

**GENDER INEQUALITY IN RURAL KENYA: EVIDENCE FROM
MURANG'A DISTRICT IN CENTRAL KENYA**

By

NJUGUNA, PURITY MUTHONI

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UNIVERSITY OF NAIROBI
EAST AFRICANA COLLECTION

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JOMO KENYATTA MEMORIAL

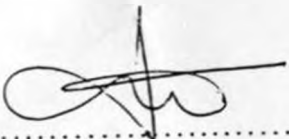
DECLARATION

I hereby declare that this research paper is my original work and has not been presented in any other University.


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Njuguna Purity Muthoni


12-07-2006
.....
Date

This research has been submitted for examination with our approval as University supervisors:


.....
Dr. Tabitha Kiriti-Ng'ang'a

12th July 2006
.....
Date

and


.....
Prof. Peter Kimuyu

July 12 06
.....
Date

DEDICATION

To you my husband Joseph for your tireless support, and
To my children, Mercy, David and Winnie for being patient.

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ABSTRACT

This paper gives a detailed account of gender inequality in a rural setting. Reasons behind this difference have been cited as poor definition of property rights regarding customary laws of inheritance of property and land tenure, which have been found to favour male adults. This has given male heads the rights to make decisions regarding what is produced, the mode of production, marketing and sharing of the returns. Male heads favour commercialization since this at times gives high returns although paid in lump sum. Female's household members have been allocated marginal lands that are unsuitable for agriculture, where they use primitive tools, since they have no access to agricultural tools and credit facilities. All this has led to reduction in food supply, which depend more on women's household income if any, or produce from farms. The situation is worsened when male heads use income from commercialized farms on themselves rather than in purchasing food for the household. Gender inequality has also been cited in the supply of labour force whereby a larger proportion of women work in commercial agriculture more than men. Cross section survey through a questionnaire was conducted to 110 households. A Tobit model was used which gave significant results in most of the variables under consideration. It was concluded that there is indeed prevalence of gender inequality in the area especially in male-headed households and more in those households where the male head consumes alcohol. Recommendations to counteract this are that resources should be directed towards women by redefining the property rights so as to include women. There is need to find out whether gender inequality could be a contributing factor to poverty.

DEFINITION OF TERMS

Gender: Is defined as the set of characteristic roles and behaviour patterns that distinguish women from men socially and culturally.

According to Sen (2001), the following are different forms of gender inequality.

Nasality Inequality: Given a preference for boys over girls that many male-dominated societies have, gender inequality can manifest itself in the form of the parents wanting the newborn to be a boy rather than a girl. It is particularly prevalent in East Asia, in China and South Korea, but also in Singapore and Taiwan. It is also beginning to emerge as a statistically significant phenomenon in India and South Asia.

Basic facility inequality: Even when demographic characteristics do not show much or any anti-female bias, there are other ways in which women can have less than a square deal. Afghanistan may be the only country in the world whose government is keen on actively excluding girls from schooling (it combines this with other features of massive gender inequality), but there are many countries in Asia, Africa, and Latin America, where girls have far less opportunity of schooling than boys do. There are other deficiencies in basic facilities available to women, varying from encouragement to cultivate one's natural talents to fair participation in rewarding social functions of the community.

Special opportunity inequality: Even when there is relatively little difference in basic facilities including schooling, the opportunities for higher education may be far fewer for young women than for young men. Indeed, gender bias in higher education and professional training can be observed even in some of the richest countries in the world, such as Europe and North America.

Ownership Inequality: In many societies, the ownership of property can also be very unequal. Even basic assets such as homes and land may be very asymmetrically shared. The absence of claims to property reduce the voice of women, and also make it harder for women to enter and flourish in commercial, economic and even some social activities.

Household Inequality: There are, often enough, basic inequalities in gender relations within the family or the household, which can take many different forms. Even in cases in which there are no overt signs of anti-female bias in, say, survival or son-preference or education, or even in promotion to higher executive positions, the family arrangements can be quite unequal in terms of sharing the burden of housework and child care. It is, for example, quite common in many societies to take it for granted that while men will naturally work outside the home, women could do it if and only if they could combine it with various inescapable and unequally shared household duties. This is sometimes called "division of labour," though women could be forgiven for seeing it as "accumulation of labour."

Bargaining Strength: This is used to refer to the ability of a household member the power to seek a share in the household decision-making. According to different authors, it is captured by ; Share of income earned by women (Hoddinott and Haddad, 1995); Unearned income (Schultz, 1990; Thomas, 1990); Current assets (Doss, 1999); Inherited assets (Quisumbing, 1994); Assets at marriage (Thomas, Contreras and Frankenberg, 2002); and The public provision of resources to specific household members (Lundberg, Pollak and Wales, 1997).

A Pareto efficient outcome: Is defined as one in which no one can be made better off without making someone else worse off.

Chicken Game: According to Mike, 2001-2005, a game of chicken is derived from a situation whereby two hooligans with something to prove drive at each other on a narrow road. The first to swerve loses face among his peers. If neither swerves, however, a terminal fate plagues both. There are two pure strategy equilibria. A different pure strategy equilibrium is preferred by each player. Both equilibria are Pareto optimal. Mixed strategy equilibrium also exists.

Prisoner's dilemma: This is used to explain a case whereby two partners in crime are separated into separate rooms at the police station and given a similar deal. If one implicates the other, he may go free while the other receives a life in prison. If neither implicates the other, both are given moderate sentences, and if both implicate the other, the sentences for both are severe. Each

player has a dominant strategy to implicate the other, and thus in equilibrium each receives a harsh punishment, but both would be better off if each remained silent. In a repeated or iterated prisoner's dilemma, cooperation may be sustained through trigger strategies such as tit for tat.

The Folk Theorem: Applies to repeated games, especially games that continue forever or have an unknown (random) end point. Essentially the folk theorem says that patterns of conditional strategies exist which can assure essentially any feasible distribution of payoffs an equilibrium to the game.

A Nash Equilibrium: This is named after John Nash, is a set of strategies, one for each player, such that no player has incentive to unilaterally change their action. Players are in equilibrium if a change in strategies by any one of them would lead that player to earn less than if they remained with their current strategy. For games in which players randomize (mixed strategies), the expected or average payoff must be at least as large as that obtainable by any other strategy. (Game Theory. net, 2006) Nash Equilibrium is a set of mixed strategies for finite, non-cooperative games between two or more players whereby no player can improve his or her payoff by changing their strategy. Each player's strategy is an 'optimal' response (cf. optimality) based on the anticipated rational strategy of the other player(s) in the game (iscid).

The Threat Points: Refer to individual members threatening *not* to cooperate in respect of the household public goods they produce. In Lundberg and Pollak (1993; 1994; 1996) model of non-cooperative behaviour the threat points refer to individual members threatening not to cooperate in respect of the household public goods they produce. Although Nash equilibrium is still possible here, the model does allow for inefficient “uncooperative” outcomes whereby household public goods are underprovided and/or produced inefficiently.

LIST OF ABBRAVIATION AND ACRONYMS

CBS	Central Bureau of Statistics
EEPs	Extra-Environmental Parameters
FAO	Food and Agricultural Organization
FED	Female Education Deficit
GIS	Geographic Information System
GOK	Government of Kenya
PCA	Principal Components Analysis
SAPs	Structural Adjustment Programmes
SNA	System of National Accounts
WHO	World Health Organization
WMS	Welfare monitoring survey
SPSS	Statistical Package for Social Sciences

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CHAPTER ONE

1.0: Introduction

1.1: Background

In many developing countries, Kenya included, cash cropping has been embraced as a means of raising household income as well as a source of foreign exchange. Longhurst (1988), Kennedy and Cogill (1985) in Kiriti and Tisdell (2003) found that as more land is put under cash crops, less food is grown for home consumption and therefore, more monetary income is needed to purchase food and other household needs from the market. Also, Pinstrup (1983) in Kiriti and Tisdell (2003) argues that expanded cash crop production can affect food availability and quality by reducing the diversity of food products and might increase the risk of crop failure since farmers become more dependent on external economic forces. However, expanded export crop production needs not reduce food availability if the cash generated leads to increased food purchases and if these are affectively distributed.

From a Tobit regression analysis done by Kiriti and Tisdell (2003), increase in agricultural commercialization tends to negatively influence per capita food availability at the family level. Households of married women suffer more in terms of food availability than households headed by women. In Kenya, this seems mainly to occur because farms of married women (in male-headed households) are more commercialized than female headed households if husbands are present, and wives not only loose control of land allocation decisions regarding cash crops but also the power to decide on how income derived from cash crops is allocated. However for male-headed households (irrespective of whether the husband has migrated or not) greater commercialization of farms is associated with reduced availability of food per capita of family members. In fact in highly commercialized firms of male-headed households, food availability per capita can be as low as or lower than in female-headed households.

According to Holger (2003), in low-income countries, more than 75 percent of women's work is in unpaid activities. Women perform unpaid tasks that are not economically rewarded, nor

socially valued or recognized as productive members of society. They spend a high proportion of their time in subsistence activities yet the workload in agricultural production is not equally shared between men and women, and productive resources are not distributed equally or at least efficiently within households to achieve the highest possible gains from production. They are often excluded from access to productive resources such as land, labor and credit. This exclusion reduces their income yet the essential task of ensuring food security falls to a great extent on them. This leads to poor nutrition, which in causes other problems in the society. Evidence of poor nutrition in Kenya is summarized in Table 1.

TABLE 1: Spatial Distribution of Poverty and Child Malnutrition in Selected Districts in Kenya.

	Incidence of Poverty %		Contribution to National Poverty		Shares of stunted Children in National totals	
	1992	1997	1992	1997	1987	1997
High Potential Zone						
Kakamega	50.2	56.69	8.1	4.47	7.9	36.1
Busia	68.2	65.99	4.0	2.06	3.3	55.1
Nakuru	na	45.08	4.0	2.93	7.8	40.0
Nandi	na	64.15	3.7	2.54	2.5	29.5
Kiambu	48.0	25.08	3.8	2.20	4.6	35.3
High and Medium Potential Zones						
Kericho	64.7	52.42	7.8	2.33	8.3	28.8
Bungoma	54.0	55.21	5.4	3.35	4.3	46.9
Meru	33.0	40.96	4.9	1.12	8.6	26.7
Kisii	46.0	57.22	4.5	3.05	13.8	54.4
Murang'a	37.0	38.62	3.8	2.91	6.8	39.6
Medium Potential Zones						
Siaya	40	58.02	3.7	3.09	5.7	54.4
TransNzoia/Uasin Gis	51.0	42.22	5.4	1.35	3.1	29.9
HomaBay/Migori	56.0	57.63	6.7	3.61	6.5	50.9
Low Potential Zones						
Machakos	43.0	62.96	6.7	3.83	10.9	51.5
Kitui	58.0	64.94	4.2	3.36	4.1	51.0

Source: Government of Kenya, Welfare Monitoring Survey 1992; 1997 and Child Nutrition Survey 1987

Table 1 summarizes the spatial distribution of poverty and child malnutrition in selected districts by agro-ecological zones. The table reveals that poverty is pervasive in country. Also evident from the table is the occurrence of poverty in Murang'a district as indicated by the level of child malnutrition in the table. Stunted growth in children reflects failure to receive adequate nutrition over a long period of time and may also be caused by chronic illness (Government of Kenya, 1998).

Household expenditure has been used as a proxy for income in derivation of the poverty line (Ministry of Finance and Planning, 2000). Using this household expenditure, there has been evidence of gender disparity in contribution of poverty as is evident in table 2 below. According to household survey, male-headed household contribute to poverty more than female-headed households. Also married male-headed households contribute to poverty more than married female-headed households. This evidence of gender disparity in expenditure patterns could be explained by the fact that, males maximize their utility more than that of the entire household by spending household income on themselves instead in purchasing of food. (Black, 2003).

TABLE 2: Contribution to National Poverty

Sex of head and Marital Status	$P_{\alpha=0}$ Adulterq
Male	74.46
Female	25.54
Male-married	71.87
Male- other	2.59
Female-married	12.88
Female-other	12.67

Source: Ministry of finance and planning, vol. 1 (2000)

NOTE: $P_{\alpha=0}$ is the ratio of the number of poor individuals to the total number of individuals in a sample or the head-count ratio.

According to Grogan (2004) addiction to alcohol could be the reason why male-headed households contribute to poverty more than female-headed households. Addiction to alcohol reduces expenditure on household food; this leads to malnutrition and poverty; it also leads to school drop out cases, and poor performance in schools due to family instabilities. According to Grogan (2004) one potential reason for greater preferences for alcohol and tobacco consumption

in households containing men is simply because men are more likely to be addicted to alcohol and/or cigarettes than are women. The same study argues that, substance addiction strongly affects consumption choices and that, the fact that a man is more likely to be addicted than a woman may be behind apparent gender differences in preference for household consumption for items like children clothes and food in which case male heads spend less on these items than females heads. According to Grootaert and Ravi (1995) in a model fitted in Ivory coast Panel data, it was found that, the presence of adult males in rural households appears to have a negative effect on levels of rural household expenditure: According to the model, each adult male was found to reduce per capita expenditure by half a dollar, more than twice as much as a child or female adult.

1.2: Statement of the problem

There is an indication of existence of gender inequality in intra-household allocation of resources in the rural setting. The reason behind this is improper definition of property rights, which according to history and traditions favors men (Davison, 1988). According to Davison, peasant women's economic position as agricultural producers was weakened by the 1954 Swynnerton Plan. By individualizing holdings and awarding male heads of household's title deeds, women's guaranteed access to cropland was endangered and their ability to secure loans for improvements on existing land was circumvented. In addition, the Plan's emphasis on cash cropping marginalized women's position as food producers.

This gender inequality affects the entire family for example in the provision of food to the household and other basic goods. This is evident in that most male-headed households' farms are commercialized. Smallholder with large land allocate a major proportion of land to cash crop production, with the result that women spend more time in the production of cash crop than in that of food crop (Davison, 1988). In addition, income from cash crops is paid in lump sum. Men tend to use this lump sum income more on themselves in unproductive social activities such as taking of alcohol instead in buying of food. Farm commercialization therefore minimizes the land acreage on food crop and if earnings from cash crop are not used in purchasing food, then the family is left without food (Kiriti and Tisdell, 2003).

Also of great importance is the evidence is lack of cooperation in decision-making between men and women in intra-household sharing of income (Wittenberg, 2003). This leads to acceptance of a non-cooperative model of intra-household allocation developed from separate sphere model (Lundberg and Pollak, 1993) of allocations due to specialization in gender roles which according to Davison (1988), are either gender specific or collaborative. Because of this gender specific specialization in household tasks, the use of chicken game (Perma, 2003), should be a better option if adopted instead of the prisoner's dilemma in explaining different household resource sharing outcomes as has been done by most of economists who have been modeling intra-household resource allocations. In this case, women become the major contributors in the provision of household public good while men continue pursuing their personal social utility maximizing behaviour, which does not always lead to improvement of family welfare.

According to Kenyan, Economic Survey (2005), household size has been known to influence poverty. It is a belief that poverty incidence is directly correlated with household size, such that the larger the household, the more the poverty incidence. This emanates from over dependence in larger households limiting effective utilization of scarce resources, contrary to the situation of smaller households. Poverty within households is known to be a key factor in children leaving home for the streets, where they often drop out of school, become involve in substance abuse, and are vulnerable to exploitation (Grogan, 2004).

There have been reported cases of gender inequality in the areas of education in Sub-Saharan Africa. The education of the mother has positive and significant impact on the nutritional status of children. Education allows the mother to understand how to manage her child's nutrition, illness, and hygiene (Fambon, 2003).

1.3: Main Objective

The main objective of this study was to find out whether inequality in intra-household resource allocation has any significant effect on food provision in rural Kenya, using Mathioya Division, in Murang'a District, as a case study.

1.4: Specific Objectives

- Male headed-ship in rural households has a significant effect in increasing agricultural commercialization.
- Male head-ship has a significant effect on availability of food to household members leading to poor nutrition.
- The presence of a man has a significant effect on household expenditure per capita.
- Males' claim on household expenditure is greater than their contribution to household earnings.

1.5: Justification of the study

Rural Kenyan households made a good case for investigating issues of intra-household decision-making, since the cultivation of land is usually divided along gender lines (Bryceson, 1995; Kajembe, 1994; Davison, 1988; Dey, 1993). Women and men are responsible for different land plots and often grow different crops, which is a common practice in many Sub-Saharan countries. The surplus, which is not committed for subsistence consumption, is sold at the market, whereas the money earned belongs to the women except that the sale of produce from cash-crops belong to men. Access to land by women is often restricted, and allocation of productive inputs like fertilizer is usually biased towards men. Women and men often show differing degrees of returns to production (Quisumbing, 1996).

Allocation decisions affect land management, where women often utilize different techniques than men. Land plots cultivated by women are often less productive because of deficiencies in natural resource management which relates to inefficient distribution of resources within households (Dey, 1997). Given the absence of women's effective control over land use and income from cash crops (which usually arrives in lump sum after a long duration of time), per capita food availability may decline as more land is put under cash crops because men mainly control cash incomes and they are less likely to use it for food purchases than females. Hence food may be scarcer in farm households headed by males than those headed by females (Kiriti and Tisdell, 2003). This study tries to ask the following research questions.

1.6: Research questions

- Does male head-ship in rural societies lead to increase in agricultural commercialization?
- Does male head -ship have any effect on availability of food to household members leading to poor nutrition?
- Does the presence of a man have any the significant effect, of reducing household expenditure per capita?
- Are male claims on household expenditure greater than their contribution to household earnings?

1.7: Organization of the Study

Chapter one of this paper is the introduction, which contains the background of the problem, the statement of the problem, the main objective, research questions and justification of the study. Chapter two has the overview of the literature review, the theoretical and empirical literature reviews. Chapter three has the model specification, both theoretical and empirical models, scope of the study, methods of data collection and estimation. Chapter four has the results and limitations of the study and chapter five has recommendations and conclusion.

CHAPTER TWO

2.1: Theoretical Literature Review

Economists analyzing household decision making allocation have traditionally assumed that the household acts as a single unit (Samuelson, 1956). It is assumed that there exists a single decision maker whose preferences form the basis of a household welfare function and that all household resources are effectively pooled. This is termed the "unitary model" (Alderman, Chiappori, Haddad, Hodinott and Kanbur, 1995) the "Common Preference Model" (Lundberg and Pollak 1996), or the "Joint Family Utility Model" (Rosenzweig and Schultz, 1984). More recently, the assumptions behind this approach have been questioned for example according to Quisumbing and Maluccio (2003), Becker's unitary models household utility $U(x)$ is maximized subject to the budget constraint $p \cdot x = \gamma = y_j + y_m + y_f$ to get the demand function $x_i = x_i(p, Y; \gamma)$ Where m is man, f female, y_j , Joint income, y_m and y_f are male and female incomes respectively. This model according to Quisumbing and Maluccio (1999) was rejected due to lack of common preference in a household. In its place, a collective model was suggested in which case (Quisumbing and Maluccio, 1999) a cooperative bargaining model, the two individuals do not cooperate. Their utility functions are $u_m^0(x_0, x_m, L_m)$ and $u_f^0(x_0, x_f, L_f)$ respectively. X_0 is public good consumed by both m and f, male and female consume x_m and x_f and L_m and L_f is leisure consumed respectively. If they don't cooperate, their indirect utility are $V_m^0(p_0, p_m, w_m, N_m; \alpha_m)$ and $V_f^0(p_0, p_f, w_f, N_f, \alpha_m)$ where the V^0 are the threat points the utility obtained independent of cooperation, while the α 's are referred to as extra-environmental parameters (EEPs). In the context of household formation, these EEPs affect the relative desirability of being single and may include access to common property resources and divorce laws. U_m and U_f are the economies of scale they enjoy for cooperating. If they both cooperate, $U_j - V_j > 0$ and $j=m,f$ If the gains from cooperation are apportioned through negotiation, then the outcome is a binding and enforceable agreement regarding the division of gains from cooperation by assuming that individuals agree to maximize a "Nash utility gain product function." This takes the form of $M = (U_m - V_m)(U_f - V_f)$ which is maximized subject to a joint

full income constraint yielding demand functions (for, say, food, water, health care) of the following form:

$$x_i = x_i(p, w, N_m, N_f; \alpha_m, \alpha_f); \quad i = 0, m, f. \quad \text{And}$$

$$L_i = L_i(p, w, N_m, N_f; \alpha_m, \alpha_f); \quad i = m, f$$

An alternative, the "Collective Model," takes as its starting point the possibility that different household members have different preference orderings and that the resolution of these differences is a nontrivial problem. One approach (Chiappori, 1997) starts with individual utility functions and assumes only that the reconciliation of differing preferences is Pareto efficient (Browning, and Chiappori, 1998). Testing for Pareto efficiency, it is not possible to test whether the collective model cooperative bargaining model, or non-cooperative bargaining model best characterizes the intra-household allocation of resources. What can be tested is whether a Pareto efficient outcome is attained. A Pareto efficient outcome is defined as one in which no one can be made better off without making someone else worse off. Claiming that an outcome is Pareto efficient is not synonymous with saying the outcome is desirable or preferred from a policy or welfare perspective. A situation in which one household member receives all of the resources could be Pareto efficient. There are two aspects of Pareto efficiency that can be tested. First, one can test whether there is a constant ratio of income effects across all pairs of goods; i.e. whether marginal utility is being equated across all individuals. If the marginal utility is higher for one person, the budget could be reallocated to increase the utility of at least one person without decreasing any one else's utility. If the following equation holds for all pairs c, c_j ,

$$(\partial c_i / \partial y_f) / (\partial c_i / \partial y_m) = (\partial c_j / \partial y_f) / (\partial c_j / \partial y_m)$$

Whereby y_f is women's income and y_m is men's income, we can conclude that the household is allocating consumption goods Pareto efficiently. (If the data are consistent with a common preferences model, then this ratio will equal one.) Thus, the result that this equation holds is consistent with any of the models; if it does not hold, then the unified and collective models and the cooperative outcome of bargaining models are rejected (Doss, 1996). Second, one can test whether there is a constant ratio of marginal productivity across all inputs; i.e., whether marginal productivity is being equated across all production activities (Doss, 1996). The collective model assumes that a Pareto efficient point is chosen. Thus; a rejection of Pareto efficiency implies a rejection of the collective model. The cooperative bargaining model predicts which Pareto

efficient point is chosen, based on the specification of the model. It is difficult to reject the cooperative bargaining model based on the conclusion that a different Pareto efficient point than the one predicted by the model was attained. A rejection of Pareto efficiency implies, however, a rejection of a cooperative outcome of a cooperative bargaining model. It rejects a “divorce threat” cooperative bargaining model but is consistent with a non-cooperative outcome of the separate spheres bargaining model.

McElroy (1990), building on earlier collaborative work by McElroy and Horney (1981) as well as a related paper by Manser and Brown (1980), indicate that individuals use a cooperative Nash-bargaining solution as the mechanism by which differences in preference rankings are resolved. A somewhat different approach, (Carter and Katz, 1997; Becker, 1974; Black, 2004; Ulph, 1988), uses non-cooperative game theory. This non-consensus model (Manser and Brown, 1980) assumes heterogeneity within households in terms of the way parents, and sometimes other members as well, allocate household budgets among all members of the household. Instead of resolving differences through preferences, individual household members maximize their own utility functions, taking as given the maximizing actions of other household members. When male members have control over household budgets, for example, the intra-household distributional outcomes are often different from when female members have control: the males are more likely to pursue their own interests, often at the expense of those of their children (Black, 2004).

According to Lundberg and Pollak (1993; 1994; 1996) model of non-cooperative behavior the threat points refer to individual members threatening *not* to cooperate in respect of the household public goods they produce. Although Nash equilibrium is still possible here, the model does allow for inefficient “uncooperative” outcomes whereby household public goods are underprovided and/or produced inefficiently. The core of the problem is imperfectly defined property rights within the household (Wittenberg, 2003), which may give rise to inefficient outcomes, i.e. to an actual distribution among members that differs from the ideal “sharing rule” associated with perfectly defined property rights. Even if the ideal sharing rule is determined through bargaining on the basis of, say, individual contributions to household income, predatory behavior subsequently could lead to a distributional outcome different from the ideal in the

Becker's sense (Black, 2003). According to Lundberg and Pollak (1993) using separate spheres model, targeted transfers need not be neutral. The threat point from which a cooperative Nash bargaining proceeds is not divorce, but a non-cooperative equilibrium within the marriage. Focal-point equilibrium may consist of complete gender specialization in the provision of household public goods corresponding to a conventional gender assignment of responsibilities. In this non-cooperative model it is once again true that distribution depends on individual resources, due to the corner solution in public-goods provision.

According to Black (2003) in a research done in South Africa, patriarchal male head of household, who is also egoistic (and/or addictive), wishes to maximize his expected utility from consuming two goods, N and F, (household) utility function containing two composite goods, one of which is a normal or relatively high quality good, N, and the other an inferior or low quality good, F. A prevalence of inferior goods in the household budget may impact negatively on the health status of individual members.

Maximize utility $U_h = U_h(N_h, F_h)$

Subject to $U_r = U_r(N_r, F_r) \geq k$ as well as the budget constraint,

$$B = P_n(N_h + N_r) + P_f(F_h + F_r),$$

where subscript r refers to the rest of the household (assumed to be altruistic in the Becker-Tomes sense), and k is some minimum utility level. Fig. 1 gives a simple illustration of this proposition.

FIGURE 1: Expenditure Pattern of a Patriarchal Non-Altruistic Head.

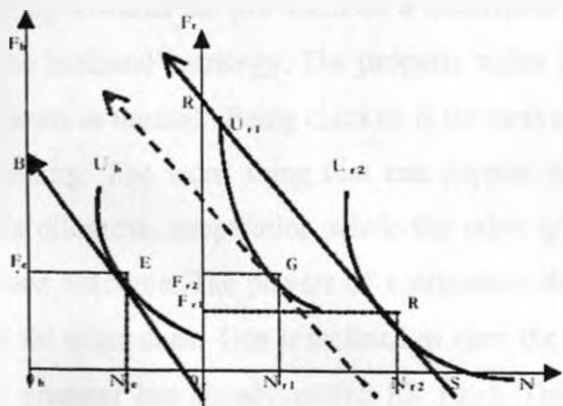


Fig 1

The household head retains the equivalent of $O_h B = O_h O_r$ of the total household budget for himself and achieves an initial equilibrium at point E. The rest of the household gets $O_r R = O_r S$ and consumes at point R. When faced with a cut in the household budget, the head may utilize his position of power and maintain his own level of consumption, thus effectively bringing about a decrease in consumption by the rest of the household, e.g. the movement from point R to G – provided $U_{r1} \geq k$.

Engle and Menon (1999) find that in many developing countries all household income – irrespective of the source – is often appropriated by the male head of household who is also the sole distributor of such income within the household. Simister and Piesse (2003) capture the relevant policy implications succinctly: “the crucial issue is not whether a woman earns money, but rather whether she controls it”. According to Hartmann (1987), the household has been viewed as the locus of tension and struggle where unequal power relations between women and men are manifested. This approach questions the notion of the family as a harmonious unit, suggesting that it must be understood “as a location of production and redistribution”. In Kisii District, Kenya, the majority of women also cannot rely on any financial support from an adult male and ‘households have become violent battlegrounds’. Recent data including well-documented cases of violence against women from the District hospitals ‘indicate that violent (sexual) behavior, even rape seem to have become men’s strategies in their pursuit of control, identity, self esteem and social value’ (Silberschmidt, 1999) pp. 24 in Sender (2002).

Table 3(a) is used to explain the outcome in a game of two players with the strategy of either contributing or not contributing towards the provision of a household public good. Let row be wife’s strategy and column be husband’s strategy. The property rights favor men such that even if they don’t cooperate it is taken as normal. Being chicken is the next to worst outcome, but still better than both not contributing. The worst thing that can happen is for both players *not* to cooperate. In the prisoner’s dilemma, cooperation while the other player does not cooperate (being the sucker) is the worst outcome. The players of a prisoner’s dilemma are better off not cooperating, no matter what the other does. One is inclined to view the other player’s decision as a given (possibly the other prisoner has already spilled his guts). Then the question becomes, why not take the course that is guaranteed to produce the higher payoff? The game of chicken

has two Nash equilibriums. The equilibrium points are the cases where one player cooperates and the other doesn't (lower left and upper right). The outcome where one does not contribute while the other one does is also an equilibrium point. What actually happens when this game is played is hard to say but one can use the following example to tell the outcome.

TABLE 3 (a): Outcomes in a Game of Chicken

Husbands Strategy \ Wife's Strategy	Cooperate	Not Cooperate
Cooperate	3, 3	-2, 5
Not Cooperate	5, -2	-4, -4

Source: Game Theory.net

Under Nash's theory, either of the two of the equilibrium points is an equally "rational" outcome. Each player is hoping for a different equilibrium point, and unfortunately the outcome may not be an equilibrium point at all. Each player can choose not to contribute – on grounds that it is consistent with a rational, Nash-equilibrium solution – and rationally crash. Strangely enough, an irrational player has the upper hand in chicken. The random player illustrates another difference between chicken and the prisoner's dilemma. With an opponent you can't second-guess, you might be inclined to play it safe and cooperate. Of the two strategies in chicken, (cooperation) has the maximum minimum. In the prisoner's dilemma, defection is safer as shown in Table 3 (b).

TABLE 3 (b): Prisoner's Dilemma

Husbands Strategy \ Wife's Strategy	Cooperate	Not Cooperate
Cooperate	3, 3	-2, 5
Not Cooperate	5, 2	0, 0

Source Perma, 2003

This non-cooperative game is what is called a dilemma. This is because players acting in an individually rational way end up in a bad state. If they attempt to collaborate, incentives on the

other to cheat on the deal to exposes each to the risk of finishing up in the worst of all possible states. This is well detailed in Table 3(b).

2.2: Empirical Literature Review

According to Kiriti and Tisdell (2004), farmlands belonging to households headed by males are more commercialized than those headed by females. They produce proportionately less subsistence output than female-headed households. They also found that increase in cash from increased commercialization and reduced subsistence farming does not increase food purchases by males. The married women also lose control of cash income with increased commercialization as their husbands take control of it and husbands are less likely to use cash income to purchase food than females. With decreased subsistence output and loss of control of cash income by women, families of married women have less food than their unmarried counterparts because of commercialization. The index of agricultural commercialization is positively associated with per capita food availability for female-headed households (Kiriti and Tisdell, 2004). Other indices put into consideration are index of deprivation, index of assets among others.

In a survey done in Mpumalanga in South Africa, indices of deprivation experienced by individuals and households were described through an examination of child mortality, female literacy and other education attainment indices, as well as asset ownership indices. Descriptive statistics was used to illustrate the severity of their suffering and, where possible, to compare levels of deprivation in the Mpumalanga survey with other south African evidence concerning rural households. Illiteracy rates for young women in rural communities were consistently two or three times higher than those of women in urban areas. Family preferences to educate boys, and the need for subsistence agricultural labor, are often cited as factors limiting the education of girls in rural communities (Heyzer, 1995). According to Mortley (1983), mothers, skills, time and health impact directly on the proximate determinants. A mother's education level can affect the child's survival by influencing her choices and increasing her skill in healthcare practices related to contraception, nutrition, hygiene, preventive care, and disease treatment. In fact, so many proximate determinants may be directly influenced by a mother's education to radically

alter chances of child survival-social synergy. According to Sender (2002) in a survey done in South Africa Mpumalanga the low level of education achieved is likely to have an adverse effect on the nutrition and survival prospects for their children. Even die-cultural relativists acknowledged the deaths of young children, as a useful indicator of deprivation and suffering. According to information collected concerning the number of children ever born to all women, the number of child deaths and the age at which children died. Thus, the under-five mortality rate, defined as the ratio of the total number of births total number of child deaths at an age of less than 5 years. There was a significant correlation between household child's death ratios and both the Female Education and the Possession Score whereby Pearson correlations at the 0.01 level (2- tailed).

Classifying households on the basis of asset index such as the Possessions Score not only produces similar results to a classification based on per capita consumption expenditures, it provides a better basis for predicting important aspects of household welfare, such as the educational attainment of household members, than consumption expenditures. Household consumption expenditure and the Possessions Score can be interpreted as proxies for something unobserved; namely, a household's economic status. According to Filmer and Pritchett, (1998) there is no priori argument as to why current consumption expenditures are a better proxy of long-run household economic status than an index of assets. Besides, the Possessions Score is much less contaminated with, measurement error than most conventional measures of household consumption expenditures.

According to Doss (1996) in her study of Ghanaian households, current asset holdings may also be affected by asset accumulation decisions made within marriage. Depending on provisions of marriage laws, assets acquired within marriage may be considered joint property and will not be easily assignable to husband or wife. The validity of inherited assets as an indicator of bargaining power may be conditional upon the receipt of these assets prior to marriage, unless bargaining power also depends on the expected value of inheritance. Inherited assets could also be correlated with individual unobservable, such as previous investments in the individual during childhood (Strauss and Thomas, 1995). Economists turn to ethnographic evidence and qualitative methods to guide the construction of appropriate measures of bargaining power. For

example based on anthropological evidence from the rural Philippines, Quisumbing (1994) argues that inherited landholdings are a valid measure of bargaining power since land is usually given as part of the marriage gift and major asset transfers occur at the time of marriage. According to Quisumbing (1999), assets brought to marriage are related to set of indicators of bargaining power that are not affected by decisions made within the marriage, though they are susceptible to the same potential endogeneity problems as inheritances. Therefore search for appropriate indicators of bargaining power should be guided not only by the need to find factors that are exogenous to decision-making within marriage, but also by their cultural relevance.

Grogan (2004) examining the effect of government transfers on household expenditure patterns, paying special attention to the gender composition of households, used the random effects Tobit (censored regression) panel data model to show that women are more concerned with the nutrition of both children and adults in the household than are men, the reason being that men prefer taking alcohol more than Women. Panel data estimators that control for unobserved heterogeneity between households were used to show that gender differences in consumption patterns are not caused by systematic unobservable preference differences across household type. One potential reason for greater preferences for alcohol and tobacco consumption in households containing men was simply because men are more likely to be addicted to alcohol and/or cigarettes than are women. Because substance addiction strongly affects consumption choices, the fact that a man is more likely to be addicted than a woman may be behind apparent gender differences in preference for consumption of items like household food and children's clothing, whereby male spend less than females. Results of a model fitted to the Ivory Coast panel data is that one presence of adult males in rural households appears to have a negative effect on levels of rural household expenditure as each adult male reduces per capita expenditure by 2 dollars, more than twice as much as a child or female adult (Grootaert, 1995). The presence of a man might not simply have the significant effect, noted in the Ivory Coast panel data, of reducing household expenditure per capita, when male claims on household expenditure are greater than their contribution to household earnings. Male control of the household budget is mostly associated with lower levels of spending on food, child health care and education (Simister and Piesse, 2002), and with higher levels of spending on alcohol and tobacco (Hoddinott and Haddad, 1995; Louw and Shaw, 1997; Parry, 2000).

Table 4 gives a summary of the literature involved in testing of intra-household models.

TABLE 4: Tests of Intra-household Resource Allocation Models¹

Null hypothesis ²	Common Preference Model	Unified Model	Collective Model	Bargaining Models ³	
				Cooperative Outcome	Non-cooperative Outcome
Individual labour income does not affect Expenditures	Reject	Consistent	Consistent	Consistent	Consistent
Individual exogenous income affect expenditure	Reject	Reject	Consistent	Consistent	Consistent
Individual exogenous income labour supply	Reject	Reject	Consistent	Consistent	Consistent
Pareto efficiency: Constant ratio of income effect	Reject	Reject	Reject	Reject	Consistent
Pareto efficiency: Constant ratio of marginal Productivity on inputs	Reject	Reject	Reject	Reject	Consistent

Source; World Development: in Doss (1996)

The following is the Literature on the testing of various intra-household models;

Testing the common preferences model: The demonstration that individual labor income, as opposed to total household income, affects household expenditure patterns - holding total household income constant, is sufficient to reject the common preferences model. Under the common preferences model, expenditure patterns should depend only on total household income - not on who earns it. A number of studies have rejected the common preferences model. For example, using 1986 data from Canada, Phipps and Burton (1993) demonstrate that even for the sub sample of households where both the husband and wife worked full time, the sources of income made a difference in the level of expenditure on eight of 12 categories of consumption goods. Cai (1989) cited in McElroy (1992), used the US Consumer Expenditure Survey data and

For the bargaining models, we test whether the outcomes are cooperative or non-cooperative.

² The cells indicate whether a rejection of the null hypothesis is consistent with the model or implies a rejection of the model.

³ All of the null hypotheses assume that total household income is held constant.

rejected the common preferences model. In addition, Hoddinott and Haddad (1995) analyzed the determinants of household expenditures in Cote d'Ivoire and found that the percentage of female income significantly affected budget shares for a number of goods. The results of these studies were consistent with any of the other intra-household models.

Testing the unified household model: The finding that individual labour income affects household expenditures, holding total household income constant, does not reject a unified household model in which households are assumed to be making both production and consumption decisions. Furthermore, in many instances, the unified household model and the cooperative bargaining model are observationally equivalent, given the available data. Senauer, Garcia and Jacinto (1988) demonstrate this point in a study on the Philippines. Their paper estimates the effect of individual wage rates on the intra-household allocation of food. In this study, a household is defined as a unit that pools all or most of its income; thus the question of whether the household faces a single budget constraint is assumed and not tested. To demonstrate that the models are observationally equivalent, the unified household model is used to obtain reduced form demand equations for each individual within the household. The same reduced form demand equation for food is obtained using a cooperative bargaining framework. The threat point for each person in the bargaining model is based on wages, which are assumed to be the same whether individuals are married or divorced. No parameters that would shift the threat point are included. Thus, the reduced-form demand equations are the same for the cooperative bargaining model as for the unified household model. These authors conclude that the value of time of household members, as represented by estimated wages, affects the intra-household distribution of food. This result rejects the common preferences model, but is consistent with the other intra-household models.

Although it is difficult to reject the unified household model entirely, it is possible to reject some version of it. For example, it is possible to reject assumption of the "household-firm" model that allocations are based on marginal productivity if an exogenous variable influences household consumption patterns. Exogenous factors could include non labor income or policies that do not change the productivity or incomes of individuals within households but affect their bargaining

power - specifically, their "threat points" in the context of a cooperative bargaining model. For example, exogenous sources of income (such as transfers or non-labor income) do not alter the marginal productivity of individuals within the household. Thus, the unified household model predicts that all exogenous income should be spent in the same manner, regardless of who receives it; in other words, there is only an income effect from receipt of unearned money. In addition, such exogenous wealth shocks should affect household factor supply decisions in the same manner, regardless of which household member receives the money. If the data indicate that exogenous income affects expenditure patterns differently, depending on who receives the income, unified household model would be rejected. Similarly, if a new policy affected the intra-household allocation of resources, without directly influencing prices or incomes, the unified household model would be rejected (Doss, 1996).

In order to test the assumptions of the unified household model, Thomas (1993) uses data from Brazil to test whether the distribution of non-labor income within the household has any impact on expenditures. Thomas's results indicate non-labor income controlled by women is associated with larger increases of the household budget share being devoted to human capital and leisure. Thus, the unified household model is rejected. Thomas and Chen (1993) obtain similar results for Taiwan. Non-labor income of individuals is significant in explaining household resource allocations. Doss (1996) finds that, in Ghana, the percentage of assets owned by women is also significant in explaining household expenditure patterns. These works suggest that measures of bargaining power not directly related to labor income may affect household economic decisions (Doss, 1996).

On bargaining models, Lundberg, Pollak and Wales (1995) examine the impact of a shift in policy in the United Kingdom from a child tax allowance that was primarily realized as a tax credit in men's paychecks to a child benefit scheme that primarily accrued as a direct payment to women. Testing for the effects of this policy change, they found that expenditures on women and children's clothing increased relative to expenditures on men are clothing (Doss, 1996).

Where these four studies focused on consumption patterns, two additional studies have looked at household labor supply to test the implications of the unified household model. Both Homey and

McElroy (1988) and Schultz (1990) in Doss, 1996, assume that non-labor income is exogenous to household production decisions and test whether non-labor income affects household labor supply. Homey and McElroy (1988) develop a three-equation linear expenditure system consistent with the Nash model. The three goods are male supply of market labor, female supply of market labor, and expenditures on a composite commodity. The results show that individual non-wage income is significant in determining levels of labor supply: the Nash bargaining expenditure system does not collapse to the system of the unified household (Doss, 1996).

Similarly, using data from Thailand, Schultz (1990) in Doss (1996), demonstrates that the unearned income of women affects the amount of wage labor that they provide. The results found were different for men's supply of wage labor. In addition, only the unearned income of women neither man's unearned income nor men or women's earned income - is associated with women's fertility levels. This suggests that unearned income shifts the bargaining power of women in the household. These two studies provide further evidence rejecting the unified household model (Doss, 1996).

Thomas and Chen (1993) in Doss, 1996, using data from Taiwan, calculate the ratio of income effects for men and women across all pairs of goods.

They find that this equation $(\partial c_i / \partial y_f) / (\partial c_i / \partial y_m) = (\partial c_j / \partial y_f) / (\partial c_j / \partial y_m)$ holds for all pairs

of goods, and thus their results indicate that a Pareto efficient consumption outcome was

obtained. An additional test was done by Bourguignon et al (1993) using data from France;

After rejecting the common preferences model, they tested whether this equation $(\partial c_i / \partial y_f) / (\partial c_i / \partial y_m) = (\partial c_j / \partial y_f) / (\partial c_j / \partial y_m)$ holds and that the marginal propensities to

consume out of total income are the same across goods. Using data for households in which both adults work full time and in which there is at most one child, the behavior that they observe is consistent with the hypothesis that households allocate resources efficiently and obtain a Pareto efficient outcome. Thus, their results are consistent with the unified household model, the collective model, or either of the bargaining models (Doss, 1996).

In order to test whether production resources are allocated Pareto efficiently, Udry (1994) in Doss, 1996, uses detailed agronomic data from Burkina Faso. He finds that crop yields are different for plots controlled by men from those controlled by women within the same household in a given year. He also finds that the household could achieve higher total output by reallocating labor and fertilizer from men's plots to women's plots. This result is inconsistent with Pareto efficiency. Pareto efficiency requires that the marginal productivity for an additional unit of labor or fertilizer be the same across all plots within the household (Doss, 1996).

Jones (1983 and 1986) in Doss (1996), found similar results in an analysis of labor allocation after the introduction of irrigated rice production in Northern Cameroon. Both men and women continued to grow sorghum after the introduction of irrigated rice, although the returns to labor from rice production were higher, because they were unwilling to rely on the market for sorghum to meet their subsistence needs. Men and women cultivate sorghum on separate plots, whereas rice fields are jointly cultivated. Much of the rice is sold and the income belongs to the men. Although most women received some compensation for working on the rice plots, the amount of compensation was contested. Jones suggests that women were holding out for higher compensation and undersupplied labor to the rice fields. Higher household income could have been attained if women allocated a greater proportion of their labor to rice production. Thus, Pareto inefficient outcomes were attained (Doss, 1996).

According to Quisumbing and Maluccio (2003) in testing for Pareto Efficiency whereby the ratio of male-to-female income effects is identical across all pairs of goods, assume that the household optimization program is $\text{Max } \mu U_m(x_m, x_f, x_0; g) + (1-\mu) U_f(x_m, x_f, x_0; g)$ and $px + px_0 = Y$, Where p is a vector of prices for both private and public goods and Y is income, U_m is male utility function and U_f is females utility function. The weighting function μ is a function of prices, incomes, and household characteristics, while the demand for any private good x_i is a function of prices and income as well as the weights μ . $x_i = x_i(p, Y; \mu, g)$. Conditional on μ , the demand functions satisfy the properties of homogeneity, adding-up, and Slutsky symmetry. According to Browning and Chiappori (1998) treating the weights as endogenous leads to a series of Slutsky-like conditions and testable restrictions on the data. Given three sources of income, e.g, y_j, y_m, y_f , and differentiating the demand functions, the ratio of any two income effects:

$(M_{x_i} / M_{y_m}) / (M_{x_i} / M_{y_f})$ is independent of i — which is true for both public and private goods.

Testing whether assets brought to marriage by each spouse have differential effects on intra household allocation. Quisumbing and Maluccio (1999) tested whether assets brought to marriage by each spouse have differential effects on intra household allocation, estimated the following expenditure function.

$$w_j = \alpha_j + \beta_1 \ln pcexp + \beta_2 (\ln pcexp)^2 + \beta_3 \ln size + \beta_4 \ln A_h + \beta_5 \ln A_w + \sum_{k=1}^{K-1} \delta_k dem_k +$$

$\sum_{s=1}^S \varphi_s z_s + \varepsilon_j$ Where: w_j is the budget share of the j th good; $\ln pcexp$ is the natural logarithm of total per capita expenditures, and $(\ln pcexp)^2$ is its square; $\ln size$ is the natural log of household size; $\ln A_h$ and $\ln A_w$ are the natural logs of assets owned by the husband and wife, respectively; dem_k is the proportion of demographic group k in the household; and z_s is a vector of dummy variables indicating location and survey round; ε_j is the error term; and $\alpha_j, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \delta_k$, and φ_s are parameters to be estimated. Square of \ln per capita expenditure is included so that any observed differences in the effects of individual assets would not be simply picking up nonlinearities in the Engel curve (Thomas and Chen (1994)). Controlling for levels of household income (as proxied by per capita expenditure), if the unitary model holds in a static framework, assets of husband and wife should have no effect on allocations so $\beta_4 = \beta_5 = 0$.

Testing the effects of husband's and wife's resources on individual outcomes A slightly different formulation for testing the effects of husband's and wife's resources on individual outcomes (Thomas, 1990; 1993 and 1996) is by estimating child's schooling outcome as a function of child characteristics (gender, age, and age squared) and parental characteristics at the time of marriage: education of the husband and wife, and assets at marriage of the husband and wife. That is,

$$E^*_{ij} = \beta_0 + \beta_1 x_{c_{ij}} + \beta_2 x_{f_{ij}} + \beta_3 x_{m_{ij}} + \beta_4 G_{ij} \cdot x_{f_{ij}} + \beta_5 G_{ij} \cdot x_{m_{ij}} + \varepsilon_{ij}$$

Where: E^*_{ij} is the educational outcome of child i in family j ; x_c is a vector of child characteristics such as sex, age, and age squared; G is the daughter dummy, and x_f and x_m are vectors of exogenous father's and mother's human and physical wealth, respectively, and ε_{ij} is

the error term in each equation. Following some tests of the unitary model, which include both human and physical capital as assets inherited, father and mother's wealth at the time of marriage enter separately into the regressions. The above equation estimated both in levels and with family fixed effects. It is possible that omitted family-level variables are correlated with regressors, and thus their estimated effects on the educational outcomes may be biased. For those families with at least two children, the within family allocation can be used as the source of variation in the sample from which to estimate intra-household differences. A fixed effects estimation procedure controls for these un-observables using family-specific dummy variables. In this specific application, only the child's sex, age, age-squared, and the interaction between child sex and parent characteristics remain as explanatory variables. While the effects of variables that do not vary across children cannot be identified, their gender implications may be investigated to the extent that they impact differently on children of different sex. Multicollinearity may be as a result of choosing sex, which can be either a boy or a girl. On the other hand, if educational outcomes were affected by individual heterogeneity, a random effects procedure would be appropriate. A Lagrange multiplier statistic tests for the appropriateness of the random effects model compared to ordinary least squares (OLS) without group effects, while a Hausman test compares the random effects model to a fixed-effects specification.

Lundberg and Pollak (1993) tested a non-cooperative model considering separate spheres in marriage. They suggested a good case for the model was a situation where roles were specialized. Although a corner solution was rejected for child transfers, this model together with the one from Wittenberg (2003) can make a good case for rural Kenya where even though a corner solution may not be an outcome, separate sphere model will fit in well in rural Kenya where household chores specialized between men and women. It will also highlight the pressure that lies on women's hands as they try to fend for the family with limited resources while men use the household resources to maximize their utility without putting into consideration the family utility and the budget constraint family public goods are therefore underprovided (Wittenberg, 2003).

Chicken Game player outcome (Perma, 2003) fitted better than the Prisoner's Dilemma outcome because in this case the spouse had no option other than contribute while the husband was

avored by property rights governing the sharing and distribution of resources. Due to lack of formal education and assets hence inaccessibility to loan facilities, there were no escape routes from poverty for the women and hence entire household and the society at large (Hashemi et al, 1996).

Tobit model was used by Kiriti and Tisdell (2003) to show the effects of cash cropping on food availability in Kenya, whereby, the results indicated that household food purchases and food availability may suffer as a consequence of increasing cash cropping in Kenya. The results found indicated that, increase in agricultural commercialization tends to negatively influence per capita food availability at the family level. Households of married women suffer more in terms of food availability than households headed by women. Muller and Croppenstedt (2000) used Heckman 2 stage on estimating the impact of farmers' health and nutritional status on their productivity and efficiency in Ethiopia. Inverse mills ratio obtained from Probit was introduced into the model then OLS was used to estimate the model in the second stage the equation. The results were significant.]

2.2: Overview of the Literature Review

As seen from above, the literature review was divided into theoretical literature and empirical literature. In the literature, different intra-household models of resources allocation over time were discussed. It began with explaining distinguishing one model from the other and the testing of these models to either accept them or reject them and why. The literature moved further to explain the reason why those models could not be applicable in the area under study and gave suggestions for the appropriate model to be adopted. Further the literature gave the kind of model of estimation to be used and areas where it had been used

CHAPTER THREE

3.0: Methodology

This paper attempts to expand the literature on intra-household allocation in two ways. First, it applies the same methodological framework to test the unitary model in a zone with same social cultural norms governing rules of inheritance and same economic conditions and climatic conditions. Second, it uses data sets that have been specifically designed to examine intra-household allocation and household decision-making, drawing on qualitative information to create culturally specific but quantifiable indicators of gender inequality. Tobit Model was adopted, as it fits well in a combination of normal probability distribution function and a censored or truncated data set that follows a cumulative density function. One part of the data set used was continuous and the other discrete (Green, 2000).

3.1: Conceptual Framework

Gender inequality in the distribution of household resources was based on the level of fairness on how resources are allocated within the household. They were either fairly or unfairly allocated. This inequality was stemming from improper definition of property rights, which have been found to favour males. As a result of this inequality females could not be allowed to inherit property such as land, could not own assets, could not dispose some of assets to cater for other basic household needs, could not be involved in decision-making regarding agricultural production, had no entitlement or accessibility to loan facilities and so on. Rules of inheritance governing inheritance of property favour male adults Davison (1988).

A household maximizes its utility $U = f(\text{food and non food items})$;

Subject to the constraint which is a function of household income which is a function of wages earned, income from agricultural products, from household assets owned and so on. Becker's unitary model would be applicable if maximization of utility by the benevolent head of the household will maximize the utility of the entire household (Becker 1978). This is not possible because due to imperfect nature of property rights within the household, individuals can preemptively claim resources that do not really belong to them (Wittenberg, 2003). Also those

preferences are not similar as assumed by Becker. Inequality therefore reduced their bargaining strength for some household members. Therefore, Intra-household resource allocation was a function of bargaining strength among other things. This bargaining strength was determined by variables such as inheritance of property, ownership of assets and assets brought into marriage. Bargaining strength gave one power to make decisions on utilization of household resources to maximize ones utility function.

Provisions of household tasks are either gender specific or gender collaborative. This specialization in provision of household public good leads to free riders problem when the household head is not altruistic. This gives the possibility of a corner solution with the non-ultruistic head free riding. The free riding problem leads to under provision of public good. This non cooperative behaviour in the provision of house hold good would lead to divorce if the threat point is divorce as is in cooperative model by Manser and Brown (1980). In this case, the threat point is not divorce but any other form of abuse as is in Lundberg and Pollak (1993). According to Kiriti, 2003, in the area under study, women can never have the threat point as divorce for they lose everything they ha attained in marriage and if they have to leave they leave with all the children without any compensation. However, the husband starts again as if nothing had ever happened. Again these women are not welcome to their families where they were born. They therefore prefer to stay on in their marriages however dysfunctional in allocation of resources.

Other economist have been using the prisoner's dilemma in intra-household allocations, but this is because the property rights governing rules of divorce are well defined and there are child's transfers. Due to specialization in tasks, women are assigned the role of food provision and taking care of the children. Prisoner's dilemma out is therefore not a rational strategy to be taken. Instead chicken game gives a better outcome whereby when the household resource are imperfectly allocated that is the male head if a man refuses to cooperate, the outcome is under provision of household good, or the spouse (female) seeks casual employment elsewhere.

The following is the distribution of outcomes from a Chicken Game⁴.

⁴ See defination of terms and Tables 3 (a) and (b) for details.

TABLE 3 (c): Outcomes in a Chicken Game

		Husband	
		Not-cooperates	Cooperates
Wife	Not-cooperates	a,w	b,x
	Cooperates	c,y	d,z

Where the following relations hold:

$$b > d > c > a,$$

$$y > z > x > w$$

In the event that the head of the household is not cooperative and is using household resources to maximizing his utility function and he is not altruistic, this would reduce the welfare of the entire household. All this can be used as a proxy on whether there is gender inequality or not. This can be captured well by the use of Tobit Model as explained below. Tobit Model has been used because it is discrete in nature on whether resources are fairly allocated or not.

3.2: Model Specification

Gender inequality was the dependent variable; it was obtained from perception on whether the outcome of the allocation of resources is fair or unfair. This gave the discrete part of the model. The explanatory variables were: whether the household is headed by male or female, percentage land used for growth of cash crop, percentage of land used for food crop, expenditure on food, expenditure on leisure, own food produced by the household, household's purchased food. (addition of own food and purchased food gave available food) household available food, food deficit within a household, assets owned by the head of the household, highest level of education attained by the head of the household, highest level of education attained by the spouse and the error term. Females were found to inherit no property especially if married. Female inherited properties were therefore not included into the model. Household assets were found to be either, owned by male heads of the households, or jointly owned by the entire household. Marital status was not included in the model; instead what was included was whether the male or female head headed the household.

Several previous studies (Strauss, 2001 and Handa, 1999) have examined the effect of the parents' education, in particular, the mother's education on the child's nutritional status. The mother's education is assumed to have a direct link with the nutrition of children the best practices f caring for the child, and the allocation of resources in the household (Fambon, 2004). This model can be explained empirically as follows.

3.3: Empirical Model

Inequality is obtained by getting a yes or no answer from questions on whether there is existence of inequality or not. This gives ground to selecting a discrete model. Censoring was done at a point where there were no outliers. This is a point where it was the end of occurrence of most outcomes. Assuming that y is the dependent variable as explained in the following model. adopted from Hallahan (2005) and Hamilton (1992). This is explained below.

$$y^* = x'\beta + \xi \dots\dots\dots 1$$

where the error term ξ

$$\xi \sim N[0, \sigma^2] \dots\dots\dots 2$$

has variance σ^2 constant across observations.

This implies that the latent variable $y^* \sim N[x'\beta, \sigma^2]$.

The observed y is defined by

$$y = \begin{cases} y^* & \text{if } y^* > U \\ U & \text{if } y^* \leq U \end{cases} \dots\dots\dots 3$$

With $U=0$, so

$$y = \begin{cases} y^* & \text{if } y^* > 0 \\ _ & \text{if } y^* \leq 0 \end{cases} \dots\dots\dots 4$$

Where $_$ means that y is observed to be missing.

No particular value of y is necessarily observed when $y^* \leq 0$.

$$\text{The binary indicator } d = \begin{cases} 1 & \text{if } y > U, \\ 0 & \text{if } y = _. \end{cases}$$

Applying the general expression for censored density

$f(y/x) = f^*(y/x) F^*(U/x)^{1-d}$ where $f^*(y)$ is the $N[x'\beta, \sigma^2]$ is the density and

$$\begin{aligned} F^*(0) &= \Pr[y^* \leq 0] \\ &= \Pr[x'\beta + \xi \leq 0] \\ &= \Phi\left(\frac{-x'\beta}{\sigma}\right) \end{aligned} \dots\dots\dots 5$$

Where $\phi(\cdot)$ is the standard normal cumulative density function and the last equality uses symmetry of the normal distribution. The censored density can be expressed as

$$f(y) = \left[\frac{1}{2\pi\sigma^2} \exp\left\{-\frac{1}{2\sigma^2}(y - x'\beta)^2\right\} \right]^d \left[-\phi\left(\frac{x'\beta}{\sigma}\right) \right]^{1-d} \dots\dots\dots 6$$

The Tobit Maximum Likelihood $\hat{\theta} = (\hat{\beta}', \hat{\sigma}^2)'$ maximizes the censored log likelihood function

$$\ln L_n(\theta) = \sum_{i=1}^n \left\{ d_i \ln f^*(y_i/x_i, \theta) + (1-d_i) \ln [1 - F^*(U/x_i, \theta)] \right\} \dots\dots\dots 7$$

Where θ are the parameters of distribution y^* .

Because censoring is from above, $d = 1$ if $y < U$ and 0

Otherwise $1 - F^*(U/x, \theta)$.

Inequality is a function of whether household head is a male or female, the percentage of land acreage used for cash crop or food crop, expenditure on food or leisure, own produced food or purchased food consumed in the household, availability or shortage of food in the household, asset owned in the household and the highest level of education attained by either the head of the household or the spouse. All this can be represented in the following equation 8.

$$\begin{aligned} \text{Inequality} = & \beta_0 + \beta_1 \text{ hhh}_m + \beta_2 \text{ hhh}_f + \beta_3 \text{ calnuse} + \beta_4 \text{ fdlduse} + \beta_5 \text{ fdpr} + \beta_6 \text{ expronleis} + \beta_7 \text{ ownfd} + \\ & \beta_8 \text{ puchfd} + \beta_9 \text{ avlfd} + \beta_{10} \text{ fdft} + \beta_{11} \text{ astowned} + \beta_{12} \text{ hheduc} + \beta_{13} \text{ speduc} + e \dots\dots\dots 8 \end{aligned}$$

The variables equation 8 were incorporated into equation 7 and be estimated using Stata. All this is explained further in table 4 together with their expected outcomes both signs and the level of significance together with findings from different researchers to support the reason for the expected sign.

TABLE 5 Description of Explanatory Variables used in the Model, Expected Signs and Reason for the Outcome

Explanatory Variables	Description	Expected signs	Reasons
hhhfemale	Household head is female	-	Gender Inequality would decrease since the head of the household being female, resources would be perceived as efficiently allocated.
hhhmale	Household head is male	+	The head of the household being a male this may increase, gender inequality; as the property rights favour males, farms may be more commercialized, male heads may spend income from cash crops more on themselves.
caclnuse	Level of Commercialization or land used for cash crop	+	Increase of proportion of land for cash crop may increase gender inequality since; this may reduce land left for food crop. Also that male heads control income from cash crops and may use it on themselves.
fdclnuse	Percentage acreage of land used for food crop	-	Decrease in percentage of land used for food crop may increase gender inequality since working in food crop farms is more of female task and female. It may reduce own food produced.

Fdexpr	Expenditure on food	-	Decrease in expenditure on food may increase gender inequality as female who have the task of providing food for the family may seek casual employment yet male heads are rarely willing to seek casual employment even they are paid better than females even if the work load is the same.
expronleis	Expenditure on leisure	+	Increase in expenditure on leisure would increase gender inequality since this would only increase head of the household's utility instead of that of the entire household.
ownfd	Own food produced	-	Increase in gender inequality would reduce food availability as a result of reducing of food crop land due to commercialization and male heads spending cash crop income on themselves.
puchs	Purchased food produced	-	Increase in gender inequality may reduce food purchase as male heads of the households prefer purchase of other things other than food. Others may prefer spending more on alcohol other than on purchasing of food.
avlblfd	Food available to the household	-	Increase in gender inequality may reduce food availability, which is a combination of purchased food and own produced food. This may be due to decrease in own produced food due to less land being committed to its production and food decrease in food purchases.

fddeficit	Food Deficit	+	Increase in food deficit may increase gender inequality because the family has no food and females who have the responsibility of feeding the family may feel oppressed as watch the family suffers because of food shortage.
astowndhh	Asset owned by the head of the household only if all the heads of households are males	+	Increase in assets owned by the head of the household may decrease gender inequality as the male head may increase purchase of household basic goods if he is not a miser.
astowndsp	Asset owned by the spouse	-	Increase in assets owned by the spouse may reduce gender inequality as female asset score has positive influence on household nutrition.
hhheduc	Highest level education attained by the Head of the household	+	Attainment of higher level of education by for the head of the household may reduce gender inequality. This is because as the male head of the house becomes more educated he may leave behind those primitive cultural activities that oppress women.
speduc	Highest level education attained by the spouse	-	Attainment of higher level of education by the spouse may decrease gender inequality because as female education improves, they are able to escape poverty by becoming more informed, use family planning in controlling family size and give better child care in form of improved nutrition, immunization and fight against infections.

v_n . The set of final estimates is obtained by measuring the v_n variables in such a way that their sum of squares yields total variance, which constitutes a restriction imposed to remove the indeterminacy problem. The "score factors" from the model are obtained by inverting equation system (9), which yields a set of estimates for each of the principal components:

$$\begin{aligned}
 A_{1j} &= f_{11} \times a_{1j} + f_{12} \times a_{2j} + \dots + f_{1N} a_{Nj} \\
 &\dots\dots\dots \\
 A_{Nj} &= f_{N1} \times a_{1j} + f_{N2} \times a_{2j} + \dots + f_{NN} \times a_{Nj}
 \end{aligned}
 \dots\dots\dots 11$$

The first principal component, expressed in terms of (non normalized) original variables, is therefore an index for each household based on the expression:

$$A_{1j} = f_{11} \times (a_{1j}^* - a_1^*) / (s_1^*) + \dots + f_{1N} \times (a_{Nj}^* - a_N^*) / (s_N^*) \dots\dots\dots 12$$

The main hypothesis of this type of analysis is that long-term household wealth explains the maximum of variance (and covariance) in asset variables adopted from Fambon (2004).

3.4: Method of Estimation

A pie chart was constructed to show average land-use (commercialization of land) in the area and to compare the percentage under female control with that under male. Calculating the Household Assets Index, a statistical procedure known as principal components analysis (PCA) to determine the weight of an index of household assets variable has been placed at the end. PCA is a mathematical technique used to reduce a complex system of correlation, into smaller number of dimensions. It aims to extract from a set of variables, a reduced number of orthogonal linear combination of those variables, which capture the common information more fruitfully. Intuitively, the first major component of a set of variables is a linear index of all the variables, which capture the greatest quantity of information, which is common to that set of variable (Fambon, 2004).

Computer packages such as excel were used to key in data do some required calculations and draw graphs. Data was then imported from excel to other computer packages such as SPSS or Stata. Stata package was then used to summarize the data set, tabulate the frequencies get the standard errors, skewness and kurtosis, estimate the Tobit model through maximum likelihood

estimator, getting marginal effects and correlation matrix. Test for heteroscedasticity were done using Stata. Scientific Package for Social Sciences (SPSS) was also used for cross tabulation and such like functions.

3.5: Data Type and Data Source

Cross Section survey was conducted in Mathioya Division in Murang'a District. This area was selected because through casual or anecdote observation, this is an area where farms are commercialized. Also according to Davison (1988), control of land use and income from farms is by male heads who make decisions on what is to be planted, where, how and how the resources are allocated. Primary data was used which was collected using a questionnaire on 100 randomly sampled households. Each respondent was interviewed once. Some of the data was collected through observation. This includes data on the sex of the respondent. Other information collected include information on the size of inherited property and by who in gender terms, the proportion of commercialized land, the amount of expenditure on food and nonfood and so on.

3.6: Scope of the Study

This study was carried out in Mathioya Division in Murang'a district. In this sampled area the major cash crop grown is coffee and tea. The major food crops grown are maize, beans, bananas etc. Some food crop also serves partially as cash crop and food crop. Cultural matters addressing issues of asset inheritance are similar in the entire area under study. Also similar livestock are kept mostly through zero grazing.

CHAPTER FOUR

The following are the results from the study. Out of the 110 questionnaires administered, 100 got responses, which are explained below using different methods.

4.0: Inheritance of Property

On gender inequality and inheritance of property, in all households headed by males, male heads inherited property. There was no situation where female was found to inherit land. This is because the property rights governing the rules of inheritance favour males. This was supported by Davison (1988) who cited the 1954 Swaynneton Plan to have awarded title deeds to men, and denied women land tenure-ship and marginalized them to position of food crop production.

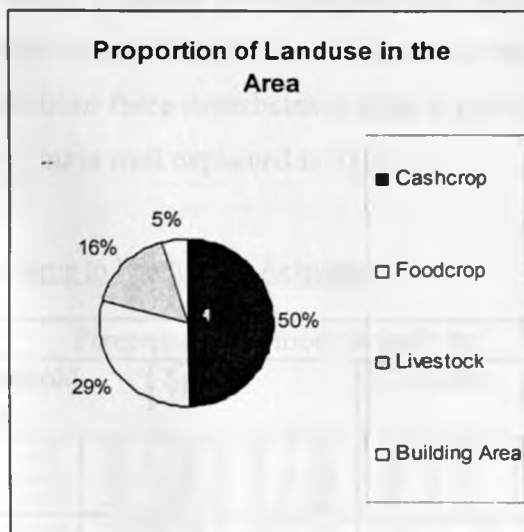
Females only inherit if they are head of single headed households. Looking at inheritance of property females inherit less than males. On ownership of property, females own less than males. In married households, females have fewer assets brought to marriage than males. This is because the cultural norms dictate that the males are the ones who make transfers to the brides during marriage in the form of dowry. On accessibility to loan facilities, males have more access to loans than females. It can therefore be concluded that males have more bargaining strength when it comes to ownership of property than females.

4.1: Commercialization of Farms

It can be concluded that Inequality in inheritance of properties was the cause of male-headed household's decision-making on allocation of more land to commercialization. This was found to lead to less land being left for food cropping. The research indicated that a relationship exists between male-headed household and agricultural commercialization. Where land is subjected to less agricultural commercialization, own food production is higher. This is because agricultural commercialization reduces land acreage on food production. Kiriti and Tisdell (2004) got similar results on commercialization and its effects on food production in Nyeri district. Also land plots for food crop get lower agricultural inputs than cash crop plots (Holger, 2003). If

ranked in order of productivity livestock production would be first, followed by food crop then cash crop production. Cash crop was found to be least productive yet it received the highest level of inputs. This can be explained by the use of pie chart in fig 2 below. It can be seen that, commercialization leads to decrease in household food production. As more farms are committed to production of commercialized crops, land acreage for growth of other crops diminishes.

FIGURE 2: Pie Chart Showing the Allocation of Farm to Productive Activities:



4.2: Production of Food

It was found that fertile land was committed to production of cash crops for it is male heads that make decision on allocation of land and they choose fertile portions of land for cash crops. This reduces output from food crop farming. Committing a big proportion of land to commercialization reduces land for food crop cultivation. This reduced the production of own food. It was found that a lot of labour force was committed in taking care of commercialized land, and taking care of homes this minimizes time spent in food production. It was also found that inappropriate tools were being used in food crop farms as compared to those used in commercialized farms. This reduces efficiency in food production. Married women were found to lack accessibility to loans to boost subsistence food production leads to poor returns from food crop farm. Female single headed household were more accessible to loans and could allocate fair

portions of funds to production of both cash crops and food crops. For married women, whether the cash crops were bringing poor returns in the world market as was the case, resources were not being directed to more productive areas like production of milk.

4.2: Demand and supply of Labour Force

On labor provision, females in households with little own produced food seek casual employment outside the household. In single headed households, females tend to employ more labour force than in male headed married households. Males who seek casual employment are paid more than females. Female labor force contributes to large proportion of labour used in rural agricultural farms than males. This is well explained in Table 6.

TABLE 6: Supply of Labour Force to Productive Activities

	Percentage of Labour Supply by;											
	Household Head			Spouse			Children			Casual Employees		
	None	Little	Much	None	Little	Much	None	Little	Much	None	Little	Much
Cash crop	31	48	21	4	30	36	51	40	7	66	23	11
Food crop	44	33	23	1	24	46	46	42	11	65	20	15
Livestock	46	34	20	10	22	30	56	32	8	69	18	13

On the labour supply, married females were found to supply a significant amount of labour force to food crops farms than married males. To the cash crop farms, both married males and females were found to produce the same amount of labour. Married women were there found to be supplying more work effort, to production of both cash crop and food crop than married males. This is another indication of inequality in the supply of labour force. These result are supported by Davison (1988), who found that small holder allocate a major portion of land to cash crop production with the result that women spend more time in the production of the cash crop than in production of food crops. Next to be considered are household's expenditure patterns on whether allocations are fair or not.

4.3: Pattern of Household Expenditure

It was found that decision-making on how to spend incomes from farms was made by male heads. In some households, there were fair allocations allocations were being apportioned fairly to purchasing of food, health and other basic needs. In cases where the household head was using more of the household income on alcohol and other form of leisure, less of household income was used on purchasing of food and other basic needs. This led to food shortages as is indicated on Table 7.

TABLE 7: Percentage Expenditure Patterns by Household Heads

	Altruistic Male Head	Non altruistic Male Head	Altruistic Female Head	Non-altruistic Female head
Expenditure on Leisure	20	60	10	30
Expenditure on Food	50	10	60	40

As it is evident from Table 7, non-altruistic household heads use household income more on themselves rather than in the purchase of food. This is outcome is similar to results obtained by Black (2003) in South Africa.

4.4: Attainment of Education

On the level of education, there was no significant difference on whether to educate boys or girls. But in cases where school fees was the reason for school drop out cases, more boys were being offered an opportunity to go beyond primary school than girls. Girls' drop-out cases from secondary schools due to pregnancies was another case for gender disparity. This leads to less education attainment among female adults than males as is summarized in the Table 8.

TABLE 8: Percentage Education Attainment

	Males	Females
None	5	20
Primary Education	20	50
Secondary Education	60	30
Tertiary Education	8	4

From Table 8, it is evident that males with higher level of education are more than females and females with lower level of education or no education at all are more than males. All these results suggest that there is gender inequality in one way or the other. These results are similar to those of Svedberg (1996) as cited by Kiriti (2003), where using data on education, women appeared discriminated against. The following is a summary of results on gender inequality.

4.5: Summary Statistics

Presence of inequality is given in Table 9. Those household experiencing no inequality or where there is fairness in distribution of resources, zero is used. One is used in households where there is inequality. Out of one hundred observations, 81% of households interviewed had inequality in the distribution of resources while 19% of the households interviewed had no inequality.

TABLE 9: Tabulation of Descriptive Statistics of the Households Experiencing Inequality.

Presence of Inequality	Frequency of Households	Percentage Number of Households	Cumulative Frequency Distribution
0	19	19.00	19.00
1	81	81.00	100.00
Total	100	100.00	

Possession Score was used as an indicator of indices of deprivation whereby the presence of consumer durables were used as an indicator of material well-being (Sender, 2002). The main hypothesis of this type of analysis was that long-term household wealth explains the maximum of variance (and covariance) in asset variables. Table 10 presents the "score factors obtained from analyzing five variables using PCA. Since all of the asset variables only take on the values 0 or 1 the weights can easily be interpreted as follows. Going from 0 to 1, changes the index by f_i / s^* . (See column 5 in Table 10). For example, a household owning a radio has an asset (or wealth) index higher than 0.55 than the one, which does not own one. Having a Coffee Sprayer increases the asset index of the household by 1.2. Having a motorcycle has the highest index. Expectations were that households with high index should have less inequality if females own assets. Female asset score was positively correlated to household nutritional status. In this study case lack of married female asset ownership is an indicator of gender inequality.

Married females were found to own no assets indicating that there was inequality. Single headed household where the head of the household was not taking alcohol, the asset index was high meaning that resources were fairly allocated.

TABLE 10: Score Factors and Summary Statistics of Variables Involved in the Calculation of the First Principal Component.

	Scoring factors (SF)	Mean	Standard Deviation (SD)	SF/SD
Has a Radio	0.20	0.50	0.40	0.55
Has a Bicycle	0.19	0.15	0.22	0.80
Has a Gas Cooker	0.39	0.17	0.34	1.00
Has a Coffee Sprayer	0.37	0.90	0.30	1.20
Has a Motor Cycle	0.28	0.04	0.20	1.40

Svedberg (1996) in Kiriti (2003) refutes the claim that gender inequality ever exists. The author claims that there is no statistically significant anti female bias in anthropometrical statistics and it is boys who are more disadvantaged. However using data on education and formal labour market participation, the author claims that women score worse than men and may well be biased against in various ways than men.

Gender inequality is more concentrated in households headed by maies. The level of commercialization in these households is significant which is captured by land used for commercial crops. This leads to less land being left for food crops, which in turn leads to reduced production of own food. This explains why results for own food production is significant and negative meaning that gender inequality is negatively related to own food production and positively related to commercialization. All this and much more are summarized in Table 11. The table summarizes means, and standard deviations of the variables. It also gives the skewness and the kurtosis of the distribution of variables and their probabilities and adjusted chi squared. As it can be seen in Table 11, different variables have variability in their means; with the mean of household head who is female being the lowest and that of household food availability being the highest. In standard deviation, it is only in households with food deficit, which fall under +4 and -4, standard deviation. This is an indicator of food shortages to some households and no food shortages to other households. This food shortage can be explained by

commercialization of farms whose expenditure is used on food purchases. Where there is no food deficit is where income from commercialized farms is not spent on leisure.

TABLE 11: Summary of Observations for Mean, Standard Deviation and Skewness/Kurtosis Tests for Normality. ----- joint -----

Variable	Obs	Mean	Std. Dev.	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
inequality	100	0.81	0.3942772	0.000	0.216	22.03	0.0000
hhhfmale	100	0.23	0.4229526	0.000	0.551	16.52	0.0003
hhhfmale	100	0.77	0.4229526	0.000	0.551	16.52	0.0003
caclrnuse	100	3.11	0.7771354	0.000	0.551	16.52	0.0003
fdclrnuse	100	2.37	0.9914279	0.059	0.299	4.68	0.0961
Fdexpr	100	1.64	0.5029208	0.247	0.001	10.43	0.0054
expronleis	100	2.06	1.221193	0.146	0.000	40.98	0.0000
Ownfd	100	5.96	0.983911	0.000	0.757	12.18	0.0023
puchsdfd	100	4.09	1.752891	0.000	0.000	29.83	0.0000
Avlfd	100	9.06	2.364809	0.167	0.002	9.71	0.0078
fddeficit	100	1.91	4.175675	0.735	0.258	1.43	0.4897
assetownd	100	1.89	1.118215	0.733	0.011	6.26	0.0437
hhheduc	100	3.64	1.07797	0.000	0.974	11.79	0.0028
speduc	100	2.85	1.647618	0.005	0.840	7.26	0.0265

Skewness characterizes the degree of asymmetry of a distribution around its mean with positive skewness indicating a distribution with an asymmetric tail extending towards more positive values and negative skewness indicating a distribution with an asymmetric tail extending towards negative values. Skewness should be within the range of -2 or +2 when the data are normally

distributed. The results from the skewness show that all the variables are normally distributed. Kurtosis, on the other hand indicates the relative peakedness or flatness of a distribution compared with the normal distribution. Positive kurtosis indicates a relatively peaked distribution and negative kurtosis indicates a relatively flat distribution. Kurtosis should also be within the range of +2 or -2 when the data is normally distributed although a few authors use +3 or -3. The results of the study are normally distributed as they fall within +2 and -2 in both Kurtosis and skewness. There are large values of adj chi squared for most of the variables. Where Prob>chi squared, most of the results are significant at 1%.

4.6: Results of the Estimation

Using gender inequality as the independent variable, and using the Tobit model to regress the research model, the following results were obtained as presented in Table 12. Hhfemale was found to be significant and with the expected sign, which was found, to be negatively related to the level of gender inequality, supporting the notion that female-headed households do not contribute to gender inequality. Commercialization was also found to be insignificant but positively related to gender inequality. This can be explained by the fact that, it is not commercialization per se that causes gender inequality but how income from commercialized farms is used whether more or less on basic needs or more or less on leisure such as alcohol. If more is used on leisure and less on purchasing of food, then there is gender inequality.

Most of female-headed households were also commercialized but their lump sum income was spent on purchase of household food and as expenditure on other basic needs. Expenditure on leisure, which is capturing expenditure on alcohol, cigarettes and such personal spending, was found to be significant at 10% level of significant. Purchasing of food was found to be significant at 10% and negatively related to gender inequality. This means that the higher the level of gender inequality within a household, the lower is the availability of funds for the purchasing of food. Food availability was found to be significant at 1% level of significance and was negatively related to gender inequality. The higher is the level of gender inequality, the lower is the level of food availability as is evident from Table 12.

TABLE 12 : Tobit Estimates

Log likelihood = -26.903554, Number of obs = 100, LR chi² = 42.84,
 Prob > chi² = 0.0000, Pseudo R² = 0.4432.

inequality	Coef.	Std. Err.	T	P> t	[95% Conf. Interval]
hhfemale	-0.263322	0.1523397	-1.73	0.087***	-0.5660652 0.0394212
cacrlnuse	0.0367186	0.0455472	0.81	0.422	-0.053797 0.1272341
fdcrlnuse	-0.664931	0.0445192	-1.49	0.139	-0.1549656 0.0219795
fdexpr	0.2197652	0.0903215	2.43	0.017**	0.0402702 0.3992601
expronleis	0.1009444	0.0393314	2.57	0.012**	0.0227816 0.1791072
ownfd	-0.1364203	0.0976421	-1.40	0.166	-0.3304634 0.0576228
pchsdfd	-0.145709	0.0853793	-1.71	0.091***	-0.3153825 0.0239645
avalfbld	-0.0668448	.0180916	-3.69	0.000*	-0.1028039 -0.0308857
fddeficit	-0.1766442	0.08347	-2.12	0.037 **	-0.3425499 -0.0107386
assetownd	-0.0834171	0.0359223	-2.32	0.023**	-0.1548052 -0.0120289
hheduc	0.0137602	0.0366531	0.38	0.708	-0.0590801 0.0866005
speduc	-0.030941	0.0396492	-0.78	0.437	-.1097353 0.0478534
_cons	0.5839732	0.3953064	1.48	0.143	-0.2016152 1.369562
_se	0.3166675	0.0223902	(Ancillary parameter)		

Note: Hhfemale was dropped due to multicollineality.

Significant variables are seven as shown below marked at t their level of significance;

- *for 1%level of significance eg avblfd;
- ** for 5% level of significance e.g fdexp, exppronleis , fddeficitand and assetownd.
- *** for 10% level of significance which include Hhfemale and pchsdfd.

Assets owned were found to be significant and negatively related to gender inequality. This means that, less asset are owned by females. This reduces their bargaining strength and again, asset ownership positively influences household food provision. The level of education was not significant and the signs were positive for head of household, and negative for the spouse

4.7: Marginal Effects

Further explanation can be obtained if one considers the marginal effects of a unit change of the dependent variable inequality on the unit change of each dependent variable. This is given in the Table 13. From the table, it is evident that, a marginal change in inequality contributes positively to commercialization, and negatively to land use left for food production but a decrease in land used for food production is greater than an increase in commercialization. It also contributes negatively to own food production, food purchasing and food deficit. This points to a reason why resources should be directed more to food farms, own food production so as to reduce this marginal effect. There is also an indication that there is no Pareto optimality in allocation of resources between the production of commercial crops and food production. From the Table13, it is evident that, a marginal change in inequality contributes positively to commercialization, and negatively to land use left for food production but a decrease in land used for food production is greater than an increase in commercialization. It also contributes negatively to own food production, food purchasing and food deficit. This points to a reason why resources should be directed more to food farms, own food production so as to reduce this marginal effect. There is also an indication that there is no Pareto optimality in allocation of resources between the production of commercial crops and food production.

Udry (1994) in Doss, 1996, uses detailed agronomic data from Burkina Faso. He finds that crop yields are different for plots controlled by men from those controlled by women within the same household in a given year. He also finds that the household could achieve higher total output by reallocating labor and fertilizer from men's plots to women's plots. This result is inconsistent with Pareto efficiency. Pareto efficiency requires that the marginal productivity for an additional unit of labor or fertilizer be the same across all plots within the household (Doss, 1996).

Table 13: Marginal Effects on Tobit Model

Variables	Dy/dx	Std. Err.	Z	P> z	y = Fitted values (predict) = 0.81		X
					[95% C.I.]		
hhhfemale*	-0.263322	0.15234	-1.73	0.084	-0.561902	0.035258	.23
caclnusee	0.0367186	0.04555	0.81	0.420	-0.052552	0.125989	3.11
fdclnusee	-0.0664931	0.04452	-1.49	0.135	-0.153749	0.020763	2.37
fdexpr	0.2197652	0.09032	2.43	0.015	0.042738	0.396792	1.64
expronleis	0.1009444	0.03933	2.57	0.010	0.023856	0.178032	2.06
ownfd	-0.1364203	0.09764	-1.40	0.162	-0.327795	0.054955	5.96
Puchsdfd	-0.145709	0.08538	-1.71	0.088	-0.313049	0.021631	4.09
avlbfd	-0.0668448	.01809	-3.69	0.000	-0.102304	-0.031386	9.06
fddeficit	-0.0051237	0.00908	-0.56	0.573	-0.022927	0.01268	1.91
assetownd	-0.0834171	0.03592	-2.32	0.020	-0.153824	-0.013011	1.89
hheduc	0.0137602	0.03665	0.38	0.707	-0.058079	0.085599	3.64
speduc	-0.030941	0.03965	-0.78	0.435	-0.108652	0.04677	2.85

(*) dy/dx is for discrete change of dummy variable from 0 to 1

4.4: Correlation Results

Table 13 shows the correlation matrix. It is evident that, households headed by females are negatively correlated to gender inequality. The level of correlation is significant at 1%. Households headed by males are correlated with the households headed by females. The former had to be dropped because of collineality.

The expected sign in correlation between the land use for cash crop was positive as expected but was not significant in causing inequality. This is because it is not commercialization that causes inequality, but how income from commercialized farms is allocated. There was a negative and

significant colleration in inequality and land used for food crop. This is what was expected as increase in commercialization decreases land allocated to food-crop. Female-headed households (hhf) are positively correlated with percentage land used for food crops (fdcln) at 1%level of significance as expected. This is because female-headed households allocate more land to production of food crops. This is because females are more sensitive to household food production than production of cash crops as feeding the household is a task customarily believed to be for females in most of Sub Saharan Africa. On the other hand, male-headed households (hbm) are negatively correlated with fdcln at 1% level of significance as expected. This is because male heads allocate more land to cash crops and less land to food production.

Expenditure on food (fexpr) is negatively correlated with expenditure on leisure (exls) at 1% level of significance. This is because once money is spent on leisure it can no longer be available to purchase food. There is a positive correlation between purchase of food (pchf) and food availability (avlbf) at 1% level of significance. This is because once food is purchased; it will be available to the household. There is a negative and significant correlation between the percentage of land used for food crop and female education. According to World Bank (1995) data from studies show that if women and men shared the same educational characteristics and inputs levels, farm specific yield would increase between 7% and 22%. Giving women primary schooling, by itself, would increase yields by 24%. The low level of education achieved by women is likely to have an adverse effect on the nutrition and survival prospects for their children. Data from 63 countries for the period 1970-1995 strongly suggests that a key determinant of reductions in child malnutrition (and mortality rates) is improvements in women's education, both in absolute terms and relative to men's education (Smith and Haddad 1999).

Table 14: Correlation Matrix

	ineq	hhf	hhm	ccln	fdcln	fdex	expls	ownf	pchfd	avblf	fdfct	asto	hhed	sped
ineq	1.0000													
hhf	-0.3410 (0.0005)	1.0000												
hhm	0.3410 (0.0005)	-1.0000 (1.0000)	1.0000											
ccln	0.0359 (0.7226)	-0.0163 (0.8722)	-0.0163 (0.8722)	1.0000										
fdcln	-0.3610 (0.0002)	0.5658 (0.0000)	0.5658 (0.0000)	0.2220 (0.0265)	1.0000									
fdex	0.0082 (0.9359)	0.2032 (0.0425)	0.2032 (0.0425)	-0.0786 (0.4372)	0.1483 (0.1409)	1.0000								
expls	0.2547 (0.0106)	-0.0465 (0.6456)	-0.0465 (0.6456)	-0.0496 (0.6241)	-0.2438 (0.0145)	-0.6059 (0.0000)	1.0000							
ownf	0.0844 (0.4040)	-0.0019 (0.9847)	-0.0019 (0.9847)	-0.0867 (0.3913)	-0.0675 (0.5045)	0.0114 (0.9101)	0.1449 (0.1502)	1.0000						
pchfd	-0.0627 (0.5354)	0.1898 (0.0586)	0.1898 (0.0586)	-0.1482 (0.1411)	0.1085 (0.2825)	-0.0775 (0.4437)	0.1437 (0.1537)	-0.1267 (0.2089)	1.0000					
avblf	0.0367 (0.7173)	0.1523 (0.1304)	0.1523 (0.1304)	-0.1432 (0.1553)	0.0278 (0.7840)	-0.0568 (0.5745)	0.2080 (0.0379)	0.4320 (0.0000)	0.8160 (0.0000)	1.0000				
fdfct	-0.0105 (0.9175)	-0.0511 (0.6138)	-0.051 (0.6138)	0.0934 (0.3556)	-0.1066 (0.2914)	0.1576 (0.1174)	-0.0445 (0.6603)	0.0385 (0.7041)	-0.3867 (0.0001)	-0.3425 (0.0005)	1.0000			
asto	-0.4374 (0.0000)	0.3958 (0.0000)	0.3958 (0.0000)	-0.0324 (0.7487)	0.2649 (0.0077)	0.0726 (0.4731)	-0.2762 (0.0054)	0.0786 (0.4370)	0.0360 (0.7220)	0.0549 (0.5873)	0.1363 (0.1763)	1.0000		
hhed	-0.0437 (0.6657)	0.0062 (0.9512)	0.0062 (0.9512)	0.0598 (0.5545)	0.0125 (0.9020)	0.0753 (0.4567)	-0.0371 (0.7137)	0.0815 (0.4201)	-0.1056 (0.2956)	-0.0522 (0.6060)	0.1251 (0.2148)	0.2098 (0.0361)	1.0000	
sped	0.2511 (0.0117)	-0.7907 (0.0000)	-0.7907 (0.0000)	-0.0185 (0.8547)	-0.5346 (0.0000)	-0.1633 (0.1044)	0.0497 (0.6234)	-0.0536 (0.5965)	-0.2121 (0.0341)	-0.1921 (0.0556)	-0.0152 (0.8807)	-0.2722 (0.0061)	0.3048 (0.0020)	1.0000

Ineq=Gender Inequality; Hhf=Household head is Female; Hhm=Household head is Male; Ccln=Land used for Cash crop; fdcln=Land used for Food Crop; fdex=Expenditure on Food; expls=Expenditure on Leisure; ownf=Own Food Produced by the Household; pchfd=Household's Purchased Food; avblf= Household Available Food; fdfct=Food Deficit within a Household; asto=Assets Owned by the Head of the Household; hhed= Highest Level of Education attained by the Head of the Household; sped= Highest Level of Education attained by the Spouse.

4.1: Limitations of the Study

The following are problems encountered during the field study. Ignorance due to high level of illiteracy was a hindrance, as some people took too long to answer questions. Others did not understand the questions and one had to spend a lot of time explaining. Yet others felt that the questions were a bit sensitive and could not freely give ready answers. Other felt that there was a hidden agenda such as being spied on because of revealing that they take the local brew, which is illegal. Others thought that they could be taxed if they revealed the true information about their income while others felt that they could be left out in allocations of Constituency Development Fund in case they declared their true income. In other cases, there was lack of cooperation as males thought that there was some kind of interference with their homes when information on the provision of labour force and the household expenditure pattern were being taken. This information could not be freely obtained as it could cause division and antagonism in the household when females realize they are being cheated and rebel. In some cases males could only disclose the information if females were not near for example, questions about the size of loan taken and the size of expenditure on alcohol.

Other people felt that their time was being wasted and they wanted to do other things. This was especially the case in the morning section when people were busy doing household work and preparing to go to the farm. Others could ask the interviewers to come later. There was a lot of cheating and guesswork resulting to a lot of underestimation and overestimation leading to wrong figures in some cases. In other instances all the information could not be obtained especially on the size of loan from married females. This led to many missing values. At the end of the day one had to really skip many households before getting a willing respondent. Finally the sample size may have caused errors and given inconsistent results. A sample size of 100 was a bit too small but this is what could be handled given the time limit and other hindering factors like availability of funds.

CHAPTER FIVE

5.0: Recommendations

Resources targeted at women are likely to be siphoned off by men (Goetz and Sen, 1994); men may reduce their levels of contribution to household expenditure as women's access to resources increases (Bruce, 1989); and where women do gain greater access to resources, this may be at the expense of increases in their burden of labour, leaving them exhausted. Where they have control over resources, they may be unable to effectively mobilize these resources to support sustainable livelihoods. Women may feel compelled to invest resources, including their labour, in 'family' businesses, or in children, identifying their own interests with those of other household members, but thereby leaving themselves vulnerable in the event of family breakdown.

Relevant policy implications stem mostly from households characterized by conflictual interests, and in particular from households in which a male household head has control over the household budget. Cash transfers - even when targeted - may not reach their intended targets (e.g. children) or may not end up in the hands of altruistic members (e.g. female parents) who have the interests of other household members at heart. Similarly, excise tax increases (e.g. on alcohol and tobacco) may not have the intended effect either, especially when non-altruistic parents are also addicts, and may in fact reinforce non-altruistic behaviour at the household level.

Cash grants may be preferable to subsidies on welfare grounds, but only if heads of households are benevolent (and if labour market choices are unaffected). If household decision making is characterized by a non-ultruistic head, transfer payments such as social old age pensions and child support grants may not reach their intended targets, and neither will a basic income grant: non-ultruistic heads may simply spend the money on alcohol, tobacco and drugs. Better targeting (e.g. of women and children) comes with its own costs, and may in any case prove to be ineffectual if, the non-ultruistic male heads have the power to appropriate government grants received by spouses. Subsidizing food, education and health care may be the better option, as it will benefit members of households most in need of such services.

Policy could be directed at non-ultruistic heads themselves; reducing their consumption of alcohol and tobacco and, in the process, conferring benefits to other members of households as well as the broader community. Parry et al (2003) distinguish between policies aimed at the “host” (the consumer), the “agent” (the product) and the legal “environment” (in which production and consumption take place). Policies targeting the host would include rehabilitation programmes aimed at treating addictions, but these are costly and may in any case not reach the targeted groups. Similarly, increasing excise taxes (to target both the agent and the host) is unlikely to reduce consumption, especially among addicted consumers, and may well have the unintended effect of reinforcing non-altruistic bad behaviour at the household level. Tightening legal restrictions is a third option, but this too may prove administratively costly as its success depends in large part on effective law enforcement.

The overriding problem with all these measures is the discriminating effect they are bound to have on moderate drinkers and smokers, many of whom may also be altruistic heads of households. Indirectly too, non-drinkers and non-smokers may have to pay higher taxes to help fund new rehabilitation programmes and additional policing costs.

Higher household income could have been attained if men allocated a greater proportion of their labor to agricultural production. If farms would become less commercialized, there would be considerable increase on own food production. If less income is spent on alcohol, and more on purchase of food, this would reduce gender inequality in intra-household resource allocation and improve the nutritional level of the household.

Since inheritance of property is one of the indicators of gender inequality, property rights governing rules of inheritance should be redefined such that women should be allowed to inherit land as it is according to the constitution because the customary law opposes the constitution due to cultural rigidities and resistance to accept change. These issues should be frequently be addressed to bring about awareness on need for adjustment so as to accommodate change. This would give women a chance to making decision on what to grow in their farms, how and when to grow and how to market their products. It would also give them accessibility to loan facilities.

Davison (1988), suggests the expansion of women's legal rights in land ownership and transformation of these rights into a reality.

Diversification of farms in production of food-crops so as to increase food production in case of cash-crop failure in the international market should be introduced. There should also be introduction of food crops in cash crop farms, which would not interfere with the growth of cash crops. Intensive farming with high yielding food-crops should be introduced to supplement the farm sizes. Other forms of gender female friendly income generating activities, which do not occupy large space, should be introduced. These include rearing of poultry or any other back yard industries. This would supplement female income.

Supply of labour in household production should be equal to both females and males and where household chores are female friendly, for example cooking and taking care of children is done by females, casual employees should be employed in farms or house-helps should be employed at home to enable females in male headed married households to take care of their farms. Provision of labour to household farms should be the same to both males and females. Wages given to casual labourers should be the same to remove gender inequality in wages.

Females should also have a share in controlling commercialized farm incomes. Instead of giving cash crop transfers in lump sum, there should be done at an agreed upon constant intervals to facilitate proper planning. Transfers from cash crops should be deducted before being handed over to an agreed on amount by both the husband and the spouse so as to meet the obligation of paying of school fees and meet household health needs and purchasing of foodstuff among other household needs. In other words, females should be given a chance in decision-making concerning the expenditure on commercialized farm's income.

World Bank (1995) concludes that gender inequality within the household affects market outcomes and these feed-backs into household decision-making. When the relative status of women within the household is improved and their access to assets and services increased, there will be an increase in returns to investment in human resources and improvement in the prospect for the sustainable economic growth. The reason may be that education enables people to

understand use of new technology better; and gives people the confidence to deal with public officials, such as extension workers. In addition, reducing the gender gap in education may increase women's ability to bargain for more resources within the household.

5.2: Conclusion

From the study, it can be concluded that, females do not inherit any property. Male heads of the households are the ones who inherit land. Also male heads of the household decide on what is to be planted and how income from farms is controlled. Male-headed households are more commercialized but what causes inequality is not commercialization, but how the income from commercialized farms is used. If this income was spent by the male heads of the household more on themselves than in purchasing of food, this reduces food availability in the household which was found to be significant and negatively related to inequality.

The presence of a male head of household was found to be significant in reducing food availability only if the head of the household was using household income on leisure and not in purchasing of food and other basic needs. All the same, food availability was not a problem to households headed by females as even if food was not enough females whether from female-headed households or male-headed households were seeking casual employment to supplement for food deficit.

Gender inequality was also cited in provision of labour, whereby, in households headed by males, female labour was used more in production of both cash crops and food crops than male labour. On ownership of assets, married females were not found to own any asset as asset are either owned by the male heads of the household and even if female can claim to own assets jointly, they were found to have no right to sell any assets. On expenditure on leisure, male heads of the households were more spending on leisure than their spouses or female heads of households.

The study has been able to prove all the stated objectives that male head-ship in rural societies has a significant effect in increasing agricultural commercialization, male head-ship has a

significant effect on availability of food to household members leading to poor nutrition; the presence of a man has a significant effect on household expenditure per capita and males' claim on household expenditure is greater than their contribution to household earnings. The last two objectives can be researched further for clarity for it was found that commercialization of farms although reduced food availability, is not the case for all households but only so where expenditure from commercialized farms was not used altruistically.

5.3: Areas for Further Study

The use of game theory in understanding intra-household allocations has been done elsewhere but has not been done in Kenya. Also relating gender inequality and its effects on poverty is a areas which need to be researched on especially in areas where a lot of household income is used on leisure which is accounted for as non food but does not contribute to maximization of household's utility.

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<p>% Land Used</p>	<p>1=Cash crop 2=Food crop 3=Livestock 4=Building</p>	<p>0=none 1=Below 12.5% 2=12.5%-25% 3=25%-50% 4=50%-75% 5=75%100%</p>			
<p>% Inputs Used in 1=Cash crop 2=Food crop 3=Livestock</p>	<p>1=Fertilizer and pesticides 2= Head of household's labour 3= Wife's labour 4=Children's labour 5=Employed labour 6= others</p>	<p>1=25% 2=50% 3=75% 4=100%</p>			
<p>Monthly expenditure in Kshs</p>	<p>1=Food 2=Health 3=Education 4=Transport 5=Family Clothing 6=Personal Smartness 7=Alcohol 8=Cigarettes 9=Community work 10=Others (Indicate)</p>	<p>0=None 1=Below 1000 2=1001-3000 -- 3=3001-6000 4=6001-9000 5=Above 9000</p>			
<p>Percentage of own produced and purchased food consumed</p> <p>0= None 1=Below25% 2=25%-50% 3=50%-75% 4=75%-100%</p>	<p>1=Coffee 2=Tea 3=Maize 4=Beans 5=Bananas 6=Vegetables 7=Meat 8=Milk 9=Eggs 10=potatoes 11=Others</p>	<p>Purchased</p>	<p>Own</p>	<p>Required</p>	<p>Food Deficit</p>
<p>Properties owned by 1=Head of the household 2=Wife Children and their ages: 3=Child 1 4=Child 2 5=Child 3 6=others (indicate)</p>	<p>1=Livestock (In numbers)</p> <p>1=None 2=Below 2 3=2-4 4=4-6 5=Above 6</p>	<p>1=Cows: Value per cow 1=Below10000 2=10000-20000 3=20000-30000 4=30000-40000 5=Above 40000</p>			

		<p>2=Goats: Value per goat 1=Below 2000 2=2000-3500 3=3500-5000 4=5000-7000 5=Above 7000</p> <p>3=Sheep Value per Sheep 1=Below 1500 2=1500-3000 3=3000-4500 4=4500-6000 5=Above 6000</p> <p>4= Others (Indicate)</p>
	2=Land (In acreage)	<p>1=None 2=Below 1 Acre 3=1-4 Acres 4=4-8 Acres 5=Above 8 Acres</p>
	3=Coffee trees	<p>1=None 2=Below 200 3=200-500 4=Above 500</p>
	4=Household assets (Value in Kshs)	<p>1=None 2=Below 2000 3=2000-5000 4=5000-8000 5=8000-11000 6=Above 11000</p>
	5=Money in Bank account in Kshs	<p>1=None 2=Below 3000 3=3000-6000 4=6000-9000 5=9000-12000 6=Above 12000</p>
	6=others (indicate)	
Inherited properties 1=Head of the household 2=Wife	<p>1=Land 2=Land with coffee trees 3=Money 4= others</p>	<p>1=None 2=Worth Below 5000 3=Worth 5000-10000 4=Worth 10000-20000 5=Worth Above 20000</p>

Education Level Attained: 1=Head of the household 2=Wife 3=Child 1 4=Child 2 5=Child 3 6=others (indicate)	1=None 2=Pre-primary 3=Primary 4=Secondary 5=Tertiary 6=University level	
In your opinion, are the resources fairly distributed?	1=Yes 0= No	
If Yes how fairly or if No how unfairly	1=Below25% 2=25%-50% 3=50%-75% 4=75%-100%	

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