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# Commercialisation of Agriculture in Kenya: Case Study of Urban Bias and Food Availability in Farm Households


## ABSTRACT

*This study investigates the effect of cash cropping on food availability and examines the determinants of the proportion of income allocated for food expenditures in the Nyeri district in Kenya. Using a Tobit model, the results suggest that in general food expenditure allocations suffer due to cash cropping in Kenya as the lump-sum income flows from this may be used for purchases other than food. Food expenditure also suffers when remittances are irregular. On the other hand, earnings from outside employment for married women living with husbands are positively associated with food expenditure allocations. Amounts of non-cash food output as well as ownership of livestock are negatively associated with food expenditure allocations. These findings indicate that lump sum income may not lead to improved welfare of women and children. Thus, there may be social reasons for increasing non-cash food production especially by women, instead of over emphasising cash cropping as now seems to be so in public policy.*



**Key words: commercialisation, non-food cash crops, food cash crops, food availability, and non-cash food crops.**

# Commercialisation of Agriculture in Kenya: Case Study of Urban Bias and Food Availability in Farm Households

## 1. Introduction

Commercialisation of agriculture can be defined as the use of agricultural goods for sale rather than for home consumption (Dewey, 1989). It can occur not only on the output side of production with increased marketing of agricultural surpluses, but also on the input side with increased use of purchased inputs. In this study, we shall concentrate on sales of output rather than purchases of inputs as an indicator of commercialisation. Commercialisation is not restricted to just non-food cash crops. Traditional food crops are sometimes marketed and some cash crops are retained on the farm for home consumption.

The World Bank, through Structural Adjustment Programs, and other international donors have been encouraging many developing countries to commercialise their agricultural sector in order to secure foreign exchange. Commercialisation can be enforced by direct government action involving forced procurement of produce or by the use of certain agricultural policies and government-imposed obligations that make it impossible for producers not to sell their products because they need cash. The introduction of a hut tax in Kenya during the colonial period forced Kenyan farmers to sell of farm produce because they needed the cash to pay the tax.

Commercialisation makes it easier for governments, whose members are mostly urban-based, to extract taxes from agriculture and furthermore trade provides extra employment and business opportunities that comparatively favour urban areas (Lipton, 1977). Trade facilitates the extraction of surplus value from small agricultural producers (Dewey, 1989). A strong urban and government bias appears to exist in favour of the cash economy. Government policies tend to encourage the production of export cash crops because in the process, the government earns foreign exchange and in African countries, frequently charges export taxes on commercial crops whose incidence often falls entirely on the producer. In addition, agricultural research and development is mostly concentrated on commercial crops. At the same time, food price policies involving state interventions in food marketing sometimes keep prices

paid to farmers low in the interest of urban consumers. Unequal terms of trade are apparent in the low prices small farmers receive for their products compared to the high cost of their purchased goods. Tuinenburg (1987) and Dewey (1989) contend that agricultural prices are maintained at artificially low levels in deference to the interest of urban consumers.

Furthermore, foreign exchange from the export of agricultural products is often used to finance urban-industrial development. The government gains net revenue, urban consumers get lower food prices and industry may get cheap raw materials. The net effect is income transfers out of agriculture. This depresses private investment in agriculture and may result in considerable rural-urban migration and rapid growth of urban areas (Kiriti and Tisdell, 2001; United Nations, 2001). As the degree of urbanisation increases, the push for a cash-based (market) exchange economy appears to intensify. So the views expressed by and policies supported by bodies such as the World Bank in favour of market-making may be a reflection of a basic very long-term social-political trend.

The growing emphasis on increased export crop production means that less weight is placed upon on-farm food production, especially self supplied food, which in turn can adversely affect the nutritional status of women and their children. Longhurst (1988); Bryceson (1989); Dewey (1981, 1989) argue that expanded cash crop production can negatively influence food availability by reducing the diversity of available food products, especially if an all or nothing technological package has to be adopted. Furthermore, greater on-farm product specialisation might increase the risk of crop failure leading to food inadequacy and increased frequency of famine. Famine usually involves a gradual worsening of food inadequacy on a widespread basis rather than a sudden and sharp decline in food availability (Bryceson, 1988).

In many developing countries, cash cropping has been embraced as a source of household income as well as a source of foreign exchange. In developing countries women are the providers of food for their families and they traditionally do this through cultivating non-cash food crops. They also participate to some extent in cultivating food cash crops to provide their families with income to purchase those items that they cannot produce or do so economically. They may also receive cash

transfers and remittances from their husbands and relatives. African married women are obliged by custom and contemporary social relations to use their incomes in cash and kind primarily to meet the basic food requirements of their families.

African men generally appropriate cash income from sale of non-food cash crops and they are less likely to use it to purchase food for the household (Kaiser and Dewey, 1991). Income of African families from cash crops, just like remittances, generally comes as a lump sum and is associated with purchase of luxury items and very little, or none of it, may be used to purchase food items. According to Engel's law, the proportion of household budget allocated to food declines as the household's income rises. This is because as income rises, a greater proportion of it is allocated to the purchase of 'luxury' items. However, the proportion of income allocated to food expenditures can be affected by other factors such as the frequency of the income, whether it is regular or irregular, who controls that income, availability of non-cash food production and, particularly in Africa ownership of livestock, age, occupation and education of the household head. In turn, these factors affect the nutritional levels of women and children.

This study investigates the effect of cash cropping on food availability and examines the determinants of the family budget allocated for food expenditure in the Nyeri district of Kenya. In this study, we address the following questions. Does cash crop farming lead to loss of diversity and result in food inadequacy in Nyeri district? How does cash income influence the household food expenditure budget? What other factors determine the proportion of cash income allocated for food consumption expenditures?

What follows is a review of background literature relevant to commercialisation, food availability and expenditure patterns. After that, we provide information about the study site in Kenya and the methods used in collecting data. We then give a summary of statistical indicators of household food availability in Nyeri district. A Tobit model is subsequently used to identify the determinants of the proportion of the cash income allocated for food consumption in the Nyeri district. Then we conclude.

## 2. A Review of Relevant Literature

There has been considerable debate about the impact on women, food availability and nutrition of shifting from subsistence to cash cropping. Kennedy's (1994) study of south-western Kenyan sugar farmers found that commercial agriculture, on the whole increased household income. This higher income, in turn, resulted in higher carbohydrate consumption by the households of sugar farmers. Nevertheless, nutrition of children appeared to suffer mainly because cash income from sugar cane accrues to male heads of households and they are less likely to spend it on food.

As mentioned above, Longhurst (1988) argues that expanded cash crop production can affect food availability by reducing the diversity of food products. Although higher incomes at household level as a result of changing crop production patterns should lead to positive nutritional benefits, this may not be realised because of high food prices due to increased marketing costs of cash crops and by the lumpy nature of cash payments from many cash crops.

Dewey (1981) found that merely replacing food with cash does not guarantee that dietary quality will remain the same. The income from cash cropping is often obtained as a lump sum once or twice a year at harvest time. Peasant families who are not used to saving relatively large sums of cash can find it difficult to stretch their income for future purchases of food. In a subsistence economy, mixed cropping and the use of several plots may smooth out seasonal fluctuations in food supply. Commercial production, on the other hand, may exaggerate seasonal cycles if cash is not as likely to be stored as is food (Dewey, 1989).

Although food is generally a priority item for most families, some may make nutritional sacrifices in order to pay for non-food necessities. One of the most important safeguards against food inadequacy in subsistence systems is multiple cropping and intercropping. In areas where subsistence agriculture is based on diverse polyculture of crops, a switch to commercial agriculture usually involves monoculture of one or a few crops and limits the diversity of crops grown for home consumption. It can, thereby have a negative impact on dietary diversity (Bryceson, 1989).

In some societies, commercial agriculture undermines the economic power of women within households, and this can directly influence nutritional parameters (Longhurst, 1988). According to von Braun (1996, p. 35), women usually have the desire and the knowledge to improve the nutrition of their vulnerable members but in developing countries, they frequently lack the resources and a voice in relevant decisions. Dewey (1989) found that when sugar cane production increased at the expense of local food production, a smaller quantity and fewer foods were produced in the home, leading to a loss of power by women within the household. The cash that was earned by the men farming sugar cane was not always allocated to food and the incidence of alcohol consumption by men increased during this time. When cheques were given out, some the men spent virtually all of the earnings on liquor and beer, while their children at home remained undernourished. On the whole, men seem more likely than women to spend cash earnings on themselves (Kaiser and Dewey, 1991).

When men predominantly produce for the market, the nutritional viability of the household depends upon male sensitivity to household purchased food needs and female subsistence food production (Bryceson, 1989). Kaiser and Dewey (1991) suggest that men are less likely than women to spend their earnings on household food needs. Tripp (1982) demonstrates that when commercial agriculture replaces subsistence production, gender-based division of household decision-making is a key element determining the impact of this change on nutritional status.

Khandker (1987, 1988) believes that women may become worse off as a result of cash cropping. He found that commercialisation increased intra-household inequality in terms of access and control over household resources since men handle the household cash income in Bangladesh, and most of South Asia. His views are also supported by Tisdell et al. (2001) in relation to rural West Bengal.

If a household allocates a disproportionate share of available farmland to a non-edible cash crop with a long gestation period, it may be trapped when other income sources become less available and the terms of trade for the cash crop develop unfavourably. Semi-subsistence agriculture frequently produces a rather constant flow of income in the form of food and some cash, whereas income from cash crops, such as coffee or tea often comes in a one lump-sum payment. Lump-sum payments are associated with

the purchase of consumer durables, whereas continuous forms of income are more likely to be spent on food (von Braun and Kennedy, 1986). Although a portion of these large payments could be saved for purchase of food and other basic items at a later time, peasant families who are not used to saving relatively large sums of cash often find it difficult to stretch their income for future purchases of food (Von Braun and Kennedy 1987). Mellor (1978) and Reutlinger and Selowsky (1976) contend that as income increases, part of the incremental earnings is spent on food although the additional energy consumed as a result of additional income can be quite small, and varies widely among groups of households with similar levels of energy deficits.

The tendency to allocate large sums of money that enter the household periodically (lump-sum income) to non-food expenditures has been advanced as a partial explanation for the failure of cash-crop income to improve nutritional levels in certain settings (von Braun and Kennedy, 1986; Pinstrup-Andersen, 1983). According to Engel's law, the proportion of a family's budget, devoted to food declines as the family's income increases. This is because as income rises, a greater proportion of it is allocated to the purchase of luxury items.

Von Braun (1994) found that in the Gambia, Kenya and the Philippines, the share of income from cash crops did not significantly affect the marginal propensity to spend on food. On the other hand, in Guatemala, an increase in the share of cash crop income from 0 to 50 percent led to a 1.3 percent decrease in the share of expenditures on food. In Rwanda, a 10 percent increase in the share of cash crop income led to a 4.8 percent decrease in the food share budget.

Von Braun and Immink (1994) found that in Guatemala, export crop production led to increased household income. Total expenditures increased among recent cooperative members by 38 percent above the average nominal increase in the study population. However, export crop-producing households spent on average, a slightly lower share of their total expenditures on food. A model to estimate Engel curves was specified and sources of income (their relative shares) as well as levels of income were included as explanatory variables. Food expenditures as a proportion of total expenditures decreased significantly and rapidly with increased income in cooperative households than in non-cooperative households, as the income was male controlled. After

controlling for income level, income composition, household size, and demographics, they found that cooperative members acquired 6 percent less calories than non-members.

Lump-sum income was associated with purchase of more luxury goods in the Mwea Tebere Irrigation Scheme in Kenya as compared to other villages in the same region and may have worsened the seasonal pattern of food consumption (Korte, 1969). In another Kenyan study, increased expenditures for housing and school fees by established sugar farmers was attributed to lump-sum income, controlled by male members of the household (Kennedy and Cogill (1987). Guyer (1980) points out that in West Africa, the level of nutrition depends more on women's than on men's income. There women earn small amounts of money at regular intervals and tend to be responsible for small, regular purchases, such as food.

Lev (1981) found that in Tanzania, increased income that came in lump form such as remittances and payment from the coffee-crop influenced wealth in such forms as housing or land ownership but had little effect on the adequacy of the household diet.

Evidence from India suggests that in-kind income is more likely to be used for family consumption than is cash income (Kumar, 1978). Produce from gardens and home production is more likely to increase household food intake than an equivalent amount of cash income. Greer and Thorbecke (1983) found that food consumption in Kenya was positively associated with farm income and negatively associated with off-farm income. This means that a decline in the level of subsistence production may result in a deterioration of the household diet for several reasons, including local food shortages, increased consumption of less nutritious purchased items and the disparity in value of home-produced and purchased foods (Gudeman, 1978).

Ownership of livestock may also influence the proportion of income allocated for food expenditures in that some livestock products can be used as a source of protein on a daily basis while sale of livestock enters the household as a lump-sum income once in a while and can be used to purchase luxury items or cater for an emergency. Dewey (1981) found that even though Mexican families switching to cattle production

had more land and more cash than other families, there was no improvement in the diet and nutrition of their children.

Demographic factors may also influence the proportion of income allocated for food expenditures. These can include age, number of children in the household, education, occupation, employment status and so on. We would expect that households with a large number of children living at home to allocate a large proportion of their cash income to food purchases. Similarly, we would expect that highly educated people would allocate more cash income to food purchases (holding other things such as effects of advertising, size of family, level of income and so on, constant) as they know the nutritious value of food. Mwabu et al. (2000) found that an increase of 10 percent in mean years of education in a household would increase food consumption by 11.1 percent. However, the authors did not correct for other factors correlated with greater education, such as higher income. Jarque (1987) found that occupation of the household head was linked to marginal budget shares for food, education, medical services, and other non-food expenses.

From the reviewed literature, it emerges that lump-sum income (which may come to a household in the form of cash income from cash crops, remittances, sale of livestock and so on) may result in reduced purchases of food for the household. It has also emerged that women are more likely than men to spend cash income on household food expenditure.

In the next section, we provide information on the study site in Kenya and the method used in collecting data.

## 3. Study Site and Data Collection Methodology

This study is based on data collected 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 principal town is Nyeri with a population of about 50,000 persons and it is also the provincial headquarters. Six divisions were selected for the study based on their differences in ecology and levels of commercialisation. 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. The sample consisted of 98 male respondents, 10 of them married but staying alone, 63 wives staying with their husbands, 26 wives staying alone as their husbands were working in the urban areas and 48 unmarried women who were heads of their households. 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 is 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.

A questionnaire was administered to collect information about the various products households produce, 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 expenditure and so on. Usually, the 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. The prices of various crops produced were made available from the Nyeri District Statistical Office.

## 4. Cash Cropping and Food Availability: Summary Statistics

The major subsistence crops grown in Nyeri district are maize, beans, potatoes, and sweet potatoes. Maize, beans, English potatoes, sweet potatoes, bananas, cabbages, kales, pumpkins and yams are the most consumed commodities and only a small proportion of these commodities is sold. For the other commodities produced, the

proportion sold is quite high and sometimes even higher than the proportion left for home consumption. Men are more involved in the sale of food crops than are females. Men sell on average 46.8 percent of food cash crops compared to 43.7 percent sold by women. This resulted from poor terms of trade for the major non-food cash crops like coffee and tea and the men have turned to the cultivation of food cash crops. Apart from growing food crops, the respondents also grow non-food cash crops, such as coffee, tea, pyrethrum, tobacco, that compete for household resources.

The main cash crops grown in Nyeri district are monoculture crops such as coffee, tea, pyrethrum, wheat and tobacco that are usually not intercropped with other crops. In response to a question on whether increased cultivation of non-food cash crops had led to loss of diversity, 55.4 percent of all the women respondents answered in the affirmative and 57.1 percent attributed this to increased acreage of cash crops. On the other hand, only 22.2 percent of the married men living alone said cultivation of non-food cash crops had led to loss of diversity and only 33.3 percent attributed the loss of diversity to increased acreage of cash crops.

Extension services are not generally offered for food crops since their economic returns are very low. Nonetheless these crops are controlled by women, and provide households with their main source of income and food security. From our Nyeri sample, we found that extension officers had visited only 12.4 percent of the 137 women farmers compared to 45.5 percent of the married men living alone. We also found that only 13.9 percent of the women compared to 27.3 percent of the married men living alone had attended training on good farming techniques. This may result in more women farmers using outdated methods of cultivation since they lack the knowledge, which they could gain if extension officers visited them.

Land titles enable land to be used as collateral to obtain credit from financial institutions. Although they are not essential prerequisites for investment in agriculture, they are important. In our Nyeri sample, 74.5 percent of all female farmers did not own the farms they cultivated. On the other hand 54.5 percent of the married men living alone owned the farms they cultivated. To be able to improve farm output, a farmer can borrow money or hire farm materials, which they can repay through monthly deductions from their sale proceeds. From our female sub-sample,

only 13.1 percent had borrowed money from the cooperative society, while 86.9 percent had not borrowed at all due to various reasons, one of them being lack of title deeds. On the other hand, 38 percent of the women had borrowed farm materials from the cooperative society. For the married men living alone, 20 percent had borrowed money from the local cooperative and 30 percent had borrowed farm materials. Lack of credit, lack of visits by extension officers and lack of knowledge on good farming techniques could be some of the factors that may have contributed to the low non-cash food production in Nyeri district.

As Nyeri district has been suffering from food shortages and famine (the majority of the farmers were relying on famine relief from the government at the time of data collection), 56.2 percent of the women respondents reported that they started experiencing famine and food shortages after they started growing non-food cash crops compared to only 40 percent of the men in our sample. However, only 35.4 percent of the women attributed these food shortages and famine to increased acreage of non-food cash crops. None of the men attributed the famine to increased cash cropping. The majority of the women respondents (56.2 percent) indicated they had been used to getting food from their farms before they started cash crop farming compared to 25 percent of the males. Only 8.8 percent of the women respondents and 75 percent of the males indicated that they had relied on the market as a source of food before the advent of cash crop farming. These findings indicate that a high percentage of men do not blame the low non-cash food production or loss of crop diversity in Nyeri district to cash cropping while a lot of women do.

Of all women respondents, only 8 percent had outside employment, earning monthly incomes of between Ksh1000 and 9000. On the other hand, 54.5 percent of the married men in our sample were employed outside the farms earning between Ksh2800 and 8000. Earnings are an important source of income for women, which can be used for food expenditures, as women are known to spend a greater proportion of their income on food than men do. These findings show that the lowest paid married male earns more that twice the minimum earnings of the lowest paid female. However, there is not a major difference in the maximum earnings that the respondents earned.

Livestock are an important source of food and income. Out of the 137 women respondents, 82.5 percent said they 'owned' livestock and only 11.1 percent reported receiving remittances. On the other hand, 70 percent of the male respondents said they owned livestock and 28.6 percent received remittances. This implies that there are more females who own livestock than males, while there are proportionately more males than females receiving remittances in our sample. However, females are often restricted by males in their sale of livestock (see later).

In Kenya, men control cash income and women control food income. In our study, we found that 65.4 percent of the married women living alone, reported making decisions regarding household expenditures while 83.3 percent made decisions regarding how much to sell and how much to consume of food cash crops. Also, 76.9 percent reported owning livestock and 80 percent received remittances from their migrant husbands.

For the unmarried women, 95.8 percent reported making decisions on household expenditure and 97.8 percent made decisions on how much to sell and consume out of food cash crops. On the other hand, 68.8 percent owned livestock and 94.4 percent received remittances. This implies that majority of unmarried women make decisions regarding income and household expenditures. The responsibility for the cash crop as well as income received from the cash crop is overwhelmingly seen as falling under male control. In our study, most married women reported that their husbands or male relatives made most decisions regarding cash crops. For example, only 25.4 percent of the married women living with husbands reported making decisions regarding household expenditure while 58.4 percent made decisions regarding how much to sell and how much to consume at home out of food cash crops.

Ownership of livestock is just as important as growing of cash crops as livestock can be sold to meet certain emergencies such as death, pay a hospital bill, or they can be slaughtered for ceremonies such as weddings and so on. However, selling of livestock, especially cows, goats, pigs and sheep is a male prerogative in jointly managed households and husbands can decide to use the cash in whatever way they want. The cash may not be used to purchase food for the family. In our study, we found that only 3.4 percent of the married women living with their husbands and only

23.1 percent of the married women living alone could sell livestock without permission from their husbands while the husbands could sell without consulting them.

In the Kenyan case, women appear to have very little influence on decisions about cash crops but they seem to have a leeway in matters concerning subsistence food crops (Kiriti, Tisdell and Roy, 2002). They appear to lose their power to make agricultural household decisions with increased commercialisation. Thus agricultural commercialisation may impact negatively on household food availability, and especially on the nutrition of children.

In the next section, we use a Tobit model to identify the determinants of the proportion of cash income allocated by household for food consumption in Nyeri district.

## 5. Determinants of The Proportion of Cash Income Allocated for Food Expenditures in Nyeri District

The way in which food is obtained is varied and can be classified in different ways. It could be self supplied, through the market where it may be exchanged for cash, bartered with other commodities or through customary exchange or it may be in the form of gifts. In this study we do not consider food in the form of gifts but only that food that is self supplied and that exchanged in the market. Nutrition of a household depends on its total of its food from the market plus non-market sources.

The determinants of the proportion of cash income allocated for food expenditures in rural areas considered in this study are: receipt of remittances, earnings from wage labour from outside employment, cash revenue from sale of cash crops, amount of non-cash food production, ownership of livestock and age of the household head. Other variables tried but later dropped from the analysis as they greatly reduced the explanatory power of the whole model are the level of education of the household head and the number of children in the household.

We can estimate a log-linear multiple regression model for determining the factors influencing the proportion of total income allocated to food expenditures using Ordinary Least Squares.

However, in the analysis of proportion of cash income from cash crops allocated for food expenditure, we may have a problem with a censored regression model, that is, we will have zero values of the dependent variable for some households as not all households may have cash crops, while the independent variables are known. In that case OLS will produce biased estimates of the coefficients. We can overcome this problem by using a Tobit model for our analysis (Wilson and Tisdell, 2002; Gujarati, 1995; Amemiya, 1985). The Tobit model can be described as follows:

$Y_i = \alpha_0 + \beta' X_i + U_i$ if RHS $\geq 0$

$Y_i = 0$ otherwise.

$Y_i$ is the dependent variable, $X_i$ is a K*1 vector of known variables as defined above. $\beta$ is a K*1 vector of unknown parameters. $U_i$ are the residuals with E ($U_i$) = 0 and a common variance, $\sigma^2$. We also assume U ~ N (0, $\sigma^2$).

The results of the Tobit analysis are found in Appendix 1.

**5.1: Regression Results with Discussion**

As shown in Appendix 1 remittances are negatively associated with income allocated to food expenditures for married men living alone, for married women living alone and the unmarried ones. The coefficient for this variable shows that an increase in remittances holding all other variables constant would reduce the proportion of cash income allocated for food expenditures. However, the marginal effects for married men living alone and the unmarried women show that the proportion of cash income allocated for food expenditures is not very responsive to changes in remittances. On the other hand, the marginal effects for married women living alone shows that a unit change in remittances would decrease the proportion of cash income allocated to food expenditures by 57.6 percent. The variable for remittances for this sub-sample was also statistically significant at the 1 percent level in explaining variations in the proportion of cash income allocated to food expenditures. This means that these households with migrant husbands and who rely on migrant income in terms of remittances allocate less of their income to food expenditures. These remittances may

not be very regular and are lump sum and so when they come, they may be used to buy luxury items such as televisions and radios, or to pay school fees, pay debts and so on. Our findings accord with those of Kaiser and Dewey (1991) and Lev (1981) who found that migrant income was associated with a strong negative effect on allocation of household resources to food. On the other hand, remittances were positively associated with income allocated to food expenditures for married women living with husbands and the remittances variable was statistically significant at the 1 percent level. The marginal effects for this sub-sample shows that a unit increase in remittances would lead to a 30 percent increase in the proportion of cash income allocated for food expenditures. These findings contradict those of Kaiser and Dewey (1991). A possible explanation for these findings could be that remittances may be coming on a regular basis for these households and so they cannot be regarded as lump sum and they can, therefore, be planned for in the food budget allocation. The remittances might be coming from their children or from relatives.

Generally, diversity of a household diet depends on the diversity of home-grown crops and dependence on purchased foods should be negatively associated with the amount and diversity of non-cash food crops grown. A decline in the level of subsistence production may result in a deterioration of the household diet due to local food shortages, increased consumption of less nutritious purchased foods and the disparity in value of home-produced and purchased foods (Dewey, 1991). In our study, we found that total non-cash output was negatively related to the proportion of income allocated to food expenditures for all the respondents and this variable is statistically significant at the 1 percent level all the respondents except for the married women living with husbands. These findings accord with those of Kaiser and Dewey (1991) who, in their Mexican study found that subsistence output had a negative statistically significant effect on resource allocation patterns. In households with higher subsistence output, a smaller percentage of total income is allocated to food expenditures. Our findings also concur with those of Kumar (1978) on India and Greer and Thorbecke (1983) on Kenya. They suggest output from home gardens and home production is more likely to increase household food intake than an equivalent amount of cash income. The marginal effects show that the proportion of cash income allocated to food expenditure is not very responsive to changes in subsistence output for all the respondents. A possible reason for this could be that the food crops grown

by the respondents might also be regarded as food cash crops and so an increase in their output may increase the sale of these food crops so that the respondents can have cash to purchase other processed foodstuffs they may not be growing such as cooking fat, spices, salt, rice and so on.

Households with higher cash crop revenue may also happen to have higher income and we would expect their total expenditure on food to rise as revenue from cash cropping rises. This was the case for the married men living alone where the correlation coefficient between total revenue and the proportion of cash income allocated to food expenditure was positive (0.420). However in all the other cases, the correlation coefficient between total revenue and the proportion of cash income from cash cropping allocated to food expenditure was negative (-0.036). It is also possible that the proportion of net income spent on food could rise with greater revenue from cash cropping even though the opposite may occur for gross income. In our analysis, we use gross income rather than net income, which would be less agricultural expenses.

In our study, we found that cash revenue derived from sale of cash crops was negatively related to the proportion of gross income allocated to food expenditures in the whole sample and the variable is statistically significant at the 1 percent level for married men living alone and for the unmarried women and at the 10 percent level for both the married women living alone and for those married and living with husbands. However, the proportion of cash income for food expenditures is also not very responsive to changes in cash income arising from sale of cash crops in the whole sample. A possible reason for this lack of response could be that the prices of non-food cash crops that farmers have been getting are very low and so the contribution of non-food cash crops to the respondents' total revenue was very small. In fact, at the time of collecting data for this study, coffee farmers had not been paid for crop delivered to coffee factories in 1999. However, our findings contradict those of Kaiser and Dewey (1991) who found that cash cropping, generally associated with lump sum income, was not linked to differences in resource allocation patterns in their study in Latin America and the Caribbean. Our findings support those of Korte (1969) who found that in Kenya, lump sum income from cash cropping was positively associated with purchase of luxury goods and hence, less income allocated to food expenditures.

Our findings also concur with those of Lev (1981) who found that increased income from the payment of coffee influenced wealth to be held in such forms as housing and land ownership and very little of it if any was used for food purchases. Von Braun and Immink (1994) also found a negative relationship between increased income and the share of food expenditures.

The effect of the age of the household head on food consumption expenditure is U-shaped, with the consumption expenditures of the elderly and young households being higher than that of households in their middle age. A possible explanation for this would be that households in the middle of the life cycle may be burdened with school fees and other human capital investment expenses and this would mean that their coping mechanism involves a drastic reduction in their food expenditure (Mwabu, et al. 2000). However, age was only statistically significant at the 1 percent level for married men living alone and the unmarried women. This means that older married men living alone and the unmarried women will allocate more cash income to food than middle-aged married men. A possible explanation for this would be that older married men living alone and the unmarried women may already have bought enough luxury items and consumer durables, built their houses and bought land or even educated their children and so they would be more concerned with food expenditures than non-food expenditures. As for the younger married men living alone and younger unmarried women with young children, feeding their families would take first priority before indulging in expenditure on luxuries.

Earnings from outside employment, another form of lump sum income that arrives at the end of every month is negatively associated to food expenditure allocation for married men living alone and the unmarried women. The marginal effects for this variable for all the respondents show that the proportion of cash income allocated for food expenditures is also not very responsive to changes in earnings from outside employment in the whole sample. This may be due to the fact the proportion of respondents that was employed outside the farm was quite small. These earnings could be used to pay household bills such as school fees, buy medicine or clothing. However, earnings were not statistically significant in explaining variations in their food expenditure allocations. On the other hand, for married women living alone and the married women living with their husbands earnings were positively associated

with food expenditure allocations. However for married women living with husbands the earnings variable is statistically significant at the 1 percent level. A possible explanation for this is that since women's earnings tend to be earmarked for food, these wives could be contributing all of their earnings to the household food budget while their husbands keep a huge proportion of cash revenue from cash crops and contribute little or nothing to food expenditures. Our findings accord with those of Guyer (1988) who found that in Ghana, of total cash expenses for food and routine supplies, women contributed two-thirds and men one-third. Also, we may argue that for these women who work for cash income, although they spend a higher proportion of their cash income on food, less subsistence food may be grown so that household food consumption could fall. Furthermore, the purchased food could be less nutritious than the home-grown food.

Dewey (1981) found that even though Mexican families switching to cattle production had more land and more cash than other families, there was no improvement in the diet and nutrition of their children. In our study, ownership of livestock is negatively associated with the proportion of income allocated to food expenditures for all women respondents, findings that support Dewey (1981). For these farmers, income from livestock can also be regarded as lump sum since sale of livestock is mainly to meet a particular need such as paying of school fees, offset funeral expenses, pay medical bills and so on. For married women living alone, an increase in livestock ownership by one standard deviation would lead to a reduction in the proportion of cash income allocated for food expenditures by 10.4 percent, while it would decrease by 0.4 percent for married women living with husbands when we look at the marginal effects of the livestock variable. A possible explanation for this might be that these women could be using livestock products for home consumption, which they might otherwise have been buying and so an increase in livestock ownership would decrease the cash income allocated for food expenditures. Women's rights in relation to small livestock such as chickens could be very different to that in large livestock such as cattle. It may be that since these women's husbands are not living with them, sale of large livestock is the husband's responsibility and when this is done, it may be for other purposes rather than the purchase of food and especially since is it done by the men. However, this variable is not statistically significant in explaining variations in food expenditure allocation in the whole sample. On the other hand, ownership of livestock is positively

associated with income allocated to food expenditures for married men living alone although not statistically significant. These findings accord with those of Mwabu, et al. (2000) who found that ownership of livestock was positively associated with increased household food expenditures of 0.3 percent, also showing that household food consumption expenditure is inelastic with respect to ownership of livestock. The proportion of cash income allocated to food expenditure was also not very responsive to changes in livestock ownership in our study. A possible explanation for this finding could be that married men living alone may not be using livestock products such as milk, eggs for home consumption but may be selling them to purchase other items like cigarettes, alcohol and so on. They may also be keeping livestock for sale on a rainy day. It may also be that for these men, an increase in livestock ownership would mean a decrease in the amount of food crops produced, necessitating an increase in the amount of purchased foods.

## 6. Concluding Comments

In summary, it seems that commercialisation has led to a loss of food diversity leading to food shortages and risk of famine in Nyeri district. Cash crops are usually grown in a monoculture system, which increases the risk of food shortages in case of food crop failure.

In Kenya cash crops are viewed as men's crops and the income from the crops accrues to them. Due to the nature of the cash income and the fact that men and women have different expenditure patterns, this cash income may not be used for the purchase of household food.

In the Kenyan case, women appear to lose their power to make decisions with increased commercialisation (Kiriti and Tisdell, 2002; Kiriti, Tisdell and Roy, 2002) and this may impact negatively not only on food availability in general but also on the nutrition of children. Our results accord with those of Elabor-Idemudia (1991).

The findings of this study concur with those studies that link household resource allocation patterns to income sources (Dewey, 1981, 1989; Kaiser and Dewey, 1991; Jarque, 1987; Heien, Jarvis and Perali 1989; Kennedy and Cogill, 1987; von Braun and Kennedy, 1986, 1987; Korte, 1969; Lev 1981; von Braun and Immink, 1994).

While households having different sources of income may also have different preferences for goods and services, these sources can influence the expenditure patterns as our analysis and results have shown.

Our findings show that income from cash crops in the Nyeri district has a negative influence on allocation patterns for food expenditure, the reason being that cash crop income comes in lump sum, and is controlled by males in joint households. However, even in female-headed households, cash revenue from cash crops is negatively associated with food expenditure allocations, which supports the critics of cash crop farming in that it may not lead to an increase in household welfare. However, the marginal effects for income from cash crops were very small showing that for these respondents, the proportion of cash income allocated for food expenditure is not very responsive to changes in cash income from cash crops.

Other forms of lump sum income that had a negative effect on food expenditures are receipt of remittances, earnings from outside employment and ownership of livestock.

The proportion of cash income allocated for food expenditures was found to be very responsive to changes in remittances especially for married women living alone where an increase in remittances led to a decrease in the proportion of cash income allocated for food expenditures. However, for all the other respondents, remittances led to a positive response to food expenditure allocations. We would therefore recommend that migrant husbands be encouraged to send remittances on a regular basis for them to be budgeted for by their wives. On the other hand earnings from outside employment for married women living with husbands were positively associated with food expenditure allocations. Increasing women's income is, therefore, crucial not only for the nutritional status of the family but also for reducing women's economic dependence.

According to traditional economic theory, any development that extends the economic opportunity of individuals or families will lead to increased economic welfare provided choice is free. However, farmers in Kenya did not or do not always have a free choice as some external forces influenced them. These include the necessity to pay taxes in cash (hut tax during the colonial times), payment of school fees for their

children and social pressures to purchase some commodities requiring cash. Also, male dominance in decision-making as in the Kenyan case can also lead to less welfare gains as males are more cash-crop oriented because they tend to put their own interest ahead of the nutrition of their children. This can translate into less welfare gains for families that participate in the commercial economy.

Our literature review shows that although in developing countries, commercialisation of agriculture is sometimes associated with rising farm household food consumption and improved nutrition, the opposite also often occurs. The latter occurrence can have several sources. It may occur because of the irregular and lump sum pattern of receipt of cash income, the tendency in some societies for males (mostly husbands) to appropriate cash income and spend it on items for themselves and not for their family, and long-term farm decisions by males in favour of cash crops rather than subsistence crops. So complex sociological, economic and psychological influences all can play a role in determining whether agricultural commercialisation in developing countries has a positive or negative influence on the food intake and level of nutrition of farm families.

Nevertheless, in the Kenyan case study reported here, amount of non-cash food output is negatively associated with food expenditure allocations. An increase in non-cash output would lead to a decrease in food expenditure allocations though by not by a large proportion. Overall, however, an increase in non-cash output would therefore raise total food consumption, that is, the quantity of self-supplied food plus purchased food. Given the increasing food demand for Kenya's growing population, there is enormous need for an increase in non-cash food production by offering extension services, credit facilities, seeds, and fertilisers especially to women instead of over emphasising agricultural commercialisation. This could increase the diversity of household diets, reduce food shortages and reduce the rural household reliance on consumption of less nutritious purchased foods.

## 7. References


Amemiya, T. (1984), “Tobit Models: A Survey”, *Journal of Econometrics*, Vol. 24, pp. 3-61.

Bryceson, D. F. (1989), “Nutrition and the Commoditisation of Food in Sub-Saharan Africa”, *Social Science and Medicine*, Vol. 28, No. 5, pp. 425-440.

Dewey, K. G. (1981), “Nutritional Consequences of the Transformation from Subsistence to Commercial Agriculture in Tabasco, Mexico”, *Human Ecology*, Vol. 9, pp. 151-187.

Dewey, K. G. (1989), “Nutrition and the Commoditisation of Food Systems in Latin America and the Caribbean”, *Social Science and Medicine*, Vol. 28, No. 5, pp. 415-424.

Elabor-Idemudia, P. (1991), “The Impact of Structural Adjustment Programs on Women and their Households in Bendel and Ogun States, Nigeria”, In Gladwin, Christina, H. *Structural Adjustment and African Women Farmers*, Gainesville: University of Florida Press, pp. 128-150.

Government of Kenya (1997), *National Development Plan*, Nairobi: Government Printers.

Greer, J., and Thorbecke, E. (1983), *Pattern of Food Consumption and Poverty in Kenya and Effects of Food Prices*, Ithaca, New York: Cornell University.

Gudeman, S. (1978), *The Demise of a Rural Economy: From Subsistence to Capitalism in a Latin American Village*, London: Routledge and Kegan Paul.

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

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

Guyer, J. (1988), “Dynamic Approaches to Domestic Budgeting: Cases and Methods from Africa”, In *A Home Divided: Women and Income in the Third Word*, Edited by Dwyer D. and Bruce J. Stanford: Stanford University Press, pp. 155-172.

Heien, D., Jarvis, L. S. and Perali, F. (1989), “Food Consumption in Mexico: Demographic and Economic Effects”, *Food Policy*, Vol. 14, No. 2, pp. 167-180.

Jarque, C. M. (1987), “An Application of LDV Models to Household Expenditure Analysis in Mexico”, *Journal of Econometrics*, Vol. 36, pp. 31-53.

Kabubo, J., and Kiriti, T. (2001), “Macroeconomic Adjustment, Poverty and Economic Growth: An Analysis for Kenya”, *African Journal of Economic Policy*, Volume 8, No. 1, pp. 42-58.

Kaiser, L., and Dewey, K. (1991), "Household Economic Strategies and Food Expenditure Patterns in Rural Mexico: Impact on Nutritional Status of Pre-school Children", *Ecology of Food and Nutrition*, Vol. 25, pp. 147-168.

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

Kennedy, E., and Cogill, B. (1985), “Effects of Commercialisation of Agriculture on Women’s Decision-making and Time Allocation”, Paper presented at Association of Women and Development Conference, April 26, 1985.

Khandker, S. R. (1987), "Women's Role in Household Productive Activities and Fertility in Bangladesh", *Journal of Economic Development*, Vol. 12, No. 1, pp. 87-115.

Khandker, S. R. (1988), "Determinants of Women's Time Allocation in Rural Bangladesh", *Economic Development and Cultural Change*, Vol. 37, No. 1, pp. 111-126.

Kiriti, T, and Tisdell, C. (2001), “Migration of Husbands, Remittances and Agricultural Production: Impacts when Wives Head Households in Rural Kenya”, Social Economics, Policy and Development, Working Paper No.21, University of Queensland.

Kiriti, T. and Tisdell, C. (2002), “Gender, Marital Status, Farm Size and Other Factors Influencing the Extent of Cash Cropping in Kenya: A Case Study”, *Social Economics, Policy and Development*, Working Paper No. 26, University of Queensland.

Kiriti, T. and 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].

Korte, K. (1969), “The Nutritional and Health Status of the People Living in the Mwea-Tebere Irrigation Settlement”, In *Investigations into Health and Nutrition in East Africa*, Edited by Kraut H. and Cremer H. D. Weltforum Verag Munchen: pp. 268-334.

Kumar, S. (1978), *The Role of the Household Economy in Determining Child Nutrition at Low Incomes: A Case Study in Kerala*, Department of Agricultural Economics Occasional Paper No. 95, Ithaca, New York: Cornell University.

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.

Lipton, M. (1977), *Why Poor People Stay Poor: A Study of Urban Bias in World Development*, Canberra: Australian National University Press.

Longhurst, R. (1988), "Cash Crops, Household Food Security, and Nutrition", *IDS Bulletin*, Vol. 19, No. 2, pp. 28-36.

Mellor, J. (1978), “Food Policies and Income Distribution in Low Income Countries”, *Economic Development and Cultural Change*, Vol. 21, No. 1, pp. 1-26.

Mwabu, G., Masai, W., Gesami, R., Kirimi, J., Ndenge, G., Kiriti, T., Munene, F., Chemengich, M. and Mariara, J. (2000), *Poverty in Kenya: Profiles and Determinants*, A Joint Research Project by the Department of Economics, University of Nairobi and the Ministry of Planning and National Development, Nairobi: African Economic Research Consortium (AERC).

Pintstrup-Andersen, P. (1983), *Export Production and Malnutrition*, Occasional Paper No. 10, Chapel Hill: University of North Carolina.

Reutlinger, S., and Selowsky, M. (1976), *Malnutrition and Poverty: Magnitude and Policy Options*, Baltimore, Maryland: Johns Hopkins University Press.

Safilios-Rothschild, C. (1988), "The Impact of Agrarian Reform on Men's and Women's Incomes in Rural Honduras", In Dwyer, D., and Bruce, J. (eds.), *A Home Divided: Women and Income in the Third World,*: Stanford: Stanford University Press, pp. 216-228.

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*, Vol. 19, No. 3, pp. 41-60.

Tripp, R. B. (1982), "Farmers and Traders: Some Economic Determinants of Nutritional Status in Northern Ghana", *Food and Nutrition*, Vol. 8, No. 1, pp. 3-11.

Tuinenburg, K. (1987), "Experience with Food Strategies in Four African Countries", In *Food Policy: Integrating Supply, Distribution, and Consumption*, Edited by J. Price Gittinger, Joanne Leslie and Caroline Hoisington, Baltimore and London: The Johns Hopkins University Press, pp.179-194.

United Nations (2001), *Reducing Disparities: Balanced Development of Urban and Rural Areas and Regions within the Countries of Asia and the Pacific*, Economic and Social Commission for Asia and the Pacific, New York: United Nations.

Von Braun, J. (1994), "Production, Employment, and Income Effects of Commercialisation of Agriculture", In *Agricultural Commercialisation, Economic Development, and Nutrition*, International Food Policy Research Institute, Baltimore and London: Johns Hopkins University Press, pp. 37-64.

Von Braun, J., Bouis, H., and Kennedy, E. (1994), "Conceptual Framework", In *Agricultural Commercialisation, Economic Development, and Nutrition*, International Food Policy Research Institute, Johns Hopkins University Press: Baltimore and London, pp. 11-33.

Von Braun, J., and Immink, M. (1994), "Non-traditional Vegetable Crops and Food Security among Small holder Farmers in Guatemala", In *Agricultural Commercialisation, Economic Development, and Nutrition*, International Food Policy Research Institute, Baltimore and London: Johns Hopkins University Press, pp. 189-203.

Von Braun, J. and Kennedy, E. (1986), *Commercialisation of Subsistence Agriculture: Income and Nutrition Effects in Developing Countries*, Working Paper on Commercialisation of Agriculture and Nutrition No. 1. Washington, D.C.: International Food Policy Research Institute.

Von Braun, J. and Kennedy, E. (1987), "Cash Crops versus Subsistence Crops: Income and Nutritional Effects in Developing Countries", In *Food Policy: Integrating Supply, Distribution, and Consumption*, Edited by J. Price Gittinger, Joanne Leslie and Caroline Hoisington, Baltimore and London: The Johns Hopkins University Press, pp.179-194.

Von Braun, J. and Kennedy, E. (1994), "Conclusions for Agricultural Commercialisation Policy", In *Agricultural Commercialisation, Economic*

*Development, and Nutrition*, International Food Policy Research Institute, Baltimore and London: Johns Hopkins University Press, pp. 365-376.

Von Braun, J. (1996), *Food Security and Nutrition*, Food and Agricultural Organization: World Food Summit Technical Background Document No. 5.

Wilson, C. and Tisdell, C. (2002), "OLS and Tobit Estimates: When is Substitution Defensible Operationally?" *Economic Theory, Applications and Issues*, Working Paper No. 15, The University of Queensland.[Forthcoming in *Empirical Economic Letters*].

**APPENDIX 1**

**TOBIT ESTIMATES OF PROPORTION OF HOUSEHOLD FOOD EXPENDITURE**

| Variable | Married Men Living Alone | Married Women Living Alone | Married Women Living with Husbands | Unmarried Women |
|---|---|---|---|---|
| **Constant** | -22.4665 | 156.5784 | 6.1821 | -20.5451 |
| | (-2.597**) | (6.797***) | (0.981) | (-2.338*) |
| **REMITT** | -1.3685 | -57.7828 | 35.7622 | -1.9922 |
| | (-0.491) | (-5.167***) | (5.886***) | (-0.705) |
| **TOUPTHC** | -0.2065 | -0.4048 | -0.01486 | -0.2066 |
| | (-3.519***) | (-4.668***) | (-0.590) | (-3.490***) |
| **CASHREV** | $-1.14 \times 10^{2}$ | -0.0111 | -0.00163 | -0.0141 |
| | (-4.429***) | (-2.415*) | (-2.135*) | (-4.364***) |
| **EARNINGS** | $-1.57 \times 10^{3}$ | 0.0055 | 0.0039 | -0.0015 |
| | (-1.870) | (1.727) | (4.231***) | (-1.708) |
| **AGE** | $9.286 \times 10^{3}$ | 0.0033 | 0.0016 | 0.0095 |
| | (6.933***) | (1.207) | (0.866) | (6.908***) |
| **LIVESTCK** | 5.3483 | -10.4811 | 3.4658 | -3.8403 |
| | (1.900) | (-1.186) | (-0.163) | (-1.370) |
| **Log likelihood** | -30.457 | -111.3750 | -229.9874 | -30.9106 |
| **N** | 11 | 26 | 63 | 48 |

Absolute t-values in parenthesis

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

**Variables**

REMITT = whether household receives remittances or not

TOUPTHC = total non-cash food output

CASHREV = cash revenue from sale of cash crop

EARNINGS = income from outside employment

AGE = age of head of household squared

LIVESTCK = whether household has livestock or not.

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