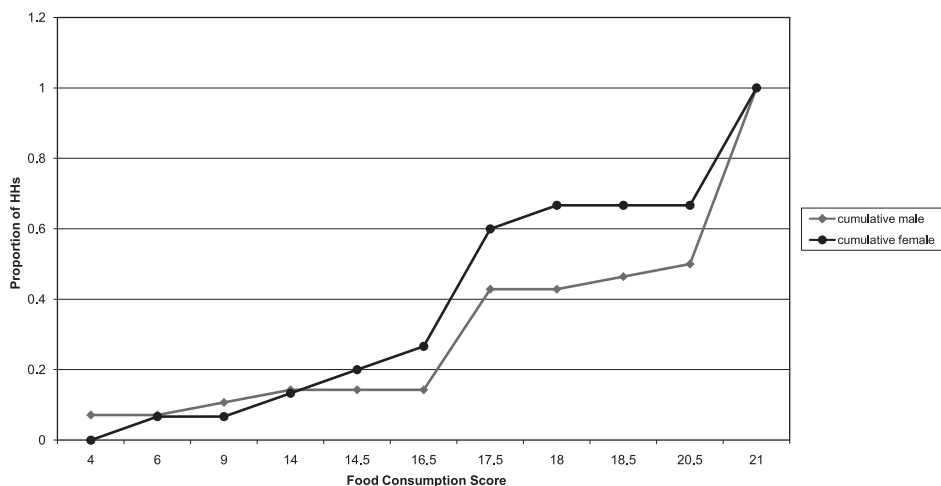

Figure 12: Gender and Food Poverty Gap Stochastic Dominance for Food Insecure HHs in Mauritania
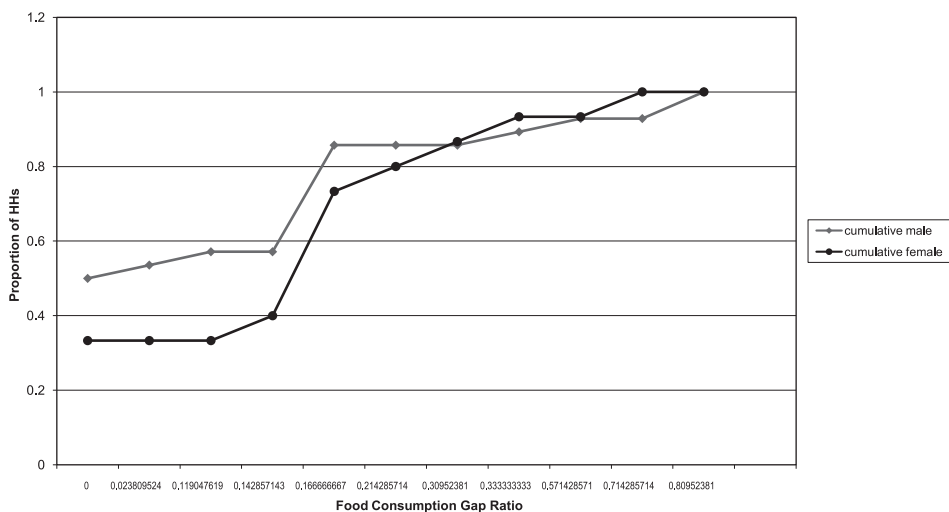
Figure 13: Gender and Food Poverty Stochastic Dominance for Food Insecure HHs in Tanzania
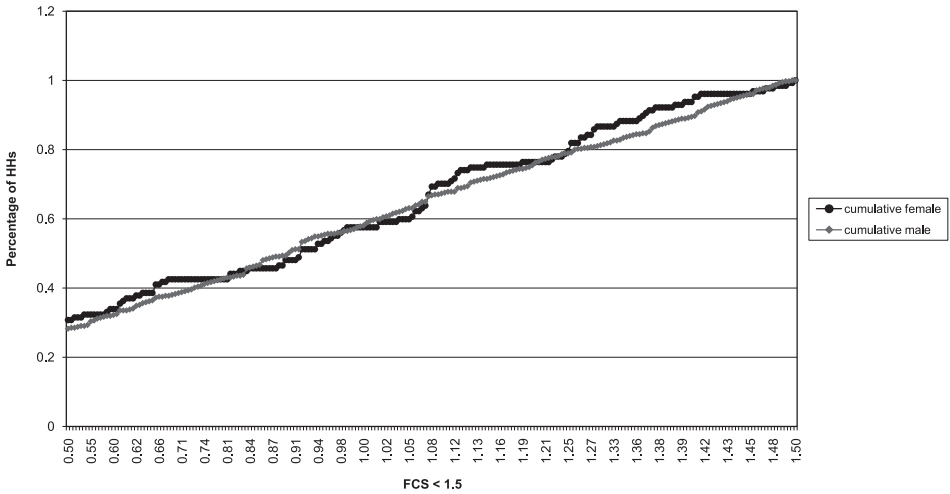
Figure 14: Gender and Food Poverty Gap Stochastic Dominance for Food Insecure HHs in Tanzania
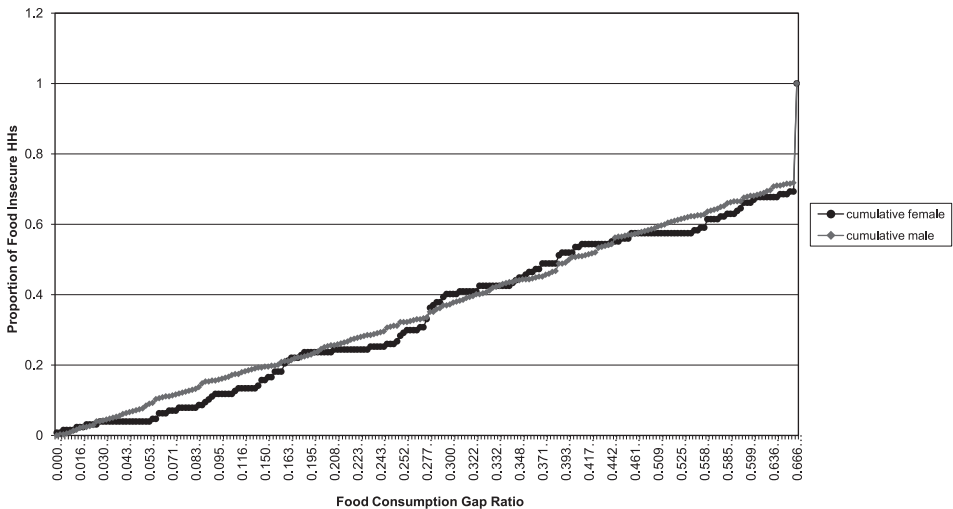
This initial look at the household data from these countries provides the basis to take a critical look at the differences in poverty based on gender characteristics. The possibility that certain factors impact MHHs' poverty status the same way as they do to FHHs cannot be disregarded a priori from the lack of stochastic dominance in the sample data. As this analysis represents observed trends, with no statistical

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significance, we will have to rely on multivariate analysis to see how MHHs and FHHs statistically relate to each other on dimensions related to rural employment.

The ambiguity of the results for a majority of the countries under study prompted a more empirically robust methodology to understand whether there is in fact a significant difference in the group food consumption score means between FHHs and MHHs. A pair-wise test of significance was conducted for food secure FHHs and MHHs and food insecure FHHs and MHHs initially for Tanzania, Mauritania and Laos where there was a clear ambiguity of the food poverty status of FHHs and MHHs[6]. In all cases, we found that there were no significant differences between the food score mean among gender disaggregated households. To further test this outcome, we applied the pair -wise significance test to Cameroon and Madagascar where a clear trend of FHH dominance in food poverty was observed using the SDA. In fact, it was found that also in these cases, there is no significant difference between the group food consumption score means of FHHs and MHHs[7]. Thus the ambiguity resulting from the SDA analysis could be reflecting unknown sampling bias in relation to what segment of the food poverty spectrum FHHs were randomly interviewed.

This shows that a priori, the difference between FHHs and MHHs in terms of food poverty is not statistically significant. This shows the need for further and more robust econometric tests. The SDA shows that FHHs are generally food poor compared to MHHs. However, the food insecure segment of FHHs is not necessarily poorer than the food insecure segment of MHHs.

4. Discriminating Structural Factors of Food Poverty

Though discriminant analysis can be used in predicting group classifications, the purpose of this analysis is simply to understand which structural factors are significant in explaining the differences between MHHs and FHHs, if in fact they are significantly different.

As such, the variables chosen to be included in the multiple discriminant analysis were not first tested for significance with t-tests or chi-square to determine if there are differences between MHHs and FHHs. Rather, the variables chosen to be included in the analysis were treated as potentially significant given the a priori knowledge that analyses gender differences, employment and poverty levels using different methodologies. These include age, education, household dependency ratio, land size, type of tenureship, productive assets, livestock assets, reliance on subsistence agriculture as measured by the percentage of own production consumed, reliance on skilled wage labour, reliance on unskilled wage labour, reliance on salary income, and reliance on remittances. The analysis here provides us with a statistical view to assess the differing characteristics of food secure and insecure male and female headed households, which has already been seen to be ambiguous due to a lack of stochastic dominance in 3 of the 5 countries under study, but also due to the insignificant differences in food poverty levels in FHHs and MHHs.

The results of the discriminant analysis will be presented in two sections. In the first section, the general results of the analysis will be elucidated, explaining the dimension, or dimensions along which significant differences were found between the four groups: male-headed food secure, male-headed food insecure, female-headed food secure and

female-headed food insecure. In the second section, there will be a further exploration of the variables which significantly and heavily account for the differences identified among the groups, thus telling us the particulars of the dimension along which the groups differ.

Finally, the variables which do show significance in determining the classification of MHH and FHHs as food poor or otherwise will be analysed in order to glean specific policy implications, which will be presented in the final section.

The differences between MHHs and FHHs: how food secure and insecure MHHs and FHHs compare?

The results of the discriminant analysis show that among three possible dimensions along which the four groups can be differentiated, only one dimension appears to be statistically significant, using the variables that are viewed as possible candidates from those available in the WFP dataset. The first derived canonical variate in each of the countries explains between 65% and 79% of the discriminating variance in the variables selected across the four groups.

Table 4: Gender Differences in Food Poverty

Country	Significant Functions (all significant at the 1% level)	Canonical Correlation Coefficient	Proportion of variance explained	Group means of the values of derived canonical variate	
Cameroon	1	0.28	0.79	FHH Food Secure FHH Food Insecure MHH Food Insecure MHH Food Secure -	0.67 1.00 0.27 0.13
Laos	1	0.29	0.75	FHH Food Secure FHH Food Insecure MHH Food Insecure MHH Food Secure -	0.88 1.92 1.00 0.09
Madagascar	1	0.40	0.77	FHH Food Secure FHH Food Insecure MHH Food Insecure MHH Food Secure -	0.57 1.28 0.05 0.25
Mauritania	1	0.30	0.73	FHH Food Secure FHH Food Insecure MHH Food Insecure MHH Food Secure -	0.52 1.36 0.88 0.16
Tanzania	1	0.30	0.65	FHH Food Secure FHH Food Insecure MHH Food Insecure MHH Food Secure -	0.61 0.96 0.18 0.18

However, the correlation coefficient and the proportion of explained variance by themselves do not tell us which groups differ most from each other, and which groups resemble each other most. This is explained by the group means calculated for each discriminant function. Looking across the 5 countries in Table 4 we can see that the same pattern among the groups emerges across the board.

The group means represent the means of the discriminant function scores by group for each significant function calculated. In Table 4 we can see that for each country female-headed households, whether they are food secure or food insecure, are always positive and close to each other.

What is most interesting when looking at the group means, is that the food insecure male-headed households are also similar to the female-headed households. Though they are not as close as the female-headed households are to each other, they are always positive and as such will represent the same direction of correlation with the canonical scores as explicated in the next section. In fact, it is the male-headed food secure households that stand apart from the rest.

These results are particularly interesting because they seem to counter the blanket assertions made that all male-headed households are similar to each other and as such should be treated as one category in relation to female-headed households. In other words, that FHHs display dominance over MHHs in food poverty. The DFA shows the importance of discriminating within gender group. Hence it appears that the discriminant factors of the food insecure MHHs are clearly different from those of food secure MHHs. However, these factors are not necessarily different when comparing food insecure MHHs with food insecure FHHs and food secure FHHs. Furthermore, this points to the fact that there are common causes to food poverty that transcend gender differences. However, the fact that food secure female-headed households are close in structure to food insecure households is consonant with the idea that female-headed households are in fact more vulnerable to poverty. This is particularly the case because they are similar to food insecure male-headed households, rather than food secure male-head households.

Gender and structural employment and livelihood indicators

The fact that food poverty is not significantly different between male-headed households and female-headed households has been established. However, we have yet to look at what the contributing factors are to the significant discriminant function that sets male-headed food secure households on one side, and food insecure households and female-headed food secure households on the other.

The results we are looking at are the canonical structure loadings, which better explain underlying (although interrelated) constructs rather than the canonical weights, which are more suitable for prediction purposes (Alpert and Peterson, 1972; Hair and Rolph, 1998). Table 5 presents the canonical structure loadings for each country that are above 0.3, which is a commonly used threshold together with the group means, which will help us understand in what direction the loadings impact the classification of households according to gender and food poverty status.

Table5: Gender and Food Poverty Discriminating Variables

Country	Significant Variable	Structural Loading	Group means	
Cameroon	Land size	-0.62	FHH Food Secure	0.67
	Education level	-0.45	FHH Food Insecure	1.00
	Productive Assets	-0.63	MHH Food Insecure	0.27
			MHH Food Secure	-0.13
Laos	Age	0.32	FHH Food Secure	0.88
	Education level	-0.58	FHH Food Insecure	1.92
	Productive Assets	-0.64	MHH Food Insecure	1.03
	HH Dependency Ratio	0.38	MHH Food Secure	-0.09
	Proportion of Income earned from Agricultural Production	-0.36		
Madagascar	HH size	-0.55	FHH Food Secure	0.57
	Education	-0.43	FHH Food Insecure	1.28
	Land size	-0.44	MHH Food Insecure	0.054
	Remittances	0.32	MHH Food Secure	-0.25
Mauritania	Education	-0.43	FHH Food Secure	0.52
	Dependence on subsistence agriculture	-0.41	FHH Food Insecure	1.36
	HH size	-0.45	MHH Food Insecure	0.88
	Productive Assets	-0.51	MHH Food Secure	-0.16
	Remittances	0.37		
Tanzania	Education	-0.53	FHH Food Secure	0.61
	Productive Assets	-0.37	FHH Food Insecure	0.96
	Remittances	0.61	MHH Food Insecure	0.18
			MHH Food Secure	-0.18

The first interesting point to note is that while direct measures of rural employment were included: proportion of income from unskilled agricultural and non-agricultural production, skilled labour and salary income as a way of gauging the importance of the type of employment in differentiating households, they, for the most part, do not represent significant factors in differentiating between the various groups. While there is evidence that MHH tend to have greater participation in skilled labour, and in formal labour more generally (UNIFEM, 2005) thus presumably leading to lower prevalence of food poverty among male-headed households, this does not come up as an important structural factor. However, this is not to say that there aren't factors underlying employment status that aren't significant in discriminating amongst the four groups.

In fact, the education level of the household head is a very important factor in every single country. Comparing the loadings with the group means, we can see that in every case the higher the level of education of the households' head, the greater the chance the group will be classified as a MHH food secure household, and vice versa for FHHs and food insecure MHHs. Figures 15 to 18 below show the dispersion of the level of education among the groups under study. Mauritania was excluded for the education variable was less informative, as it does not reflect levels of education.

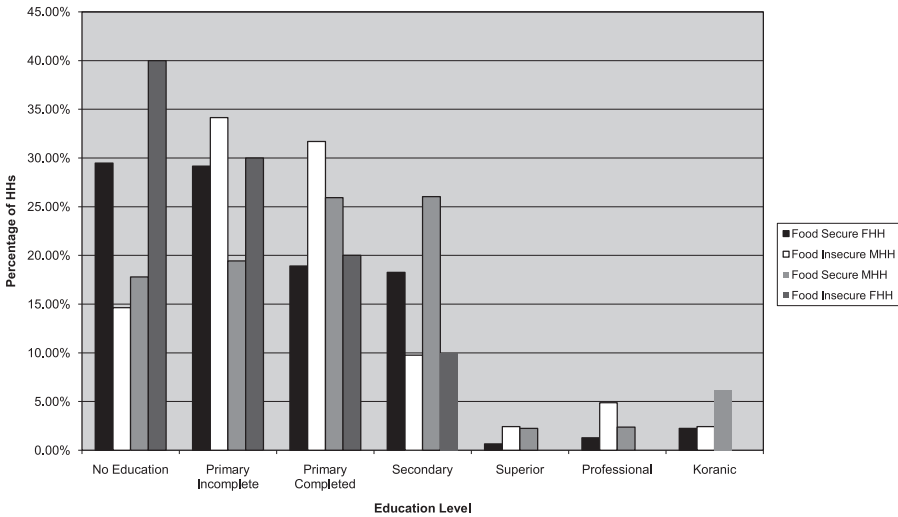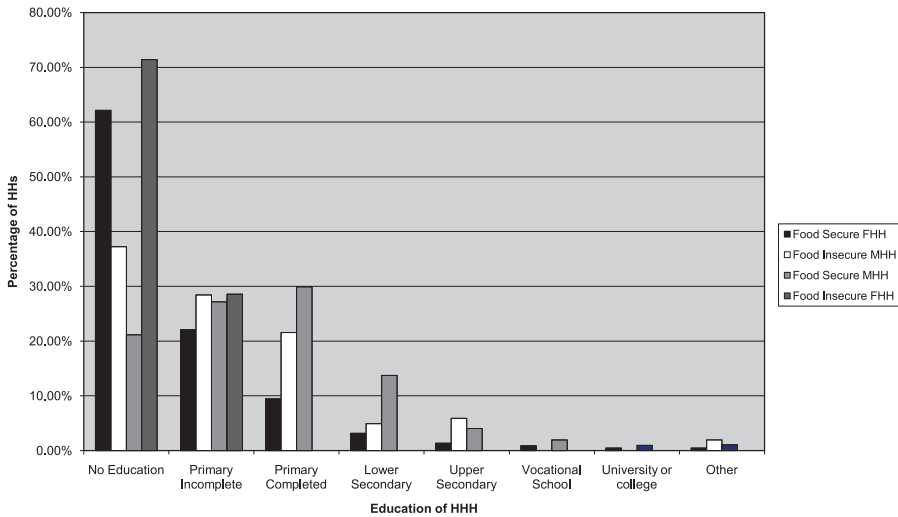Figure 15: Levels of Education by Group in Cameroon

Figure 16: Levels of Education by Group in Laos

Both food insecure MHHs and FHHs are mostly uneducated. While food insecure FHHs are overwhelmingly uneducated, with at least 40 percent of them not having any education at all (reaching the highest at 70 percent in Laos), MHH food insecure households also seem to be more likely to finish primary school. In fact, in Tanzania and Cameroon a higher percentage of food insecure MHHs completed primary school than those that had no education at all. In terms of food secure FHH, there is still a high percentage of those who are not educated.

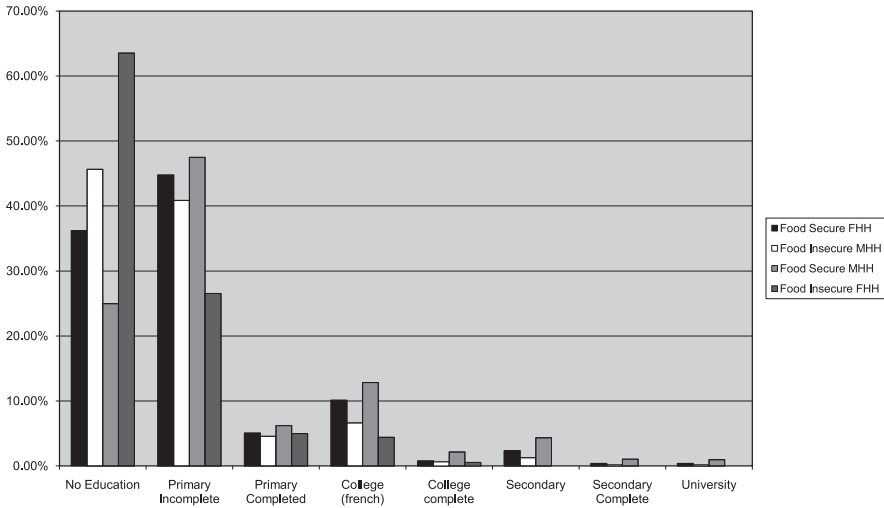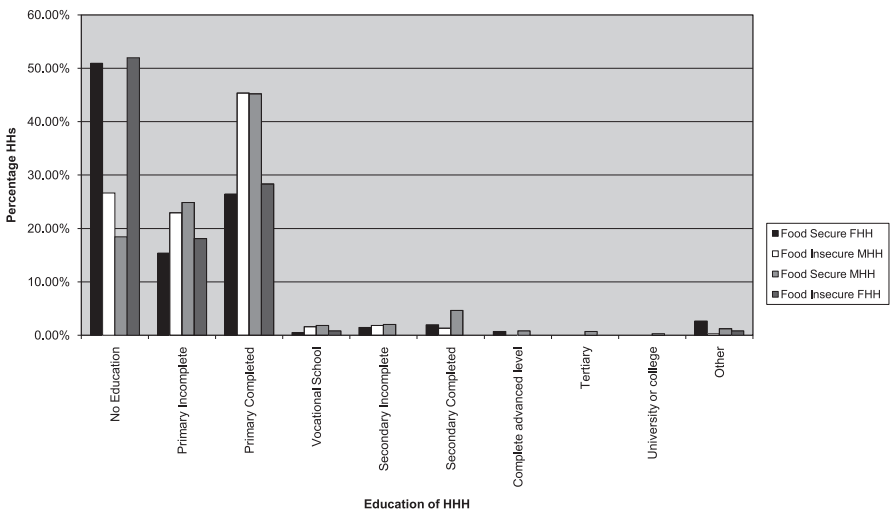Figure 17: Levels of Education by Group in Madagascar

Figure 18: Levels of Education by Group in Tanzania

However, it is also true that there is a greater proportion of food secure FHHs that start and even complete primary education. It is, in fact, the food secure MHHs that show a higher level of education across the board.

Another factor that is significant across the board is access to productive assets, upon which employment status clearly impinges as these include access to generators, mills, ploughs and other assets that are central to essential livelihood activities. Also with this variable we see that the more productive assets

a household has access to, the greater the likelihood the household will be classed as a food secure MHH.

Another interesting factor that is highlighted by this analysis is the importance of remittances to household income for the female-headed households, but also for the food insecure MHHs, particularly in Madagascar, Tanzania and Mauritania. This however, may be due to the fact that FHHs are de facto heads of household because males may have migrated. Also, food poor MHHs may have sent out some family members and received remittances in return (Quisumbing, 2001). In fact, 37% of FHHs in Madagascar have reported their marital status as 'living apart' suggesting that the males have indeed migrated. In Mauritania 49% of FHHs reported that a member of their household migrated during the year for remittances, and 53% of those households had the male head of the household migrate, which shows that the FHHs in these circumstances are de facto heads of households during certain times of the year. This does highlight the problematic of the definition of the 'female-headed household' and the level of analysis that is most appropriate for gender analyses (Momsen, 2002; Chant, 2003). Fundamentally the structural loadings point to the importance of initial conditions, of factors that underlie employment status in determining the differences between gender and food poverty, rather than current and direct employment status.

These conclusions point to very specific policy implications that are discussed in the final section.

5.   Concluding Remarks and Policy Implications

These results go some way in countering and going beyond the assertion previously made that the nature of poverty of FHHs is related to factors operating at the home while MHHs poverty is ruled mainly by issues related directly to employment. Here we can see that the underlying factors of food poverty in both male-headed and female-headed households has to do with initial conditions and access to sufficient opportunities and resources, most importantly productive assets and education. As long as household heads do not have some access to a minimal set of livelihood assets, whether they are male or female, they are more likely to become food poor.

This is a very important assertion in saying that while there may still be particularly gender-sensitive issues related to intra-household factors, MHH and FHH poverty tend to be impacted by similar factors to the same end. However, looking at the specific case of education, it is still obvious that FHHs face greater obstacles at accessing important prerequisites to pulling out of food poverty. Thus, these results do not in any way negate the social, cultural, and political bias that exists against women the world over.

However, policies should be concentrating specifically on the factors that may provide individuals with the opportunity to access higher levels of employment, to address the fundamental problems related to resource and asset bases, in particular the financial and human assets, as well as productive assets essential in participation in rural employment of any kind. This puts into question the focus

on income-generating activities without paying due attention to factors that allow individuals to sustainably benefit from employment, and that ease individuals' entry into employment, barring any social, cultural and political obstacles. Thus, the increased focus on women in relation to poverty alleviation policies, supported by the 'feminization of poverty' school of thought might lead to the misperception that poverty and difficulties in employment belong to FHHs only (Moore, 1994; Chant, 2003). Thus, the promotion of policies that target both MHHs and FHHs is crucial in relation to education and better access to productive assets for rural households.

In short, this analysis highlights the importance of the longer-term links for poverty reduction through employment. These differences were elucidated previously by Von Braun (1995), and seem to hold true. In his model short-term income for the poor, assets, technology and education, health and skills were outlined as the long-term links to labour, productivity and long-term income towards poverty reduction. In light of this, policies such as Food-for-Assets, Food/Cash for Work, and Food for Education are likely to have a solid long term impact. These, however, must be complemented with national policies that ensure equal access to land, and other productive assets. Thus, the focus of national governments should also remain on formative social spending, acknowledging those relying solely on employment programmes. In fact, it is the asset-creating effects of employment programmes that make them sustainable developmental instruments (Von Braun, 1995).

The results also give a certain implication in relation to targeted programmes. Though the structural factors impacting FHHs and food insecure MHHs are identified as the same, it is also true that FHHs and MHHs do not follow the same route to this trap. Given these results, it is clear that the points of policy focus for all food poor households should be coherent. However, further research is required to see whether different modalities apply to MHHs and FHHs given the different social, cultural, political and economic factors that prove as obstacles. Nonetheless, it is also clear that greater attention needs to be paid to long-term policies and investments in ensuring sufficient access to education, land and other assets to all food insecure households, without necessarily only targeting FHHs to the possible detriment of food poor MHHs. In particular, policies such as cash/food-for-assets and school feeding can provide important short-term springboards for larger scale changes in national policies in terms of ensuring access to all to the human, social, physical, financial and natural assets that are central to escaping this trap.

Notes:
This article was originally presented at the FAO-IFAD-ILO Technical   Expert Workshop, Rome, Italy in March, 2009. Ceren Gurkan worked with WFP as a market Analyst in Rome, Italy. Issa Sanogo is a market Specialist at WFP, Rome, Italy.

1   Madagascar presents a different case, however, where the heterogeneity within provinces meant that the provincial level did not provide a suitable way to stratify the sample. The existing system of agro-ecological zones divides the country into 16 zones that do not reflect household food security patterns. Therefore, principal component and non-hierarchical cluster analysis was used to group districts with similar characteristics based on a variety of indicators covering socio-economic risk and spatial data.

2   The 5 island regions were considered as 1 region for the purpose of the CFSVA, which is why only 22 rather than 26 regions were used as the first stratification.

3   Livestock assets included a weighted average of the following animals: cattle, bulls, buffalo, camels, goats/sheep, poultry, and donkey/horse. The weights were determined in order to reflect the importance of the various livestock as a store of wealth as determined by levels of market prices. As a result the weights were accorded the following ranking: camel, bulls, buffalo, cattle, horse, donkey, goat/sheep, and poultry.

4   The productive assets variable was very simply constructed by summing the number of different productive assets possessed by a particular household over the total number of possible productive assets asked in the survey. Productive assets include farming implements, fishing nets, boats, bicycles, mills, sewing machines, generators and any other asset that might facilitate in the earning of an income. However, given the different types of productive assets they will be calculated as a weighted average like livestock assets.

5   Tanzania had a different methodology for calculating the FCS. However, this is of minor importance to this analysis since it still helps in identifying food poor households based on the same indicators of food frequency and dietary diversity.

6   These present some interesting results which are worth looking into further.

7   In all cases, the null hypothesis that the group means of food secure FHH and food secure MHH; and food insecure MHH and food insecure FHH were not significantly different than zero could be rejected at the 10% level.

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