

Structural Changes in African Households: Female-headed households and Children's Educational Investments in an Imperfect Credit Market in Africa¹

Edward Asiedu^{a,b,*}, Amin Karimu^{a,d,e} and Abdul Ganiyu Iddrisu^c

^aUniversity of Ghana Business School, Legon

^bChair of Development Economics, University of Passau Germany

^cDepartment of Economics, University of Aberdeen UK

^dSchool of Economics, University of Cape Town, South Africa

^eBusiness School, Birmingham City University, Birmingham

Abstract

Female headship of households has increased significantly around the world. This paper establishes a link between gender, income, and children's educational investments in an imperfect credit market. We show using a representative household survey from Ghana that, even though there is a positive correlation between income and educational investments, there are expected and unexpected heterogeneities in income and children's educational investments. We find that, whereas income levels for male-headed households with children 6 to 18 years are over 20% higher, female-headed households tend to invest 31% to 38% more on children's education than male-headed households. In imperfect credit markets, higher educational investments could be taking place at the expense of other household outcomes such as food/leisure. Our empirical results show the need for different interventions for different households. We also show how institutional changes that recognize affirmative action can interact with household-level structural changes.

Keywords: Female-headed households, educational investment, imperfect credit markets, structural change in households, affirmative action, Ghana.

JEL: I20, I24, I25, I30, J16

¹ We are grateful for valuable comments from conference participants at the 2017 Canadian Economics Association Annual Meeting, Nova Scotia.

*Corresponding author: E. Asiedu (edasiedu@ug.edu.gh/easiedu1@gmail.com), University of Ghana Business School (UGBS), Development Finance, P.O. Box LG78, Legon, Accra-Ghana and Chair of Development Economics, University of Passau, Germany, Rooms 155-158 ZB Innstraße 29 94032 Passau.

1 Introduction

In developing countries, in particular, structural changes have emerged as a major policy concern, and ought to be understood in the design of pro-poor policies (Kotsadam et al., 2017; Posel, 2001; Berthélemy and Söderling, 2001; Appleton, 1996; Bossen, 1975). Structural changes that are 1) economy-wide changes such as changes in the employment patterns of women and their general economic position in households (Kotsadam et al., 2017; Berthélemy and Söderling, 2001), and 2) sociocultural changes in women's positions in households as household heads or local leaders in communities (Appleton, 1996 and Bossen, 1975) have implications far beyond women empowerment to general economic development. For the latter case, in Sub-Saharan Africa, evidence points to increasing female headship of households. For instance, In South Africa, Posel (2001) finds that approximately one-third of all households in the KwaZulu-Natal region are headed by female household heads. According to Appleton (1996), as far as 1992, 25% of households in Uganda were headed by women, with more than twice as many people who live in urban areas living in female-headed households. In the case of Ghana, trend analysis by Lloyd and Gage-Brandon (1993) shows that the proportion of households headed by women increased from 29% in 1987/88 to approximately 35% in 2012/2013.

There is however somewhat conflicting evidence on the implications of changes in household structure in terms of headship, in developing countries, on household livelihood outcomes. For example, whereas on one hand, some empirical studies find that female-headed households are not poorer (Appleton, 1996) and have been observed to have experienced increased economic activity since the 1980s in many developing countries (Klasen and Gaddis, 2013), others, on the other hand, find that female-headed households are disadvantaged and are more likely to have longer spells of poverty, have less access to resources, less access to credit, etc., and

as such are less able to smoothen consumption over their lifetime relative to male-headed households (Lloyd and Gage-Brandon, 1993; Rosenhouse 1989; MacLanahan, 1988). Brown and van de Walle (2021) showed that female-headed households in Sub-Saharan Africa at the pooled-level had lower poverty rates than male-headed households, but the opposite holds when modest adjustments for economies of scale in consumption are made.

Despite the existing evidence on broad welfare, very little is known about the consequences of female headship of households in developing countries, particularly on children's outcomes. Thus, we examine the effect of female headship of households in Sub-Saharan Africa on the educational outcomes of children, specifically, investments in children's education. The only study closer to ours is that of Kennedy and Peters (1992) in which they find a positive relationship between female headship and nutrition in households in Kenya and Malawi. They hypothesized that the link between female headship and improved nutrition is via improvement in food preparation techniques among female-headed households, even though such female-headed households had lower incomes. While their finding is informative, because of the traditionally gendered nature of food preparation one would have expected such an outcome. In many households in Sub-Saharan Africa, food preparation is carried out mainly by adult women in the households, and as such one would expect higher nutrition if the woman, in addition to preparing the meals, also controls the household budget as the household head. The impact of female headship may however be different if it is not an activity like food preparation, which is already gendered.

We contribute to the existing literature using data from Ghana—a country with a large and growing female headship of households—to address the following questions: Do male and female-headed households differ in their investments in children's education? Can the differences in

household educational investments be explained by inequality in income between male and female headship of households? What is the effect of structural changes at the community level in the nomination of women local leaders on educational investments in female-headed households? What happens to female investment in children's education when they are financially included?

Using the representative Ghana Living Standard Survey (GLSS 6, 2012/2013) which contains information on 16,722 households, of which approximately 60% have children between the ages of 6 – 18 years, we find that, first, the two (2) major reasons for female headship in Ghana are divorce/separation (27.3%) and widowhood (36.2%). Secondly, we find that the female-headship status of households has not worsened children's educational investments. Comparing educational investments between female-headed households and male-headed households, we find that even though male-headed households have almost 20% higher income than female-headed households, there are no significant differences in children's educational investments between male and female-headed households based on a simple descriptive t-test. In a regression setting that allows for controlling for all possible confounding factors (such as education of the household head, age of the household head, the average age of the children, the share of female children in the household, district effects such as differences in quality of education, etc.), we find 31% to 38% higher educational investments in female-headed households. The evidence is largely consistent across expenditure quintiles and age brackets. We also find that investments in male-headed households with a higher share of female children tend to be lower, than their counterparts with a higher proportion of male children. The gender proportion of children seems not to matter for female-headed households investments.

We proceeded to examine two important pathways that could moderate further female-headed households' investment in children's education: community-level affirmative action and

financial inclusion. We find that institutional change recognizing affirmative action in the selection of local community leaders i.e., having a woman as a local community leader in the community of the female household head correlates with female-headed households' educational investments. This suggests that aside from gender equity reasons for the nomination of women into local positions of authority in Sub-Saharan Africa, there are additional 'role model' empowerment benefits for females heading households. Lastly, there is evidence of how addressing credit market imperfection through improvement in bank account ownership among women drives improvement in women's reproductive and maternal health services utilization and behavior (Singh et al. 2019). We find that access to the formal financial systems for female-headed households positively improves their ability to invest in children's education.

The remainder of the paper is organized as follows: Section 2 considers the empirical and theoretical literature that explains gender differences in household outcomes including children's educational investments. In Section 3, we present the data and outline the model specification and estimation strategy. Section 4 presents the analysis and discusses the findings. Finally, in Section 5 we provide the conclusion and policy recommendation.

2 Literature review

Structural changes are taking place in many developing countries both at the household level where many women are becoming leaders of households i.e., female headship of households, and at the political level where increasingly women are being selected or local leadership being reserved for women (quotas). The leadership outcomes of women in many settings are observed to be different from that of men. Deininger et al. (2020) point to the fact that female leaders can change the nature and quality of investments made at the household level, and in the case of

community leadership, the type of public goods supplied. A number of studies on the role of female leadership in communities have found female leaders to be associated with improved child health and nutrition (see Duflo, 2012), higher child survival, and more breastfeeding and immunization (Bhalotra and Clots-Figueras, 2014), as well as improved learning outcomes in primary schools all at the community-level (Pathak and Macours, 2017). These findings are explained by the type of investments that communities that have female leaders make, compared with communities headed by male leaders.

Several studies have found that differences in household outcomes correlate with the gendered headship of the household (see Brown and van de Walle, 2021; Kennedy and Peters, 1992; Appleton, 1996; Buvinic and Gupta, 1997). Precisely, Kennedy and Peters (1992) study in Kenya and Malawi found higher household income among male-headed households, compared to that of female-headed households (see also Buvinic and Gupta, 1997). Appleton's (1996) study on Uganda found however similar consumption and income levels between male and female-headed households. Brown and van de Walle's (2021) study, which focused on households, and not necessarily households with children, finds lower poverty among female-headed households. The evidence on household income, consumption, and household headship, even though examined is not conclusive.

Beyond the association between female headship of households and welfare indicators such as income and consumption, a number of studies have also examined the association between female headship and children's outcomes. Conceptually and practically, a structural change in household headship driven by widowhood, and divorce (in settings with weak national child support systems like in Sub-Saharan Africa), can 1) deprive the remaining spouse who has custody of the children of additional revenue needed to support the household, and 2) force the remaining

spouse to spend more time with the children depriving her of labour income. The income shortfall consequences on household outcomes can be dire for children in households headed by women. Thus, female headship of a household that has children may have implications far beyond a similar change in a household without children.

The empirical evidence so far, for the association between female headship of households and children's outcomes is mixed and context-specific. Whereas some report that children from female-headed households had higher educational outcomes, higher calorie-adequacy ratios, and lower rates of preschooler malnutrition than male-headed households in Sub-Saharan Africa and the Dominican Republic (Kossoudji and Mueller, 1983; Kennedy and Peters, 1992; Johnson and Rogers, 1993), others, particularly in Latin America, find children's welfare measured by educational and nutritional outcomes to be lower among female-headed households (Chant, 1985; Barros et al., 1997).

In terms of the empirical literature on the substantive issue of investment in children's education across male and female-headed households, even though studies have touched on bits and pieces, it has not been directly examined in depth, particularly in Sub-Saharan Africa. For example, Glick and Sahn (2000) considered a poor urban environment in Conakry, Guinea, and found that growth in household incomes led to more investments in girls' education but had no significant effect on boys' education, suggesting that policies that raise household incomes will, in general, increase gender equity in schooling. Hedges et al. (2016) examined the impacts of wealth, diversifying livelihoods, and child characteristics on educational investment in rural Tanzania using data for 1,719 children (aged 7–19) and from 19 villages. They show that pastoralist households' children were less likely to attend school, but the neighboring business owners and farmers invested more in schooling. Consistent with the findings of Glick and Sahn

(2000) and Hedges et al. (2016), Shapiro and Tambashe (2001) using data from D. R. Congo find that improved economic well-being translates into more investments in children's education, but contrary to Glick and Sahn (2000), they find that the observed effect is similar for both genders. Thus, the existing studies do not specifically examine the association between female headship of households and children's educational investments.

Aside government's role in investing in education at the macro-level, parents affect their children's economic status through the resources they devote to education, which in turn is expected to shape the expected earnings of children and the future economic status of the households (see Becker 1975; Becker and Tomes, 1986, Behrman et al., 1982). Brown (2006), Behrman et al. (1997), and Coleman et al. (1966) studies in China, Pakistan, and the United States respectively conclude that family characteristics such as parental education and literacy are more important determinants of educational achievement than school quality or teacher experience. It is however still not clear whether household characteristics such as the gender headship of the household in Sub-Saharan Africa matter for children's educational investments.

The theoretical literature provides some plausible reasons for differences in children's educational investments among male and female-headed households. Ishikawa's (1975) modification of Becker (1975) and Becker and Tomes (1986) models highlighted the notion that aside from differences in income, differences in preferences are linked to 'family value orientations' i.e., parental altruism and parental self-satisfaction. Parental altruism here reflects a setting in which parents designate the gratuitous concern for their children's welfare after the latter becomes independent, and therefore allocate resources or borrowing in the capital market to facilitate the achievement of children's long-term outcomes. Parental self-satisfaction designates parents' wish to enjoy family wealth by themselves and to have little concern for their children's

welfare after they become independent (Ishikawa, 1975). The subsequent question is about how large the income effect is compared to any possible strength of any *a priori* altruistic norm of women towards their children. If the literature on gender differences in altruistic behaviour holds (see also Andreoni and Vesterlund, 2001; Croson and Gneezy, 2009), then one will expect female households to have a much higher investment in children than male households.

Another plausible explanation for any potential differences in investments in children's education is the 'burden carrier' phenomenon. Bhalotra and Clots-Figueras, (2014) argue that the burden of fertility or child mortality for women explains the higher health investments by women. Specifically, they argue that, because women carry the burden of high fertility and child mortality – dealing with children being sick, witnessing their children die, having further births, and the risk of child death – women tend to invest more in their health. Thus, in expanding this phenomenon one would expect that if the burden of failed children – dropping out of school, being in prison, death, and not doing well in the future – will be on a woman alone in a female-headed household, then she is likely to invest more in her children's education to avert these situations. By extension, if the burden of failed boy or girl child will sorely be on a woman alone in a female-headed household, then she is unlikely to discriminate between investment between boys and girls, and as such plausible differences in investment between female-headed households with more girls or more boys will not exist.

Aside from the effect of altruism and on whom the burden of failed children will fall, Parish and Willis (1993) argue that parents' goals are often smothered by the lack of resources and that family investment decisions can be expanded by the relaxation of credit constraints. Imperfect credit markets tilted against women will therefore have consequences on a female head's ability to invest in children's education. Even though Demirgüç-Kunt et al. (2013) find that there is

improvement in bank account ownership around the world but found also that the gender gaps persist. Asiedu, et al. (2013) and Demirgüç-Kunt, et al. (2013) documents the fact that in imperfect credit markets, women are disproportionately excluded when it comes to accessing credit to smoothen consumption. In an extensive literature review of the impact of credit constraints on the accumulation of human capital, Lochner and Monge-Naranjo (2012) highlighted the importance of credit access on early childhood investments and overall lifetime acquisition of human capital.

From the empirical literature on financial inclusion, Sakyi-Nyarko et al. (2022) find that different measures of financial inclusion such as savings and formal account ownership yield a more pronounced impact on the financial resilience of households. Others have found positive impacts of financial inclusion on household food security (Larson et al., 2019), household risk mitigation (Urrea and Maldonado, 2011), and micro-enterprise start-up and growth (Yang and Zhang, 2020). However, very little is known about how the financial inclusion of women in imperfect financial markets in developing countries can affect children's educational investments. Thus, as a plausible pathway, we examine the role of women's access to the financial system on the education investments of children.

A growing number of literature show impacts, both short and longer-term, of female community-held leadership positions on political empowerment and female decision-making (see Bhalotra and Clots-Figueras, 2014; Deininger et al., 2020). Beaman et al. (2012) conclude that female leadership influences girls' aspirations and educational attainment. In terms of childbearing decisions, Kalsi (2017) find that exposure to female leaders at the local level increased the survival of higher birth order girls. As another plausible pathway, we examine the effect of female local leadership in communities on children's educational investments in female-headed households.

3. Data, model specification, and estimation strategy

The paper uses data from the Ghana Living Standard Survey (GLSS 6, 2012/2013) round 6. This data is a nationally representative household survey across all districts in Ghana. Reference can be made to Karimu et al. (2016) and Asiedu and Chimbar (2020) for a more detailed presentation of the survey design. The GLSS survey originally interviewed 16,722 households. However, not all households in the data have children in the school-going age bracket of 6 – 18 years. Out of the total sample of households interviewed, 60.3% reported having at least one child while 39.7% had no child. For this study, and based on the focus of this study, we narrow our analysis to the 10,111 households that reported having at least a child between the indicated child age bracket.

The key variables of interest for our analysis are the variables related to household headship, educational expenditures, non-educational expenditures, total household expenditure, household income, household size, number of children, educational level of household head, age of the household head, and the marital status of the household head. The expenditures and incomes were aggregated over months to obtain yearly values. As far back as the late 1980s, as shown by Lavy (1996), the main cost of education for children has not been the tuition cost, but the cost of transportation to and from school as well as other non-tuition costs. Double-digit inflation experienced (and still being experienced) in many developing countries also exacerbates the impact of children's educational expenses on households' livelihoods (currently around 45%²). In Egypt and Ethiopia, Lloyd et al (2003) and Dagnew, A. (2017) respectively, showed that school supplies such as textbooks, uniforms, etc., are highly associated with school exists and dropouts.

² <https://www.myjoyonline.com/imf-revises-ghanas-average-inflation-forecast-to-45-4-in-2023/#:~:text=The%20International%20Monetary%20Fund%20has%20revised%20its%20average,Ghana%20will%20however%20end%20the%20year%20at%2029.4%25.>

Our linear model translates, similarly to the work of Kennedy and Peters, (1992) and Mammen (2011), as follows:

$$\ln(tot_eduinu)_i = \beta_0 + \beta_1 Fem_Head_i + \beta_2 \ln(hhtg_inc)_i + \beta_5 \ln(other_exp)_i + \beta_3 Hh_Size_i + \beta_4 Hhh_Edulev_i + \beta_6 other_controls_i + \alpha_i + \rho_i + \pi_i \quad (1)$$

where $\ln(tot_eduinu)$ represents the log of household total educational investment measured by the household's total expenditure on education (includes textbooks, registration fees, PTA contributions, school uniforms, school shoes, school supplies, transportation to and from school, boarding fees and expenses on extra tuition)³; Fem_Head is a dummy variable that takes the value one (1) if the household head is a female, and zero (0) otherwise; $\ln(hhtg_inc)$ represents the log of total household income measured by total household annual gross income; $\ln(other_exp)$ represents the log of household expenditure on other items (including food, health, clothing, cooking energy, housing, transport, communication, recreation, and miscellaneous), Hh_Size represents the size of the household measured by the number of people in a household; Hhh_Edulev denotes the highest attained level of education by the household head; and $other_controls$ such as the age of the household head, marital status of the household head, employment status of the household head, the number of children in the household, and a dummy for whether the household resides in a rural or urban area. α_i represents region-fixed effects, which control for time-invariant unobserved region characteristics. ρ_i represents district fixed effects that control for time-invariant unobserved regional and district factors that could explain differences in educational investments in children such as population and political factors at the local administrative level, and π_i is the random error term of the equation.

³ In Ghana, at the lower levels, school tuition cost is free (under the FCUBE, free compulsory basic education), and the main expenditures for children's education are textbooks, registration fees, PTA contributions, school uniforms, school shoes, school supplies, transportation to and from school, boarding fees, and expenses on extra tuition.

4 Data Analysis and Discussion of Results

In this section, we first present a description of the data on the proportion of households headed by females and the major reasons for the headship status of the households. We then proceed afterward to describe the key variables used in the empirical analysis. Next, we present the empirical results and provide discussions on the key findings. We now provide sensitivity analyses of our main results examining heterogeneous effects across different income quintiles and age brackets. The latter is critical in order to identify any differences in the study outcome across various clusters in the sample.

4.1 What is driving the increase in female headship in Ghana?

In 1987/88, the proportion of households formally headed by a woman in Ghana was 29% (Lloyd and Gage-Brandon, 1993). From our full data, which includes households without children in the age bracket 6 to 18 years, the proportion headed by women increased to 34.7% in 2012/13. For households with children (the focus of our study), the proportion of households headed by women is 28%.

Table 1: Composition of female-headed households by marital status

Marital status	1987/88 ¹	2012/13	2012/13*
Never married	3.1	10.6	3.7
Currently married	49.5	23.1	27.4
Cohabitation		5.4	5.4
Divorced/Separated	24.2	26.6	27.3
Widowed	23.3	34.9	36.2

¹ *Source:* Lloyd and Gage-Brandon (1993)

*Only for households with children between 6 and 18 years

Table 1 shows that not only has the proportion of female households changed since the 1980s but also the marital status of households has changed. Column 2 of Table 1 presents the full sample (for both female-headed households with children and without), and the marital status of female-headed households. Column 3 of Table 1 presents the marital situation for only female-headed households with children between the age bracket of 6 – 18 years.

Comparing the three columns gives credence to the structural changes that have taken place at the household level since the 1980s. We first start by comparing the two full samples (without restricting to those with children) as shown in column 1 for 1987/88 and column 2 for 2012/13. In Ghana, as shown in Table 1, the proportion of female heads of households who have never married has increased from 3.1% in 1987/88 to 10.6% in 2012/13. Over the period, the proportion of females who head households and are married has reduced to 23.1%. Lloyd and Gage-Brandon (1993) attributed the high marriage rate among female-headed households in the 1980s to the co-existence of matrilineal and patrilineal traditions in important ethnic groups, the extensive participation of women in the cash economy, and the migration of spouses.

Interestingly, one marital dimension which did not exist in the 1980s in Ghana has emerged, and that is cohabitation. Approximately, 5.4% of females who headed households were cohabitating. Generally, in 2012/13, a larger proportion of females who headed households were divorced/separated and widowed, compared with 1987/88. Precisely, 61.5% of females who headed households were divorced/separated and widowed, against 47.5% in 1987/88. Clark and Brauner-Otto (2015) study on divorce across 33 Sub-Saharan African countries observed that divorce rates have been stable or declining in many of these countries. Our data reflects Clark and Brauner-Otto (2015) observation. Divorce/separation rates have been quite more stable than widowhood rates. Based on our full sample, while divorce/separation among female heads

increased from 24.2% in 1987/88 to 26.6% in 2012/13, widowhood among households with women heads increased from 23.3% in 1987/88 to 34.9% in 2012/13.

In terms of the marital situation of women who head households and have children within the age bracket of 6 to 18 years, the data (as presented in Column 3) shows that 27.3% are divorced whereas 36.2% are widowed. In general, comparing columns 3 to 2, the proportion of female heads who are divorced/separated and widowed is much higher for those with children (63.5%) compared to the full sample (61.5%).

On the policy front, a number of studies show concern that using female household headships as targeting criteria for social support intervention could increase divorce rates (see Uunk, 2004; Bitler et al., 2004). On the contrary, from a purely descriptive point of view (at least up to this point), we show that women headship of households is driven more by the death of a spouse, than divorce even in the full sample (34.9% against 26.6%), and therefore, probably, combining the women headship with spousal deaths for targeting of social interventions can help to identify the needy in society. As noted by Thomas (2008), spousal death can have a debilitating effect on livelihood security.

4.2 Descriptive analysis

We now provide a discussion of the basic statistical properties of the data. Table 2 proceeds to present the summary statistics for the key variables accordingly. All figures are annualized for this paper. Estimates, as presented in Table 2, show that male-headed households do have significantly higher household income than female-headed households (see also Figure 1). Precisely, male-headed households have a yearly income of 9,682.24 GHS (1,862 USD\$) whereas

female-headed households have a yearly income of 7,802.99 GHS (1,500 USD\$).⁴ The difference is statistically significant at the 1% level of significance. This finding is consistent with the Rosenhouse (1989) argument that female-headed households generally have less access to resources, and as such are less able to smoothen consumption over their lifetime, relative to male-headed households. It thus raises the economic well-being concerns that households face, and the rhetoric that female-headed households should be supported in the financing of their children's education. The analysis is however not complete without a detailed evaluation of children's investment behaviour in male and female-headed households.

We now turn our attention to the level and differences in educational investments between female and male-headed households. Remember, these are households with children between the ages of 6 to 18 years. The yearly average household educational expense for households with children is 994.31 GHS (191 USD\$). For the full data sample (all households irrespective of whether they have children between 6 to 18 years), we find a relatively lower average yearly educational expense of 711.98 (137 USD). Thus, households with children indeed spend more on education than the average household in the sample. This finding reflects the higher educational burden borne by households with children between the ages of 6 to 18 years.

With regards to gender differences in educational investments between male and female-headed households, even though we find a much higher income among male households compared to female households (which was significant), descriptively, we do not find any significant difference in educational expenses between male and female-headed households. Precisely, female-headed households with children spend yearly an average of 950.20 GHS (183 USD\$) whereas male-headed households on average spend 1,011.97 GHS (195 USD\$) (p-value = 0.125).

⁴ The average yearly household income is 9,145.021 GHS (1,758.7 USD\$)

Putting this into perspective, whereas female-headed households on average spend 12.2% of their yearly income on educational expenses, male-headed households tend to spend approximately 10.5% of their income on educational expenses. Thus, even at the descriptive level, the burden of educational expenses is higher for female-headed households. Interestingly, male-headed households have a significantly higher number of children (2.53) than female-headed households (2.02), signifying that the per-child expenditure on education is much higher in female-headed households.

Household consumption of other items (non-education-related items) is much higher in male-headed households compared to female-headed households. Precisely, male-headed households spend a yearly amount of 8,670.27 GHS (1,667 USD\$) on other items whereas female-headed households spend 6,852.8 GHS (1,317 USD\$) on similar items (p-value = 0.000). One will argue that the higher expenditures on ‘other items’ may be driven more by the differences in household size as presented in Table 2. To give a much better comparison, we divided the average household expenditures into ‘other items’ (non-educational expenditures) by the average household size for both male and female-headed households and find that male-headed households spend on average 1,669 GHS (320 USD\$) per year on each household member, while on average, the yearly non-educational expenditure for each household member in the female-headed household is 1,578 GHS (303 USD).⁵ Therefore, from a purely descriptive point of view, male-headed households tend to spend more in total and per capita on non-educational expenses than female-headed households. But female-headed households have a higher per-child educational expenditure. We will proceed to test whether these observed differences as shown by the

⁵ With the difference being significant.

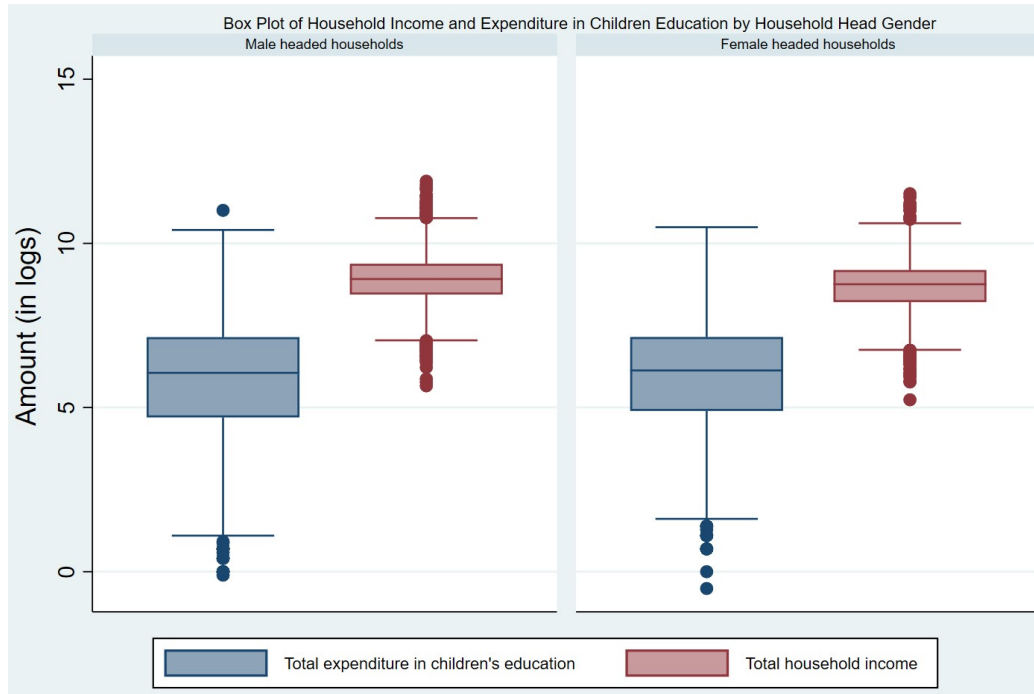
descriptive analysis are robust to controlling for differences in households' characteristics in a regression model setting.

Table 2: Summary statistics for households with children of ages 6 to 18

Variable	Obs	Full Sample		Male HHs	Female HHs	P-value
		Mean	Std. Dev.	Mean	Mean	
Household income	10,111	9145.02	8179.10	9682.24(101.5)	7802.99(125.5)	0.0000
Education Investment	10,111	994.31	1829.09	1011.97(22.5)	950.20(29.8)	0.1248
Female head	10,111	0.286	0.452			
Female Dces_mces	10,110	0.120	0.325	0.118(0.004)	0.123(0.006)	0.488
Number of children (6-18yrs)	10,111	2.387	1.477	2.530 (0.018)	2.020 (0.021)	0.0000
Household size	10,111	4.665	2.600	5.195(0.031)	4.342(0.036)	0.0000
Head's Education Level	10,111	1.132	0.917	1.201(0.011)	0.961 (0.016)	0.0000
Marital Status	10,111	2.937	1.485	2.377(0.010)	4.337(0.032)	0.0000
Other Expenditures	10,111	8150.71	7310.89	8670.27(90.66)	6852.8(111.93)	0.0000
Head access to bank account (Financial Inclu.)	10,111	0.395	0.005	0.419(0.006)	0.336(0.009)	0.0000
Head Employed	10,111	0.998	0.0005	0.999(0.0003)	0.994(0.002)	0.0000
Rural	10,111	0.603	0.005	0.644(0.006)	0.501(0.009)	0.0000
Average age of household children	10,111	11.606	0.030	11.387(0.034)	12.154(0.057)	0.0000

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Households with at least a child between the ages 6 to 18.

Figure 1: Income and Educational Expenditure across gender of household head



In terms of other controls, we find that 12% of the households (both male and female-headed) have lived in a district with a nominated female local leader referred to as the district chief executive (DCE). There are no differences in exposure to the female DCE between female-headed households and male-headed households. The average number of children between the ages of 6 and 18 years in female-headed households is 2, whereas that of male-headed households is 2.5. In terms of total household size, it is 4.3 for female-headed and 5.2 for male-headed households. Female heads of households are slightly less educated (0.96) than male heads of household (1.20). In terms of access to bank accounts, a higher percentage of male-headed households (42%) have access to bank accounts compared to female-headed households (34%). Thus, there still exist gender gaps in formal financial inclusion. Employment seems to be very high among the population of households with children between the ages of 6 and 18 years (99.9% for males and 99.4% for females). Interestingly, a significantly relatively lower percentage of female-headed

households reside in rural areas (50%), whereas a higher percentage of male-headed households reside in rural areas (64%). The latter could be a reflection of the inherent modernization in urban areas. These differences are controlled for in the empirical model presented in the next sections.

4.3 Empirical Results and Discussion

The results shown in Table 3 are obtained from estimating equation (13) using the Ordinary Least Squares (OLS) technique, with and without including regional and district fixed effects. The first column of Table 3 reports results that do not control for both regional and district fixed effects. The second column presents estimates that control for only regional fixed effects, whereas the third column controls for both regional and district fixed effects i.e., regional and district factors that could explain differences in educational investments in children such as population and political factors at the local administrative level.

As an additional robustness check, we also estimated equation (13) for the various aggregate expenditure quintiles and the age brackets of the household heads. The latter addresses any possible cohort effects which could impact educational investments in children. Results from these quintiles estimations are presented in Tables 4 and 5 and discussed subsequently. All standard errors are robust standard errors to address possible heteroskedasticity concerns in the pooled data.

In our estimated model, the gender effect of female headship of households is identified by the coefficient on the female headship variable (*Fem_head*). For all our empirical estimates (as shown in columns 1- 3 of Table 3) for the sample of households with children, we find a positive and significant effect of female headship on children's educational investments. Specifically, the

results in columns 1 – 3 show a difference ranging from 0.27 to 0.32 (31% to 38%)⁶. Thus, after controlling for the unobserved region and district fixed effects, the effect of the headship reduces marginally. The coefficients on the headship variable remain highly significant. Subsequent analysis will be based on the model that controls for both region and district fixed effects. Focusing on the estimated coefficient as reported in the third column, the difference in the logarithm of our outcome variable, between male and female-headed households (which is 0.28) corresponds to a 32% higher investment by female households than by male households. Our finding shows that despite the revelation from Table 2 that male-headed households have higher incomes, female-headed households with low household income however tend to significantly invest more in children's education in Ghana than male-headed households.

In terms of other important covariates that drive educational investments, we find a positive and significant relationship between household income and children's educational investment (across all three models), reflected by the positive coefficient on the household income variable (Ln_income). Also, the number of children in the household between the ages of 6 and 18 years, the household size, the education of the household head, and age are all positive drivers of children's educational investment. Interestingly, compared to household heads that have 'never married', household heads who are in polygamous relationships tend to invest less in children's education. This evidence is consistent across all three estimated models. In terms of the effect of other burdens on the household, the coefficient on the "other expenditure" variable (LnOther_Exp) tends to negatively relate to educational expenditure on children, reflecting the trade-offs households make in meeting their household's needs. Higher educational investments could affect other household consumptions. We do not observe a significant impact of employment status –

⁶ $100 (e^{\beta} - 1)$ See Halvorsen and Palmquist (1980) for further explanation.

even though positive – on children's investments. It seems that the employment effects are captured by the income effect. For many developing countries with low or no social support systems, being employed is very critical to one's income. Lastly, we find the coefficient on the rural dummy to be negative and significant in all specifications presented in columns 1 – 3.

Table 3: Estimates of the equation (1) using OLS

Dependent Variable: Total Investment in Children's Education (LnTot EduInv1)			
Independent Variables	(1)	(2)	(3)
Fem_head	0.320*** (0.0424)	0.272*** (0.0423)	0.277*** (0.0424)
Ln_income	8.717*** (0.316)	8.530*** (0.315)	8.527*** (0.317)
Number of children (6-18yrs)	0.141*** (0.0151)	0.131*** (0.0149)	0.133*** (0.0148)
HH_size	0.0327*** (0.0102)	0.0451*** (0.0103)	0.0458*** (0.0103)
1.HHedlev_primary	0.375*** (0.0387)	0.297*** (0.0381)	0.296*** (0.0378)
2.HHedlev_secondary	0.607*** (0.0397)	0.494*** (0.0395)	0.489*** (0.0393)
3.HHedlev_tertiary	0.627*** (0.0687)	0.548*** (0.0683)	0.543*** (0.0681)
HHH_Age	0.00685*** (0.00114)	0.00593*** (0.00113)	0.00593*** (0.00112)
2.HHH_Maristat_mono	0.202* (0.112)	0.195* (0.113)	0.196* (0.112)
3.HHH_Maristat_poly	-0.325** (0.135)	-0.308** (0.135)	-0.304** (0.133)
4.HHH_Maristat_cohab	0.151 (0.123)	0.0716 (0.124)	0.0779 (0.123)
5.HHH_Maristat_divorce	0.108 (0.120)	0.0601 (0.121)	0.0579 (0.120)
6.HHH_Maristat_wido	0.0525 (0.121)	0.0463 (0.122)	0.0488 (0.120)
HHH Employed	0.0656 (0.247)	0.00804 (0.246)	0.0266 (0.240)
LnOther_Exp	-7.655*** (0.317)	-7.512*** (0.314)	-7.505*** (0.315)
Rural	-0.423*** (0.0335)	-0.429*** (0.0328)	-0.435*** (0.0332)
Constant	-5.772*** (0.319)	-5.102*** (0.333)	-5.042*** (0.331)
Regional Effects	No	Yes	Yes
District Effects	No	No	Yes
Observations	10,111	10,111	10,111
R-squared	0.621	0.631	0.636

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The coefficients of the region and district dummies are not stated for conciseness.

Beyond controlling for income in the regression models, as a robustness check, we also examine if differences in income levels could be driving our main results. And therefore, we estimate equation (13) for various expenditure quintiles. Precisely, we estimate the model comparing households in the same income quintile. The results of these estimations are presented in Table 4. Column 1 of Table 4 presents the estimates for the lowest income quintile (the poorest) whereas column 5 presents estimates for the highest income quintiles (relatively the richest).

As shown in Table 4, interestingly, the five coefficients on the female variable are all significant and positive. Female-headed households, when matched with male-headed households in the same income bracket, significantly invest more in children's education than male-headed households. In terms of magnitudes, the difference in investment between male and female-headed households is smallest in the second quantile. Interestingly, the magnitude in terms of the different educational investments that male and female households make is much larger in the richest quantile. This evidence shows that investment in children's education goes far beyond just income and that differences in parental altruism combined with the fact that the female head solely bears the burden of failed children may be a contributing factor, supporting both Ishikawa (1975) and Bhalotra and Clots-Figueras, (2014), respectively. We can't however separate the two effects, whether the burden of being a single parent drives the altruistic behaviour of female-headed households.

Many of the control covariates have similar effects across the five estimated quantile models. The three covariates that stick out as having differential impacts are the number of children in the household between the ages of 6 to 18 years, the age of the household head, and the employment of the household head. The number of children in the household seems to positively drive household investments in children's education in lower-income quantiles (columns 1 to 3 of

Table 4) but has no significant impact within richer quantiles. Thus, the educational investment burden of having more younger children within the school-going age of between 6 and 18 years is higher in relatively poorer households than in richer households. Furthermore, poor households with more children will have to spend a larger part of their income on children's education than poor households with fewer children. Turning to the age variable, we find that age seems to drive investments in children's education for households in lower-income quantiles (columns 1 and 2 of Table 4) but has no significant impact on richer households. This result implies that, for poor households who deal with many binding constraints, investments in their children's education only improve with age. Young poor households are challenged when it comes to educational investments for their children. Turning to employment, we find heterogeneous impacts. Thus, beyond the observed positive impact of income, we find that for the poorest quantile (1) the household head's employment status is positively associated with the level of investment in children's education. This could be a reflection of the effect of reduced uncertainty about income among the poor, once they are in employment. For the four quantiles (columns 2 to 5), employment status does not drive investments in children's education directly, other than through the effect of income.

Table 4: Estimates of the equation (1) for Various Expenditure Quintiles using OLS

Dependent Variable: Total Investment in Children's Education (LnTot_EduInv1)					
Independent Variables	Quintile (1)	Quintile (2)	Quintile (3)	Quintile (4)	Quintile (5)
Fem_head	0.224** (0.0878)	0.152* (0.0813)	0.241*** (0.0755)	0.230*** (0.0711)	0.436*** (0.112)
LnTGHH_inc	16.03*** (0.865)	10.48*** (0.546)	9.639*** (0.519)	7.472*** (0.519)	5.108*** (0.418)
Number of children (6-18yrs)	0.177*** (0.0245)	0.107*** (0.0254)	0.0840*** (0.0311)	0.0621 (0.0381)	0.00777 (0.0371)
HH_size	0.00987 (0.0170)	0.0781*** (0.0215)	0.0531* (0.0323)	0.114*** (0.0342)	0.178*** (0.0349)
1.HHedlev_primary	0.242*** (0.0586)	0.262*** (0.0665)	0.133* (0.0783)	0.141 (0.118)	0.389* (0.202)
2.HHedlev_secondary	0.504***	0.443***	0.239***	0.287***	0.535***

	(0.0720)	(0.0731)	(0.0755)	(0.110)	(0.184)
3.HHedlev_tertiary	0.629**	0.915***	0.468***	0.486***	0.709***
	(0.297)	(0.184)	(0.153)	(0.149)	(0.187)
HHH_Age	0.00422**	0.00777***	0.00309	0.00188	-0.00182
	(0.00182)	(0.00213)	(0.00234)	(0.00311)	(0.00362)
2.HHH_Maristat_mono	0.350	-0.0848	0.407*	0.803*	0.164
	(0.292)	(0.238)	(0.215)	(0.411)	(0.207)
3.HHH_Maristat_poly	0.185	-0.306	-0.119	0.786*	-0.428
	(0.299)	(0.266)	(0.304)	(0.443)	(0.309)
4.HHH_Maristat_cohab	0.292	-0.209	0.274	0.522	-0.0637
	(0.309)	(0.258)	(0.231)	(0.435)	(0.251)
5.HHH_Maristat_divorce	0.143	-0.104	0.293	0.782*	-0.0730
	(0.318)	(0.248)	(0.226)	(0.417)	(0.231)
6.HHH_Maristat-wido	0.111	-0.0488	0.161	0.650	0.139
	(0.306)	(0.249)	(0.234)	(0.427)	(0.224)
HHH Employed	2.662***	0.0781	0.176	0.286	0.439
	(0.296)	(0.360)	(0.189)	(0.381)	(0.628)
LnOther_Exp	-15.20***	-9.717***	-8.510***	-6.603***	-4.186***
	(0.856)	(0.517)	(0.467)	(0.460)	(0.373)
Rural	-0.373***	-0.366***	-0.320***	-0.282***	-0.406***
	(0.0847)	(0.0583)	(0.0568)	(0.0702)	(0.100)
Constant	-6.944***	-2.906***	-5.650***	-2.935**	-4.028***
	(0.549)	(0.871)	(1.262)	(1.200)	(1.231)
Region Effects	Yes	Yes	Yes	Yes	Yes
District Effects	Yes	Yes	Yes	Yes	Yes
Observations	2,883	2,106	1,925	1,764	1,433
R-squared	0.544	0.552	0.569	0.543	0.548

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The coefficients of the region and district dummies are not stated for conciseness.

As suggested, for the purposes of further robustness we estimate the model clustering within the age bracket that the household head falls. It is important to understand whether male and female heads of similar age are similar in their investment in children's education. In order not to lose statistical power, we grouped the sample of household heads into three age categories i.e., those under 40 years (3,549 households), those between 41 and 60 years (4,747 households), and those above 61 years (1,815 households). Column one of Table 5 contains the estimates for joint male and female heads below 40 years, column two contains estimates for those between 41 and 60 years and the last column contains the estimates for the elderly above 61 years.

On our key variable of interest, female headship, we find a consistently positive and significant coefficient. Comparing the magnitudes of the coefficients across age brackets, it is

intuitive to observe that the difference in investment between male and female households narrows with age brackets. However, interestingly, even households headed by elderly women tend to invest more in children's education than households headed by elderly men. The empirical results show that the initial difference in investments in children between younger household heads (40 years and below) that we observe in column one is also observed for older age cohorts. Interestingly, the magnitude of the gender difference in children's educational investment is larger in column one for households with younger household heads compared to households with relatively older household heads. This finding can be a reflection of cultural change in the importance of education among women across different generations. Overall, the observed differences (at the pooled level) in household head investment in children's education, even though female-headed households have lower incomes, are robust to quantile and age bracket specifications.

Table 5: Estimates of the equation (1) for various household heads in different age brackets

Dependent Variable: Total Investment in Children's Education (LnTot_EduInv1)			
Independent Variables	40 years and below	41 to 60 years	61 years and above
	(1)	(2)	(3)
Fem_head	0.305*** (0.0687)	0.176*** (0.0608)	0.235* (0.125)
Ln_income	9.782*** (0.512)	8.039*** (0.314)	8.234*** (1.052)
Number of children (6-18yrs)	0.0908*** (0.0305)	0.121*** (0.0204)	0.106*** (0.0332)
HH_size	0.0812*** (0.0225)	0.0335** (0.0137)	0.0428** (0.0211)
1.HHedlev_primary	0.340*** (0.0728)	0.272*** (0.0534)	0.301*** (0.0761)
2.HHedlev_secondary	0.602*** (0.0760)	0.389*** (0.0519)	0.398*** (0.0946)
3.HHedlev_tertiary	0.590*** (0.130)	0.458*** (0.0824)	0.363* (0.191)
2.HHH_Maristat_mono	0.0397*** (0.00622)	-0.00373 (0.00327)	-0.00354 (0.00457)
3.HHH_Maristat_poly	-0.0792 (0.125)	0.127 (0.280)	0.629 (0.400)
4.HHH_Maristat_cohab	-0.496** (0.200)	-0.405 (0.302)	-0.136 (0.136)

5.HHH_Maristat_divorce	-0.246* (0.143)	0.125 (0.287)	0.0955 (0.260)
6.HHH_Maristat_wido	-0.216 (0.141)	-0.0526 (0.285)	0.214 (0.156)
HHH Employed	0.167 (0.169)	0.0544 (0.286)	0.0430 (0.126)
LnOther_Exp	-0.166 (0.182)	0.583 (0.771)	-0.0768 (0.276)
Rural	-8.815*** (0.507)	-6.980*** (0.310)	-7.203*** (1.046)
Constant	-0.533*** (0.0551)	-0.347*** (0.0444)	-0.387*** (0.0946)
Regional Effects	Yes	Yes	Yes
District Effects	Yes	Yes	Yes
Observations	3,549	4,747	1,815
R-squared	0.639	0.659	0.583

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The coefficients of the region and district dummies are not stated for conciseness.

4.4 Effect of institutional change in the selection of local community heads

To better understand the reason for female heads' higher investments in children, we posit and test the female role model effect. We rely on the literature on female leadership in communities and women empowerment to examine one mechanism for the children's investment behavior of female household heads (see Deininger et al., 2020; Bhalotra and Clots-Figueras, 2014, Pathak and Macours, 2017; Matsa and Miller, 2013; Duflo, 2012; Asiedu and Ibanez, 2014). We do not argue that this is the only mechanism. There could be other behavioral and women nurturing factors that could also shape behaviour. We examine a specific channel: female headship of local assemblies/authorities. Thus, specifically, we check if the orientation of female-headed households in educational investments is influenced by the success of women breaking the glass ceiling in local communities.

In Ghana, the headship of the district assembly or the local government, which is referred to as the district chief executive (DCE) position is selected by the president of the country. Over

the years, there has been pressure from civil society groups to force governments to bridge the gender differences in the nomination of these local leaders. The number of female local leaders nominated as a result of this push from civil society groups has led to a gradual increase in the nomination of women. For example, out of the 212 DCE nominations made by the president in 2018, 34 constituting 16% were women. Even though this can be considered meager, it is an improvement over the situation in the 1960s when women were virtually absent. One can say that we explore how social change in formal institutions interacts with social change at the household level to drive household outcomes, in this case, investments in children. In this regard, we examined whether investments in children's education are influenced by the increased nomination of women into positions of power at the local district assembly level.

We collected data from the Local Government Services (LGS)⁷ on the nomination of females as local assembly leaders across districts and generated a dummy variable `dces_wces` which takes on the value of 1 if the district where the household lives have ever had a female local head, and 0 otherwise. We argue that the nomination of women as heads of districts is a random allocation by the government, and as such we do not expect female nomination as the head at the local level to correlate with district and household-level characteristics. We proceeded still to test if empirically there are correlations between female leadership in communities and community-level characteristics. We find weak correlation coefficients ranging in absolute terms between 0.01 and 0.09 for many of the district characteristics. Precisely, the correlation coefficient between the gender of the DCE of the local district and average district educational expenditure (-0.08), average

⁷ <https://myhealthbasics.site/list-of-dce-in-ghana/>
<https://ghana.opendataforafrica.org/data/#region=GH-EP>

district income (0.00), average district household size (0.09), average district educational level (-0.04), district average number of children (0.07), and district expenditures (0.012).

For our estimation, we interact the female household head variable with the gender of the local DCE variable. The estimated results are presented in Table 6. For the full sample, as presented in column 1 of Table 6, the interaction between the female head of the household and the female leadership at the local level is significant at the 10% level. The coefficient on the female-headed household variable (as a standalone) in the full model as presented is also significant, which signifies that the gender difference in educational investments even exists in districts with male local heads. The coefficient on the interaction variable shown in the full model indicates the additional impact of the nomination of women local heads in the district on incentivizing educational investments in female-headed households.

To further explore the robustness of the interaction results, we disaggregate the interaction results by the different age cohorts of the households in the sample. These results are presented in columns 2 to 4 of Table 6. The main interesting finding is that the coefficient on the interaction variable ($Femhead * Dces_mces$) is only significant among female-headed households 40 years and below. We do not find a significant impact of the interaction term on female household heads in the 41-60 years and the above 60 years age groups. The result implies that having a female local community leader incentivizes investments in children's education for female household heads below age 40. Thus, the 'role model' effect of female leadership at the local level is stronger for younger women who are household heads than older women. Across all models, the coefficient of the female head variable is positive and highly significant.

Table 6: Estimates of equation (1) – Local female role model effect

Dependent Variable: Total Investment in Children's Education				
Independent Variables	Full sample	40 years and below	41 to 60 years	61 years and above
	(1)	(2)	(3)	(4)
Fem_head	0.597*** (0.0567)	0.648*** (0.0883)	0.473*** (0.0838)	0.441*** (0.166)
Dces_mces	0.211*** (0.0699)	-0.0163 (0.129)	0.245*** (0.0912)	0.488*** (0.173)
(Femhead*Dces_mces)	0.251* (0.117)	0.640*** (0.194)	0.0914 (0.166)	-0.0798 (0.287)
Ln_income	0.0584*** (0.0154)	0.0217 (0.0261)	0.0789*** (0.0198)	0.0576 (0.0485)
Number of children (6-18yrs)	0.218*** (0.0191)	0.259*** (0.0377)	0.153*** (0.0267)	0.135*** (0.0435)
HH_size	0.0983*** (0.0131)	0.0857*** (0.0280)	0.110*** (0.0179)	0.109*** (0.0256)
HHedlev_primary	0.580*** (0.0490)	0.671*** (0.0873)	0.546*** (0.0720)	0.497*** (0.103)
HHedlev_secondary	1.219*** (0.0476)	1.347*** (0.0838)	1.116*** (0.0675)	0.888*** (0.122)
HHedlev_tertiary	1.799*** (0.0800)	1.982*** (0.146)	1.693*** (0.100)	1.075*** (0.289)
HHH_Age	0.0125*** (0.00145)	0.0591*** (0.00761)	0.00156 (0.00444)	-0.00573 (0.00594)
HHH_Maristat_mono	0.280* (0.145)	-0.132 (0.160)	0.133 (0.398)	-1.915 (0.221)
HHH_Maristat_poly	-0.731*** (0.170)	-1.034*** (0.245)	-1.077** (0.422)	-0.664*** (0.162)
HHH_Maristat_cohab	0.127 (0.157)	-0.179 (0.179)	-0.0306 (0.408)	-0.0686 (0.326)
HHH_Maristat_divorce	0.234 (0.155)	-0.0809 (0.179)	-4.99e-05 (0.405)	0.200 (0.206)
HHH_Maristat_wido	0.0447 (0.157)	-0.0171 (0.214)	-0.145 (0.405)	-0.0364 (0.169)
HHH Employed	0.146 (0.361)	0.643*** (0.212)	0.829 (1.017)	-0.693* (0.396)
LnOther_Exp	-0.799*** (0.0321)	-0.818*** (0.0530)	-0.803*** (0.0453)	-0.688*** (0.0844)
Rural	-0.891*** (0.0390)	-1.015*** (0.0651)	-0.785*** (0.0550)	-0.820*** (0.106)
Constant	-3.846*** (0.452)	-4.326*** (0.521)	-4.180*** (1.162)	-1.060 (0.887)
District Effect	Yes	Yes	Yes	Yes
Observations	10,111	3,532	4,747	1,832
R-squared	0.385	0.426	0.387	0.305

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The coefficients of the region dummies are not stated for conciseness

Our results point to the fact that there could indeed be positive spill overs from affirmative action policies. The nomination of more women into positions of power in local communities can

help to inspire, particularly, younger female household heads to dedicate more resources to the education of their young children. An outcome whose realization is important for breaking intergenerational poverty. In addition, our results also point to the fact that different strategies are needed to nudge household-level investments in education. Investment in education does not only depend on household income.

4.5 Effect of financial inclusion of women

Using the Global Financial Inclusion (Global Findex) database, Demirgüç-Kunt et al. (2013) highlighted the existence of significant gender gaps in ownership of bank accounts and as such having access to credit products across developing countries. Specifically, Demirgüç-Kunt et al. (2013) find that in countries where women face legal restrictions on their ability to work, head a household, choose where to live, and receive an inheritance, women are less likely to own an account, relative to men, as well as to save and borrow. Using data from India, a study by Demirgüç-Kunt et al. (2013) show a recent increase in bank account ownership, especially by women and poor adults. Singh et al. (2019) find that owning a bank account improves women's reproductive and maternal health services utilization and behavior in India. From our data, we see that 36% of women heading households have bank accounts compared to 42% of male household heads who have bank accounts. We examine in this section whether female-headed households' financial inclusion impacts their children's educational investments. To examine this, we interacted with the female household head variable with the access to bank account ownership variable. The estimated results are presented in Table 7.

The coefficient on the female head variable reflects the difference in children's educational investments between female and male household heads who both do not have a formal bank account. We find that the differences in children's educational investments hold between male and female-headed households that do not have formal bank accounts. Across all estimated models, we find the coefficient on the access to a bank account (Accesssto_bank account) positive and significant. This shows that, for male-headed households, access to formal bank accounts is positively associated with investments in children's education. The hypothesis channels are that having bank accounts can help 1) households to safely save towards their children's education, and 2) households to receive loans from banks in the event of need.

In examining the coefficient on the interaction of the female household head variable with the access to bank accounts variable (Femhead*Accesssto_bank account), we find that there is an added impact of having bank accounts for female-headed who are 40 years and below and no significant impacts for relatively older female household heads. Younger female heads as compared to relatively older ones have lower incomes and as well as lower social networks, that they can rely on in the event of any financial needs, and therefore being financially included is more critical (see McGowan et al., 2015; World Bank, 2019; Handaragama and Kusakabe, 2021; Steele et al., 2023). Thus, the financial inclusion of particularly younger female household heads is important for such households to smoothen children's educational investments. Imperfect credits markets that affect younger women's ability to open bank accounts, not only will it affect savings and social empowerment as observed by Demirgüç-Kunt et al. (2013) but tends to spill impact negatively on human capital investments of children in households headed by younger women.

Table 7: Estimates of equation (1) – Effect of financial inclusion

Dependent Variable: Total Investment in Children's Education				
Independent Variables	Full sample	40 years and below	41 to 60 years	61 years and above
	(1)	(2)	(3)	(4)
Fem_head	0.667*** (0.0642)	0.710*** (0.105)	0.560*** (0.0931)	0.470*** (0.173)
Dces_mces	0.290*** (0.0596)	0.165 (0.109)	0.282*** (0.0788)	0.464*** (0.153)
Accessto_bank account	0.352*** (0.0454)	0.289*** (0.0767)	0.376*** (0.0627)	0.334*** (0.119)
(Femhead*Accessto_bank account)	0.1041 (0.0783)	0.0362* (0.0204)	0.1971 (0.215)	-0.1134 (0.207)
Ln_income	0.0448*** (0.0156)	0.00910 (0.0266)	0.0648*** (0.0200)	0.0420 (0.0487)
Number of children (6-18yrs)	0.215*** (0.0190)	0.256*** (0.0378)	0.152*** (0.0267)	0.133*** (0.0434)
HH_size	0.102*** (0.0131)	0.0882*** (0.0279)	0.113*** (0.0178)	0.112*** (0.0256)
HHedlev_primary	0.546*** (0.0492)	0.641*** (0.0877)	0.514*** (0.0722)	0.471*** (0.103)
HHedlev_secondary	1.122*** (0.0486)	1.266*** (0.0851)	1.017*** (0.0687)	0.794*** (0.126)
HHedlev_tertiary	1.625*** (0.0814)	1.833*** (0.149)	1.520*** (0.102)	0.883*** (0.295)
HHH_Age	0.0128*** (0.00145)	0.0592*** (0.00760)	0.00205 (0.00443)	-0.00509 (0.00596)
HHH_Maristat_mono	0.267* (0.144)	-0.140 (0.159)	0.150 (0.399)	-1.915 (0.221)
HHH_Maristat_poly	-0.732*** (0.170)	-1.043*** (0.245)	-1.034** (0.422)	-0.662*** (0.162)
HHH_Maristat_cohab	0.146 (0.157)	-0.161 (0.178)	0.0362 (0.408)	-0.0702 (0.330)
HHH_Maristat_divorce	0.234 (0.154)	-0.0789 (0.178)	0.0406 (0.405)	0.193 (0.204)
HHH_Maristat_wido	0.0306 (0.157)	-0.0372 (0.213)	-0.129 (0.406)	-0.0305 (0.168)
Head Employed	0.204 (0.362)	0.642*** (0.206)	0.746 (1.030)	-0.766* (0.436)
LnOther_Exp	-0.765*** (0.0324)	-0.783*** (0.0537)	-0.768*** (0.0455)	-0.668*** (0.0849)
Rural	-0.846*** (0.0393)	-0.977*** (0.0652)	-0.732*** (0.0557)	-0.795*** (0.106)
Constant	-3.541*** (0.455)	-4.049*** (0.525)	-3.897*** (1.172)	-0.833 (0.906)
District Effect	Yes	Yes	Yes	Yes
Observations	10,111	3,532	4,747	1,832
R-squared	0.389	0.428	0.392	0.308

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The coefficients of the region dummies are not stated for conciseness

4.6 Additional robustness check on the main results

As a robustness check, as suggested, we also control for additional household characteristics, and even though we controlled for community fixed effects, we control for more community contextual factors. Specifically, we control for the number of school-going children in the district (in addition to the number of children in the household), the average household income in the district, and the average age of children in the household (see Table 8). Others have argued that the gender composition of the children in the household could also drive children's educational investments (see Alderman and King, 1998; Glick and Sahn, 2000). And therefore, as a robustness check, we also control for the share of female children in the household. The estimated coefficient on our main variable (gender of household head) remains positive and significant, with the estimates ranging between 0.29 to 0.34. This corresponds to a 34% to 41% higher investment in children's education in female households than in male households.

The results for the other control variables are also very interesting. Focusing on column 3 of Table 8 which controls for both district and region fixed effects, interestingly, the coefficient on the number of school-going children in the district is positive and highly significant. The average income of the district, which proxies the quality of education in the district is positive, but not statistically significant. These results reflect how the nature of the district can influence household children's educational investments. Aside from the additional district controls and in terms of additional household controls, the impact of the average age of the children in the household, and the gender mix of the children in the household (share of children in the household who are females) are examined. We find the coefficient on the average age of the children between the ages of 6 to 18 years in the household to be negative but not statistically significant.

With regards to the proportion of female children in the household and its role in educational investments, we interacted the share of female children in the household with the gender of the household head (Femhead*%femchildproportion). Across the entire sample, we find that the coefficient on the share of female children in the household (%femchildproportion) is negative and significant at the 1% level of significance. These estimated effects suggest that male-headed households with a higher share of female children tend to invest less than male-headed households with more male children. To better understand this finding, we examine the coefficient on the interaction variable i.e., the interaction between the share of female children in the household and the female head of household variable (Femhead*%femchildproportion). As shown in Table 8, the coefficient on the interaction variable is positive but not significant. This finding suggests that, for female-headed households, aggregate investment in children is not conditional on the gender mix of the children within the household. General altruism combined with the sole burden and responsibility for any negative children outcomes like involvement in crime seems to be driving behind female investment in children's education.

Table 8: Estimates of the equation (1) using OLS

Dependent Variable: Total Investment in Children's Education (LnTot_EduInv1)			
Independent Variables	(1)	(2)	(3)
Female head	0.338*** (0.0566)	0.288*** (0.0565)	0.289*** (0.0565)
Femhead*%femchildproportion	-0.00557 (0.0786)	0.000927 (0.0784)	0.00707 (0.0785)
Ln_income	8.753*** (0.327)	8.568*** (0.326)	8.561*** (0.326)
Number of children (6-18yrs)	0.144*** (0.0152)	0.134*** (0.0150)	0.135*** (0.0149)
HH_size	0.0316*** (0.0102)	0.0438*** (0.0103)	0.0441*** (0.0103)
1.HHedlev_primary	0.359*** (0.0386)	0.282*** (0.0381)	0.282*** (0.0379)
2.HHedlev_secondary	0.560*** (0.0396)	0.449*** (0.0398)	0.446*** (0.0397)
3.HHedlev_tertiary	0.557*** (0.0672)	0.484*** (0.0673)	0.484*** (0.0672)
HHH_Age	0.00793***	0.00707***	0.00708***

	(0.00121)	(0.00121)	(0.00120)
2.HHH_Maristat_mono	0.147	0.141	0.148
	(0.111)	(0.112)	(0.111)
3.HHH_Maristat_poly	-0.370***	-0.233*	-0.229*
	(0.134)	(0.135)	(0.133)
4.HHH_Maristat_cohab	0.104	0.0236	0.0343
	(0.122)	(0.123)	(0.123)
5.HHH_Maristat_divorce	0.0645	0.0161	0.0196
	(0.119)	(0.120)	(0.119)
6.HHH_Maristat_wido	0.00176	-0.00306	0.00428
	(0.120)	(0.121)	(0.120)
HHH Employed	0.111	0.0613	0.0253
	(0.244)	(0.242)	(0.235)
LnOther_Exp	-7.699***	-7.562***	-7.555***
	(0.325)	(0.322)	(0.322)
Rural	-0.395***	-0.407***	-0.422***
	(0.0327)	(0.0323)	(0.0329)
Average age of household children (6-18 yrs)	0.0082	0.0081	0.0074
	(0.00617)	(0.00617)	(0.00613)
Female children proportion in HH (%femchildproportion)	-0.0948**	-0.102**	-0.0981**
	(0.0454)	(0.0449)	(0.0447)
Household have access to credit (dummy)	0.153***	0.155***	0.157***
	(0.0308)	(0.0308)	(0.0307)
Number of school-going children in district	0.326***	0.221**	6.325**
	(0.0860)	(0.0886)	(2.810)
Log of average income of district	-0.218**	-0.186**	2.603*
	(0.0893)	(0.0885)	(1.500)
Constant	-3.022***	-2.770***	-18.44*
	(0.877)	(0.882)	(10.19)
Regional Effects	No	Yes	Yes
District Effects	No	No	Yes
Observations	10,095	10,095	10,095
R-squared	0.624	0.633	0.638

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The coefficients of the region and district dummies are not stated for conciseness.

5. Conclusion and Recommendations

The structural changes within households in Sub-Saharan Africa do have important implications for the design and implementation of pro-poor policies. The main objective of this paper is to examine how the position of women as household heads impacts investments in children's education. Precisely, we examine, first, the income and educational investment differences across male and female-headed households in Ghana using representative household-level data. We then

shed light on how the institutional change of formal structures in local communities that recognizes affirmative action does interact with the modernization of household structures. And lastly, we explore how the financial inclusion of women impacts children's outcomes. Thus, this paper examines the impact of social structural change, in the form of changing headship in Africa on children's educational investment decisions, exploring the mediation effect of affirmative action and financial inclusion of women.

First, we find that 61.5% of females who head households were divorced/separated and widowed. Comparing with data from 1987/88, which had 47.5% of female-headed households being divorced/separated and widowed, reflects the structural change that has taken place over the decades. As observed by Thomas (2008), the death of a spouse or divorce increases vulnerabilities within households. Compared to data from 1987/88 which did not report the phenomenon of 'cohabitation', 5.4% of females who head households reported being in a cohabitating relationship.

For our main findings, we find that income levels in male-headed households are over 20% more than that of female-headed households. However, female-headed households tend to invest 31% to 38% more in children's education than male-headed households, controlling for possible confounding factors. Thus, despite the relatively lower level of income in female-headed households, female-headed households with lower levels of household incomes tend to invest a greater proportion of their incomes in children's education compared with male-headed households with higher levels of income. Additional robustness checks show that the gender differences in educational investments persist within the same income quintiles and age brackets. As indicated earlier, altruistic motives combined with the sole burden of failed children on a female head of a household seem to be plausible drivers of higher education investments in female-headed households than the negative consequence of lower incomes. In addition, we find that even within

the same income quintiles and age brackets, female-headed households in the midst of household structural changes tend to spend more on education than male-headed households. An indication that strategies to improve women's access to employment will trigger even increased educational investments, without the need necessarily for large-scale national educational interventions such as school feeding and school uniform interventions, which are poorly targeted in many countries.

In terms of the role of modernization in local societies, we find that in communities that are assigned female district leaders, female heads of households tend to commit more of their financial resources to their children's education. We interpret this as the role model effect. We argue that, when women see that other women in their community have risen in the political circles, it encourages them to invest more in their children's education, with the hope that their children can be important people one day also in the community. The evidence shows how institutional changes that recognize affirmative action can empower local women to take their children's education seriously. Thus, nominating women into positions of authority in local communities in developing countries can reinforce the investment of women in their children's education.

Robustness checks show that for female heads of households, there are no biases against male children. Specifically, we find that while the share of female or male children between the ages of 6 to 18 years in a household has no impact on female-headed households' educational investments, there is a negative association between the share of female children and educational investment levels in male-headed households. The evidence shows the equity impact of the greater household decision-making power of female heads of households and the absence of bias against boy children in the modernized household state. The result is also an indication of the need to continuously push policies and household-level interventions to nudge the realization of the importance of female education and outcomes in developing countries, even in this 21st century.

Lastly, we observe the role of financial inclusion of women in the educational investment of children. Particularly, for women under the age of 40 years and heading a household, financial inclusion in the form of owning a bank account tends to improve educational investments in children. We do not observe such an effect for older women. Older women may have stronger formal and informal networks that could help them to save and borrow to smoothen children's educational investments, than younger women. Thus, policy-wise, the integration of women with children who head households into the financial system can have nontrivial consequences for children's educational investments. One limitation of this study is that we are not able to observe dynamics in household investments as households transition from one headship type to another. Future studies with very good panel data can explore how the transition from male-headed household status to female-headed households, or vice versa, can impact children's outcomes.

References

- Alderman, H., & King, E. M. (1998). Gender differences in parental investment in education. *Structural Change and Economic Dynamics*, 9(4), 453-468.
- Andreoni, J., & Vesterlund, L. (2001). Which is the fair sex? Gender differences in altruism. *The Quarterly Journal of Economics*, 116(1), 293-312.
- Appleton, S. (1996). Women-headed households and household welfare: An empirical deconstruction for Uganda. *World Development*, 24(12), 1811-1827.
- Asiedu, E., & Ibanez, M. (2014). *The weaker sex? Gender differences in punishment across matrilineal and patriarchal societies* (No. 30). GlobalFood Discussion Papers.
- Asiedu, E., & Chimbar, N. (2020). Impact of remittances on male and female labor force

- participation patterns in Africa: Quasi-experimental evidence from Ghana. *Review of Development Economics*, 24(3), 1009-1026.
- Asiedu, E., Kalonda-Kanyama, I., Ndikumana, L., & Nti-Addae, A. (2013). Access to credit by firms in Sub-Saharan Africa: how relevant is gender? *American Economic Review*, 103(3), 293-97.
- Beaman, L., Duflo, E., Pande, R., & Topalova, P. (2012). Female leadership raises aspirations and educational attainment for girls: A policy experiment in India. *science*, 335(6068), 582-586.
- Barros, R., Fox, L., & Mendonca, R. (1997). Female-headed households, poverty, and the welfare of children in urban Brazil. *Economic Development and Cultural Change*, 45(2), 231-257.
- Becker, G. S., & Tomes, N. (1986). Human capital and the rise and fall of families. *Journal of Labor Economics*, 4(3, Part 2), S1-S39.
- Becker, Gary S. Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. 2d ed. New York and London: Columbia Univ. Press (for Nat. Bur. Econ. Res.), 1975.
- Behrman, J. R., Khan, S., Ross, D., & Sabot, R. (1997). School quality and cognitive achievement production: A case study for rural Pakistan. *Economics of Education Review*, 16(2), 127-142.
- Behrman, J. R., Pollak, R. A., & Taubman, P. (1982). Parental preferences and provision for progeny. *Journal of Political Economy*, 90(1), 52-73.
- Berthélemy, J. C., & Söderling, L. (2001). The role of capital accumulation, adjustment and structural change for economic take-off: Empirical evidence from African growth episodes. *World Development*, 29(2), 323-343.

- Bhalotra, S., & Clots-Figueras, I. (2014). Health and the political agency of women. *American Economic Journal: Economic Policy*, 6(2), 164-197.
- Bitler, M. P., Gelbach, J. B., Hoynes, H. W., & Zavodny, M. (2004). The impact of welfare reform on marriage and divorce. *Demography*, 41(2), 213-236.
- Bossen, L. (1975). Women in modernizing societies 1. *American Ethnologist*, 2(4), 587-601.
- Brown, P. H. (2006). Parental education and investment in children's human capital in rural China. *Economic Development and Cultural Change*, 54(4), 759-789.
- Brown, C., & Van de Walle, D. (2021). Headship and poverty in Africa. *The World Bank Economic Review*, 35(4), 1038-1056.
- Buvinić, M., & Gupta, G. R. (1997). Female-headed households and female-maintained families: are they worth targeting to reduce poverty in developing countries? *Economic Development and Cultural Change*, 45(2), 259-280.
- Chant, S. (1985). Family formation and female roles in Queretaro, Mexico. *Bulletin of Latin American Research*, 17-32.
- Clark, S., & Brauner-Otto, S. (2015). Divorce in sub-Saharan Africa: Are unions becoming less stable? *Population and Development Review*, 41(4), 583-605.
- Coleman, J. S. (1966). *Equality of educational opportunity [summary report (Vol. 1)]*. US Department of Health, Education, and Welfare, Office of Education.
- Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature*, 47(2), 448-474.
- Dagnew, A. (2017). Determinants of Students' Dropout Rate in Primary Schools: The Case of Awi Zone Selected Schools, Ethiopia. *African Educational Research Journal*, 5(3), 186-193.
- Deininger, K., Nagarajan, H. K., & Singh, S. K. (2020). Women's political leadership and

- economic empowerment: Evidence from public works in India. *Journal of comparative economics*, 48(2), 277-291.
- Demirgüç-Kunt, A., Klapper, L. F., & Singer, D. (2013). Financial inclusion and legal discrimination against women: evidence from developing countries. *World Bank Policy Research Working Paper*, (6416).
- Duflo, E. (2012). Women empowerment and economic development. *Journal of Economic Literature*, 50(4), 1051-79.
- Glick, P., & Sahn, D. E. (2000). Schooling of girls and boys in a West African country: the effects of parental education, income, and household structure. *Economics of education review*, 19(1), 63-87.
- Halvorsen, R., & Palmquist, R. (1980). The interpretation of dummy variables in semilogarithmic equations. *American Economic Review*, 70(3), 474-475.
- Handaragama, S., & Kusakabe, K. (2021). Participation of women in business associations: A case of small-scale tourism enterprises in Sri Lanka. *Heliyon*, 7(11).
- Hedges, S., Mulder, M. B., James, S., & Lawson, D. W. (2016). Sending children to school: rural livelihoods and parental investment in education in northern Tanzania. *Evolution and human behavior*, 37(2), 142-151.
- Ishikawa, T. (1975). Family structures and family values in the theory of income distribution. *Journal of Political Economy*, 83(5), 987-1008.
- Johnson, F. C., & Rogers, B. L. (1993). Children's nutritional status in female-headed households in the Dominican Republic. *Social Science & Medicine*, 37(11), 1293-1301.
- Kalsi, P. (2017). Seeing is believing-can increasing the number of female leaders reduce sex selection in rural India? *Journal of Development Economics*, 126, 1-18.

- Karimu, A., Mensah, J. T., & Adu, G. (2016). Who adopts LPG as the main cooking fuel and why? Empirical evidence on Ghana based on national survey. *World Development*, 85, 43-57.
- Kennedy, E., & Peters, P. (1992). Household food security and child nutrition: the interaction of income and gender of household head. *World Development*, 20(8), 1077-1085.
- Klasen, S., & Gaddis, I. (2013). Structural change, economic development, and women's labor force participation. *Journal of Population Economics*, 27(3).
- Kossoudji, S., & Mueller, E. (1983). The economic and demographic status of female-headed households in rural Botswana. *Economic Development and Cultural Change*, 31(4), 831-859.
- Kotsadam, A., Østby, G., & Rustad, S. A. (2017). Structural change and wife abuse: A disaggregated study of mineral mining and domestic violence in sub-Saharan Africa, 1999–2013. *Political Geography*, 56, 53-65.
- Larson, J. B., Castellanos, P., & Jensen, L. (2019). Gender, household food security, and dietary diversity in western Honduras. *Global Food Security*, 20, 170-179.
- Lavy, V. (1996). School supply constraints and children's educational outcomes in rural Ghana. *Journal of Development Economics*, 51(2), 291-314.
- Lloyd, C. B., & Gage-Brandon, A. J. (1993). Women's role in maintaining households: family welfare and sexual inequality in Ghana. *Population Studies*, 47(1), 115-131.
- Lloyd, C. B., El Tawila, S., Clark, W. H., & Mensch, B. S. (2003). The impact of educational quality on school exit in Egypt. *Comparative Education Review*, 47(4), 444-467.
- Lochner, L., & Monge-Naranjo, A. (2012). Credit constraints in education. *Annu. Rev. Econ.*, 4(1), 225-256.

- Mammen, K. (2011). Fathers' time investments in children: do sons get more?. *Journal of Population Economics*, 24(3), 839-871.
- Matsa, D. A., & Miller, A. R. (2013). A female style in corporate leadership? Evidence from quotas. *American Economic Journal: Applied Economics*, 5(3), 136-69.
- McGowan, P., Cooper, S., Durkin, M., & O'kane, C. (2015). The influence of social and human capital in developing young women as entrepreneurial business leaders. *Journal of Small Business Management*, 53(3), 645-661.
- Parish, W. L., & Willis, R. J. (1993). Daughters, education, and family budgets Taiwan experiences. *Journal of Human Resources*, 863-898.
- Pathak, Y., & Macours, K. (2017). Women's political reservation, early childhood development, and learning in India. *Economic Development and Cultural Change*, 65(4), 741-766.
- Posel, D. R. (2001). Who are the heads of household, what do they do, and is the concept of headship useful? An analysis of headship in South Africa. *Development Southern Africa*, 18(5), 651-670.
- Rosenhouse Persson, S. (1989). *Identifying the poor: is "headship" a useful concept?* World Bank.
- Sakyi-Nyarko, C., Ahmad, A. H., & Green, C. J. (2022). The gender-differential effect of financial inclusion on household financial resilience. *The Journal of Development Studies*, 58(4), 692-712.
- Shapiro, D., & Tambashe, B. O. (2001). Gender, poverty, family structure, and investments in children's education in Kinshasa, Congo. *Economics of Education Review*, 20(4), 359-375.
- Singh, A., Kumar, K., McDougal, L., Silverman, J. G., Atmavilas, Y., Gupta, R., & Raj, A. (2019). Does owning a bank account improve reproductive and maternal health services utilization

- and behavior in India? Evidence from the National Family Health Survey 2015–16. *SSM-Population Health*, 7.
- Steele, C. R., Moake, T. R., & Medina-Craven, M. N. (2023). Developing women leaders: The role of women's professional organizations. *Human Resource Development Quarterly*.
- Thomas, F. (2008). Remarriage after spousal death: options facing widows and implications for livelihood security. *Gender & Development*, 16(1), 73-83.
- Urrea, M. A., & Maldonado, J. H. (2011). Vulnerability and risk management: the importance of financial inclusion for beneficiaries of conditional transfers in Colombia. *Canadian Journal of Development Studies/Revue canadienne d'études du développement*, 32(4), 381-398.
- Uunk, W. (2004). The economic consequences of divorce for women in the European Union: The impact of welfare state arrangements. *European Journal of Population/Revue europeenne de demographie*, 20(3), 251-285.
- World Bank Group. (2019). *Profiting from parity: Unlocking the potential of women's business in Africa*. World Bank.
- Yang, L., & Zhang, Y. (2020). Digital financial inclusion and sustainable growth of small and micro enterprises—evidence based on China's new third board market listed companies. *Sustainability*, 12(9), 3733.

Conflict of Interest Statement

We the authors of this manuscript state categorically that we did not receive any financial support from any individual, group, or organization that has a financial, ideological, or political stake related to the manuscript. We also do not hold, or in the last three years have held, any paid or

unpaid position in an organization whose policy positions, goals, or financial interests are related to this manuscript. The authors, therefore, declare that we have no conflict of interest.