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Article

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Changes in gender differences in household poverty in Kenya

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Abstract: Gender poverty differences in households are likely to affect female-headed households more than male-headed households. This paper examined the evolution of the gender poverty rate gap and identified the factors that underlie differences in poverty rates between female-headed households and male-headed households using the most recent representative household surveys conducted by the Kenya National Bureau of Statistics in 2005/06 and 2015/16. An extended Blinder-Oaxaca decomposition analysis with nonlinear regression was performed. The findings indicate that poverty rates for female-headed households and male-headed households declined from 38.56 to 32.73% in 2005/06 to 30.23 and 26.04% in 2015/16, respectively. Although female-headed households (1.12) have a higher chance of falling into poverty than male-headed households (0.95), the decline in the poverty rate was higher for female-headed households (8.33%) than for male-headed households (6.69%). Therefore, the results do not support the feminization of poverty hypothesis in Kenya. Factors that have bridged the gender poverty gap include cash transfers that explain 11.02% of the gaps, literacy (53.97%), university education (10.39%), secondary education (40.84%), employment in public and private sectors (26.66%) and business employment (10.58%). Recommended policies include the implementation of the gender policy and affirmative action, enhancing literacy levels, and secondary and university enrolment.

Subjects: Gender & Development; Development Economics; Gender Studies - Soc Sci

Keywords: gender differences; poverty; feminization; decomposition; household

JEL CLASSIFICATION: I32; J16

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1. Introduction

Gender mainstreaming and leaving no one behind have become strong policy tools to reduce poverty and gender inequality in recent years. Gender inequality and poverty reduction have attracted a lot of attention and policy interventions since the 1980s (Republic of Kena, 2006, 2007; Declaration, 1995; Kabeer, 2015; Moser, 2003; Republic of Kenya, 2000; World Bank, 2001). Gender analyses have been undertaken to deconstruct how gender differences in roles, rights, activities, needs, choices, and opportunities impact girls, boys, women, and men in certain circumstances. Kabeer (2015) asserts that gender inequality is prevalent across different strata of society, but it is more pronounced amongst the poor, especially women. United Nations Development programme (1995) argues that women comprise about 70% of the world's poor population. S. H. Chant (2006b) concerts that the disproportionate representation of women in the world's poor has been deepening and the increased incidences of female household headship have brought forward the challenges that women endure.

The world gender gap in health and survival, education attainment, economic participation and opportunity, and political empowerment has narrowed over the years in many developing countries (2017; World Bank, 2012; World Economic Forum, 2019). The World Economic Forum (2019) shows that 68.8% of the gender gap has been closed in 2019 compared to 68.0% in 2017 (World Economic Forum, 2017). The pace of achieving universal gender parity is, however, slow with women in a disadvantaged position (World Economic Forum, 2017). Gender gaps in economic participation and opportunities and political empowerment remain wide with gender gap indices of 57.8 and 24.7%, respectively, in 2020 (World Economic Forum, 2019). The World Economic Forum (2019) argues that the gender gap as at 2019, will take 99 years to bridge if concerted efforts are not put in place to address it. Overall, the gender gap index for Kenya averaged 67.1% in 2020 in the four dimensions, with health and education attainment scoring 98.0% and 93.8%, respectively (World Economic Forum, 2019). World Bank (2018) asserts that Kenyan women face tremendous poverty challenges as majority of them live in poor households where access to productive resources is segregated in a gender dimension.

Existing literature (World Bank, 2012; World Economic Forum, 2019) indicate that gender disparity affects economic growth and hinders economic development. Kabeer (2015) suggests that the interaction between gender and economic deprivation enhances poverty for women more than men. Gender inequality has led to few economic opportunities for women leading to low women empowerment and increased poverty levels in female-headed households. The World Bank (2012) supports gender equality as a fundamental development objective that is smart economics. This paper analyzes gender differences in household poverty by investigating the drivers of household poverty across gender and time. Existing literature on gendered poverty in Kenya (for example Geda et al., 2005) has not considered gender poverty differences over time and whether the factors that influence poverty and gender have changed as new data set emerged. Geda et al. (2005) has also not considered the feminization of poverty hypothesis as it has not decomposed the factors that explain gender differences in household poverty among female-headed households and male-headed households over time. This paper decomposes gender differences in household poverty to highlight policy implications and factors that drive gender poverty disparities in households over time.

2. Literature review

The theoretical literature on gender dates to the 1970s when issues of Women and Development gained prominence in the development arena (Warren, 2007). The cornerstone of Women and Development was the Women in Development approach that encouraged the treatment of women issues separately in development and the Gender and Development approach that integrated gender issues into planning in all development work (March et al., 1999; Moser, 2003). During the 1970s, the feminization of poverty concept was also coined to illustrate the growing number of households headed by low-income earning women (S. H. Chant, 2006a). The feminization of poverty concept was pioneered by Pearce (1978), and Buvinic et al. (1978) who noted that

poverty had become a female problem as households headed by women were suffering from high poverty levels than those headed by men. These papers termed the process whereby socio-economic and cultural norms cause and enhance poverty among women and girls leading to more women and girls compared to men and boys being excessively represented amongst the poor as the feminization of poverty.

The feminization of poverty concept came to be popular in determining analyses of poverty and informing poverty reduction strategies that targeted women as a tool for gender-responsive poverty mitigation policies. S. H. Chant (2006b) describes the tenets of the feminization of poverty as a disproportionate representation of women in the world's poor that has been deepening, and increased incidences of female household headship. Buvinic et al. (1978) described female household heads as the poorest of the poor while Pearce, D. (1978) as quoted by Kabeer (2015) acknowledged the phrase the poorest of the poor concerning female headship and its rise as a symbol of the perceived process of the feminization of poverty. The Declaration (1995) adopted the Beijing Platform for Action that strengthened the feminization of poverty concept because women faced persistent and increased burden of poverty.

The concept of women empowerment also emerged with the argument that women could only reduce poverty if they were empowered to make their own choices and decisions (Kabeer, 1999). Chaudhary et al. (2012) contend that women empowerment can occur through human development and structural changes, while United Nations Development programme (1995) argues that empowerment can also occur through access to social services. Gender Analysis Frameworks to address the assumption that development was gender-neutral and benefitted boys and girls, men and women equally, were developed (Kabeer, 2003; Warren, 2007). This was after the realization of the diverse roles boys, girls, women and men, and the social construct that gender play in economic development.

Theoretical approaches to analyze poverty using a gender lens were developed that include the Poverty Line Approach (poverty headcount, poverty gap, and severity of poverty) that was advanced by Foster et al. (1984) to calculate national poverty lines to separate the poor from non-poor. World Bank (2005) showed how to set up a poverty line, while United Nations Development programme (1995) present a measure of multidimensional poverty. Sen (1976) developed the Capabilities Approach as the measurement of inequalities became difficult, especially in identifying the poor and constructing the poverty index. Participatory Rural Appraisal was developed from the works of Chambers (1991) and it's upscaling by the World Bank (2001) to the Participatory Poverty Appraisal that informed poverty appraisal assessments conducted by countries in the 2000s. Participatory Rural Appraisal approach was also developed from the concept of Rapid Rural Appraisal to enable local communities to participate, analyze and share their poverty situations (Chambers, 1994).

Quisumbing et al. (2001) show that poverty estimates are higher for female-headed households and females than for male-headed households and males, respectively, though the differences are not across countries. This argument is collaborated by Wiepking and Maas (2005) who found the gender effect to increase the probability of becoming poor and women having a higher likelihood of becoming poorer than men. Ur Rahman et al. (2018) found gender in education to affect household poverty while an increase in male-female tertiary, secondary, and primary enrolment and literacy ratio decreased the probability of household poverty.

Chaudhary et al. (2012); and Ali and Hatta (2012) argue that enhancing the welfare of women and girls through improving their status of health, nutrition, contraceptive use, literacy, schooling, labour force participation, mobility, and ownership of assets as factors that will empower them and help them escape poverty. Other dimensions of empowerment include improvement in the position of women in the household through women's participation in intra-household decision-making, and control over household assets and income. Existing studies (Anyanwu, 2010;

Appleton, 1996; Baye & Epo, 2009); Epo & Baye, 2016; Epo et al., 2011; Twerefou et al., 2014) have focused on the relationship between poverty/welfare and gender to inform policy. Cagatay (1998), and Kiriti and Tisdell (2003) suggest that gender and poverty can be better understood if analyses are based at the household level as the unit of analysis. Lekobane and Mooketsane (2016) found female-headed households to have higher incidences of poverty than male-headed households. Anyanwu (2014) found that household size, divorce/separation, monogamous, and widowhood marriage status significantly and negatively correlated with the likelihood of being poor.

Existing empirical literature (Bibi & Chatti, 2010; Jayamohan & Kitesa, 2014; Rajaram, 2009; Twerefou et al., 2014) on the feminization of poverty concept have compared the poverty status between male-headed households and female-headed households to test the feminization of poverty assumption. The studies compare incidences of poverty in a two-period data to analyze whether incidences, depth, and severity of poverty within female-headed households is increasing and worsening compared to male-headed households. Studies that have confirmed the feminization of poverty include Rajaram (2009) and Katapa (2006). Other studies (Appleton, 1996; Bibi & Chatti, 2010; Jayamohan & Kitesa, 2014; Klasen, Lechtenfeld and Povel, 2011;) have found no evidence on the feminization of poverty concept. Aggarwal (2012) disagreed with the notion of the feminization of poverty terming it overemphasized since data and conceptual construction do not support the concept, while S. Chant (2003) terms the feminization of poverty and the poorest of the poor concepts to be fabled and exaggerated.

Yoong et al. (2012) suggest that although the bargaining power of an individual within the household increases with their income share, lack of legal rights and social norms may crowd out the impact of making social protection payments to women on their bargaining power. Handa et al. (2009) argue that cash transfers may reduce any intra-household transfers from men to women thus undermining women's bargaining power within the household as they also find little evidence on the impacts of PROGRESA on women's empowerment. Evaluations of cash transfer programmes in other countries present positive impacts as found by De Brauw et al. (2014) on *Bolsa Familia* on women's decision-making power in Brazil and Ambler (2016) who find that the likelihood of women becoming the primary decision-maker in the household in South Africa increased with pension receipts. Ambler and Brauw (2017) find the Pakistan's Benazir Income Support Program to have significant and positive impacts on some variables on women's empowerment and decision-making power. This notion is similar to Muhammad and Masood (2019) who find that cash transfer programmes can enhance women's empowerment, employment, and decision-making power in the household.

3. Methodological framework

The conceptual framework and methodology used in the paper are hinged on whether drivers of household poverty vary across gender and time, and whether the feminization of poverty hypothesis holds true in Kenya. The conceptual framework assumes that improved empowerment and decision-making for women in households, better health, and education for women and improved access to markets for women will increase female-headed households' earnings from entrepreneurship and employment, and well-being of children that will reduce current and future poverty (Sinha et al., 2007). This is likely to stimulate future savings and investment, increased consumption, and enhanced human capital accumulation by female-headed households. Improved maternal education and health and control over household resource allocation by women will improve their children well-being, educational and health status. The increase in women's influence over decision-making in the household will also lead to intergenerational transmission of earnings capability and this will in turn reduce gender poverty gap.

3.1. Data sources and sample size

The data used in this paper is from two representative household-level surveys conducted by the Kenya National Bureau of Statistics in 2005/06 and 2015/16. The two Kenya Integrated Household Budget Surveys provide rich data as they were conducted over a period of 12-months. We use the

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absolute poverty line[1] developed by Kenya National Bureau of Statistics (2017, 2007) to compare poverty rates between female-headed households and male-headed households in 2005/06 and 2015/16. The survey of 2005/06 had a smaller sample size compared to the 2015/16 data set, but Kenya National Bureau of Statistics (2017, 2007) contends that both survey designs provide sufficient information to provide accurate estimates for representative indicators at the national and county/district levels, gender, place of residence, and other household and individual characteristics. The sample size by gender is 14,377 male-headed households and 7,396 female-headed households giving a total sample size of 21,773 households in 2015/16 while the 2005/06 data gives a total sample size of 3,678 households that comprises of 2,579 male-headed households and 1,099 female-headed households. The delineated total sample size for the rural and urban residence of 2,549 households and 1,129 households in 2005/06 compared to 12,288 households and 9,485 households in 2015/16, respectively, is sufficient to provide useful evidence in this paper.

3.2. Theoretical model

The theoretical model used in this paper seeks to answer the questions of whether there are gender poverty differences between female-headed households and male-headed households after correcting for differences in observed characteristics. To evaluate group differences, theoretical models use logit, probit and other non-linear models to compare group differences (Kuha & Mills, 2020; Long & Mustillo, 2021). A logit model for binary response variables can be used for group comparison as outlined by Kuha and Mills (2020); and Long and Mustillo (2021). Let the group response binary variable Y be 1 for true and 0 for false and where Y is a random sample from a Bernoulli distribution with probability variables $\pi_i = P(Y_i = 1)$. The binary logistic model of π_i relative to X_i is given by function (1.1).

$$logit(\pi_i) = log\frac{\pi_i}{1-\pi_i} = \propto + \beta X_i \tag{1}$$

The maximum likelihood estimator of β given i = 1,2, 3, … .,n and if the observations for X_i are independent is given by function (1.2).

$$\hat{\beta} = log\frac{\hat{p}(Y=1|X=1)/[1-\hat{p}(Y=1|X=1)]}{\hat{p}(Y=1|X=0))/[1-\hat{p}(Y=1|X=0)]} \tag{2}$$

where $\hat{p}(Y=1|X=k)$ is the conditional proportionality of Y = 1 given X=k in the sample size for all values of k = 0,1. In function (1.2), the regression coefficients can be interpreted as a marginal effects. The values of outcome $Y_i(X)$ are always 0 and 1 since this is a binary variable. Therefore, the proportions of the units for which $Y_i(0)$ is 1 and that where $Y_i(1)$ is 0 can be understood as the marginal effect of X and Y that can be estimated by a comparison of the proportions of the units. Suppose the proportion of the units are π_1 and π_0, then the log odds ratio β can be estimated using function (3).

$$\beta = log\frac{\pi_1/(1-\pi_1)}{\pi_0/(1-\pi_0)} \tag{3}$$

Which gives the log ratios between the dependent variable Y(X) and the independent variable X in the population of n subgroups.

3.3. Model specification

3.3.1. Measurement of gender poverty gap

The Foster et al. (1984), herein referred as FGT, poverty indices were used to compare the incidences of poverty between male-headed households and female-headed households. The FGT family of poverty indices are used to test how women are compared to men in the poverty

measure as shown in function (1.4). The poverty measures are also additively decomposable into population sub-groups to allow analysis of poverty by population sub-groups such as female-headed households against male-headed households. The FGT measure allows us to estimate the headcount index for $\alpha = 0$ that shows the incidence of poverty for both female-headed households and male-headed households; the poverty gap index for $\alpha = 1$ that measures the depth of poverty in both female-headed households and male-headed households, and the poverty severity index for $\alpha = 2$that assess how poor the poor are in both female-headed households and male-headed households.

$$P_{\alpha(y_i;z)} = \frac{1}{n}\sum_1^q \left(\frac{g_i}{z}\right)^{\alpha} \tag{4}$$

Where p_α is the poverty measure, $z > 0$ is the poverty line, y_i is a vector of incomes for the i^{th} household, g_i is the income shortfall of the i^{th} household, q represents the number of poor households with income less than z, and n is the total number of households.

Delineating the households into two sub-groups by the gender of the household headship, poverty incidences, depth, and severity differences between female-headed households and male-headed households can be estimated using function (1.5).

$$\Delta p_\propto(y_i; z) = p_\propto^{FHH}(z) - p_\propto^{MHH}(z) \tag{5}$$

To test whether there are changes in gender poverty differences, function (1.5) can be applied on two period cross-sectional surveys (2005/06 and 2015/16) as shown in function (1.6).

$$p_{\propto,t}^{FHH}(z) - p_{\propto,t}^{MHH}(z) > p_{\propto,t-1}^{FHH}(z) - p_{\propto,t-1}^{MHH}(z) \tag{6}$$

The FGT indices are subjected to robust standard estimations to test for significant differences in poverty profiles between female-headed households and male-headed households.

3.3.2. Explaining changes in gender poverty gap

Second, we estimate the factors that influence gender disparities in household poverty in the two periods using logit regression. We assume that the probability of a household being poor to be an unobserved latent variable y* that produces a binary outcome. Assuming the latent variable y* is linearly related to explanatory variable X, then the regression relationship is represented in function (1.7).

$$y_i^* = X_i\beta_i + \varepsilon_i \tag{7}$$

where $X_i = (X_1 \ldots .X_n)$ are household/individual characteristics for the i^{th} household/individual, $\beta_i = (\beta_1 \ldots \ldots \ldots . \beta_n)$ are coefficients and $\varepsilon_i = (\varepsilon_1 \ldots \ldots \ldots \ldots \varepsilon_n)$ are the error terms for all $i = 1,2 \ldots \ldots \ldots \ldots \ldots \ldots$n. In function (1.7), y* is an unobservable latent variable. The probability of being poor is given by function (1.8).

$$Pr(y_i = 1|X) = 1 - F(-X_i\beta_i) \tag{8}$$

where F is a cumulative density function for the error term ε_i.

We formulate the empirical logit model by incorporating household and individual characteristics to estimate the marginal effects of each explanatory variable represented by function (1.9).

$$Pr(y_i = 1|X) = \beta_0 + \sum_{i=1} \beta_i X_i + e_i \tag{9}$$

We turn our analysis into a polychotomous model of an ordered logit to understand the factors that influence gender poverty differences in households in the three dimensions of non-poor, poor and hard-core poor. We assume the three categories to be 1 (if a household is non-poor), 2 (if a household is poor), and 3 (if a household is hard-core poor[2]) and their respective probabilities to be y_1, y_2, and y_3. An individual will fall in any of the categories represented by functions (1.10a, 1.10b and 1.10c).

$$y_1 = F(\beta' x_i) \tag{10}$$

$$y_2 = F(\beta' X_i + \varepsilon) - F\left(\beta^{'x_i}\right) \tag{11}$$

$$y_3 = F(\beta' x_i + \varepsilon) \tag{12}$$

Where F is a logistic cumulative density distribution function of an ordered logit model.

The probability of a household falling in any of the three categories is given by function (1.11).

$$Prob(F_{ij} = 1) = \emptyset\left(\alpha_j - \beta^{'x_i}\right) - \emptyset\left(\alpha_{j-1} - \beta^{'x_i}\right) \tag{13}$$

Where $\emptyset$ is the cumulative logistic density distribution function and the α_j's are the coefficients represented in functions (1.10a, 1.101b and 1.10c).

3.3.3. Explaining gender poverty gap

Thirdly, we turn to the extended decomposition methodology of Oaxaca (1973) and Blinder (1973) as advanced by Fairlie (2006) for non-linear models to elicit the factors that explain changes in gender differences in household poverty. The extended non-linear regression models of Blinder-Oaxaca allows the decomposition of the outcome variable between two groups into a part that is explained by differences in observed characteristics and a part attributable to differences in the estimated coefficients.

Let the two groups be defined by Male (M) and Female (F) and y be the outcome variable of interest that is explained by a vector of determinants X. The predicted male-female poverty gap ($\Delta\hat{Y}$) in the extended Blinder-Oaxaca framework is represented in function (1.12).

$$\Delta\hat{Y} = \hat{Y}_M - \hat{Y}_F \tag{14}$$

We let the poverty gap, $\hat{Y}_t$, for males and females in time t to be $\hat{Y}_t^M$ and $\hat{Y}_t^F$, respectively, and entering them into the function (1.12) yields function (1.13).

$$\hat{Y}_t^M - \hat{Y}_t^F = \varphi\left(\hat{X}_t^M, \hat{\beta}_t^M\right) - \varphi\left(\hat{X}_t^F, \hat{\beta}_t^F\right) \tag{15}$$

Where $\hat{X}_t^M$ and $\hat{X}_t^F$ are the vectors of individual and household characteristics for male-headed households and female-headed households, respectively. $\hat{\beta}_t^M$ are deterministic coefficients for male-headed households and $\hat{\beta}_t^F$ are deterministic coefficients for female-headed households. Decomposing function (1.13) yields function (1.14).

$$\hat{Y}_t^M - \hat{Y}_t^F = \left\{\varphi\left(\hat{X}_t^M, \hat{\beta}_t^M\right) - \varphi\left(\hat{X}_t^F, \hat{\beta}_t^M\right)\right\} + \left\{\varphi\left(\hat{X}_t^F, \hat{\beta}_t^M\right) - \varphi\left(\hat{X}_t^F, \hat{\beta}_t^F\right)\right\}. \tag{16}$$

Where $\varphi\left(\hat{X}_t^F, \hat{\beta}_t^M\right)$ has been introduced to the equation to represent the counterfactual distribution to account for differences between gender. The first term in functions (1.14) on the right-hand side is the decomposition effects in individual and household attributes. The second term is the effects of the differences in the coefficients on the determinants of poverty. To study the differences in period t and t + 1, we introduce the time-variant in function (1.15). This paper explains the gender poverty differences using the gap in the probability or explained gap (characteristic effect) that relies on the likelihood that the characteristics of individuals that explain poverty differ among groups.

$$\begin{aligned}\left(\hat{Y}_{t+1}^M - \hat{Y}_t^F\right) - \left(\hat{Y}_{t+1}^F - \hat{Y}_t^F\right) = &\left\{\left[\varphi\left(\hat{X}_{t+1}^M, \hat{\beta}_{t+1}^M\right) - \varphi\left(\hat{X}_{t+1}^F, \hat{\beta}_{t+1}^M\right)\right] - \left[\varphi\left(\hat{X}_t^M, \hat{\beta}_t^M\right) - \varphi\left(\hat{X}_t^F, \hat{\beta}_t^M\right)\right]\right\} \\ &+ \left\{\left[\varphi\left(\hat{X}_{t+1}^F, \hat{\beta}_{t+1}^M\right) - \varphi\left(\hat{X}_{t+1}^F, \hat{\beta}_{t+1}^F\right)\right] - \left[\varphi\left(\hat{X}_t^F, \hat{\beta}_t^M\right) - \varphi\left(\hat{X}_t^F, \hat{\beta}_t^F\right)\right]\right\}.\end{aligned} \tag{17}$$

3.4. Definition of variables

The main correlates of household gender poverty differences that the paper uses are presented in Table 1.

4. Empirical results and discussions

4.1. Descriptive statistics

The means and standard deviations for the various indicators vary across the two periods with 2015/16 showing improved performance in most indicators compared to 2005/06 as shown in Tables 2 and 3. A comparison of the same indicators between 2005/06 and 2015/16 by gender shows that majority of the indicators favoured male-headed households compared to female-headed households.

The mean and standard deviations for most indicators in 2005/06 are favourable to male-headed households compared to female-headed households except for the age, rural residence, and household size variables as shown in Table 2. The female-headed households have a lower household size that does not translate into a lower dependency ratio and majority of female-headed households reside in rural areas compared to male-headed households. The education and literacy indicators are favourable to male-headed households. The analyses show that female-headed households are more likely to be unemployed and if employed, they are dominantly employed in the agriculture sector. The marital status variable indicates that more female-headed households than male-headed households are living with someone, separated, divorced, widowed, or never married. On average, the probability of female-headed households receiving cash transfers compared to male-headed households was low.

In 2015/16, the indicators of interest of this paper are skewed towards the male-headed households compared to the female-headed households except for the age and household size variables as shown in Table 3. On average, female-headed households have older heads due to their high years of life expectancy and lower household sizes compared to male-headed households though this does not translate to a lower dependency ratio for female-headed households. On average, more female-headed households received cash transfers and resided in rural areas in 2015/16 compared to male-headed households. The high receipt of cash transfers to female-headed households may be attributed to better targeting of cash transfers that focus on women empowerment and their vulnerability as majority live in poverty. Male-headed households have better indicators in the highest level of education attained compared to female-headed households. The high educational attainment may lead to better health, higher employment opportunities and higher earnings for male-headed households compared to female-headed households.

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Table 1. Summary of variables

Variables	Definitions
Dependent Variables	
Household Poverty	In the binomial model, =1 if a household is poor and 0 otherwise while in the ordered model =1 if a household is non-poor, =2 if a household is poor and =3 if a household is hard-core poor
Explanatory Variables	
Gender of the Household Head	=1 if a household is headed by a female, 0 otherwise
Age of Household Head	Years completed since birth
Household Size	Number of individuals in the household
Literacy	=1 if literate and 0 otherwise
Highest Level of Education Attained	=1 if in Primary and post-primary with/without certificate and 0 Otherwise; =1 if in Secondary and post-secondary and 0 otherwise; =1 if in university and 0 otherwise; and =1 for no education and 0 otherwise
Employment Status	=1 if in public and formal sector employment and 0 otherwise; =1 if working in agricultural sector and 0 otherwise; =1 if in informal and business sector employment and 0 otherwise; and =1 if unemployed and 0 otherwise.
Marital Status	=1 if monogamous married and 0 otherwise; =1 if polygamous married and 0 otherwise; = 1 if living together and never married and 0 otherwise; = 1 if separated or divorced and 0 otherwise; and =1 if widow or widower and 0 otherwise
Area of Residence	=1 if rural residence and 0 otherwise; and = county of residence
Cash Transfers	=1 if received cash transfers and 0 otherwise
Dependency Ratios	=Number of elderlies aged 65 years and above plus children aged below 18 years

Source: Author's thoughts from reviewed literature

Female-headed households are disadvantaged as their average literacy level is significantly lower than the male-headed households that may be associated with low levels of education.

The proportion of male-headed households being employed in a public or private sector, and a business-setting is higher than that of female-headed households due to the high levels of education attainment by male-headed households. Female-headed households are more likely to be employed in the agriculture sector due to their low education attainment while on average, female-headed households are likely not to be employed compared to male-headed households. Majority of male-headed households are monogamously married compared to female-headed households whose proportion is higher in polygamous relationship, separated, divorced, widowed, or never married.

4.2. Measurement of gender poverty gap

The analysis shows that female-headed households recorded higher incidences of absolute poverty in both 2005/06 and 2015/16 compared to male-headed households. The poverty rate in female-headed households declined from 38.56% in 2005/06 to 30.23% in 2015/16 compared to male-headed households' rate that declined from 32.73% to 26.04% over the same period. The decline in absolute poverty rates in female-headed households (8.33%) was sharper compared to that in male-headed households (6.69%). Though the decline was stiff for female-headed households, the decline did not translate to better absolute poverty rates for female-headed households compared to male-headed households. It can be deduced that female-headed households did not

Table 2. Descriptive statistics by gender of household head, 2005/06

Variable	Female-headed households' sample					Male headed households' sample				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Household Size	1,099	4.558	2.628	1	24	2,579	5.184	2.860	1	23
Age of household head	1,099	46.328	16.903	6	98	2,579	43.087	14.754	15	99
Household head's age squared	1,099	2431.68	1773.80	36	9604	2,579	2074.08	1482.11	225	9801
Residence	1,099	0.641	0.480	0	1	2,579	0.579	0.494	0	1
Received cash transfers	1,099	0.540	0.499	0	1	2,579	0.670	0.470	0	1
Dependency ratio	1,099	1.607	1.676	0	10	2,579	1.344	1.423	0	13
Secondary Education	1,099	0.230	0.421	0	1	2,579	0.346	0.476	0	1
University Education	1,099	0.015	0.123	0	1	2,579	0.037	0.189	0	1
Primary Education	1,099	0.362	0.481	0	1	2,579	0.449	0.497	0	1
No Education	1,099	0.389	0.488	0	1	2,579	0.159	0.365	0	1
Literacy	1,099	0.558	0.497	0	1	2,579	0.815	0.389	0	1
Employment in Public/Private sector	1,099	0.186	0.389	0	1	2,579	0.269	0.443	0	1
Business Employment	1,099	0.153	0.360	0	1	2,579	0.273	0.446	0	1
Agriculture Employment	1,099	0.326	0.469	0	1	2,579	0.304	0.460	0	1
Unemployed	1,099	0.336	0.472	0	1	2,579	0.155	0.362	0	1
Monogamous	1,099	0.250	0.433	0	1	2,579	0.767	0.423	0	1
Polygamous	1,099	0.090	0.286	0	1	2,579	0.113	0.317	0	1
Never Married	1,099	0.125	0.330	0	1	2,579	0.072	0.258	0	1
Separated/Divorced	1,099	0.115	0.319	0	1	2,579	0.020	0.141	0	1
Windowed	1,099	0.417	0.493	0	1	2,579	0.022	0.148	0	1

Source: Author's Computation from 2005/06 Kenya Integrated Household Budget Surveys data

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Table 3. Descriptive statistics by gender of household head, 2015/16

Variable	Female-headed households' sample					Male headed households' sample				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Household Size	7,396	3.849	2.319	1	20	14,377	4.478	2.602	1	28
Age of household head	7,385	47.063	17.437	12	100	14,362	43.437	15.232	13	99
Household head's age squared	7,385	2,518.9	1,826.4	144	10,000	14,362	2,118.8	1,527.611	169	9,801
Residence	7,396	0.636	0.481	0	1	14,377	0.584	0.493	0	1
Received cash transfers	7,396	0.523	0.500	0	1	14,377	0.278	0.448	0	1
Dependency ratio	7,396	1.902	1.927	0	14	14,377	1.650	1.772	0	20
Secondary Education	7,396	0.232	0.422	0	1	14,377	0.345	0.475	0	1
University Education	7,396	0.021	0.145	0	1	14,377	0.044	0.206	0	1
Primary Education	7,396	0.420	0.494	0	1	14,377	0.468	0.499	0	1
No Education	7,396	0.320	0.466	0	1	14,377	0.137	0.344	0	1
Literacy	7,389	0.611	0.487	0	1	14,363	0.827	0.378	0	1
Employment in Public/ Private sector	7,396	0.201	0.401	0	1	14,377	0.316	0.465	0	1
Business Employment	7,396	0.247	0.432	0	1	14,377	0.324	0.468	0	1
Agricultural Employment	7,396	0.379	0.485	0	1	14,377	0.282	0.450	0	1
Unemployed	7,396	0.189	0.391	0	1	14,377	0.081	0.273	0	1
Monogamous	7,396	0.289	0.453	0	1	14,377	0.767	0.422	0	1
Polygamous	7,396	0.109	0.312	0	1	14,377	0.091	0.288	0	1
Never Married	7,396	0.113	0.317	0	1	14,377	0.077	0.267	0	1
Separated/Divorced	7,396	0.127	0.332	0	1	14,377	0.040	0.197	0	1
Windowed	7,396	0.362	0.481	0	1	14,377	0.024	0.153	0	1

Source: Author's Computation from 2015/16 Kenya Integrated Household Budget Surveys data

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Table 4. Foster-Greer-Thorbecke (FGT) poverty indices, 2005/06 and 2015/16

Household headship	2005/06			2015/16		
	P_0	P_1	P_2	P_0	P_1	P_2
Subgroup FGT index estimates, P(a)						
Female-headed household	.386 *(.017)*	.138 *(.004)*	.072 *(.0048)*	0.302 *(.0084)*	0.090 *(.0020)*	0.041 *(.0010)*
Male-headed household	.327 *(0.010)*	.110 *(.007)*	.051 *(.0026)*	0.260 *(.0063)*	0.070 *(.0035)*	0.028 *(.0020)*
Difference	0.059	0.028	0.028	0.042	0.020	0.013
Subgroup poverty 'share', S_k = v_k.FGT_k(a)/FGT(a)						
Female-headed household	0.33105	0.34542	0.37126	0.35755	0.38235	0.40791
Male-headed household	0.66895	0.65458	0.62874	0.64245	0.61765	0.59209
Subgroup poverty 'risk' = FGT_k(a)/FGT(a) = S_k/v_k						
Female-headed household	1.11913	1.16774	1.25508	1.10339	1.17993	1.25881
Male-headed households	0.94996	0.92954	0.89285	0.95044	0.91374	0.87593

Source: Author's computation using 2005/06 and 2015/16 Kenya Integrated Household Budget Surveys data. Values in parentheses show standard errors.

Table 5. Estimated probabilities of being non-poor, poor or hard-core poor

Sample	2005/06			2015/16		
	Probability of being			Probability of being		
	Non-Poor	Poor	Hard-core poor	Non-Poor	Poor	Hard-core poor
National	**0.6782**	**0.2403**	**0.0816**	**0.7069**	**0.2461**	**0.0470**
Female-headed households	0.6055	0.2858	0.1087	0.6736	0.2719	0.0545
Male-headed households	0.7069	0.2211	0.0720	0.7233	0.2332	0.0435
Rural	**0.5800**	**0.3007**	**0.1193**	**0.6548**	**0.2862**	**0.0590**
Female-headed households	0.5214	0.3320	0.1466	0.6307	0.3042	0.0651
Male-headed households	0.6069	0.2850	0.1081	0.6679	0.2763	0.0558
Urban	**0.7979**	**0.1569**	**0.0453**	**0.7762**	**0.1907**	**0.0332**
Female-headed households	0.7388	0.1991	0.0620	0.7415	0.2187	0.0398
Male-headed households	0.8167	0.1430	0.0403	0.7907	0.1788	0.0305

Source: Author's computation using 2005/06 and 2015/16 Kenya Integrated Household Budget Surveys data

suffer high and increasing poverty rates during the period under review compared to male-headed households. Overall, absolute household poverty declined by 7.06 percentage points between 2005/06 and 2015/16.

The movement from hard-core poor to poor households indicates a sharp decline between the two periods, while the change from poor to non-poor was marginal. The probability of female-headed households of escaping from hard-core poor to poor was higher than the probability of male-headed households who recorded a decline of 9.14 and 6.76 percentage points, respectively. The movement from poor to non-poor was also higher for female-headed households compared to male-headed households over the same period. The increase in non-poor households was higher for female-headed households (8.33%) compared to male-headed households (6.69%) over the two periods.

Data analysis using the FGT measurements shows that female-headed households recorded high rates in the three FGT indices of headcount index ($\alpha = 0$), poverty gap index ($\alpha = 1$) and severity of poverty ($\alpha = 2$) in both periods as shown in Table 4. The headcount ratio or the proportion of poor households (P_0) in female-headed households of 0.386 in 2005/06 and 0.302 in 2015/16 is higher compared to those of male-headed households of 0.327 and 0.260 over the same period, respectively. The average normalized poverty gap (P_1) and the average squared normalized poverty gap (P_2) follow a similar trend to that of P_0 over the period under review. The difference in headcount index between female-headed households and male-headed households of 0.059 in 2005/06 was higher than the difference of 0.042 in 2015/16, which shows that female-headed households bridged the poverty gap in 2015/16, though they remain poorer compared to male-headed households. This trend is recorded in the poverty gap and the severity of poverty indices.

The male-headed households recorded a higher share of poverty compared to the female-headed households in both years due to their large population in the sample. However, the share of female-headed households in the proportion of poor households in P_0, increased by 0.03 points from 0.331 in 2005/06 to 0.358 in 2015/16 compared to that of male-headed households that declined by a similar margin from 0.669 to 0.642 over the same period. The risk of falling into poverty was also higher for female-headed households compared to male-headed households in the two periods. The probability of female-headed households falling into poverty was 1.119 in 2005/06 and 1.103 in 2015/16 compared to 0.950 and 0.950 for male-headed households over the same period, respectively.

Overall, the FGT indices are higher for female-headed households compared to male-headed households in the two periods but the female-headed households seems to bridge the gap in 2015/16 compared to 2005/06 as shown by the negative differences in Annex A1. The result shows that there are significant differences in 2005/06 between female-headed households and male-headed households for P_0 in secondary school level of education, literacy level and agricultural employment at 1%, 5%, and 10% significance levels, respectively. In 2015/16, significance level is only established at 5% for agricultural employment for the P_1 and P_2. Therefore, we can conclude that female-headed households made strides to escape poverty in 2015/16 as there are no significant differences when compared to male-headed households in the means of FGT indices against socioeconomic variables except for employment in agriculture sector.

Overall, the probability of being non-poor and poor increased by 4.06% and 2.36% from 0.678 to 0.240 in 2005/06 to 0.707 and 0.246 in 2015/16, respectively, as presented in Table 5. On the other hand, the probability of being hard-core poor declined significantly by 73.6% from 0.0816 to 0.047 over the same period. The probability of female-headed households to be non-poor increased by 10.11% from 0.606 in 2005/06 to 0.674 in 2015/16 compared to the probability of male-headed households to be non-poor, which increased by 2.27% from 0.707 to 0.723 in 2015/16. At the national level and in 2005/06, the probability of female-headed households to be poor or hard-core poor was higher at 0.286 and 0.109 compared to the probability of male-headed households to be poor or hard-core poor at 0.221 and 0.072, respectively. In 2015/16, the probability of female-headed households to be poor or hard-core poor was also higher compared to the probability of male-headed households.

The probability of female-headed households to be poor or hard-core poor declined over the two periods, while the probability of male-headed households to be poor increased as the probability of being hard-core poor declined in the same period. The data indicates that rural areas had a decline in the

probability of being poor and hard-core poor, while the urban areas show an increase in the probability of being poor between 2005/06 and 2015/16 for both female-headed households and male-headed households. However, the probability of female-headed households and male-headed households to be poor in the urban areas increased over the same period as the probability of being hard-core poor for both female-headed households and male-headed households declined in the same period.

4.3. Determinants of gender poverty gap

Annex A2 shows the explanatory variables that are significant in determining gender poverty differences in households over time. The regression has been carried in three stages in each period. The first regression represents the pooled sample between female-headed households and male-headed households; the second represents the female headed households only, while the third is that of male-headed households only. The likelihood ratio tests for all the estimated models reject the null hypothesis that all explanatory variables of the regression coefficients are zero at 1% level of significance.

The logit regression results indicate that the time variable is an important determinant of poverty in both female-headed households and male-headed households. The significance is stronger in male-headed households at 5% compared to 10% in female-headed households. The pooled regression also indicates that gender differences are important in explaining large effects on poverty over time with a negative marginal effect (−0.122) that is significant at 10%. This result indicates that Kenya is narrowing the gender gap and that female-headed households had a significantly lower probability of being poor than male-headed households in 2015/16.

The factors that are important in bridging gender poverty differences in households that have a negative and significant marginal effect over time at 1% include literacy level, rural residence, university education, secondary and primary education, employment in the public and private sectors, undertaking business, employment in agriculture sector, monogamous and polygamous marriages. Those that widen gender poverty differences in households over time include living together and never married, separated, and divorced; cash transfers; household size; age and age squared; and dependency ratio. Nearly half of the counties have become enablers to bridge the gender poverty differences across female-headed households and male-headed households due to the policies being implemented by devolved governments.

The ordered logit regression is also estimated for the pooled, female-headed households only and male-headed households only samples as shown in in Annex A3. Most of the factors that are important in explaining gender poverty differences between female-headed households and male-headed households in the binomial logit model are also important in the ordered logit regression. Similar to the results of the logit model, time and gender are particularly important determinants of poverty differences in the poor and hard-core poor categories. The strong regressors in the ordered model that reduce gender poverty difference in both female-headed households and male-headed households across the two periods include university and secondary education, literacy levels, rural residence, employment in the public and private sectors, doing business and employment in the agriculture sector. Being in a monogamous or a polygamous union is also important in reducing gender poverty differences in the lower cadres of poor and hard-core poor households. The result further shows the importance devolution has played in addressing gender poverty differences as majority of the counties show negative and significant marginal effects over the period under review. We can conclude that counties are now able to support households to address gender poverty differences especially for those that are in the poor and hard-core poor categories, a finding that is different from earlier studies that documented rural areas to be poverty traps.

4.4. Explaining gender poverty gap

In the decomposition analysis, the Fairlie methodology estimates the dependent variable occurring between the two periods and computes time differences in the independent variables to the outcome differential using the female-headed households' coefficients. The probability of being

poor for female-headed households is 0.313 compared to 0.270 for male-headed households over the two periods as shown in Annex A4. The decomposition results indicate that 82.12% of gender poverty differences between 2005/06 and 2015/16 are explained by individual and household socio-economic characteristics.

The socio-economic characteristics that are significant in bridging the gender poverty gap between 2005/06 and 2015/16 are cash transfers that explains 11.02% of the gaps, literacy level (53.97%), university education (10.39%), secondary education (40.84), employment in the public and private sectors (26.66%) and business employment (10.58%). The social economic characteristics that are significant in worsening gender poverty differences between 2005/06 and 2015/16 include household size (−41.47%), rural residence (−12.16%), and employment in agricultural sector (−14.02). Result from counties shows others bridging the gap poverty gap while others have worsened it.

4.5. Discussion of results

Estimation of the pooled binomial and ordered models indicate that gender differences are important in explaining large effects on poverty similar to the findings of Jayamohan and Kitesa (2014); Twerefou et al. (2014); Epo et al. (2011); and Anyanwu (2010). Our findings are not consistent with Twerefou et al. (2014) and Baye and Epo (2009)) who found poverty incidences to be higher among male-headed households than in female-headed households that did not support the feminization of poverty hypothesis. Our findings support the assertion that the variables that explain gender poverty differences in the household are favourable to the male-headed households relative to the female-headed households. One key finding of this paper is that the feminization of poverty hypothesis is a weak concept in Kenya similar to existing literature (Jayamohan & Kitesa, 2014; Klasen, Lechtenfeld and Povel, 2011; Bibi & Chatti, 2010; Appleton, 1996).

Our findings further, indicate that female-headed households have lower mean household sizes compared to male-headed households in both periods but this does not translate to lower poverty levels for female-headed households when measured through this indicator. Our findings are similar to the findings of Anyanwu (2014); Epo et al. (2011); and Baye and Epo (2009)) who found female-headed households to be disadvantaged in poverty levels when measured through the household size. Our findings contradict the findings of Twerefou et al. (2014) and Anyanwu (2010) who found that male-headed households were poorer compared to female-headed households when measured through the size of the households. Our findings further show that household size significantly explains gender poverty differences between female-headed households and male-headed households similar to Twerefou et al. (2014); Epo et al. (2011); and Baye and Epo (2009)). On the other hand, the dependency ratio increases poverty in a household because of sharing the scarce resources in both periods similar to Lekobane and Mooketsane (2016) and Appleton (1996) findings. Similarly, our findings indicate that the age of the household head is a significant determinant of poverty in both male-headed households and female-headed households as found by Twerefou et al. (2014); Epo et al. (2011); and Appleton (1996).

Our findings also support the assertion by Epo and Baye (2016); Jayamohan and Kitesa (2014); Twerefou et al. (2014); Anyanwu (2010); and Baye and Epo (2009)) that education is important in explaining large effects on gendered poverty or well-being in both female-headed households and male-headed households. Our results are also similar to Ur Rahman et al. (2018) who found gender in education to adversely influence household poverty. Further, our results on the effect of literacy of the head of the household on gender poverty differences are supportive of the findings by Baye and Epo (2009)) and Majeed and Malik (2014) who found lietracy of the household head to influence gender poverty differences. On employment status, our results confirm the findings of Twerefou et al. (2014) who found that being employed reduced the likelihood of being poor. Further, our results support the assertion of Majeed and Malik (2014) and Kang'ethe (2018) who find cash transfers to narrow the poverty gap.

On the effect of the marital status of the household head on gender poverty differences, our results are consistent with Twerefou et al. (2014); and Appleton (1996) who found the effects to

vary across the different categories of marital status. Similar to Epo et al. (2011), our findings show that residence is an important factor in explaining gender poverty differences and the rural areas have ceased being poverty traps.

5. Conclusion and policy recommendations

The paper examined whether gender differences in household poverty have changed over the years 2005/06 and 2015/16. From the analysis of the absolute poverty rates between female-headed households and male-headed households for the period 2005/06 and 2015/16, it is deduced that poverty incidences for both female-headed households and male-headed households improved over the two periods, but the rate of improvement was higher for female-headed households. Further, the poverty headcount, the poverty gap, and the severity of poverty indices were high in female-headed households, but we note that female-headed households are bridging the gender poverty gap in all the poverty indices. The ordered model also demonstrates that female-headed households are lagging male-headed households in the three categories of poverty, but the incidences have improved over time. This confirms that the feminization of poverty is a weak concept in Kenya. Incidentally, female-headed households have a higher probability of falling into poverty than male-headed households.

Further, we have shown that variables that determined poverty between 2005/06 and 2015/16 in both the binary and ordered models are gender, age, the household size, education, employment, and marital status, residence, literacy level, dependency ratio and cash transfers. Of these variables, secondary and primary education, cash transfers, employment in the public-private sectors and rural residence are variables that improved poverty in female-headed households while age, secondary and university education, literacy level, cash transfers and rural residence are significant variables that improve poverty rates in male-headed households. Marital status is the only variable that has changed over the two periods to improve poverty levels in both female-headed households and male-headed households.

The decomposition results indicate that 82.12% of gender poverty differences between 2005/06 and 2015/16 are explained by individual and household socio-economic characteristics. The socio-economic characteristics that have bridged the gender poverty gap are cash transfers, age, literacy level, university and secondary education, employment in the public and private sectors, and business employment while household size, rural residence, employment in agricultural sector and monogamous marriage worsened it.

From our findings, several policy considerations are recommended to bridge the gender poverty gap between female-headed households and male-headed households. To cushion old households, a robust social protection safety net should be developed by the ministry responsible for social protection that targets aged male heads to cushion their families from falling into poverty. Since the majority of women work in the agricultural sector, the ministries responsible for agricultural policy and manufacturing together with counties should put in place a prudent policy that supports investment in the agricultural sector, pricing of the rural agricultural produce, focusing on foreign direct investment to the agricultural sector to enhance value addition, and increasing wages for the agricultural workers will alleviate the wage differentials between the agricultural and non-agricultural workers.

Further, bridging secondary and university education differences between female-headed households and male-headed households and implementation of the affirmative action law and policy will drastically reduce the gender poverty gap. Some rural counties have moved from being poverty traps for the majority of female-headed households due to the devolved system of government. Enhancing devolved governance structures through more resources that can support rural development will bridge the gender poverty gap.

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Notes

1. The poverty line used in this paper borrows from the poverty line developed by the Kenya National Bureau of Statistics, where any person who consumed less than KSh. 988 in rural areas and KSh. 1,474 in urban areas per month in 2005/06 was considered food poor while those who consumed less than KSh. 1,562 in rural areas and KSh. 2,913 in urban areas during the same period were considered to be overall poor (Kenya National Bureau of Statistics, 2007). In 2015/16, food poor persons consumed less than KSh. 1,954 in rural areas and KSh. 2,551 in urban areas while overall poor persons consumed less than KSh. 3,252 in rural areas and KSh. 5,995 in urban areas per month (Kenya National Bureau of Statistics, 2017).
2. In Kenya, any individual or household with a monthly total adult equivalent consumption expenditure that is less than KSh 1,954 and KSh 2,551 in rural areas and urban areas, respectively, are considered to be hard-core poor.

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Annex A1. Significance tests for FGT means by gender of households for selected variables, 2005/06 and 2015/16

	2005/06			2015/16		
	p0	p1	p2	P0	P1	P2
Variables	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**
RESIDENCE						
Male headed households	0.4288 (0.0012)	0.1578 (0.0006)	0.0803 (0.0003)	0.3622 (0.0002)	0.1047 (0.0001)	0.0451 (0.0000)
Female headed households	0.4267 (0.0017)	0.1570 (0.0008)	0.0798 (0.0005)	0.3619 (0.0003)	0.1045 (0.0001)	0.0451 (0.0001)
difference	0.0021 (0.0021)	0.0008 (0.0010)	0.0005 (0.0006)	0.0003 (0.0003)	0.0002 (0.0001)	0.0001 (0.0001)
RECEIVED CASH TRANSFERS						
Male headed households	0.4281 (0.0011)	0.1573 (0.0005)	0.0800 (0.0003)	0.3612 (0.0003)	0.1044 (0.0001)	0.0451 (0.0001)
Female headed households	0.4287 (0.0019)	0.1576 (0.0009)	0.0800 (0.0005)	0.3617 (0.0003)	0.1045 (0.0001)	0.0450 (0.0001)
difference	−0.0006 (0.0021)	−0.0003 (0.0011)	0.0000 (0.0006)	−0.0005 (0.0004)	−0.0001 (0.0002)	0.0000 (0.0001)
SECONDARY EDUCATION						
Male headed households	0.4304 (0.0015)	0.1584 (0.0008)	0.0805 (0.0004)	0.3612 (0.0002)	0.1045 (0.0001)	0.0451 (0.0001)
Female headed households	0.4224 (0.0028)	0.1571 (0.0013)	0.0805 (0.0008)	0.3611 (0.0004)	0.1044 (0.0002)	0.0450 (0.0001)
difference	0.0080 (0.0032)***	0.0013 (0.0016)	0.0000 (0.0009)	0.0001 (0.0005)	0.0002 (0.0002)	0.0001 (0.0001)
UNIVERSITY EDUCATION						
Male headed households	0.4249 (0.0044)	0.1564 (0.0020)	0.0793 (0.0011)	0.3598 (0.0006)	0.1037 (0.0003)	0.0447 (0.0001)
Female headed households	0.4134 (0.0101)	0.1522 (0.0050)	0.0782 (0.0027)	0.3592 (0.0013)	0.1039 (0.0006)	0.0449 (0.0003)
difference	0.0115 (0.0112)	0.0042 (0.0052)	0.0011 (0.0029)	0.0005 (0.0014)	−0.0002 (0.0006)	−0.0002 (0.0003)
LITERACY						
Male headed households	0.4293 (0.0010)	0.1577 (0.0005)	0.0801 (0.0003)	0.3614 (0.0002)	0.1045 (0.0001)	0.0450 (0.0000)
Female headed households	0.4252 (0.0018)	0.1574 (0.0009)	0.0804 (0.0005)	0.3615 (0.0002)	0.1044 (0.0001)	0.0450 (0.0001)

(*Continued*)

(*Continued*)

Variables	2005/06			2015/16		
	p0	p1	p2	P0	P1	P2
	Mean	Mean	Mean	Mean	Mean	Mean
difference	0.0041 (0.0021)**	0.0003 (0.0010)	−0.0003 (0.0006)	0.0000 (0.0003)	0.0000 (0.0001)	0.0000 (0.0001)
EMPLOYMENT IN PUBLIC/PRIVATE SECTOR						
Male headed households	0.4293 (0.0017)	0.1581 (0.0009)	0.0805 (0.0005)	0.3610 (0.0002)	0.1043 (0.0001)	0.0450 (0.0001)
Female headed households	0.4254 (0.0032)	0.1579 (0.0015)	0.0806 (0.0008)	0.3607 (0.0004)	0.1042 (0.0002)	0.0450 (0.0001)
difference	0.0039 (0.0037)	0.0002 (0.0018)	−0.0001 (0.0010)	0.0003 (0.0005)	0.0001 (0.0002)	0.0000 (0.0001)
AGRICULTURAL EMPLOYMENT						
Male headed households	0.4283 (0.0016)	0.1570 (0.0008)	0.0798 (0.0004)	0.3623 (0.0003)	0.1048 (0.0001)	0.0452 (0.0001)
Female headed households	0.4235 (0.0024)	0.1560 (0.0012)	0.0793 (0.0007)	0.3619 (0.0003)	0.1044 (0.0001)	0.0450 (0.0001)
difference	0.0048 (0.0029)*	0.0010 (0.0014)	0.0005 (0.0008)	0.0004 (0.0004)	0.0004 (0.0002)**	0.0002 (0.0001)**

Source: Author's calculation using the 2005/06 and 2015/16 Kenya Integrated Household Budget Surveys data. Standard errors are in parenthesis. ***, **, * represent establishment of significance level at 1%, 5% and 10%, respectively.

Annex A2. Logit regression using total consumption per adult equivalent and a time dummy variable, 2005/06 and 2015/16

Variable	Pooled sample	Female headed households' Sample	Male headed households' sample
	Coef.	Coef.	Coef.
Time Dummy	−0.161(0.046)***	−0.152(0.081)*	−0.135(0.057)**
Female Headed Household	−0.122(0.041) ***		
Received cash transfers	0.020(0.034)	−0.044(0.055)	0.083(0.043)*
Household Size	0.247(0.008) ***	0.290(0.015) ***	0.221(0.011) ***
Age of household head	0.010(0.006)*	0.011(0.009)	0.007(0.008)
Household head's age squared	0.000(0.000)	0.000(0.000)	0.000(0.000)
Literacy	−0.507(0.056) ***	−0.494(0.093) ***	−0.519(0.071) ***
Residence	−0.278(0.036) ***	−0.234(0.062) ***	−0.284(0.044) ***
Dependency ratio	0.055(0.011) ***	0.057(0.017) ***	0.056(0.015) ***
University Education	−2.840(0.188) ***	−3.108(0.527) ***	−2.681(0.205) ***
Secondary Education	−1.106(0.071) ***	−1.382(0.126) ***	−0.936(0.090) ***
Primary Education	−0.239(0.061) ***	−0.418(0.095) ***	−0.090(0.081)

(*Continued*)

Variable	Pooled sample	Female headed households' Sample	Male headed households' sample
	Coef.	Coef.	Coef.
Employment in Public/ Private sector	−0.283(0.057) ***	−0.237(0.097) **	−0.364(0.074) ***
Business Employment	−0.137(0.054) ***	−0.021(0.088)	−0.248(0.072) ***
Agricultural Employment	−0.204(0.051) ***	−0.197(0.078)**	−0.248(0.070) ***
Monogamous	−0.041(0.058)	−0.244(0.079) ***	0.381(0.129) ***
Polygamous	−0.144(0.066)**	−0.182(0.093)**	0.216(0.139)
Never Married	0.190(0.084)**	0.186(0.119)	0.511(0.157) ***
Separated/Divorced	0.145(0.075)*	0.212(0.095)**	0.206(0.167)
Mombasa	−0.669(0.151) ***	−0.716(0.291) ***	−0.679(0.178) ***
Kilifi	0.115(0.120)	0.166(0.212)	0.061(0.147)
Tana_River	0.671(0.128) ***	0.432(0.219)**	0.789(0.160) ***
Lamu	−0.788(0.138) ***	−0.873(0.248) ***	−0.778(0.168) ***
Taita_Taveta	0.053(0.132)	−0.312(0.246)	0.192(0.158)
Garissa	0.527(0.132) ***	0.301(0.258)	0.636(0.155) ***
Wajir	−0.272(0.130)**	−0.486(0.228)**	−0.139(0.161)
Mandera	0.808(0.141) ***	0.642(0.231) ***	0.897(0.182) ***
Marsabit	0.007(0.134)	−0.015(0.236)	0.016(0.164)
Isiolo	−0.064(0.123)	−0.290(0.213)	0.053(0.152)
Meru	−0.985(0.132) ***	−0.827(0.234) ***	−1.083(0.160) ***
Tharaka_Nithi	−0.579(0.141) ***	−0.300(0.242)	−0.752(0.176) ***
Embu	−0.255(0.125)**	−0.104(0.230)	−0.322(0.149)**
Kitui	0.197(0.114)*	0.111(0.193)	0.258(0.145)*
Machakos	−0.341(0.127) ***	−0.548(0.227)**	−0.221(0.155)
Makueni	−0.104(0.125)	−0.224(0.209)	−0.001(0.160)
Nyandarua	0.001(0.133)	0.059(0.231)	−0.038(0.164)
Nyeri	−0.483(0.138) ***	−0.297(0.232)	−0.614(0.175) ***
Kirinyaga	−0.502(0.140) ***	−0.439(0.262)*	−0.554(0.167) ***
Muranga	−0.551(0.134) ***	−0.502(0.227)**	−0.588(0.168) ***
Kiambu	−0.416(0.137) ***	−0.144(0.252)	−0.544(0.165) ***
Turkana	1.218(0.132) ***	1.304(0.203) ***	1.019(0.185) ***
Samburu	0.986(0.133) ***	0.923(0.222) ***	1.005(0.167) ***
Trans_Nzoia	−0.287(0.134)**	−0.417(0.256)	−0.272(0.157)*
Uasin_Gishu	0.146(0.122)	0.078(0.232)	0.148(0.144)
Elgeyo_Marakwet	0.267(0.123)**	0.473(0.236)**	0.194(0.145)
Nandi	−0.141(0.126)	−0.073(0.239)	−0.190(0.149)
Baringo	0.044(0.129)	0.165(0.232)	−0.025(0.155)

(*Continued*)

(*Continued*)

Variable	Pooled sample	Female headed households' Sample	Male headed households' sample
	Coef.	**Coef.**	**Coef.**
Laikipia	0.308(0.128)**	0.522(0.219)**	0.132(0.162)
Nakuru	−0.219(0.128)*	−0.305(0.236)	−0.209(0.153)
Narok	−1.088(0.134) ***	−0.978(0.257) ***	−1.119(0.157) ***
Kajiado	0.308(0.133)**	0.263(0.243)	0.284(0.160)*
Kericho	−0.216(0.123)*	−0.166(0.228)	−0.268(0.147)*
Bomet	0.065(0.125)	−0.231(0.248)	0.149(0.145)
Kakamega	0.035(0.116)	−0.003(0.212)	0.055(0.138)
Vihiga	0.342(0.124) ***	0.429(0.210)**	0.313(0.157)**
Bungoma	−0.015(0.119)	0.166(0.217)	−0.103(0.143)
Busia	1.063(0.120) ***	0.929(0.211) ***	1.137(0.146) ***
Siaya	−0.041(0.124)	−0.156(0.208)	0.031(0.156)
Kisumu	0.146(0.119)	0.061(0.217)	0.179(0.143)
Homa_Bay	−0.264(0.117)**	−0.301(0.207)	−0.285(0.144)**
Migori	−0.017(0.120)	−0.171(0.205)	0.058(0.150)
Kisii	0.345(0.118) ***	0.256(0.215)	0.370(0.143)***
Nyamira	0.003(0.129)	−0.034(0.223)	0.024(0.160)
Nairobi_City	−0.879(0.144) ***	−0.931(0.306) ***	−0.893(0.164) ***
_cons	−0.813(0.172) ***	−0.937(0.292) ***	−1.130(0.240) ***
Pseudo R-squared	*0.1879*	*0.2013*	*0.1857*
Log likelihood	*-13202.798*	*-4416.2492*	*-8726.4931*
LR chi2 statistics	*0.0000*	*0.0000*	*0.0000*
Number of obs	*25,425*	*8,484*	*16,941*

Source: author's calculation using the 2005/06 and 2015/16 Kenya Integrated Household Budget Surveys data. The results present impact effects. Standard errors are in parenthesis. ***, **, * represent establishment of significance level at 1%, 5% and 10%, respectively.

Annex A3. Ordered logit regression estimates using per adult equivalent consumption with a time dummy variable, 2005/06 and 2015/16

Variables	Pooled sample	Female headed households' sample	Male headed households' sample
	Coef.	**Coef.**	**Coef.**
Time dummy	−0.297(0.043)***	−0.323(0.076) ***	−0.256(0.054) ***
Female Headed Household	−0.129(0.039)***		
Received cash transfers	0.009(0.032)	−0.031(0.052)	0.062(0.041)
Household Size	0.236(0.008) ***	0.262(0.013) ***	0.218(0.010) ***
Age of household head	0.017(0.005) ***	0.023(0.009) ***	0.012(0.007)*

(*Continued*)

Variables	Pooled sample	Female headed households' sample	Male headed households' sample
	Coef.	**Coef.**	**Coef.**
Household head's age squared	0.000(0.000) ***	0.000(0.000) ***	0.000(0.000)
Literacy	−0.508(0.052) ***	−0.513(0.087) ***	−0.510(0.066) ***
Residence	−0.163(0.034) ***	−0.094(0.058)*	−0.184(0.042) ***
Dependency ratio	0.046(0.010) ***	0.051(0.015) ***	0.045(0.013) ***
University Education	−2.885(0.186) ***	−3.074(0.524) ***	−2.776(0.203) ***
Secondary Education	−1.157(0.068) ***	−1.363(0.120) ***	−1.031(0.085) ***
Primary Education	−0.290(0.057) ***	−0.419(0.089) ***	−0.177(0.075) **
Employment in Public/ Private sector	−0.335(0.053) ***	−0.265(0.091) ***	−0.416(0.069) ***
Business Employment	−0.210(0.051) ***	−0.098(0.081)	−0.316(0.067) ***
Agricultural Employment	−0.251(0.047) ***	−0.279(0.072) ***	−0.274(0.064) ***
Monogamous	−0.040(0.055)	−0.226(0.074) ***	0.356(0.126) ***
Polygamous	−0.130(0.062)**	−0.143(0.085)*	0.198(0.135)
Never Married	0.206(0.081) ***	0.199(0.114)*	0.498(0.154) ***
Separated/Divorced	0.126(0.072)*	0.182(0.089)**	0.171(0.164)
Mombasa	−0.638(0.147) ***	−0.617(0.281)**	−0.677(0.174) ***
Kilifi	0.055(0.113)	0.065(0.196)	0.028(0.140)
Tana_River	0.626(0.116) ***	0.548(0.199) ***	0.664(0.143) ***
Lamu	−0.842(0.135) ***	−0.826(0.239) ***	−0.869(0.164) ***
Taita_Taveta	0.034(0.128)	−0.276(0.237)	0.156(0.152)
Garissa	0.504(0.117) ***	0.156(0.229)	0.645(0.138) ***
Wajir	−0.415(0.118) ***	−0.506(0.206) ***	−0.335(0.146)**
Mandera	0.903(0.117) ***	0.745(0.193) ***	1.022(0.152) ***
Marsabit	0.057(0.124)	0.092(0.219)	0.040(0.152)
Isiolo	−0.026(0.115)	−0.092(0.198)	0.011(0.143)
Meru	−1.023(0.129) ***	−0.774(0.226) ***	−1.163(0.158) ***
Tharaka_Nithi	−0.593(0.138) ***	−0.237(0.233)	−0.807(0.173) ***
Embu	−0.221(0.121)*	−0.014(0.223)	−0.312(0.144)**
Kitui	0.219(0.108)**	0.205(0.181)	0.253(0.138)*
Machakos	−0.284(0.123)**	−0.401(0.218)*	−0.203(0.151)
Makueni	−0.046(0.121)	−0.110(0.201)	0.037(0.153)
Nyandarua	−0.009(0.128)	0.142(0.220)	−0.090 (0.158)
Nyeri	−0.496(0.135) ***	−0.243(0.223)	−0.659(0.171) ***
Kirinyaga	−0.529(0.137) ***	−0.434(0.255)*	−0.598(0.164) ***
Muranga	−0.537(0.130) ***	−0.435(0.220)**	−0.591(0.164) ***
Kiambu	−0.399(0.134) ***	−0.119(0.241)	−0.537(0.162) ***

(*Continued*)

(*Continued*)

Variables	Pooled sample	Female headed households' sample	Male headed households' sample
	Coef.	**Coef.**	**Coef.**
Turkana	1.765(0.117) ***	1.902(0.179) ***	1.529(0.164) ***
Samburu	1.108(0.117) ***	1.077(0.197) ***	1.129(0.148) ***
Trans_Nzoia	−0.244(0.129)*	−0.304(0.247)	−0.253(0.151)*
Uasin_Gishu	0.210(0.116)*	0.251(0.219)	0.170(0.137)
Elgeyo_Marakwet	0.303(0.117) ***	0.664(0.221) ***	0.163(0.139)
Nandi	−0.106(0.121)	0.052(0.226)	−0.194(0.144)
Baringo	0.062(0.122)	0.314(0.220)	−0.061(0.148)
Laikipia	0.335(0.122) ***	0.624(0.204) ***	0.117(0.156)
Nakuru	−0.214(0.124)*	−0.179(0.226)	−0.259(0.149)*
Narok	−1.092(0.131) ***	−0.926(0.248) ***	−1.157(0.155) ***
Kajiado	0.338(0.127) ***	0.331(0.226)	0.301(0.153)**
Kericho	−0.107(0.116)	−0.003(0.207)	−0.196(0.141)
Bomet	−0.009(0.118)	−0.206(0.237)	0.038(0.137)
Kakamega	0.032(0.110)	0.022(0.201)	0.040(0.132)
Vihiga	0.333(0.118) ***	0.456(0.198)**	0.289(0.150)*
Bungoma	0.009(0.114)	0.157(0.206)	−0.070(0.138)
Busia	1.105(0.108) ***	0.939(0.192) ***	1.197(0.132) ***
Siaya	−0.048(0.119)	−0.125(0.200)	0.012(0.151)
Kisumu	0.140(0.115)	0.085(0.206)	0.158(0.138)
Homa_Bay	−0.222(0.113)**	−0.182(0.197)	−0.279(0.140)**
Migori	−0.051(0.115)	−0.127(0.195)	−0.016(0.143)
Kisii	0.325(0.113) ***	0.305(0.204)	0.319(0.136)**
Nyamira	0.043(0.125)	0.043(0.214)	0.046(0.155)
Nairobi_City	−0.852(0.141) ***	−0.847(0.300) ***	−0.888(0.161) ***
/cut1	0.770(0.165)	1.045(0.276)	0.989(0.231)
/cut2	2.791(0.166)	3.027(0.279)	3.047(0.233)
Pseudo R-squared	*0.1634*	*0.1716*	*0.1627*
Log likelihood	*-17802.26*	*-6100.6878*	*-11637.718*
LR chi2 statistics	*0.0000*	*0.0000*	*0.0000*
Number of obs	*25,425*	*8,484*	*16,941*

Source: Author's calculation using the 2005/06 and 2015/16 Kenya Integrated Household Budget Surveys data. The results present impact effects. Standard errors are in parenthesis. ***, **, * represent establishment of significance level at 1%, 5% and 10%, respectively.

Annex A4. Non-linear decomposition using per adult equivalent consumption and time dummy variable for 2005/06 and 2015/16

Variable	Coef.	Proportion explained, %	Proportion unexplained, %
Received cash transfers	−0.0047(0.0021)**	11.02	2.40
Household Size	0.0176(0.0009)***	−41.47	−9.03
Age of household head	−0.0013(0.0011)	3.10	0.68
Literacy	−0.0229(0.0037) ***	53.97	11.75
Residence	0.0052(0.0008) ***	−12.16	−2.65
University Education	−0.0044(0.0004) ***	10.39	2.26
Secondary Education	−0.0174(0.0030) ***	40.84	8.89
Primary Education	−0.0001(0.0006)	0.23	0.05
Employment in Public/ Private sector	−0.0113(0.0028) ***	26.66	5.80
Business Employment	−0.0045(0.0013) ***	10.58	2.30
Agricultural Employment	0.0060(0.0021) ***	−14.02	−3.05
Monogamous	0.0180(0.0142)	−42.45	−9.24
Polygamous	−0.0007(0.0008)	1.61	0.35
Never Married	−0.0008(0.0008)	1.98	0.43
Separated/Divorced	−0.0013(0.0030)	3.16	0.69
Mombasa	−0.0010(0.0005)**	2.26	0.49
Kilifi	0.0000(0.0001)	0.11	0.02
Tana_River	−0.0001(0.0001)**	0.34	0.07
Lamu	0.0000(0.0000)	0.02	0.01
Taita_Taveta	0.0000(0.0001)	−0.10	−0.02
Garissa	0.0003(0.0001)**	−0.70	−0.15
Wajir	0.0000(0.0000)	0.00	0.00
Mandera	−0.0007(0.0001) ***	1.74	0.38
Marsabit	0.0000(0.0000)	0.08	0.02
Isiolo	0.0000(0.0000)	0.06	0.01
Meru	−0.0003(0.0003)	0.63	0.14
Tharaka_Nithi	0.0001(0.0001) ***	−0.35	−0.08
Embu	−0.0003(0.0002)	0.74	0.16
Kitui	−0.0012(0.0005)**	2.87	0.62
Machakos	0.0002(0.0001)	−0.36	−0.08
Makueni	−0.0002(0.0004)	0.52	0.11
Nyandarua	0.0000(0.0001)	0.02	0.00
Nyeri	0.0003(0.0001)**	−0.65	−0.14
Kirinyaga	−0.0003(0.0002)**	0.81	0.18
Muranga	0.0007(0.0002) ***	−1.62	−0.35
Kiambu	−0.0012(0.0006)**	2.76	0.60

(*Continued*)

(*Continued*)

Variable	Coef.	Proportion explained, %	Proportion unexplained, %
Turkana	−0.0044(0.0009) ***	10.26	2.23
Samburu	−0.0006(0.0001) ***	1.37	0.30
Trans_Nzoia	−0.0001(0.0002)	0.35	0.08
Uasin_Gishu	0.0003(0.0002)	−0.74	−0.16
Elgeyo_Marakwet	0.0001(0.0001)	−0.33	−0.07
Nandi	−0.0001(0.0002)	0.30	0.07
Baringo	0.0000(0.0001)	0.04	0.01
Laikipia	−0.0001(0.0001)	0.16	0.04
Nakuru	−0.0002(0.0004)	0.40	0.09
Narok	−0.0004(0.0001) ***	0.97	0.21
Kajiado	0.0001(0.0001)	−0.29	−0.06
Kericho	−0.0001(0.0001)	0.25	0.05
Bomet	0.0003(0.0001) ***	−0.81	−0.18
Kakamega	0.0000(0.0001)	−0.01	0.00
Vihiga	−0.0003(0.0002)	0.60	0.13
Bungoma	−0.0001(0.0001)	0.14	0.03
Busia	−0.0015(0.0003) ***	3.62	0.79
Siaya	0.0003(0.0004)	−0.65	−0.14
Kisumu	0.0000(0.0001)	−0.08	−0.02
Homa_Bay	0.0003(0.0002)	−0.61	−0.13
Migori	−0.0001(0.0004)	0.18	0.04
Kisii	0.0002(0.0001)	−0.39	−0.08
Nyamira	−0.0001(0.0001)	0.13	0.03
Nairobi_City	−0.0020(0.0004) ***	4.62	1.01
Proportion explained or unexplained		*82.12*	*17.88*
Total gap explained			*-0.03505462*
Gap in the probability (G=1- G=0)			*-0.04268522*
Pr(Y!=0|G=1)			*0.31335928*
Pr(Y!=0|G=0)			*0.27067406*
Number of obs			*25,425*
N of obs G=0			*16,941*
N of obs G=1			*8,484*

Source: Author's calculation using the 2005/06 and 2015/16 Kenya Integrated Household Budget Surveys data. The results present impact and marginal effects. Standard errors are in parenthesis. ***, **, * represent establishment of significance level at 1%, 5% and 10%, respectively.

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