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ABSTRACT

This article examines the effects of agricultural commercialization and other factors on per capita food availability by means of a case study in the Nyeri district in Kenya. It was found that cash cropping has a negative influence on per capita food availability in the male-headed households. This negative influence is not apparent in the female-headed households and in fact, per capita food availability rises with increased agricultural commercialization. Households of married women seem to suffer more in terms of reduced food availability than households headed by females. Husbands have control over cash income and therefore influence food purchases. They are less likely than females to use the cash for food purchases and tend to spend the cash on themselves, thus reducing food availability to family members. This suggests that in some patriarchal societies, caution should be displayed in encouraging cash cropping especially in male-headed households. Cash cropping under such circumstances is unwise from both a food availability and food security point of view because it can result in reduced crop diversification hence increasing the risks of income food deficits for families. Other factors found to have an influence on per capita food availability are employment of the women outside households, educational level of the women and the quality of land.

Keywords: cash cropping, family size, female-headed households, male-headed households, and per capita food availability.

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1. Introduction

In much of Kenya (and most of sub-Saharan Africa), subsistence output per land unit is low relative to the rest of the developing countries and has tended to stagnate over the last three decades (FAO, 2001). However, yield estimates are highly speculative in view of the variability of peasant production and vast amounts of subsistence produce that does not enter the market. Nevertheless, indicators suggest that population growth in Kenya is outstripping increases in food supply, especially in rural areas where the food poverty rates are estimated to be 39 percent in rural areas and 34 percent in the Central Province of Kenya using 603 Kenya shillings as the food poverty line for rural areas and 704 Kenya shillings as the food poverty line for Central Province (Republic of Kenya, 1998). However, these estimates are based on data collected in 1994 and therefore the poverty lines are based on the 1994 prices.

The growth of the Kenyan economy has been on the decline since then especially the agricultural sector whose growth rate declined to only 1.3 percent in 1999 compared to a population growth of 2.9 percent during the same period (Republic of Kenya, various issues). Kenya's mean per capita food production has dropped drastically over the past few decades and its incidence of poverty and hunger have increased. A large proportion of the population now subsists on a mean daily intake of less than 2000 kilocalories per day per adult equivalent (FAO, 2001).

Generally Kenyan food production faces many problems including drought, pests and diseases, small farm-size holdings that are inadequate to produce the minimum food requirements in a year, inadequate cash earnings for food purchases and increased monoculture crop-farming due to cash cropping which restricts nutritional food varieties. As commercialization proceeds, there is a tendency for specialisation to develop in rural peasant production. An increasing proportion of the population ceases to be engaged in food production and instead relies on the market supply of food. With a decrease in food producers, there is need for an increase in labour productivity in food production to ensure adequate food supply. However, in the absence of an improvement in food productivity, families may experience food inadequacies both from food production deficiencies and imperfect market conditions especially in less developed countries (Bryceson, 1989).

Figures provided by the UNDP (2000) and FAO (2001) show that daily per capita calorie intake in Kenya was less in 1997 than in 1970. Declining per capita food production and per capita food intake is causing Kenya to become more dependent on food imports and food aid. In Kenya, agricultural output increased steadily after independence in 1963 until the mid-1970s. Since then production of the major food crops has not kept up with increased demand because of increased population growth rates, climatic variability, and problems with the organizational structure of food production, storage and distribution. Kenya's population growth rate of 2.9 percent per annum is high compared with other developing countries. In the absence of increases in food productivity per unit of land and improved market conditions, Kenya faces the risk of serious food consumption shortages.

In Kenya, per capita food production in 1980 was 82 percent of what it was ten years previously, and food aid increased from 2000 metric tons in 1974/75 to 115,000 metric tons in 1981/82. Food aid imports rose to 425,000 metric tones in 1984/85. Between 1988-90, Kenya's food import dependency was 10 percent of its GDP. In 2001/2002, the food aid imports were 450,000 metric tons after commercial food imports of 751,000 metric tons (FAO, 2001). The World Food Programme (2000) listed Kenya as one of the countries that faced serious food shortages by the end of May 2000. Between 1996-1998, food availability in Kenya, i.e. the average per capita dietary energy supply in kilocalories per day was only 1970kcal/day per adult equivalent for the average Kenyan (FAO, 2001).

In many developing countries, Kenya included, cash cropping has been embraced as a means to raise household income as well as a source of foreign exchange. Longhurst (1988); Kiriti and Tisdell (2004); Kennedy and Cogill (1985) found that as more land is put under cash crops, less food is grown for home consumption and therefore, more monetary income is needed to purchase food and other household needs from the market. Pinstrup-Anderson (1983) argues that expanded cash crop production can affect food availability and quality by reducing the diversity of food products and might increase the risk of crop failure since farmers become more dependent on external economic forces. However, expanded export crop production need not reduce food availability if the cash generated leads to increased food purchases and if these are effectively distributed.

The neoclassical economic theory assumes that if commercialization occurs and families market their produce freely, their welfare is raised by this market exchange especially because total household cash income increases and the farm household has more income to purchase food, which it now does not produce. Hence, its food availability improves. However, food availability is not just dependent on cash incomes. The form of income (constant or lump sum) and who controls it in the household may determine how much food is available in a household. Given the absence of women's effective control over land use and income from cash crops (which usually arrives in lump sum after a long duration of time) in Kenya, per capita food availability may decline as more land is put under cash crops because men mainly control cash incomes and they are less likely to use it for food purchases than females (Kaiser and Dewey, 1991). Hence, food may be scarcer in farm households headed by males than those headed by females.

By analysing results from structured interviews of 137 households in the Nyeri district in Kenya, this article seeks to examine the influence of marital status of women on per capita food availability. Nevertheless, marital status may not be the only possible determinant of food availability. Other factors such as the proportion of land under nonfood cash crops has been identified in the literature as a possible influence on per capita food availability in many developing countries. We shall consider this factor as well as other possible determinants such as whether the husband stays together with his wife or he has migrated, and so on. In the next section, we briefly review literature relevant to agricultural commercialization and food availability.

2. A Brief Review of Relevant Literature

Several researchers have pointed out that despite having higher incomes and more assets, the family food consumption of cash crop farmers is not necessarily superior to that of subsistence farmers (Collis, 1962; Dewey, 1979; Fleuret and Fleuret, 1983; FAO, 1984; Haaga et al., 1986).

Although an FAO study (1984) on tea in Kericho in Kenya did not address the issue of family food consumption, it found no significant difference in nutritional status indicators of children in families of tea and non-tea growers, despite the former having more cattle and higher nominal farm incomes. The extra wealth of tea-growing families was not translated

into improved nutritional status for their children. The group of families growing tea stood a higher risk of poor nutritional status than those families growing tea and maize.

The changed economic situation of the family may require or induce it to spend much of its income on needs other than food. Payment of taxes (e.g., value added tax in Kenya) and high costs often associated with cash crops (for example, fertilizers, pesticides, hired labour) may drain a family's income leaving less for food purchases. Although food is generally a priority item for most families, some may reduce food purchases in order to pay for non-food necessities or even luxuries.

In rural peasant households, the purchase of consumer durables may not be very common but there are some basic items like salt, cooking fat, kerosene, soap and clothing that rural households have to purchase. Hence, the income derived from cash crops does not all go into food expenditure and with increased family sizes, per capita food availability may decline.
Reviewing 29 village surveys in different parts of Africa, Schofield (1979) found nutrient intake levels were significantly higher in the purely subsistence villages compared with semi-cash villages. Schofield suggests that pure subsistence villages are better fed than those that cultivate cash crops at the expense of subsistence crops.

Kumar (1977) on the basis of evidence from Kerala, India, suggests that notional incomes in the form of own production safeguard food consumption more than an equivalent amount of income generated by growing cash crops mainly because intra-household cash income allocation decisions are mainly made by men.

If it is true that farms where Kenyan males are present are more commercialized than those farms where males are absent, and if cash income controlled by husbands is less likely to be used for food purchases, does this translate into less food availability for these farm households? A sample discussed in the next section is designed to provide evidence about this issue.

3. Study Site, Sample and Data Collection Methodology

This study is based on data collected from a sample of rural households in Nyeri district in Central Kenya. The district has a very high population density with some areas of high agricultural potential, such as Tetu division, having more than 400 persons per km^2, whereas

new settlement areas such as Kieni West have 100 persons per km^2. The district's principal town, Nyeri has a population of about 50,000 persons and is also the provincial headquarters. Six divisions were selected for the study based on their differences in ecology and levels of commercialization. The divisions are Nyeri, Othaya, Tetu, Mukurweini, Mathira and Kieni. We used the Kenya Central Bureau of Statistics Welfare Monitoring Sampling Frame to randomly select our sample. The data were collected in the months of December 2000 and January 2001.

A random sample of 330 households was selected but due to death, migration, absentees and non-responses, we ended up with responses of 185 households, that is 55 percent of those selected. There were 235 respondents and out of these there were 98 males and 137 females. Of these, there were 63 male-headed households (married women living with husbands), 26 also male-headed but the wives living alone as the husbands had migrated to the urban areas and 48 female-headed households consisting of single, divorced and widowed women.

The response rate was lower than hoped for because (1) the women were very busy as it was during the short rains and there were food crops in the fields and coffee, tea, pyrethrum and other cash crops to be harvested; (2) husbands refused to give permission in a number of cases for wives to participate, because some husbands were suspicious that their wives were being incited to divorce or disobey them; (3) other households thought that we had been sent by the government and since Nyeri district was then an opposition zone, they would not respond kindly to any government functionaries; and (4) some households did not perceive any direct personal benefit from answering the questions.

It is possible that non-response imparted a minor bias to the results. For example, it may have been that the most domineering husbands did not permit their wives to participate in this survey. Despite the above limitations of the survey, it does provide an indication of the nature of household agricultural decisions in the Nyeri district. In particular, it provides information about factors influencing household food production for subsistence, and cash cropping and how these may be influenced by marital status and in the process they also influence household food availability.

A structured questionnaire was administered by direct interview to collect information about the various products produced by households, their receipt of remittance, earnings from

outside employment, amount of non-cash output, amount of non-food output, ownership of livestock, demographic information like age, education, number of children, allocation of income to food purchases and so on.

Nyeri district has a varied tropical climate influenced by its location. The pattern of rainfall is typically equatorial since the district is situated within the highlands of Kenya (Mount Kenya to the east and the Aberdare ranges to the west) and near the Equator. Nyeri district experiences two rainy seasons: the long rainy season and the short rainy season. The long rains normally begin in March and end in May, while the short rains start in October and end in December. The March to May season is wetter due to direct exposure of moisture from the south-easterly winds which blow over a wide area of the Indian ocean, while the October to November season is also wet but of a shorter spell due to decreased precipitation and decreased temperatures as one proceeds from lower to higher altitudes. Short rains result in low food crop yields and at times crops wither even before they can be harvested and only those crops that mature fast are grown during this period. As such, most households rely on the output they harvest from crops grown during the long rains and the food is expected to last them for almost the whole year. Therefore, output from crops during the long rains gives a representative picture of food availability for the whole year. Our study investigated the output of crops grown during the long rainy season.

Usually, planting for the long rains starts in March and the main harvest months are September and October. This, therefore, means that the recall period was quite short and for this reason, we assume the data is reasonably correct and quite representative of agricultural production in Nyeri district.

In the next section we look at the possible influences of food availability per head at the family level in the rainy season.

4. Association between Food Availability per Head and Commercialization: Linear Regression Analysis using Single Independent Variable

The way in which food is obtained is varied and can be classified in different ways. It can be self supplied, purchased in the market in exchange for cash, obtained by barter in a market, secured through customary exchange, or it may be received in the form of gifts from friends, relatives or from the government, for example, in the form of government famine relief in

Kenya. In this study we do not consider food in the form of gifts nor customary exchange but only self supplied food and purchased food.

Food availability of a household depends on total food supplies from the market plus non-market sources. To test for food availability we need to look at food availability per head of the family. If a woman is unmarried or her husband has migrated, he does not have to be fed by the rural household. Staudt (1982); Kiriti and Tisdell (2003a); Fortmann (1984) found that when women are married, farms are more commercialized than when they are not married and that husbands negatively influence the proportion of cash income allocated for food purchases (Kaiser and Dewey, 1991; Kennedy, 1994; Kiriti and Tisdell, 2004; Bryceson, 1989).

Food availability per capita depends on the number of family members. Therefore, we need to consider the number of dependents in the family and their ages and the question of whether children should be treated as adults or as the equivalent of a fraction of an adult. Due to lack of information and data from our survey on the actual number of dependents in the household and their ages, it is hard to determine per adult equivalents of the children. However, if all surviving children are taken as a proxy for dependants, then a family in which a woman and husband are living together in our sample has 6.54 dependents whereas a woman living alone has 5.31 mouths to feed on average. A female-headed household would have 6.48 mouths to feed. However, as noted in Kiriti and Tisdell (2003b), the majority of the 'unmarried' women were widows whose children may have left home. Nevertheless, in order to compare the effect of marital status and commercialization on food availability, we also include some estimates for the unmarried women in order to answer the question of whether food becomes scarcer in a family with growing commercialization with the presence of a husband. We do this by first using single linear regression analysis and then multiple regression analysis.

Food availability was estimated by adding the value of subsistence output to the value of purchased food. This was done for all the 137 women respondents, that is, for the male-headed households and for the female-headed households. To get the value of purchased food, households were asked how much out of total income from cash crops, earnings from outside employment and remittances they allocated for food purchases during normal times and not during festivals. Subsistence output comprising mainly maize, beans, potatoes, carrots, cabbages and kales was expressed in monetary terms using local market prices

obtained from the local branch of the Kenya Central Bureau of Statistics. Hence, food availability was the summation of the value of subsistence output and the value of purchased food all in Kenya shillings hereafter referred to as Ksh.

The figure for food availability was then divided by the average family size including the household head (if not migrated) to obtain per capita food availability. This means that for a married woman living with her husband, food per head was obtained by dividing food availability by the average number of children in the family (4.54) plus 2. Where a married woman's husband had migrated to the urban areas and so the husband does not need to be fed, or the woman headed the household, we added 1 to the average number of children (5.31) and (6.48) respectively.

Scattergrams were plotted to check visually whether there is any relationship between per capita food availability and the index of commercialization and to check for the presence of outliers. The index of commercialization was taken as the percentage of land under cash crops out of total farmland (Perccrop). It was found that there was an element of heteroscedasticity with per capita availability of food varying more as the level of commercialization increased hence making the assumption of constant variance invalid. The presence of outliers may have added to the problem of heteroscedasticity. We therefore decided to delete three outliers.

Another source of heteroscedasticity is a greater error of measurement at some levels of an independent variable. Our independent variable is the percentage of farmland under commercial crops and the respondents may have estimated incorrectly the percentage of land under cash crops.

Heteroscedasticity may also have been as a result of the interaction of the per capita availability of food with another variable that is not part of the equation i.e. specification errors due to omitted variables. For example, it may be that increasing variability in per capita food availability with commercialization is associated with education. For those with higher education, there may be a possibility of having more food per capita. Thus, a solution would be to include other variables as well as commercialization as predictors of per capita food availability to strengthen the model as well as eliminate heteroscedasticity. This we do in the next section.

Another possible response to heteroscedasticity would have been to transform the variables or take their logarithms or square roots and then applying the least squares analysis to the resulting set of transformed variables. However, the transformation may alter the hypothesized relationship among the variables and interpretation. The analysis is then limited to the transformed data.

Another option is to use the untransformed variables with a more stringent α level (for normal = 0.05). It is recommended that one should use $\alpha = 0.025$ with moderate violation and 0.01 with severe violation (Tabachnick and Fidel, 2001).

However, it should be noted that while heteroscedasticity is not fatal to an analysis of ungrouped data, there is even more predictability if the heteroscedasticity is accounted for. However, if it is not, the analysis is weakened but not invalidated (Tabachnick and Fidel, 2001). In any case, in cross-sectional data involving heterogeneous units, heteroscedasticity is and may be the rule rather than the exception (Gujarati, 1995) and heteroscedasticity does not destroy the unbiasedness and consistency properties of ordinary least squares estimators, although these are no longer minimum variance or efficient.

We took the figure for food availability per head (Percapfd) as the dependent variable and first regressed it against the index of commercialization. It was found that there was a negative correlation coefficient of 0.167 between the per capita food availability and the percentage of land under cash crops for all households in the sample and this was statistically significant at the 10 percent level. The regression line is downward sloping showing that as the percentage of land under cash crops increases by 1 percent, the per capita food availability of a family in the sample falls by Ksh.6.50. However, the percentage of farmland under commercial crops is statistically significant only at the 10 percent level in explaining variations in per capita availability of food for all women. Also, the coefficient of determination is quite low ($r^2 = 0.029$) showing that it may not necessarily be commercialization alone that reduces per capita food availability among the respondents in this district.

Bivariate correlation analysis was also done for all the married women living with their husbands to see whether marital status played any role in per capita food availability. It was

found that the correlation between per capita food availability and the percentage of land under cash crops is –0.364 for married women living with their husbands and is also statistically significant at the 1 percent level. The coefficient of determination for the regression line is 0.133 showing that variations in the percentage of farmland under commercial crops explain 13.3 percent of the variations in per capita food availability.

Figure 1 shows how per capita availability of food in the family varies with variations with commercialization for married women living with their husbands.

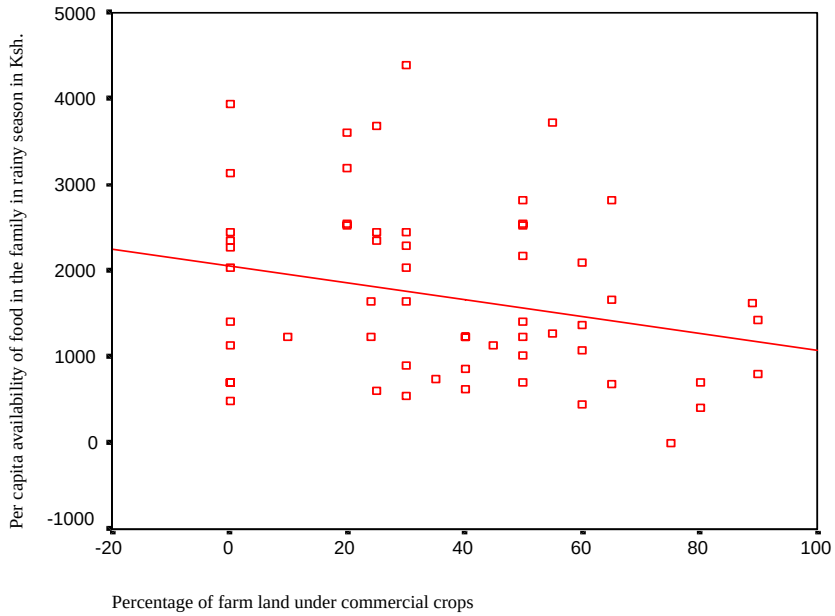

Figure 1: Relationship between per capita food availability and percentage of land under cash crops for married women living with husbands. Regression line is Percapfd = 2295.250 – 14.758Perccrop. Note that values in this graph can only be non-negative even though computer construction of it begins at negative values.

The coefficient for the commercialization variable is negative and shows that as the percentage of land under commercial crops rises by one percent, per capita food availability falls by Ksh.14.76. This supports the hypothesis that food availability in households where husbands are present is negatively associated with commercialization. Married women living with husbands have to contend with their husband's control of the cash, especially from cash crops and this negatively influences the per capita food availability of family members.

As mentioned before, to get the value of purchased food we calculated the proportion of household income from various sources (including that from cash crops, remittances and earnings) allocated for food purchases. There may be a probability of some households reporting zero values for these if they do not grow cash crops, do not receive remittances and they are not employed outside the household. Hence, the figure for food availability for these households would only be derived from the value of subsistence output and when divided by the family size, it could be low. However, it may also be that some women failed to report their output from subsistence crops and so their per capita food availability would appear to be near zero in the scatter diagrams.

For the married women living with husbands, the lowest amount of food availability was Ksh.2.30 per capita. These households could be relying on famine relief from the Kenya government for survival or they could be using past savings to purchase food. The maximum amount of per capita food availability was Ksh.4383. As Figure 1 shows, there were some women who did not engage in commercial farming as they allocated their land to subsistence farming or left part of the land uncultivated for buildings or for grazing.

Figure 2 shows the relationship between food availability and commercialization for the unmarried women, i.e. female-headed households.

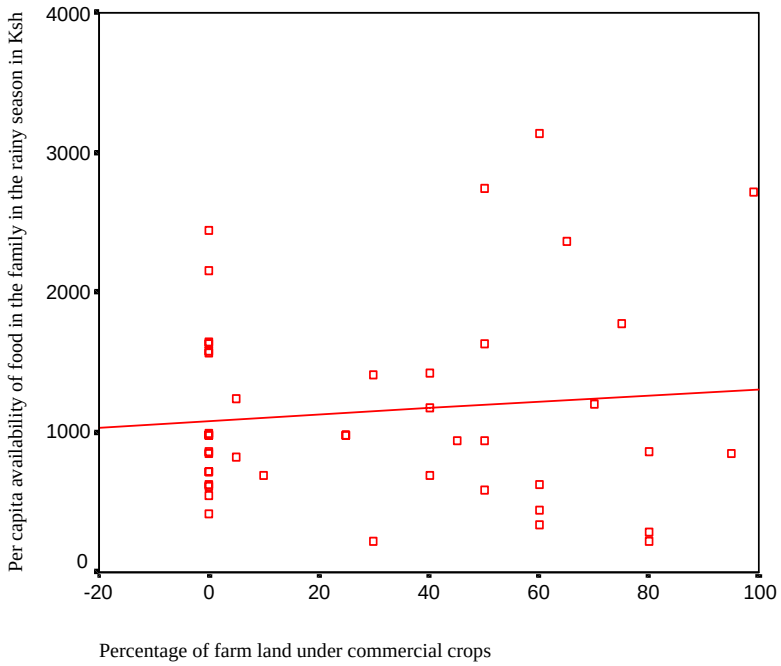

Figure 2: Relationship between per capita food availability and percentage of land under cash crops for female-headed households. Regression line is Percapfd = 1080.070 + 2.286Perccrop. Note that values in this graph can only be non-negative even though computer construction of it begins at a negative value.

The correlation coefficient between per capita food availability and commercialization for these women is positive (0.168) but it is not significant, indicating that although the two variables are associated positively, the relationship is not very strong. The coefficient for the index of commercialization shows that as the percentage of land under cash crops rises by one percent, the per capita food availability of this group increases by Ksh.2.30. However, commercialization is not statistically significant in explaining variations in per capita food availability for the female-headed households. The coefficient of determination is quite low (0.028) showing that commercialization is not an influential factor in explaining variations in per capita food availability for the female-headed households as it explains only a very small percent of the variations in per capita availability of food for these households.

The analysis so far, supports the hypothesis that commercialization in male-headed households where the husband is present, per capita food availability declines. By contrast, for the female-headed households, a one percent increase in the percentage of land allocated

for cash crops leads to an increase in the per capita food availability, but the association is weak.

Figure 3 shows the relationship between per capita food availability for married women living alone. In this case, the husband has migrated but usually visits periodically and exerts control over the household in terms of growing of cash crops and claims cash income from cash crops (Kiriti and Tisdell, 2003b).

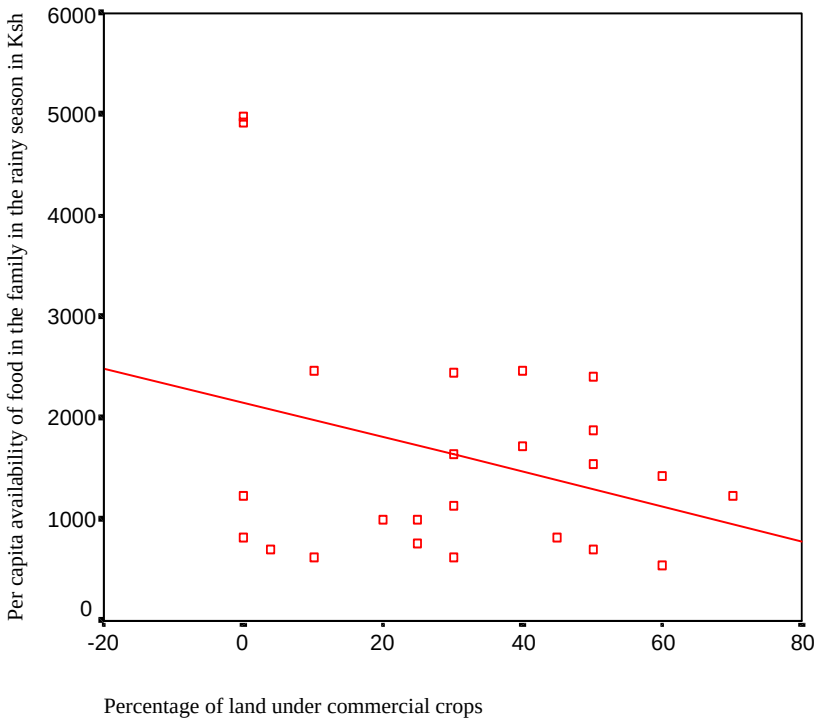

Figure 3: Per capita food availability and commercialization for married women living alone. Regression line is Percapfd = 2147.394 – 16.926Perccrop. Note that values in this graph can only be non-negative even though computer construction of it begins at a negative value.

The coefficient of commercialization for married women living alone in households shows that as the percentage of farmland under commercial crops increases by 1 percent, the per capita availability of food falls by Ksh.16.90 and this relationship is significant at the 5 percent level.

Comparing the regressions lines in Figure 1 and 3, it is seen that on average, married women living with their husbands have more food per capita than married women living alone. Also,

for the same degree of commercialization, per capita food availability is slightly lower for married women living alone compared with the married women living with their husbands. This may be due to the fact that where the husband is present, more total output is produced (Kiriti and Tisdell, 2003a) and these households have larger farm sizes compared to households of married women living alone whose husbands are often forced to migrate to urban areas due to poverty and small farm sizes (Kiriti and Tisdell, 2003b). Because migrant husbands still control the income from cash crops and the degree of commercialization on their farms, per capita food availability also falls for this group of married women. In fact, it falls at a faster rate with increased commercialisation than in the case of wives living with their husbands.

The husband even when he is away from home, tends to influence the degree of commercialisation of the farm and to have control over cash income. This affects household food purchases. However, husbands have little control over disposal of subsistence food (women's crops) in Kenya. If more land is allocated for commercial crops and less for subsistence crops, these households end up with less food per capita as a result of agricultural commercialization. This implies that male (gender control) in patriarchal societies is important in determining food availability. In addition, lump sum payments may result in less purchases of food in commercialized households (Lev, 1981; Longhurst, 1988).

Thus, from the analysis so far we have found that in the case of married women (husband alive and effectively head of household) food availability tends to fall with increased commercialization but the relationship is not so close as judged by the coefficient of determination even though it is statistically significant. In the case of unmarried women, such a negative relationship is not present.

Where a woman effectively heads a household, food availability per capita is on average lower than in the former cases. By contrast, it tends to rise with the percentage of land under commercial crops. However, food availability for families where a woman heads the household may be understated by our data because they may have a high proportion of children who have moved out of home and are no longer dependents. In the next section, we concentrate on the sub-samples of the married women (living together with husband and those living alone) and female-headed households using multiple regression analysis.

5. Multiple Regression Analysis

To test for other possible factors that may influence per capita food availability, we added more explanatory variables and ran a regression for the married women (male-headed households) and another one for the unmarried women (female-headed households). We also did the same for the married women living with their husbands and those married but living alone. The other independent or explanatory variables used in the model are:

Employed = whether the woman is employed outside the household, 1 if she is, 0 if she is not;

Edu = educational level of the woman, 0 if never attended school, 1 lower primary school, 2 upper primary school, 3 secondary school, 4 high school, 5 college/polytechnic and 6 university;

Landqual = quality of land as perceived by the respondents, 2 if above average, 1 if average and 0 if poor;

Remitt = if household receives remittances, 1 if yes, 0 if it does not.

We use ordinary least squares to check for the influence of various explanatory variables on per capita food availability.

Table 1 shows the average per capita food availability for one rainy season for all women in the three types of households. Also shown are values of other variables used in the multiple regression analysis.

Table 1

Average Values of Variables used in the Analysis

Marital Status	Percapfd	Perccrop	Employed	Edu	Landqual	Remitt
Married women living with husbands	1705.76	35.51	1.00	2.94	1.02	0.11
Married women living alone	1632.27	29.16	1.00	2.80	1.20	0.80
Female-headed households	1152.71	30.62	1.00	1.98	1.23	0.60

As Table 1 shows, the average per capita food availability in Kenyan shillings is highest for married women living with husbands followed by the married women living alone. The

female-headed households have the least amount of food per capita, showing that marital status is an important factor in determining the per capita food availability in the family. However, the low per capita food availability for unmarried women may be due to other factors rather than marital status, for example, their age may be an influence since the sub-sample of unmarried women included widows (21.2 percent) with an average of 61 years and an average of 6.8 children. The average family size for these women was also quite large compared with the other women in the study and this may have reduced drastically the per capita food availability for the unmarried women. Kiriti and Tisdell (2003a) found that the total output for female-headed households was relatively lower than that of married women. Greer and Thorbecke (1986); Collier and Lal (1980) and Republic of Kenya (1998) show that food poverty and absolute poverty are found mainly among the female-headed households. There may also be the possibility that food availability for these women was understated because of lack of information of the exact number of dependents.

Equation 1 and 2 show the effects of the variables taken as explanatory variables on the per capita food availability for families in which married women live with their husbands (Equation 1) and for families where married women live alone (Equation 2) using ordinary least squares.

Percapfd = 747.54 – 10.99Perccrop + 724.94Employed + 370.02Edu. +
(0.507) (-2.248**) (1.219) (2.130**)

191.20Landqual – 304.95Remitt (Equation 1)

(0.902) (-0.608)

R^2 = 0.236 F stat = 3.331 N = 63

Percapfd = 3583.78 – 22.17Perccrop + 1536.56Employed + 537.03Edu.
(1.489) (-1.941**) (1.680*) (2.068**)

+ 766.85Landqual + 86.28Remitt (Equation 2)
(1.879*) (0.139)

$R^2 = 0.404$ F stat = 2.436 N = 26

Figures in parenthesis are t-values

* Significant at the 10 percent level
**Significant at the 5 percent level
**Significant at the 1 percent level

The two equations indicate that the index of commercialization is a statistically significant variable in both types of households at the 5 percent level. However, the coefficient of the commercialization index shows that the per capita food availability falls by much more in households where the husband is away when the percentage of land for cash crops is increased by one percent. This may be due to the fact that even where husbands have migrated to the towns, they still make decisions regarding cash income (Kiriti, et al, 2002) and there may be a possibility that when cash income increases, the migrant husband keeps it and uses it for himself and it is not used for family food at all (Kaiser and Dewey, 1991).

The level of education of the wives is positively associated with the per capita availability of food as education is statistically significant for the married women living with their husbands and married women living alone at the 5 percent level. Similar effects of educational level on food availability have been observed by Kaiser and Dewey (1991) and Heien, et al. (1989).

Receipt of remittances is also positively related to the per capita availability of food for married women living alone but negatively associated with per capita food availability for married women living with their husbands. However, the variable is not statistically significant for both types of households. This may be due to the fact that wives living with their husbands may not be receiving as much remittances as the wives living alone and whatever remittances they receive may not make a significant contribution to the per capita availability of food. Also, the remittances may be lump sum and irregular. Chances are that the husband may use such remittances for his own purposes and not for food purchases. This may explain the negative relationship between the two variables. However, the lack of statistical significance of remittances for wives living alone may possibly be due to the fact that remittances may be spread out among so many uses and so whatever is used for food purchases may not be very significant.

Quality of land contributes positively to food availability in the family but land quality is only significant for the households of wives living alone where it is statistically significant at the 10 percent level. Davison (1988) and Kiriti and Tisdell (2003a) found that husbands usually allocate the good fertile land for cash crops, hence, the lack of statistical significance of land quality on food availability for households where the husband is present.

A woman's employment outside the household and hence her earnings contributes positively to per capita food availability for both types of households but employment is statistically significant at the 10 percent level only for wives living alone. This may be due to the fact that these women can manage their earnings and do as they please with them since the husband is not present while for wives living with husbands, the use of their employment earnings may be dictated by the husbands who may direct it to other uses and not to food (Tisdell, et al, 2001) hence the lack of statistical significance of employment for wives living with husbands.

The coefficient of determination for the model for wives living alone is quite high (0.404) showing that the variables used explain more that 40 percent of the variations in per capita food availability while the explanatory variables explain only 23.6 percent of the variations in per capita food availability for wives living with their husbands.

Table 2 shows the influence of the explanatory variables on per capita food availability for all households with married women (male-headed households) and the female-headed households using ordinary least squares. We can see from Table 2 that the coefficient of determination value is quite low (26.5 percent for male-headed households and 10 percent for the female-headed households). So the overall explanatory power of these models appears to be low. There may be a possibility that the relationship between these variables and per capita food availability may be non-linear. It may also indicate that there are variables rather than the ones used that we may have left out of the models that could have contributed to an increase in the overall explanatory power of the model. Such variables may include infrastructure, the operations of the market, distance from urban areas, climatic factors, and so on. Most of these variables could not be used due to lack of information and data on them.

Table 2

Family food availability estimated in Kenya Shillings per head in the Nyeri district of Kenya

Variable	Married women (Male-headed households)	Unmarried women (Female-headed households)
Constant	1520.03	1090.83
	(1.359)	(0.332)
Perccrop	-14.07	3.193
	(-3.301***)	(0.878)
Employed	900.22	-394.03
	(2.015**)	(-0.821)
Edu	455.48	116.265
	(3.772***)	(1.008)
Landqual	329.47	281.79
	(1.820*)	(1.074)
Remitt	30.771	-25.232
	(0.151)	(-0.372)
R^2	0.265	0.095
F-stat	5.636	0.796
N	89	48

Figures in parenthesis are t-values

* Significant at the 10 percent level
**Significant at the 5 percent level
**Significant at the 1 percent level

Von Braun and Immink (1994) found that the production of export crops by smallholder farms in Guatemala had a positive effect on household income and food security. They found that export cropping was associated with higher yields of staple foods (maize and beans) and thus, export producers maintained own production of these foods for consumption in the context of a risky food-market environment. However, from our analysis as shown in Table 2, it can be seen that the index of agricultural commercialization is negatively associated with per capita food availability in male-headed households. The coefficient for this variable indicates that as more land is put under cash crops, food availability per head at the family level declines by Ksh.14 for the married women. The index of commercialization is also statistically significant at the 1 percent level for families of married women in explaining variations in food availability per head. A possible reason for these results is that in households where women are married, husbands tend to use the cash income for non-food purchases and this tendency is reinforced when cash income tends to come in a lump sum (Kaiser and Dewey, 1991).

As noted in Kiriti and Tisdell (2003a), farmlands of male-headed households are more commercialized than those headed by females; they produce proportionately less subsistence output than female-headed households; and the married women also lose control of cash income with increased commercialization as their husbands take control of it (Tisdell, et al, 2001) and husbands are less likely to use cash income to purchase food than females (Kaiser and Dewey, 1991).

One could argue that a shift from subsistence to cash crop growing should not reduce per capita food availability if income levels are raised in the process. This would be true in cases where the increased income more than compensates for the loss of subsistence food output. A higher income normally would improve food availability if the extra income were spent on food. However, previous findings by various authors (Kaiser and Dewey, 1991; Kennedy, 1994; Kennedy and Cogill, 1985; FAO, 1984), have found that higher cash incomes do not necessarily improve food purchases. With decreased subsistence output and loss of control of cash income by women, families of married women can have less food than their unmarried counterparts because of commercialization.

The index of agricultural commercialization is positively associated with per capita food availability for the female-headed households. The coefficient for this variable shows that as the percentage of cash crop land increases by one percent, per capita food availability increases by Ksh.3.19. However, this coefficient is not statistically significant in explaining variations in per capita food availability for the female-headed households.

We had hypothesised that employment of the woman outside the household and hence her contribution to household income would lead to an increase in per capita food availability for the family. This hypothesis was supported in that employment of the woman outside the household and hence her earnings and contribution to family income is positively associated with per capita food availability for male–headed households and this variable is statistically significant in explaining variations in per capita food availability for the married women. Employment is statistically significant at the 5 percent level for the male-headed households. The coefficient for employment is also quite large showing that a one percent increase in employment leads to an increase in per capita food availability of more than Ksh.900.

Our results accord with those of Guyer (1980); Tripp (1982) who found that women's income in sub-Saharan Africa tends to be earmarked for food. Kennedy (1994) in her study of Kenyan sugarcane growers also found that female-controlled income had a significant positive effect on household food consumption. Our results also accord with those of Jarque (1987), who found that families whose heads of households are employees or self-employed have higher levels of food consumption than those families whose heads of household are either employers or unpaid family workers.

However, Kiriti and Tisdell (2004) found that a woman's employment outside the farm, and hence her earnings, were negatively associated with the proportion of household income allocated for food purchases especially for married women. A possible reason for our results here could be that employment outside the farm opens opportunities for women in Kenya to formal and informal credit where collateral may not be needed. Hence, employed women may have other sources of obtaining cash such as small loans from employment cooperatives (SACCOS), rotating savings and credit associations (ROSCAS) and so on and they may use the cash obtained from such sources for food purchases.

On the other hand, the employment variable is negatively associated with per capita food availability for the female-headed households showing that increasing employment for the unmarried women leads to a reduction in food availability per capita for these families. However, the employment variable is not statistically significant for these female-headed households. The negative relationship may possibly be because the employment of these women may mean the withdrawal of their labour from the farm leading to low subsistence output, which is a component of food availability and also low cash crop output and hence low cash income. These women may also be too poor to afford hired labour and so their employment outside the household leads to a reduction in food availability.

The education level of the woman is positively associated with per capita food availability for the married women. In these sampled male-headed households education is statistically significant at the 1 percent level in explaining variations in per capita food availability. For these married women an increase in the level of education by one percent leads to an increase in per capita food availability of Ksh.455.48.

However, for the female-headed households, an increase in education by one percent leads to an increase in per capita food availability of only Ksh.116 but the effect of education on per capita food availability for these women is not statistically significant.

Kiriti and Tisdell (2003a) found that educated women allocate less land to subsistence food and that education is negatively associated with non-cash food output, implying that farms of educated women are more commercialized than those of the uneducated ones. (Note that the correlation coefficient between education and the index of commercialization was less than 0.5. Therefore, multicollinearity was sufficiently low for the two variables to be retained). Our findings here imply that families with educated women have more food per capita than those of uneducated women other things the same. Although educated women often produce less non-cash food crops than the less educated, they compensate for the loss in food output by using cash to purchase extra food. This evidence gives some support to the argument that education enhances the capability of the woman to assimilate and utilize nutritional information.

Quality of land is also statistically significant at the 10 percent level for the married women and contributes positively to per capita availability of food in the family. An increase in the quality of land by 1 percent contributes to a Ksh.329.47 rise in per capita food availability for married women and Ksh.281.79 for the female-headed households. This is as expected because good fertile land will not only produce greater yields of subsistence crops but also higher yields of cash crops than poorer quality agricultural land. However, quality of land was not statistically significant for the unmarried women.

Remittances contribute positively to per capita availability of food for married women. An increase in remittances by 1 percent leads to an increase in per capita food availability of Ksh.30.77. However, remittances are not statistically significant in explaining variations in per capita food availability for these male-headed households. In this case, this is possibly because remittances are irregular, lump sum and controlled by the husbands and thus make no significant contribution to per capita food availability (Kaiser and Dewey, 1991; Lev, 1981). On the other hand, it is found that for the female-headed households (unmarried women) remittances are associated with a decrease in per capita food availability. A one percent increase in remittances is associated with a decrease in per capita food availability of

Ksh.25. This may be because females unable to produce as much food tend to receive higher remittances from relatives or for other reasons.

6. Conclusion

From the single regression analysis, we have seen that increased agricultural commercialization tends to negatively influence per capita food availability at the family level. Households of married women suffer more in terms of food availability than households headed by women. In Kenya, this seems mainly to occur because farms of married women (in male-headed households) are more commercialized than female-headed households if husbands are present, and wives not only lose control of land allocation decisions regarding cash crops but also the power to decide on how income derived from cash crops is allocated (Kiriti, et al, 2002). Commercialization is found to be negatively associated with per capita food availability for the male-headed households and the variable was also statistically significant in explaining variations in per capita food availability of families of married women. In the case of female-headed households, such a negative relationship is not present.

Furthermore, using multiple regression analysis, increased agricultural commercialization is found to be associated with reduced food availability to family members in male-headed households. In the regression models considered, the only one with high explanatory power was for the married women living alone. All the others had low explanatory power in terms of low coefficients of determination, so clearly additional factors to degree of commercialization (plus the ones considered in the multiple regression analysis) have an influence. Factors other than the degree of agricultural commercialization and household gender status found to have an influence on per capita food availability are employment of the women outside the household, quality of land and education.

We have found strong evidence that the marital status of household heads (or of women in families) in Kenya influence per capita food availability to most families in our sample. Despite the shortcomings in our statistics as far as the numbers of dependent family members is concerned, it seems that food availability on average for family members is greatest in male-headed households where the husband and wife live together, somewhat lower in cases where the husband has migrated and least in cases where households are female-headed. The main reason for this seems to be that agricultural production of households tends on average

to be higher for the first type of household, somewhat lower for the second type and least for the female-headed households (Kiriti and Tisdell, 2003a). However, for male-headed households (irrespective of whether the husband has migrated or not) greater commercialization of farms is associated with reduced availability of food per capita of family members. In fact on highly commercialized farms of male-headed households, food availability per capita can be as low or lower than in female-headed households as can be seen by considering the right hand values in Figure 1, 2 and 3.

This study raises concerns that in male-headed households in patriarchal societies increased agricultural commercialization is likely to be associated with reduced availability of food to household members. The main reason seems to be sociological. Males control cash from sales of commercial crops and seem more inclined than wives or females generally to spend it on themselves or on nonfood priorities thus reducing food availability to family members. This suggests that in some patriarchal societies more caution should be displayed in encouraging cash cropping especially in male-headed households.

Most governments in less developed countries tend to encourage cash cropping via agricultural extension services and so on. But this seems unwise from a food availability point of view. It could also be unwise from a food security viewpoint because it can result in reduced crop diversification increasing the risks of fluctuations in income and possible food deficits for families. Since our data is only cross sectional, this dynamic (time-series) aspect cannot be tested by using it.

7. References

Bryceson, D. (1989), "Nutrition and the Commoditisation of Food in sub-Saharan Africa", *Social Science and Medicine*, **28**(5): 425-440.

Collier, P. and Lal, D. (1980), *Poverty and Growth in Kenya*, World Bank Staff Working Paper, Washington D.C.

Collis, W. (1962), "On the Ecology of Child Health and Nutrition in Nigerian Villages", *Tropical and Geographical Medicine*, **14**: 140-163.

Davison, J. (1988), *Agriculture, Women, and Land: The African Experience*, Westview Press, Boulder and London.

Dewey, K. (1979), "Agricultural Development, Diet and Nutrition", *Ecology of Food and Nutrition*, **1**: 103-119.

FAO (1984), "Integrating Nutrition into Agricultural and Rural Development Projects: Six Case Studies", *Nutrition in Agriculture*, No. 2, Rome.

FAO (2001, *The State of Food and Agriculture 2001*. Rome: FAO.

Fleuret, P. and Fleuret, A. (1980), "Nutrition, Consumption and Agricultural Change", *Human Organization*, **39**(3): 250-260.

Fortmann, L. (1984), "Economic Status and Women's Participation in Agriculture: A Botswana Case Study", *Rural Sociology*, **49**(3): 452-464.

Greer, J. and Thorbecke, E. (1986), "Food Poverty Profile Applied to Kenyan Smallholders", *Economic Development and Cultural Change*, **35**(1): 115-141.

Gujarati, D. (1995), *Basic Econometrics*, Third Edition, New York: McGraw-Hill, Inc.

Guyer, J. (1980), "Household Budgets and Women's Incomes", *African Studies Center Working Paper No. 28*, Boston: Boston University.

Haaga, J. Mason, J. Omoro, F. Quinn, V. Rafferty, A. Test, K. and Wasonga, L. (1986), "Child Malnutrition in Rural Kenya: A Geographic and Agricultural Classification", *Ecology of Food and Nutrition*, **18**: 297-307.

Heien, D., Jarvis, L. S. and Perali, F. (1989), "Food Consumption in Mexico: Demographic and Economic Effects", *Food Policy*, **14**(2): 167-180.

Jarque, C. (1987), "An Application of LDV Models to Household Expenditure Analysis in Mexico", *Journal of Econometrics*, **36**: 31-53.

Kaiser, L. and Dewey, K. (1991), "Migration, Cash Cropping and Subsistence Agriculture: Relationships to Household Food Expenditures in Rural Mexico", *Social Science and Medicine*, **33**(10): 1113-1126.

Kennedy, E. (1994), "Effects of Sugarcane Production in Southwestern Kenya on Income and Nutrition", In *Agricultural Commercialisation, Economic Development, and Nutrition*, (pp. 252-275). International Food Policy Research Institute, Baltimore and London: Johns Hopkins University Press.

Kennedy, E., and Cogill, B. (1985), "Effects of Commercialization of Agriculture on Women's Decision-making and Time Allocation", Paper Presented at Association of Women in Development Conference, April 26, 1985.

Kiriti, T. and Tisdell, C. (2003a), "Gender, Marital Status, Farm Size and Other Influences on the Extent of Cash Cropping in Kenya: A Case Study", In C. A. Tisdell, U. Sankar and M. Srivastava (eds), *Leading Economic Issues: Essays in Honour of Professor Chandra Srivastava*, Vol. 1, New Delhi: B. R. Publishing Corporation. [Forthcoming]

Kiriti, T. and Tisdell, C. (2003b), "Migration of Husbands, Receipt and Use of Remittances by Wives in Rural Kenya: A case Study", In C. A. Tisdell, U. Sankar and M. Srivastava (eds), *Leading Economic Issues: Essays in Honour of Professor Chandra Srivastava*, Vol. 4, New Delhi: B. R. Publishing Corporation. [Forthcoming]

Kiriti, T. and Tisdell, C. (2004), "Commercialization of Agriculture in Kenya: Case Study of Policy Bias and Food Purchases by Farm Households", *Quarterly Journal of International Agriculture*. [Forthcoming]

Kiriti, T. Tisdell, C. and Roy, K. (2002), "Female Participation in Decision-making in Agricultural Households in Kenya: Empirical Findings", *International Journal of Agricultural Resources, Governance and Ecology*. [Forthcoming]

Kumar, S. (1977), “The Role of Household Economy in Determining Child Nutrition at Low-Income Levels: A Case Study in Kerala”, *Cornell University Occasional Paper No. 95*. Ithaca.

Lev, L. (1981), *The Effect of Cash Cropping on Food Consumption Among the Meru of Northern Tanzania*, Working Paper No. 21, East Lansing, Michigan: Michigan State University.

Longhurst, R. (1988), “Cash Crops and Food Security: Cash Crops, Household Food Security and Nutrition”, *IDS Bulletin*, **19**(2): 28-36.

Pinstrup-Anderson, P. (1983), “Export Crop Production and Malnutrition”, *Food and Nutrition*, **9**(2): 6-14.

Republic of Kenya (1991), *Economic Survey*, Nairobi: Government Printer. Various Issues

Republic of Kenya (1998), *National Poverty Eradication Plan; 1999-2015*, Nairobi: Government Printer

Schofield, S. (1979), *Development and the Problems of Village Nutrition*, London: Croom Helm.

Staudt, K. (1982), "Women Farmers and Inequities in Agricultural Services", In *Women and Work in Africa*, (pp. 102-119). Edited by Edna G. Bay. Boulder: Westview Press.

Tabachnick, B. and Fidell, L. (2001), *Using Multivariate Statistics*, Fourth Edition, Boston: Allyn and Bacon.

Tisdell, C. Roy, K and Regmi, G. (2001), “Socio-economic Determinants of the Intra-Family Status of Wives in Rural India: Analysis and Empirical Evidence”, *Gender Issues*, **19**(3): 41-60.

Tripp, R. (1982), “Farmers and Traders: Some Economic Determinants of Nutritional Status in Northern Ghana”, *Food and Nutrition*, **8**(1): 3-11.

United Nations (2000), *World Food Programme Annual Report*, Rome: The Programme

UNDP (2000), *Human Development Report 2000*, Oxford: Oxford University Press.

Von Braun, J. and Immink, M. (1994), “Nontraditional Vegetable Crops and Food Security in Guatemala”, In *Agricultural Commercialisation, Economic Development, and Nutrition* (pp. 189-203). Baltimore and London: The Johns Hopkins University Press.

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