

SOCIAL ECONOMICS, POLICY AND DEVELOPMENT

Working Paper No. 34

**Marital Status, Farm Size and other Influences
on the Extent of Cash Cropping in Kenya:
A Household Case Study**

by

Tabitha Kiriti and Clem Tisdell

June 2003



ISSN 1442-8563
**WORKING PAPERS ON
SOCIAL ECONOMICS, POLICY AND DEVELOPMENT**

Working Paper No. 34

**Marital Status, Farm Size and other Influences on the Extent
of Cash Cropping in Kenya: A Household Case Study¹**

by

Tabitha Kiriti² and Clem Tisdell³

June 2003

© All rights reserved

¹ The authors would like to thank the Directorate of Personnel Management (DPM) in Kenya and the African Economic Research Consortium (AERC) for financial support. As usual the opinions do not necessarily reflect those of the DPM or AERC and any errors are the responsibility of the authors.

² Tabitha Kiriti is a lecturer in Economics on study leave from the University of Nairobi.
Email: s805985@student.uq.edu.au

³ School of Economics, The University of Queensland, Brisbane QLD 4072, Australia
Email: c.tisdell@economics.uq.edu.au

WORKING PAPERS IN THE SERIES, *Social Economics, Policy and Development* are published by School of Economics, University of Queensland, 4072, Australia. They are designed to provide an initial outlet for papers resulting from research funded by the Australian Research Council in relation to the project 'Asset Poor Women in Development',

Chief Investigator: C.A. Tisdell and Partner Investigators: Associate Professor K.C. Roy and Associate Professor S. Harrison. However this series will also provide an outlet for papers on related topics. Views expressed in these working papers are those of their authors and not necessarily of any of the organisations associated with the Project. They should not be reproduced in whole or in part without the written permission of the Project Leader. It is planned to publish contributions to this series over the next few years.

For more information write to Professor Clem Tisdell, School of Economics, University of Queensland, Brisbane 4072, Australia. (e-mail: c.tisdell@economics.uq.edu.au)

Marital Status, Farm Size and Other Influences on the Extent of Cash Cropping in Kenya: A Household Case Study

ABSTRACT

This article examines the effects of marital status, farm size and other factors on the extent of cash cropping (and allocation of land use) by means of a case study in the Nyeri district in Kenya. It was found that married women are involved in the production of a relatively greater amount of output of cash crops than unmarried women since husbands prefer to have more land under cash crops than food crops. Farmers with better quality land allocate a high proportion of it to non-food cash crops, which may expose some households to greater risks of possible famine. The proportion of land allocated to food crops declines as the farm size increases while the proportion of land allocated to non-food cash crops rises as the size of farm increases. Age is also inversely associated with subsistence. Education, though inversely associated with subsistence farming does not appear to be statistically very significant as an influence on the composition of land use and composition of farm output. With growing commercialisation, married women work more hours than unmarried ones, working not only on non-cash food crops but also on non-food cash crops. Married women seem to lose their decision-making ability with growth of agricultural commercialisation, as husbands make most decisions to do with cash crops. Married women in Kenya also have little or no power to change the way land is allocated between food and non-food cash crops.

Keywords: agricultural commercialisation, marital status, non-food cash crops, food cash crops, non-cash food crops.

Marital Status, Farm Size and Other Influences on the Extent of Cash Cropping in Kenya: A Household Case Study

1. Introduction

Neoclassical economic theory suggests that farms within a region with similar quality land will produce a similar composition of production if all farm produce can be marketed under perfectly competitive conditions (Collier, 1983). This is so if farms are of similar size, or if their scale lines for expansion in size are linear. Furthermore, given unitary functions for farm households the welfare of farm families is usually increased by marketing possibilities compared to self-reliance. Indeed, if a farm family does market any produce freely, this implies, given the conditions of neoclassical economic theory, that its welfare is raised by this market exchange.

However, it is argued here that such conclusions cannot be drawn in the African situation. In the Kenyan situation, farm households headed by males may show a different composition of production and land use to those headed by females. Marital status may influence land use because of cultural and power factors within the family. Secondly, marketing of produce is not necessarily a sign that this enhances family welfare, or that such exchange is optimal from the point of view of all family members.

By analysing the results from structured interviews with 137 households in the Nyeri district of Kenya, this article seeks to determine the influence of marital status of women on the composition of farm production and land use in terms of the proportion of subsistence crops and cash crops grown. But marital status is not the only possible influence on the extent of cash cropping. Farm size has, for example, been recognised in the literature as an additional influence in Africa. We shall consider this factor as well as some other possible influences such as the age of the respondents, whether or not the husband stays with his wife or has migrated, and so on.

First, we briefly review the relevant literature paying particular attention to marital status as a possible influence on the extent of cash cropping in Africa. In doing this, we emphasise the limitations in the African context of the neoclassical proposition that the occurrence of market exchange for cash implies an increase in family welfare compared to the absence of

such exchange and that increased cash cropping raises family welfare if it is not a decision imposed on the family from outside. Secondly, the nature of the survey is outlined and this is followed by a summary of the relevant statistics. While this summary does help to identify significant factors associated with changes in the extent of cash cropping, it does not allow simultaneously for multiple influences. However, multiple regression analysis is then used to address this matter. By using this analysis we are able to identify some factors that appear to influence significantly the extent of cash cropping in our sample.

2. A Brief Review of Literature

Given that all commodities can be traded without market transactions costs, the neoclassical model shows if trade occurs, it always increases the welfare of a farm family. This however, assumes that the family has a common utility function with the same properties as that usually assigned to an individual. Furthermore, if in a region all farms have similar resource endowments, they have identical product transformation functions. Thus, because they face identical prices in the region for their products, then as argued by Collier (1983), the composition of their production will be identical under perfectly competitive market conditions.

This is illustrated in Figure 1. The set OCB represents the production and consumption possibilities of a farm household in the absence of trade. Supposing that the household can produce two commodities, X_1 and X_2 . If, however, trade becomes possible and line EDJ becomes the household's relevant price line, the household's consumption possibilities are extended to become the set OEJ. Whereas originally, this household might have reached its highest attainable indifference curve at point G' , after trade becomes possible, it can reach a higher indifference curve. In the case illustrated, it is able to shift from the point G' to a consumption bundle corresponding to point G and reach the indifference curve I_1I_1 .

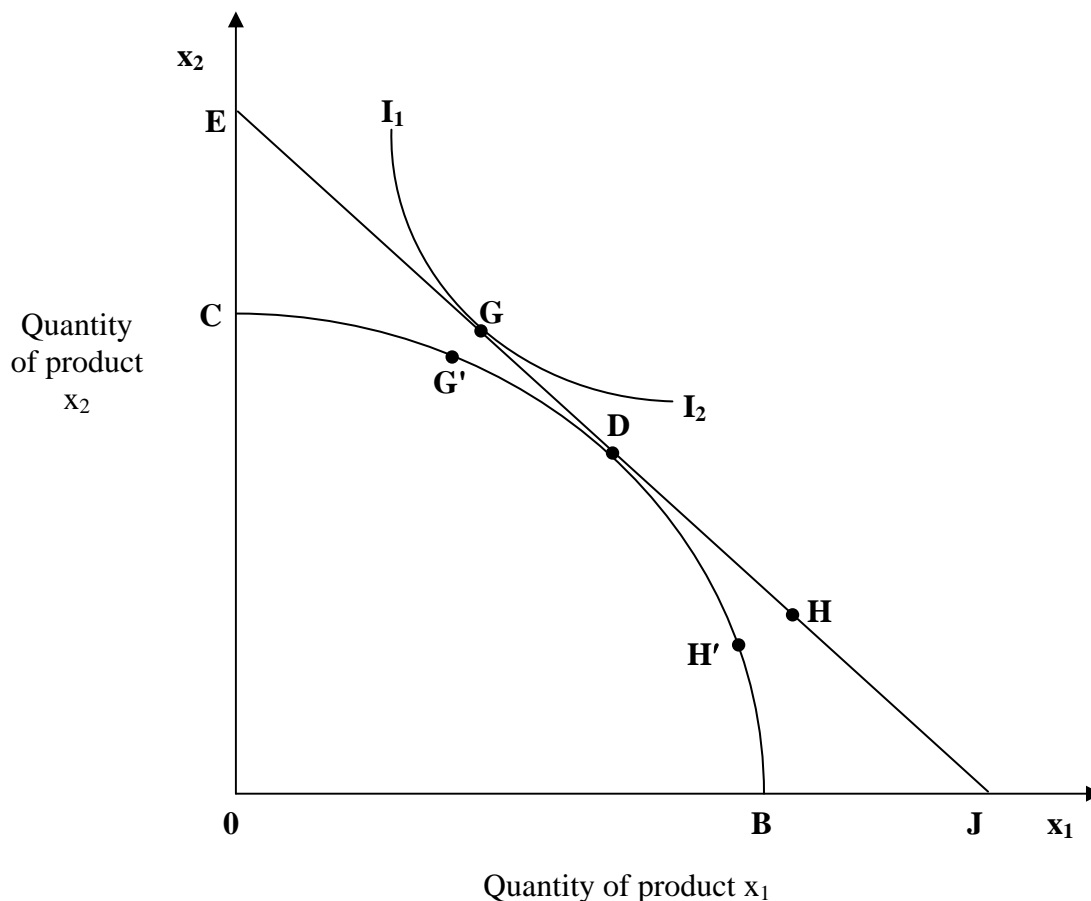


Figure 1: Illustration of the neoclassical argument that free trade raises the welfare of farm households and Collier's (1983) argument for uniformity in the composition of household production

Only if its highest attainable indifference curve prior to the possibility of trade is tangential to point D does the farm household fail to benefit from trade possibilities. However, its welfare is not reduced by the possibility of trade in this case. In most cases, the welfare of the farm family will improve as a result of trade possibilities. The farm family will always be able to gain by trade given neoclassical theory, if its initial equilibrium is at a point other than one corresponding to D.

Also, given Collier's (1983) assumption that farms have the same production possibilities, scope for marketing produce under conditions of perfect competition will result in all farms in a region having the same composition of production. Because all face the same set of prices, all, in the case illustrated in Figure 1, produce the combination of production corresponding to point D. This will not happen in the absence of trade, if farm families have differences in their tastes. For example, because of differences in tastes before trade opportunities, farm families might produce and consume the combination corresponding to

point G' and another that corresponding to H' . Although after trade, the production combination of these families is identical (D), their consumption bundles are likely to remain different. For example, one family moves from consumption bundle G' to G and the other might move from H' to H . Both are better off according to the neoclassical theory.

This view, however, relies heavily on the assumption that the family is a team with a common utility function for all its members and that family choice accords with it. This, however, ignores conflicts about economic choices in households and the fact that in some societies, marketing produce to obtain cash for further market exchange alters power relationships within families. In Africa and in some other developing countries, husbands typically take control of cash income and largely determine its expenditure (c.f. Tisdell et al; 2000). Furthermore, husbands are in a position to influence land use on their household's farm, that is to influence how much of its resources are used for producing cash crops. In such circumstances, although the welfare of a husband may increase as a result of trade, this may not be so for the remainder of his family. Although the welfare of the remainder of his family need not decline, it can do so and intra family conflict can arise.

This can be clarified by using Figure 2. In this figure, line ABF shows the trade-off between subsistence income for a household and cash income from cash cropping. For simplicity, it is shown to be linear, but it need not be. Typically in Africa, husbands control cash cropping and women subsistence crops (Boserup, 1970; Staudt, 1982; Fortman, 1984; Kennedy and Cogill, 1985; Nasimiyu, 1985; Cowen, 1986; Davison, 1988). One of the ways in which in which the husband can vary cash income from cropping is to increase the proportion of a farm allocated to cash crops and reduce that available to his wife for subsistence crops.

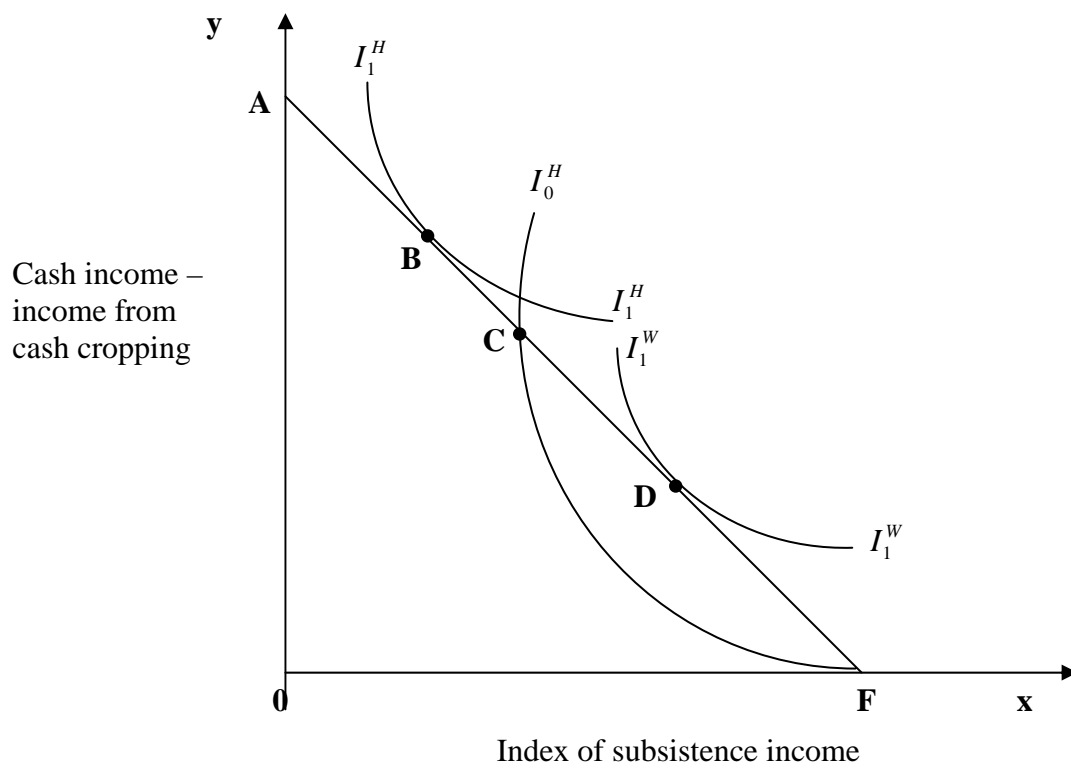


Figure 2: Trading for cash income does not necessarily increase the welfare of all family members.

In the absence of a cash exchange economy, this farm household has the consumption possibility corresponding to point F, but the whole set OAF becomes possible with exchange. In these circumstances, the husband might prefer the combination of production corresponding to point B whereas his wife (wives) or remainder of his family may prefer that corresponding to point D. The husband's highest attainable indifference curve is shown by I_1^H and that of his wife by I_1^W . Intrafamily conflict exists.

If the will of the husband prevails and he chooses combination B, the remainder of the family (assuming that the wife best represents their interests) is worse off by engaging in trading for cash than by remaining in subsistence economy. In the absence of trade, the remainder of the family is at F on the indifference curve marked I_0^W . While the husband is better off as a result of engaging in cash transactions, the rest of the family is worse off. On the other hand if the husband is able to compromise, all family members could be benefited. Combinations on the line BD represent the efficient set for the household, and a choice on the line CD represents a Paretian improvement for the family compared to the subsistence situation corresponding to point F. Thus, given the male dominance and control of cash, a household

may not benefit by engaging in trade. Some members (usually females and children) can, but need not, be worse off. Thus, the neoclassical point of view requires qualification in these circumstances.

To some extent, the above model helps to explain why different views exist about the impact of cash cropping on the welfare of women and children and different results are reported from different regions. Although many authors agree that women's role as food producers in developing countries has been marginalised and their welfare reduced by the introduction of cash cropping (eg, Boserup, 1970; Safilios-Rothschild, 1982; Barnes, 1983; Guyer, 1984; Kennedy and Cogill, 1985; Nasimiyyu, 1985), others find that women producers in some areas of West Africa, in particular, have actually benefited from the introduction of cash cropping and the commercialisation of land (eg, Berry, 1975; Okali, 1983; Afonja, 1986).

Other writers who have expressed doubts about the benefits of cash cropping to women in Africa include Davison (1988). She found in her sample that women spent the bulk of their time cultivating and harvesting tea yet it was the owner (the husband) of the land and tea crop who largely benefited from production. Her findings imply that cash cropping and increased family income do not necessarily lead to increased welfare for women and children. These findings are supported by Fortmann (1982) who, after examining the effect of Tanzania's national agricultural policy designed to promote cash cropping, found that these agricultural policies had reduced the income of wives and their families' wellbeing. Kaiser and Dewey (1991) made a similar conclusion, as does Longhurst (1988).

Bestemann (1995b) notes that the Third World cash crop production is often controlled by male farmers. As males expand cash cropping, women are left with less land and with increasingly marginal land. Shifts into cash crops results in men taking over land previously cultivated by women or with women having access to less productive or more distant plots (Spring and Wilde, 1991).

Men have traditionally had more options for moving into cash cropping on their own fields and leaving the production of subsistence crops to their wives. With this increased responsibility for family subsistence, women often do not have adequate land, labour and time to produce their own food crops and in most cases, wives work as unpaid family labourers in their husband's cash crop fields. Thus, women continue to be identified

culturally with the production of food crops in Africa, while cash crop production is largely a family affair, with men being the supervisors. Cash cropping seems to have resulted in increased work and decreased access to cash for women in many developing countries (Safilios-Rothschild, 1988).

Furthermore, in areas where a cash economy has taken hold, women's agricultural labour at the compound-household level is likely to be under-compensated or not paid for at all (Safilios-Rothschild, 1988; Haugerud, 1995; Julin, 1993; Kiriti and Tisdell, 2002; Kennedy and Cogill, 1985). Women may also find that their decision-making role is reduced significantly with cash crop farming (von Braun, de Haen and Blanken, 1991; Kaiser and Dewey, 1991; Julin, 1993; Kiriti and Tisdell, 2002; Haugerud, 1995).

If it is true in Africa that domination of the family by the husbands biases farm production in favour of cash crops, then we might expect to find evidence for this by comparing the farm land use and production patterns of male-headed and female-headed households in Africa. A sample, discussed in the next section, is designed to provide evidence about this matter.

However, the extent of cash cropping can be expected to depend on several factors of which male influence is just one. For example, Davison (1988) found in her African sample, that the relative importance of cash cropping compared to subsistence cropping rose with farm size. We shall also allow for such factors. Let us now turn to the study site and the nature of our survey before summarising and commenting on the main statistics and then undertaking multiple regression analysis and interpreting the results.

3. Study Site and Nature of the Survey

This study is based on data collected in December 2000 and January 2001 in Nyeri district in Central Kenya. The Nyeri district has a very high population density with some areas of high agricultural potential, such as Tetu division, having more than 400 persons per km², whereas new settlement areas such as Kieni West have 100 persons per km². 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: Nyeri, Othaya, Tetu, Mukurweini, Mathira and Kieni. These divisions were selected so as to be representative of the district in terms of differences in ecology and levels of commercialisation in the district. In these divisions,

farmers produce food crops mostly for home consumption but some is marketed, as well as purely cash crops such as tea, coffee, pyrethrum and tobacco. The latter are mostly sold in the international market.

The Kenya Central Bureau of Statistics Welfare Monitoring Sampling Frame was used to select our sample. A random sample of 330 households was drawn but due to death, migration, absentees and non-responses we ended up with a sample of 185 households. Of these 11 were households headed by single males. These are not considered in this article because we want to concentrate on the responses of women interviewed. Thus this sample consists of 63 wives staying with their husbands, 26 wives staying alone as their husbands were working in urban areas, and 48 unmarried women (never married, divorced, separated or widows) who were heads of their households. Thus the sample consists of the responses of 137 women from 137 households.

The survey was conducted in Swahili by direct interview using a structured questionnaire. Of the 185 households in which either women or men were present, 48 refused to participate. The reasons for this included the following: (1) the women were too busy as it was during the short rains and there were food crops in the fields and coffee, tea, pyrethrum and other cash crops were being harvested; (2) the husbands refused to give permission in a number of cases as they were suspicious that their wives were being incited to divorce or disobey them; (3) the 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) the 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 cropping for cash, particularly non-food cash cropping, and how these vary with marital status.

We shall summarise how perceived land quality of farms and their size vary with marital status of households, identify variation in land use and in composition of production of

households with marital status of women and consider the allocation of time between production of non-cash food crops and cash crops by women according to the marital status in households.

4. Farm Land use and Composition of Production in the Nyeri Sample

Table 1 shows how women in farming households perceived the quality of the land on which they live. In most cases, this quality was considered to be about the average for the district. Unmarried women tended to live on farms with better land quality on average than married women and also, as can be seen from Table 2, tended to have larger sized farms. Some differences are also evident between the quality of land on average of wives living with their husbands and wives living alone. On average the latter reported having slightly higher quality land but as can be seen from Table 2 the size of their farms on average is smaller.

Table 1
Land Quality of their Farms as Perceived by Women in the
Nyeri District According to the Marital Status

Quality of land →	N	Above average (%)	Average (%)	Below average	Total percentage
Marital status ↓					
Married women living with husbands	63	17.5	66.7	15.9	100
Married women living alone	26	26.9	61.5	11.5	100
Unmarried women	48	27.1	70.8	2.1	100
Total	137				

Table 2 shows the percentage allocation of land between uncultivated land, non-cash crops, food-cash crops and non-food cash crops by marital status, as well as the average size of farms by marital status. It is important to note that married women living alone have on average smaller farms. This may have contributed to the migration of their husbands to the urban centres (Kiriti and Tisdell, 2001). On the other hand, unmarried women have the largest size of farms on average. The unmarried category of women includes widows, those who never married, the divorced and separated. Among these widows were in the majority and were much older on average.

Table 2
Average Farm Size, Average Percentage Allocation of Land
to Crops for Home Consumption and for Cash in Nyeri District

Marital status	N	Average farm size (acres)	% Fallow (a)	% Non-cash crops (b)	% Food cash crops (c)	% Non-food cash crops (d)	Total
Married women living with husbands	63	2.25	16.24	48.73	7.08	27.87	100
Married women living alone	26	1.65	15.19	55.65	4.00	25.00	100
Unmarried women	48	2.70	14.58	52.29	7.21	25.92	100
Total	137						

Table 2 shows that on farms where married women live with their husbands a higher percentage of the land is allocated to non-food cash crops (28 percent) than on farms headed by unmarried women and on those where the husband has migrated (25 and 25.9 percent respectively). Furthermore the presence of the husband is associated with a bias towards cash cropping. Column (b) also shows that when the husband is present, only 48.7 percent of the land is allocated for subsistence output. On the other hand, when the husband is away (migrated) or the woman is not married, 55.6 percent and 52.29 percent of the land is respectively allocated for subsistence food crops. This suggests that the degree of the presence of a husband biases farmland use in favour of cash cropping.

Boserup (1970: 53-57) points to the introduction of cash cropping with its attendant emphasis upon male-controlled agricultural intensification as a primary determinant of women's loss of status and power in African agriculture. The introduction of cash crops has meant that male rather than female producers more often control intra-family decisions involving agricultural production (Staudt, 1982; Fortmann, 1984; Kennedy and Cogill, 1985; Cowen, 1986).

As outlined in Kiriti and Tisdell (2002) only 12.5 percent of farm wives reported having made the decision regarding the acreage of the cash crop to be planted. For those who did not make the decision about the acreage of the cash crop, 69.8 percent said their husbands made the decision, 14.6 percent reported that their fathers-in-law made it, 14.6 percent attributed the decision to their mothers-in-law while 2.1 percent reported that their brothers-in-law

decided on the acreage of the cash crop. Thus most wives are presented with a *fait accompli* by their husbands in terms of decisions regarding allocation of land for cash crops.

Only 25.8 percent of the wives reported making decisions regarding acreage of non-cash food crops, 28.1 percent made decisions regarding how much fertiliser and pesticide to use on food crops and only 18.8 percent of the wives made decisions regarding how much fertiliser and pesticide to use on non-food cash crops. On the other hand, only 26.1 percent of the wives made decisions on when to direct labour to cash crops, 32.9 percent made decisions on how much to use at home and how much to sell. Our findings are consistent with those of Boserup (1970); Staudt (1982); Nasimiyyu (1985); Cowen (1986); Fortmann (1984); Kennedy and Cogill (1985).

Tisdell, Roy and Regmi (2000) found that whereas the wife has control over the food that she grows for the family, she has little or no control over cash. It is generally contended that non-cash food production is under the control of the wife and directly used for family nutrition. However, cash income is not, and it is considered that husbands are less likely to use cash for the welfare of wives and children (Kaiser and Dewey, 1991). Our results show that only 13.5 percent of the wives make decisions on household spending. However, only 16.5 percent of the wives keep the cash after sale of crops compared to 83.5 percent of husbands. About 60 percent of the husbands keep the money in their own individual accounts while 40 percent keep it in a joint account. Thus, women appear to lose their ability to make decisions with increased commercialisation and this may impact negatively not only on food availability in general but also on the nutrition of children as suggested by von Braun, de Haen and Blanken (1991); Kaiser and Dewey (1991).

Asked whether their husbands would like to grow less or more cash crops, 37.5 percent of the married women living with their husbands said their husbands would like to grow more cash crops, 25 percent said less while 37.5 percent thought their husbands think the percentage is just correct. On the whole, husbands would like more cash cropping.

Table 3 shows the production by weight of non-cash food crops and non-food cash crops by marital status on the whole farm. While weight of produce has limitations as an index of output, so do other indicators. In male-headed households, husbands generally control cultivation of non-food cash crops while their wives manage cultivation of non-cash food

crops. However, married women living with husbands are expected to work on their husband's fields (cash crop fields) when required by their husbands to do so. On the other hand, the female-headed households (households headed by single mothers, divorced or widowed and those women whose husbands have deserted them and those headed by women whose husbands are away working as migrant workers in urban areas) have greater choice. However, even when husbands have migrated, they may still give some directions to their wives to plant and attend to cash crops or do so through a relative (Kiriti and Tisdell, 2002).

Table 3
Production of Non-cash Food Crops and Non-food Cash Crops
by Women's Marital Status for one Season

Marital status	N	Non-cash food output (kg)	Cash output (kg)	Total output (kg)
Married living with husband	63	103.78 (36.56%)	180.10 (63.44%)	283.88
Married living alone	26	107.73 (39.88%)	102.38 (60.12%)	270.11
Unmarried women	48	95.53 (42.73%)	128.00 (57.27%)	223.53
Total	137			

Table 3 shows that the percentages of non-cash food output to total output is highest for unmarried women (42.73 percent), next for married women living alone (39.88 percent) and least for married women living with husbands (36.56 percent). Non-food cash output shows a reverse pattern. This seems to support the hypothesis that bias towards cash cropping rises with the degree of presence of a husband.

Table 4 shows allocation of time between non-cash food crops and non-food cash crops by marital status of women in our sample. The hours spent on non-food cash crops include those spent on food cash crops.

Table 4
Allocation of Time per Week between Non-Cash Food Crops and Non-Food Cash Crops by Women according to their Marital Status

Marital Status	N	Hours spent on non-cash food crops	Hours spent on cash crops	Total hours spent
Married women living with husbands	63	17.73 (56.74%)	13.52 (43.36%)	31.25
Married women living alone	26	17.38 (63%)	10.19 (27%)	27.57
Unmarried women	48	14.32 (55.4%)	11.53 (44.6%)	25.85
Total	137			

Table 4 shows the number of hours spent on food production by women is on average higher than the number spent on non-food cash crops no matter what the marital status of the women. This is consistent with the findings of von Braun and Kennedy (1994). However, it can be seen that married women living alone spend proportionally less time on cash crops and much more time on subsistence food crops than married women living with their husbands. This table also indicates that women living with their husbands generally work more hours than women in the other categories. Married women living with husbands spend on average 31.25 hours working on their household farm. Although not shown, these women also spend their time preparing food, collecting firewood and water, looking after children. Married women living alone spend an intermediate number of hours working on their farms, whereas unmarried women seem to be working fewer hours than the rest of the women. Thus there appears to be a positive association between degree of presence of a husband and the hours of farm work of a woman.

Many farm women do not directly benefit from their increased work efforts or efficiency as individuals. Instead, men control the incomes (Julin, 1993; Muntemba, 1982). Women work as unpaid family workers on their husband's fields and have no control of the profit from this work. In our study, 93.8 percent of the wives said they and the children are not paid for work done on the cash crop plot and gave various reasons for this state of affairs. Our results are similar to those of Julin (1993); Muntemba (1992); Safilios-Rothschild (1988); and Haugerud (1995). Introduction of cash cropping has brought about greater gender segregation in labour tasks with men increasingly becoming agricultural managers.

While the above results suggest that, on average, marital status has an influence on agricultural land use by households, it being more biased in favour of cash cropping the greater the degree of presence of a husband, they also indicate that other factors have an influence as well, some of which may vary with marital status of women in households. To take account of multiple influences on agricultural land use by households and to determine the statistical significance of these influences, multiple regression analysis can be useful. This is now applied to our data from the sample.

5. Multiple Regression Analysis: Influences of the Allocation of Household Land between Cash Crops and Subsistence Crops

Growing of crops, grazing animals and using space for the homestead are some ways of utilising land as a resource in rural Kenya. To decide on how land is going to be allocated involves choice. Decisions about the allocation of the land involve a multiplicity of factors: the objectives of its owners or occupiers, for example, whether they are profit-maximisers or not, the process by which they reach decisions and background factors that consciously or unconsciously influence their decisions and so on. These include personal factors and also external influences arising from the quality of the land, its size, and so on.

While the proportions of land (L_i) allocated by women to non-food cash crops, non-cash food crops, food cash crops and fallow land seem to depend on marital status of the woman, other factors also may have an influence. They include level of her education, quality of the land, the size of the land, and the woman's age. These are simultaneously considered as possible independent variables using the following linear model:

$$L_i = \beta_0 + \beta_i X_i + U_i \quad i = 1, \dots, n. \quad (1)$$

Here L_i is the type of land use and is the dependent variable and X_i is a vector of exogenous explanatory variables; U_i = error term; β_0 = constant; and β_i = regression coefficients. In summary, the following variables are used in the model.

Dependent Variables

L_1 = percentage of farmland used for non-cash crops (subsistence)

L_2 = percentage of farmland used for food cash crops

L_3 = percentage of land used for non-food cash crops

L_4 = percentage of land used for fallow, buildings etc. that is, land not used for cropping

Independent or Explanatory Variables

Mastatus = marital status of the women, 1 if married, 0 if not married

Landqual = quality of land as reported by respondents, 1 if 'good' for agriculture, 0 if not

Totfmsz = total amount of land in acres of the household

Age = age of woman in years

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

The above may be estimated as a system of reduced form equations with an extended list of exogenous explanatory variables that affect any of the structural relations because allocation decisions may be treated as simultaneously determined. However, it would not be possible to identify the structural coefficients from the estimates and, therefore, it would be impossible to draw firm conclusions about the specific impact of explanatory variables in the system for each type of land use. We therefore estimate separate regression equations for the four allocation decisions. This is done partly due to limited information and data limitations and also to meet the objective of illuminating key factors that influence household allocation of land to different uses. Also, non-cash output as a percentage of total crop output is considered as a function of the same set of explanatory variables as listed above.

From the previous section and the literature, it seems likely that marital status as well as total farm size influence land use and the relative degree of emphasis on subsistence crops compared to cash crops. It is also possible that land quality has an impact because both the quantity and quality of land help determine total agricultural output. We also consider age as a possible influence on the basis that older women (may if married, have older husbands) and age may be a possible influence on product-mix. In addition, more education could be associated with greater reliance on markets because successfully using markets requires significant predictive ability.

The results of the linear multiple regression are shown in Table 5. We can see that the R^2 values are quite low. So the overall explanatory power of these models appears to be low. This is particularly so for the percentage of land used for food cash crops and for the percentage of land not cropped ('fallow').

Table 5
Determinants of Allocation of Land for Various Uses: All Women

Variable	% Land for non-cash food crops	% Land for food cash crops	% Land for con-food cash crops	% Land left fallow	Non-cash output as a percentage of total output
Constant	124.297 (6.255)***	-5.933 (-0.479)	-27.874 (-1.812)*	3.542 (0.377)	124.128 (6.345)***
Mastatus	-12.700 (-2.035)**	3.182 (0.818)	6.291 (1.302)	3.859 (1.309)	-18.631 (-3.043)***
Landqual	-3.929 (-0.866)	-3.752 (-1.327)	8.132 (2.315)**	1.299 (0.606)	-4.039 (-0.903)
Totfmsz	-2.165 (-3.233)***	-0.033 (-0.080)	1.941 (3.745)***	0.431 (1.364)	-1.940 (-2.952)***
Age	-0.829 (-3.341)***	0.276 (1.786)*	0.434 (2.259)**	0.100 (0.855)	-0.947 (-3.890)***
Edu	-5.505 (-1.724)*	1.938 (0.974)	3.922 (1.586)*	0.379 (0.251)	-4.891 (-1.553)*
R^2	0.173	0.034	0.177	0.035	0.195
F Stat	5.487	0.919	5.643	0.963	6.269
N	137	137	137	137	137

Figures in parenthesis are t ratios

***Significant at the 1 percent level

** Significant at the 5 percent level

* Significant at the 10 percent level

It should be noted also that the values of the constants in Table 5 indicate that the relationships involved are likely to be non-linear. Thus, the linear estimates given should be regarded only as approximations over a limited range.

On the other hand, marital status seems to be statically very significant as an influence on the percentage of total crop output accounted for by subsistence output. Although statically not very significant, the percentage of land allocated to non-cash food crops is about 12 percentage points higher in the case of unmarried women compared to married women. The percentage of non-cash crop output to total crop output is about 18 percentage points higher in the case of unmarried women compared to married women, and this relationship is

statistically very significant. This implies that married women are involved in the production of a relatively greater amount of output of cash crops than unmarried women. Therefore, the impact of marital status on the composition of farm output and land use is quite large.

The statistical results indicate that farmers with better quality land allocate a high proportion of it to non-food cash crops. The relationship is statistically significant at the 5 percent level. Also, subsistence output is a relatively smaller proportion of total crop output on better quality farms but the relationship is not statistically significant.

With increasing farm size, there is a tendency for the percentage of farmland allocated to subsistence food crops to decline and for that allocated to non-food cash crops to rise. The relationship is significant at the 1 percent level but the impact appears to be relatively small. A similar relationship holds for subsistence food output as a percentage of total crop output. It declines with an increase in farm size and the relationship is statistically significant at the one percent level.

The proportion of land used for subsistence food crops declines with the age of the respondent, as does the output of such crops as a proportion to total output of crops. Both relationships are significant at the one percent level.

The remaining possible explanatory variable, education, does not appear to be statistically very significant as an influence on the composition of land use and on the composition of farm output.

6. Discussion and Concluding Comments

The above models, even though they do not provide high overall explanatory power, point to the importance of marital status as an influence on land use for subsistence food production relative to cash crops, and as a factor affecting the composition of farm production, that is the proportion of crop output for subsistence use and for cash. In households in which women are married, there is relatively greater emphasis on land use for cash production and on output for marketing.

However, the relative bias in favour of cash crops shows up as proportionately more important in relation to the composition of crop output than land use. This is probably because the composition of farm production depends not only on the allocation of land to

various crops but also on the allocation of variable inputs. As can be seen from Table 4, where a woman is married, more of a woman's labour is allocated to cash crops than in cases where women are unmarried. A similar bias is also likely in relation to other variable inputs such as fertiliser. Thus our results are consistent with the view in the literature (see literature review) that African husbands favour cash cropping.

In addition, the results from the analysis of our sample are consistent with Davison's hypothesis (Davison, 1988) that larger farms tend to be relatively more cash-oriented in Africa. Factors that may contribute to this result could be that demand by households for subsistence food is relatively income inelastic and exposure to risk from an increase in cash cropping in terms of safety-first is less on larger farms. Once minimum subsistence food requirements of the household are met, there may be little risk in diversifying into cash crops and the demand for increasing quantities of subsistence crops for consumption may relatively be low.

Age was found to be a statistically significant explanatory variable influencing the degree of cash cropping. The older the respondent the greater the relative emphasis on cash cropping. This may be because older persons have more knowledge of markets. Such crops also often involve a longer-term investment than subsistence crops, as in the case of coffee. Given the life-cycle asset hypothesis, older persons might be more able to invest in such crops or they may be more likely to have a legacy of such crops, involving, to some extent, a sunk investment that locks them into such crops. They may also have fewer dependents thereby reducing their total household demand for subsistence food crops. These possible influences need additional study.

We also divided married women into two groups: those where their husband is present in their household (most); and those where their husband had migrated and was not normally present in the household. We used a similar multiple regression model to that discussed above to explore whether there was a significant difference in crop composition (subsistence cropping versus cash cropping) in households where the husband and wife are together and those in which the husband has migrated. No statistically significant difference was revealed even though the coefficient of this variable indicates that there is less emphasis on cash cropping in households when the husband has migrated than when the husband is normally present. This result is consistent with that of Kiriti, Tisdell and Roy (2002) that even when

husbands have migrated, they often exert an influence on the composition of crops grown on their farm by providing their wives with instructions and/or by appointing a local proxy to act on their behalf.

Thus, the results from the sample support the view that gender inequality plays a major role in influencing the degree of commercialisation of agriculture in Africa. Husbands tend to bias land use and crop production in favour of cash crops at the relative expense of subsistence food production. While marital status seems to be a major influence on the degree of cash cropping in the Nyeri District, it is not, however, the sole influence, as was demonstrated. Farm size and age seem to be of some significance.

While neoclassical economic theory might identify farm size as a possible influence on the composition of production on farms, it seems less likely to identify gender inequality as a factor affecting the degree of production of cash crops on farms in Africa. Thus, in analysing agricultural production decisions in Africa and formulating policy advice, care is required in applying neoclassical economic theory.

7. References

- Afonja, S. (1986), "Changing Modes of Production and the Sexual Division of Labour Among the Yoruba", In *Women's Work*, edited by Eleanor Leacock and Hellen I. Safa. South Hadley, MA: Bergin and Garvey Publishers, pp. 122-135.
- Barnes, C. (1983), "Differentiation by Sex Among Small Scale Farming Households in Kenya", *Rural Africana*, Vol. 15, No. 16, pp. 41-63.
- Berry, S. (1975), *Cocoa, Custom and Socio-Economic Change in Rural Western Nigeria*, London: Clarendon Press.
- Besteman, C. (1995), "Income Generation", In *Gender and Agricultural Development: Surveying the Field*, edited by Henderson, H. Kreider, and Hansen Ellen. Tuscon: University of Arizona Press, pp. 26-30.
- Boserup, E. (1970), *Woman's Role in Economic Development*, New York: St. Martin's Press.
- Collier, P. (1983), "Malfunctioning of African Rural Factor Markets: Theory and a Kenyan Example", *Oxford Bulletin of Economics and Statistics*, Vol. 45, No. 2, pp. 141-172.
- Cowen, M. (1986), "Change in State Power, International Conditions and Peasant Producers", *The Journal of Development Studies*, Vol. 22, No. 23, pp. 55-84.
- Davison, J. (1988), "Who Owns What? Land Registration and Tensions in Gender Relations of Production in Kenya", In *Agriculture, Women, and Land: The African Experience*, Boulder and London: Westview Press, pp. 157-176.

- Fortmann, L. (1982), *Women's Work in a Communal Setting: The Tanzanian Policy of Ujamaa*, In Bay Edna *Women and Work in Africa*, Boulder, Colo.: Westview Press, pp. 42-60.
- Fortmann, L. (1984), "Economic Status and Women's Participation in Agriculture: A Botswana Case Study", *Rural Sociology*, Vol **49**, No. 3, pp. 452-464.
- Guyer, J. (1984), *Family and Farm in Southern Cameroon*, Boston: Boston University Press.
- Haugerud, A. (1995), *The Culture of Politics in Modern Kenya*, New York: Cambridge University Press.
- Julin, E. (1993), *Structural Change in Rural Kenya*, Unpublished PhD Thesis, University of Gotenborg, Sweden.
- 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., and Cogill, B. (1985), "Effects of Commercialisation 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. (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., 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].
- Longhurst, R. (1988), "Cash Crops, Household Food Security, and Nutrition", *IDS Bulletin*, Vol. **19**, No. 2, pp. 28-36.
- Muntemba, M. S. (1982), "Women and Agricultural Change in the Railway Region of Zambia: Dispossession and Counter-strategies, 1930-1970", In Edna Bay (ed.), *Women and Work in Africa*, Boulder, Colombia: Westview Press, pp. 72-98.
- Nasimiyu, R. (1985), "Women in the Colonial Economy of Bungoma: Role of Women in Agriculture, 1902-1960", In *Women and Development in Africa*, edited by G. S. Were. Nairobi: Gideon Were Press, pp. 56-73.
- Okali, C. (1983), *Cocoa and Kinship in Ghana*, London: Kegan Paul.
- Safilios-Rothschild, C. (1982), *The Persistence of Women's Invisibility in Agriculture: Theoretical and Policy Lessons from Lesotho and Sierra Leone*, New York: Centre for Policy Studies, The Population Council.
- 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.
- Spring, A. and Wilde, V. (1991), "Women Farmers, Structural Adjustment, and FAO's Plan of Action for Integration of Women in Development", In *Structural Adjustment and African Women Farmers*, Edited by Gladwin, Christina, H. pp. 387-408, Gainesville: University of Florida Press.

- Staudt, K. (1987), "Uncaptured or Unmotivated? Women and the Food Crisis in Africa", *Rural Sociology*, Vol. **52**, No. 4, pp. 37-55.
- Tisdell, C. Roy, K. and Regmi, G. (2000), "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.
- 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., de Haen, H., and Blanken, J. (1991), *Commercialisation of Agriculture under Population Pressure: Effects on Production, Consumption, and Nutrition in Rwanda*, Research Report No. 85. International Food Policy Research Institute: Washington DC.
- Von Braun, J. and Kennedy, E. (1994), *Agricultural Commercialisation, Economic Development, and Nutrition*, International Food Policy Research Institute, Baltimore and London: Johns Hopkins University Press.

PREVIOUS WORKING PAPERS IN THE SERIES
SOCIAL ECONOMICS, POLICY AND DEVELOPMENT

1. Poverty and Economically Deprived Women and Children: Theories, Emerging Policy Issues and Development”, Clem Tisdell, September 1999.
2. Sen’s Theory of Entitlement and the Deprivation of Females: An assessment with Indian Illustrations by Clem Tisdell, Kartik Roy and Ananda Ghose, September 1999.
3. Gender Inequality, Development and UNDP’s Social Valuation Indices: HDI, GDI and GEM with Particular Reference to India by Clem Tisdell, Kartik Roy and Anand Ghose, September 1999.
4. Asset-Poor Women in India and the Relevance of Amartya Sen’s Analysis by Clem Tisdell, February 2000.
5. Institutional Impediments, Entitlement Exchange and Women’s Empowerment in Rural India: The Case of Access to Education by K. C. Roy, Clem Tisdell and A. Ghose, February 2000.
6. The Socio-Economics of Gender Issues in Rural India: Results of Interviews in Three Villages and a Forest Meeting in Eastern India by Clem Tisdell and Kartik C. Roy, May 2000.
7. The Development of Kiribati: An Analysis of Trends, Issues and Policies by Clem Tisdell, May 2000.
8. The Development of Samoa: An Analysis of Trends, Issues and Policies by Clem Tisdell, May 2000.
9. The Development of the Solomon Islands: An Analysis of Trends, Issues and Policies by Clem Tisdell, May 2000.
10. The Development of Tuvalu: An Analysis of Trends, Issues and Policies by Clem Tisdell, May 2000.
11. The Development of Vanuatu: An Analysis of Trends, Issues and Policies by Clem Tisdell, May 2000.
12. Sustainable Development and Human Resource Capital by Clem Tisdell, May 2000.
13. Gender Inequality in India: Evidence from a Rural Survey in West Bengal by Clem Tisdell, July 2000.
14. Property Rights in Women’s Empowerment in Rural India: A Review by K. C. Roy and C. A. Tisdell, July 2000.
15. Push-and-Pull Migration and Satisficing versus Optimising Migratory Behaviour: A Review and Nepalese Evidence by Clem Tisdell and Gopal Regmi, October 2000.
16. Socioeconomic Determinants of the Intra-family Status of Wives in Rural India: Analysis and Empirical Evidence by Clem Tisdell, Kartik Roy and Gopal Regmi, December 2000.
17. Villagers and the Use and Conservation of Indian Forests: The Role of Joint Forest Management by Clem Tisdell, Kartik Roy and Ananda Ghose, May 2001.
18. Globalisation, Development and Poverty in the Pacific Islands: The Situation of the Least Developed Pacific Island Nations by Clem Tisdell, June 2001.
19. Globalisation, Institutions and Empowerment of Women in Africa: Kenya’s Experience by Tabitha Kiriti, Clem Tisdell and Kartik Roy, June 2001.
20. Female Participation in Decision-Making in Agricultural Households in Kenya: Empirical Findings by Tabitha Kiriti, Clem Tisdell and Kartik Roy, September 2001.
21. Migration of Husbands, Remittances and Agricultural Production: Impacts when Wives Head Households in Rural Kenya by Tabitha Kiriti and Clem Tisdell, November 2001.
22. Summaries of Survey Responses of Household Heads in Three Forest Villages in the Midnapore District of West Bengal, India: Use of Forest Resources by Villagers, Forest Sustainability and Management by Clem Tisdell, Kartik Roy and Ananda Ghose, November 2001.
23. A Report on Socioeconomic Attributes and Gender Inequality in Kondh-Dominated Villages: A Comparative Analysis of Tribals and Non-Tribals in the Phulbani District, Orissa, India, by Clem Tisdell, Kartik Roy and Ananda Ghose, March 2002.
24. Economic Theories of the Family and Discrimination in a Social Context: Entitlements of Kondh Tribal Females in India by Clem Tisdell, Kartik Roy and Ananda Ghose, March 2002.
25. Children and Economic Development: Family Size, Gender Preferences and Human Capital

- Formation – Theory and Indian Cases by Clem Tisdell, May 2002.
26. Gender, Martial Status, Farm Size and other Factors Influencing the Extent of Cash Cropping in Kenya: A Case Study by Tabitha Kiriti and Clem Tisdell, May 2002.
 27. Commercialisation of Agriculture in Kenya: Case Study of Urban Bias on Food Availability in Farm Households by Tabitha Kiriti and Clem Tisdell, June 2002.
 28. Prejudice against Female Children: Economics and Cultural Explanations, and India Evidence by Clem Tisdell and Gopal Regmi, September 2002.
 29. Economic Globalisation, Liberalisation and Bangladesh: Poverty, Labour Norms and the Environment by Clem Tisdell, November 2002.
 30. Rural Poverty and China's Entry to the WTO: Present Knowledge, Unresolved Issues and China' Policy Options by Clem Tisdell, November 2002.
 31. Family Size, Economics and Child Gender Preference: A Case Study in the Nyeri District of Kenya by Tabitha Kiriti and Clem Tisdell, June 2003.
 32. Commercialisation of Agriculture in Kenya: Case Study of Policy Bias and Food Purchases by Farm Households by Tabitha Kiriti and Clem Tisdell, June 2003.
 33. The Relationship Between Commercial Agriculture and Food Availability to Kenyan Farm Families: A Case Study by Tabitha Kiriti and Clem Tisdell, June 2003.