

## Trends in the social stratification of family formation across select countries in sub-Saharan Africa

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### Introduction

Income inequality is rising particularly within countries, across the globe, including in the countries of sub-Saharan Africa (SSA).<sup>1</sup> Ten of the 19 most unequal countries in the world are located in sub-Saharan Africa.<sup>2</sup> Rising economic inequality exacerbates the established social gradient of health<sup>3,4</sup> with detrimental social and health consequences, particularly for those left behind.<sup>5-8</sup> For example, across the global North, alongside rising economic inequality growing evidence supports the assertion that family formation patterns are becoming increasingly stratified by education, resulting in “diverging destinies” for future generations.<sup>9,10</sup> As compared to those with higher levels of education, less educated mothers have become increasingly likely to have “fragile families” characterized by earlier and nonmarital childbearing, and a greater likelihood of experiencing divorce, separation or nonresidential parenting. Such family arrangements have negative consequences for children’s health and wellbeing.<sup>9</sup> Efforts to mitigate effects among the disadvantaged have launched policy debates about reducing nonmarital childbearing,<sup>11,12</sup> providing social support to single mothers,<sup>13</sup> and addressing underemployment of working-class men within a globalizing economy.<sup>14</sup>

Rising economic inequality in sub-Saharan Africa, which is intrinsically tied to the dramatic expansion of education in the region, may also spur uneven social change in union and family formation patterns in this region, with potential intergenerational consequences for the most disadvantaged. Indeed, rapid social change in family formation patterns have been documented including an overall increase in age at first marriage<sup>15</sup> and first birth<sup>16</sup>, an increase in informal, cohabiting unions,<sup>15,17</sup> particularly notable in urban settings,<sup>18</sup> and changing levels of nonmarital first birth.<sup>19</sup> *Yet, it remains unclear whether these documented changes to family formation in different contexts across sub-Saharan Africa are becoming increasingly socially stratified.* In some contexts, these changes may be experienced similarly across the socio-economic gradient, and are indicative of overall economic growth and development,<sup>15,20</sup> however, in others, they may be experienced unevenly and in response to growing inequality. For example, a delay or “retreat” from formal marriage may result from the perception that marriage processes (e.g., bride wealth payments) are too expensive,<sup>21,22 23,24</sup> increasing the likelihood of nonmarital first birth for couples who cannot afford to marry.

In this descriptive paper, we ask: *Is there evidence of increasing social stratification in family formation patterns in sub-Saharan Africa?* Specifically, we examine whether age at first birth, age at first marriage, and nonmarital first birth, have become increasingly stratified by women’s educational attainment. Our findings serve as a

starting point for a larger research agenda on the impact of rising economic inequality for social stratification in family systems across sub-Saharan Africa and can direct policy development to mitigate impact on mothers and their children in settings of concentrated disadvantage.

### **Diverging Destinies in the Global North**

Across the global North, research shows that family formation behaviors of women are increasingly stratified along educational lines. Over the course of the latter half of the 20<sup>th</sup> century, more educated women tended to begin childbearing at increasingly older ages, on average, as compared to less educated women. In addition, after an initial rise in divorce rates across all groups, more educated women became far less likely to experience divorce. By contrast, less educated mothers have become increasingly likely to have “fragile families” characterized by earlier and nonmarital childbearing, and a greater likelihood of experiencing divorce, separation or nonresidential parenting.<sup>13</sup> Such family arrangements can hold negative consequences for children’s health and wellbeing.<sup>9</sup> For example, nonmarital childbearing is associated with less engagement from fathers, and lower levels of paternal investment can lead to poorer health and behavioral outcomes for children.<sup>25-28</sup> These family patterns further exacerbate disadvantage as well; even among the poor, early and nonmarital childbearing is associated with poorer outcomes for the next generation.<sup>9</sup>

Sarah McLanahan coined the term “diverging destinies” to explain this empirical reality that has been documented in the U.S. and Europe.<sup>8,9</sup> She proposed that this growing divergence in family formation behaviors across education was likely due to a combination of cultural changes and technological developments within a shifting economic and socio-political landscape. Specifically, the second wave of the feminist movement alongside developments in contraceptive technology resulted in highly educated women (and men), beginning in the 1960s, imagining roles for women other than ‘wife’ or ‘mother,’ while enabling women to control their fertility. In addition, during the last half century, there was a significant growth in the median annual income gap for the relatively well-educated as compared to other groups. Assortative mating practices shifted as well, such that the highly educated became more likely to marry one another. Changes to the labor market during this time, including economic recession, impacted low-skilled men the most, rendering them less “marriageable.”<sup>14,29</sup> Finally, changes to welfare policies benefitted single mothers more than married couples.(McLanahan, 2004)

It is important to emphasize that research also demonstrates that “fragile family structures” do not result in negative outcomes for all disadvantaged children in all disadvantaged families.<sup>30</sup> There are important subgroup and contextual differences in whether and how changes to family structures exacerbate disadvantage.

### **Rationale for Diverging Destinies in sub-Saharan Africa**

#### Inequality in sub-Saharan Africa

A recent UNDP report comprehensively details the levels, trends, and determinants of economic inequality

across sub-Saharan Africa.<sup>2</sup> While, overall, from 1990 through 2010, income inequality levels declined, that summary statement obscures extensive variation in levels and trends across the region (see Table 1)<sup>31</sup> Today, southern African countries have among the highest levels of economic inequality in the world (e.g., Botswana, Namibia, South Africa all have Gini coefficients above .60), despite some of these countries having experienced declines in inequality levels since 1990 (e.g., Namibia). In other countries, income inequality levels have been rising, but began quite low (e.g., Ivory Coast). The trends in inequality over time (see Table 1) can be reduced to four patterns: rising inequality, falling inequality, U-shaped pattern of inequality, and lastly, an inverted-U shape. There are many potential determinants for the differences in these observed trends.

Cornia describes three sets of determinants of the variation in levels and trends in economic inequality across sub-Saharan Africa from the colonial period forward: 1) traditional, structural causes of inequality including differences in colonial and post-colonial agricultural systems, natural resources and mining, regressive state redistribution policies (e.g., VAT and trade taxes), uneven levels of development of the urban formal employment sector, and inter-ethnic concentrations of political and economic power, and public policies that favor certain groups over others; 2) Newer, non-traditional factors including international aid flows, levels and trends in foreign direct investment, a growing level of remittances, and the terms of global trade; 3) Other significant determinants including the effects of the HIV epidemic, the sustained high fertility levels, and significant gender inequality.<sup>31</sup>

These multiple influences have operated differently across countries and over time; corresponding to the diversity observed in levels and trends in inequality, and anticipating extensive diversity in the social consequences of shifts in income inequality. While the reasons behind a rise (or fall) in inequality almost certainly differ across context, we are interested in whether there is indication of any consistent patterns in the effects of such a rise on social systems.

#### Mechanisms through which inequality may impact social stratification in family formation in SSA

Some of the determinants of income inequality across sub-Saharan Africa described above likely play a more proximate role in influencing social stratification of family systems. These include gender inequitable systems with respect to not only employment opportunities, but wealth generation, including marriage and property rights; and high fertility levels which are increasingly concentrated among the rural, poor, and associated with earlier marriage. As described above within the Global North, access to contraception can also exacerbate divergence in family formation patterns. Alongside gains to women's education, in contexts where education shapes women's access to and knowledge about effective contraception, it is plausible that the most highly educated African women are increasingly motivated and able to access highly effective contraception,<sup>32</sup> controlling their reproduction in ways that lowers their likelihood of non-marital births, which tend to be unintended.<sup>33</sup>

Like the case in the U.S., we might expect emerging cultural differences in family systems corresponding to education. The educational system is a cultural institution, where different lifestyles, tastes and values are imparted and internalized. Cultural distance then increases across educational level, even more so as assortative mating takes place increasingly along an educational gradient.<sup>34</sup> In contexts across sub-Saharan Africa, urban residence and education are associated with ideational change including preferences for “modern” marriage and family, characterized by an emphasis on conjugal bonds, with later marriage and smaller family size preferences.<sup>35</sup> Those exposed to high levels of education become more culturally distant from associated with increasing cultural distance between status groups, given the extent to which lifestyles, values and tastes are influenced by the educational system and are ‘classed.’<sup>34</sup>

Economic change has also likely influenced unequal shifts in marriage and family, but not necessarily in the same ways as it has in the U.S. Rather, economic policy changes in many burgeoning economies have resulted in high levels of male youth unemployment, in many cases affecting young men with college-level education.<sup>24,36,37</sup> This translates into only the most elite accessing formal, stable employment. This factor would likely play a larger role in the inequality of family change in contexts where the formal sector has remained small and has contributed significantly to overall levels of income inequality. At the same time, as economies become more cash-dependent, and demonstration of economic capital becomes more associated with social status and prestige, marital processes, including introduction ceremonies and bride wealth payment have become more cash intensive, leaving fewer and fewer able to formally marry.<sup>24</sup>

Therefore, we may expect to see changes to family formation systems among the elite, with less rapid change to the vast majority of the population, and the least change to least well-off; and we would expect this pattern in those countries where economic inequality is rising; with less evidence of this in those economies where economic inequality has remained stable or has fallen over time. We also anticipate that the economic mechanisms through which inequality levels have changed will play a significant role in determining whether and to what extent we see evidence of corresponding shifts in the social stratification of union and family formation.

We address family formation patterns across the educational gradient, specifically, as this is a particularly important system of social stratification in sub-Saharan Africa. The costs of secondary and tertiary education remain prohibitive for many, making educational attainment a particularly strong indicator of economic status.<sup>38</sup> Educational attainment is also an increasingly important vehicle for social mobility,<sup>39</sup> and a major determinant of women’s economic wellbeing.<sup>40</sup> Therefore, it may be that women left behind by the transition to mass education are increasingly at risk of family formation patterns akin to those characterized as fragile families. We ask: Are differences in family formation processes increasing over time across the educational gradient, exacerbating stratification in family formation patterns?

## **Hypotheses**

Based on work examining diverging destinies in the Global North, and our conceptualization of these processes in sub-Saharan Africa, we expect:

1. The age of first marriage and the age of first birth to rise more dramatically among the most advantaged cohorts as compared to those less-advantaged cohorts.
2. The percent of nonmarital first births to either rise less quickly or decline across cohorts among the most advantaged, once controlling for ethnic and religious beliefs, as compared to cohorts of less advantaged women.
3. We expect to find stronger evidence of divergence across relative educational attainment level within those countries that have experienced a recent rise in economic inequality levels

## DATA AND METHODS

We leverage data from 82 Demographic and Health Surveys (DHS) across 17 countries that vary in economic inequality trajectories over time. To capture changes during the recent period of rising economic inequality, we restrict analyses to those countries where we can focus on mothers born as early as 1960 and at a maximum age of 34 using at least three DHS surveys between 1986 and 2016. The DHS are nationally representative household-based surveys conducted about every 5 years with women and men of childbearing age (typically 15-49 years). The DHS uses a stratified two-stage cluster sampling design.<sup>41</sup> We use the following criteria to establish our analytic sample. First, to maximize the duration of the observation period, we restrict analyses to those countries where we have access to at least 3 waves of data with the first allowing us to construct birth cohorts beginning in 1960. These parameters yield 92 datasets within 20 countries. Second, to minimize recall error on timing of union and family formation events for our multivariate analyses, we will limit observation to women less than 35 years of age at the time of the survey. We examine trends in union and family formation within each of these 17 countries.

Because DHS questionnaires have remained stable over time on the key indicators of interest, we can create synthetic cohorts by combining the same birth cohorts across different waves of data collection to examine trends over time. For the purposes of visualizing trends, we relax age restrictions (to include women up to the age of 49) and display data for ten-year cohorts beginning in 1940. For multivariate analyses we apply age restrictions to minimize recall bias; our earliest birth cohort is 1960-1969. We extend our analyses to the 1980-1989 birth cohort; at the time of the most recent survey women in this cohort would vary in age from 29-36 years.

*Income inequality indices:* Further restricting our sample of countries, we include only those countries that are included in the UNDP's Integrated Inequality Database (IID), a database that examines inequality indices (Gini Coefficients) across data sources and compiles the most reliable indices across selected sub-Saharan African contexts from 1993-2011.<sup>42</sup> The UNDP report categorized countries into four different inequality patterns over time: rising, falling, U-shaped, or inverted U-shaped. In so doing, we eliminate three countries

in which inequality data were not documented, leaving a total of 82 DHS across 17 countries (see Table 1).

## **Outcome Measures**

We focus on three outcomes indicative of change in union and family formation, and widely discussed in the literature – the age at first marriage, the age at first birth and the percent of non-marital first birth.

Age at first birth and age at first marriage: We chose to examine age at first birth and at first marriage as there have been documented overall increases in both over time associated with economic development. Studies have suggested that the overall rise seen in these indicators is indicative of economic development and progress, specifically, there are noted associations between these demographic changes and overall increases in women’s educational attainment and urbanization.<sup>15,16</sup> In addition, these are important indicators to consider across socio-economic status and over time because of the well-known social, economic and health consequences of early marriage<sup>43,44</sup> and early childbearing<sup>16,45</sup>, respectively. We use women’s reported age in years at first birth, and reported age in years at first marriage or cohabitation; and use median age to demonstrate trends over time across educational gradient.

Nonmarital first birth: We examine nonmarital first birth for a few reasons. First, it is associated with informal or unstable relationships, and longer durations of single motherhood.<sup>46,47</sup> Second, there are compelling conceptual links between nonmarital first birth and inequality in sub-Saharan Africa through delays in marriage due to its rising costs. Third, in sub-Saharan Africa, nonmarital births correspond with child health and survival risks.<sup>48,49</sup> The DHS collect data on the date (day, month, year) of first birth as well as on the month and year of the start of cohabitation or marriage, along with women’s report of whether she has ever married. We use these data as the basis for our measure of nonmarital first birth. We define births as non marital if they occurred to never-married mothers or preceded the reported month and year of first marriage (by at least one month) for mothers who later married.<sup>47</sup>

## **Independent variables**

Educational Gradient: We use the reported highest completed grade in years to construct measures of educational attainment. We generate relative categorical measures of educational attainment. We do so both because inequality is a relational concept and because women’s educational attainment levels have changed over this time frame in many (but not all) countries. We set out to follow McLanahan’s approach, which was to create a categorical variable based on the interquartile range of the distribution in educational attainment, cut at highest 25%, middle 50%, and lowest 25% attainment levels for each birth cohort.<sup>9</sup> However, given a few important contextual differences, we chose to use a different set of cut points, specifically, where possible, we differentiated the top 10%, the middle 65% and the bottom 25%. We did this for a few reasons. As described above, we expect changes in family formation systems that result from shifting values and preferences to begin among the elite, and the most highly educated. The percentage of women who have completed secondary education and beyond, known to be associated with real returns on

investment and expanded opportunity structures, was quite low for many cohorts. As we wished to capture and be able to differentiate, the experience of the more ‘elite’ in these settings, we created a 10% cut point for the relatively highest educational category. As for the remaining groups, we were not always able to use the intended cut-points. In many countries, particularly in West Africa, for many cohorts, the percentage of women who had received no education was much higher than 25% of the total distribution; for the earliest cohorts it was above 90% in some countries. For cohorts where more than 25% of the population had no education, we set cut points to capture all of those with no education in the bottom category, the top 10% in the highest category, and the remainder in the middle category.

Birth cohort X education interactions: Our main analytic variable is an interaction term that assesses the educational gradient over time. To do this, we construct a birth cohort dummy variable and interact it with educational gradient to assess whether the association between education and our outcomes of interest (age at first birth, age at first marriage, nonmarital birth, cohabitation) have changed over time.

**Control variables:** We control for ethnicity, or where not available, subnational region, which often correlates strongly with ethnicity; and religion, as categorical variables. In some countries, Muslim women marry earlier and are more likely to have children within the context of marriage.<sup>50</sup> Where possible (two countries), we also control for childhood place of residence, which captures the respondents “main place of residence before the age of 12” and accounts for whether they were raised in a large city, small town, or rural area. We expect that in addition to capturing social stratification, this variable may also capture social environmental influences on union and family formation preferences.

## **Analysis**

In each of 17 countries, we combine all eligible and available surveys (range is three to six) to construct synthetic birth cohorts. We run country-specific multivariate linear regression analyses predicting the median age at first birth, and the median age at first marriage; and multivariate logistic regression analyses predicting the likelihood of having a nonmarital first birth, by educational attainment over time. Data were programmed using R and analyses were conducted in Stata (version 14).

We use relative educational attainment to assess the extent to which these outcomes diverge over time when comparing women with the lowest educational attainment levels to those with higher educational attainment levels. For these country-specific regression models, we use data across all birth cohorts and include interaction terms between birth cohort and categorical relative educational attainment measures, using lowest attainment as the reference category to assess divergence in the extent of educational stratification over time. To aid in the interpretation of our country-specific model findings, we organize our findings using the UNDP’s categorization of sub-Saharan African countries into three patterns of income inequality: rising, U-shaped, and falling (only Rwanda was categorized with an inverted-U and so presented

with countries with falling inequality levels).<sup>2</sup>

## **FINDINGS**

We present descriptive findings graphically, depicting each of three outcomes across birth cohorts beginning in 1940 through 1989. We then present multivariate analyses for each outcome, grouped by trends in inequality. We show both unadjusted results that account for only birth cohort, education and their interaction and then, models with all controls included.

### **Age at First Marriage**

Figure 1 shows a series of graphs depicting the median age of first marriage for women beginning with those born between 1940-1949 by relative educational attainment. Evidence of divergence over time is most clearly noted in Ghana, Kenya, Malawi, Niger, Rwanda, Tanzania, Uganda and Zambia. In all of these countries, the age of marriage rises much more quickly over cohorts of women in the highest educational category as compared to change seen in either the middle or low education groups. Most of these countries (all but Niger and Zambia) are characterized by rising or U-shaped economic inequality, lending moderate support to our expectation of a greater extent of divergence in these contexts.

It is also important to note that across most countries, we see very little change in the age of first marriage among women in the lowest educational attainment group. There is evidence of some shifts in Mali, Niger, and Senegal, countries, with the exception of Senegal, marked by a very low age of first marriage. This suggests that despite the concerted focus in mass education, the benefits of education are not universal. In the remainder there is either no change, or a decline in the age of first marriage over time for this population. Likewise, in many countries, there are few notable distinctions between the middle educational attainment category and the lowest category; with notable exceptions of Cameroon, Kenya, Nigeria, Senegal, and Zimbabwe.

For the regression analyses we restrict the sample to those women ages 15-35 born between 1960-1989, therefore capturing less of the change over time, but with arguably higher quality data. Nonetheless, the regression results are largely consistent with the interpretation of the figures (See tables 2a-d). First, we find, as expected, that educational attainment category, and less consistently, birth cohort, are associated with the median age of marriage in most countries, with the only exception being Ghana. As for the birth cohort education interactions, we find support for our expectation of increased divergence in the age of first marriage by education in contexts marked by rising inequality - Ghana, Uganda, Malawi and Tanzania, but less strongly in Zambia, Senegal and Rwanda in both unadjusted and adjusted models.

### **Age at First Birth**

The graphs in Figure 2 depicting change in the median age of first birth by educational attainment are similar to that of the age of first marriage. Here, we see a sustained rise in the age of first birth among the highest educational attainment group in Ghana, the Ivory Coast, Tanzania and Uganda; and less consistent,



but rising trends in Kenya, Rwanda, Zambia and Niger. Again, most of these countries, with the exceptions of Zambia, Rwanda and Niger, are characterized by rising economic inequality.

As in the case for marriage, we also note far less change among the middle and lowest educational attainment groups in the age of first birth. And unlike the median age of first marriage, there is almost no evidence of gains to the age of first birth for either the middle or lowest educational attainment groups. Instead, in many countries, including the Ivory Coast, Madagascar, Malawi, Mali, Namibia, and Nigeria it appears that the age of first birth has declined rather than risen among these groups. This suggests that the overall gains observed in the age of first birth have taken place only for the relatively elite.

The regression results (see Tables 3a-d) show that educational attainment is positively associated with age of first birth; but that birth cohort is associated with a rise in the age of first birth only in Kenya, Tanzania, Senegal, and Zimbabwe. The evidence of divergence in the age of first birth by educational attainment category shown in the figures is strongly or moderately supported by the multivariate analysis for Ivory Coast, Ghana, Uganda, Malawi, Burkina Faso, Namibia, Senegal and Rwanda. Some of the distinctions between these findings and those suggested by the graphs is explained by the truncated timeframe captured in these multivariate analyses; the reference category is the lowest educational category in the 1960-1969 birth cohort. In these analyses there is stronger overall evidence of divergence in the age of first birth across educational attainment groups over time than there was for the age of first marriage. However, there is less support of our expectation that this divergence would be more apparent in contexts marked by rising economic inequality. Rather, we find nearly as much evidence of this divergence in contexts marked by falling inequality as those marked by rising economic inequality.

### **Nonmarital First Birth**

The trends in nonmarital birth are far less consistent across countries and do not tell a clear story about demographic divergence. First, as noted in prior review studies, both the magnitude and the direction of the trend differs across these countries (see Figure3). Overall, levels of nonmarital first childbirth are highest in Namibia, Cameroon and the Ivory Coast; and lowest in Ghana, Rwanda and Nigeria. While there is an overall rise in nonmarital first birth in Zambia, Malawi, and Rwanda, there is an overall decline in Zimbabwe, Burkina Faso, Kenya, Madagascar, Nigeria, Niger and Senegal. There does appear to be evidence of divergence, but the patterns differ from those seen for both age of first marriage and first birth. In the majority of countries, the rate of nonmarital first birth is lower for those with the lowest levels of education likely explained by the lower age at first marriage among these same groups. Therefore, there is notable divergence between the highest and the middle educational attainment groups in many contexts; whereas for Cameroon, Ivory Coast, Kenya, Tanzania and Uganda, there is a sharper, or earlier decline in nonmarital first birth among those with the relatively highest level of educational attainment, as compared to women in the middle educational attainment category. In a subset of these countries(Cameroon, Ivory

Coast, Tanzania and Uganda)., the magnitude of nonmarital birth begins as highest among the most educated. The social acceptance and therefore stigma around nonmarital childbearing differ across contexts, ethnicities and religious beliefs in significant ways which likely explain some of the variation observed across countries.

The regression results are more difficult to interpret given the heterogeneity of trends across countries and educational attainment categories (see Tables 4a-d). In the majority of countries, the main effect of birth cohort is significant; however in 5 countries, there is an overall decline in nonmarital childbearing over time; while in the remaining 10 countries, there is an increase. Likewise, educational attainment, overall, has a significant influence on nonmarital childbearing rates in all countries, and in most cases, the odds of nonmarital childbearing increase with educational attainment. However, as indicated in the figures, in six countries there is significantly higher odds of nonmarital birth for women in the middle education category as compared to the lowest category, but no significant difference between the highest and lowest categories educational attainment categories. The interaction terms yield significant results in most countries, however it is important to appreciate that while these often reflect a sharper decline in nonmarital childbirth over time among women in the higher educational attainment categories, they are often beginning from a higher level of nonmarital birth. We find little support for divergence in nonmarital childbearing across social status in countries marked by rising economic inequality. Rather, we find divergence across educational attainment groups in most countries, and evidence of a sharper decline in these rates among those with higher levels of education in those countries marked by falling economic inequality.

## **DISCUSSION**

In this analysis we pooled data from 82 Demographic and Health Surveys across 17 countries to examine trends in union and family formation patterns across an index of social stratification. As summarized in Table 5, we see much stronger evidence of diverging patterns by education in those countries characterized by rising inequality than those characterized by falling economic inequality. We find evidence of emerging social stratification in the age of first marriage and birth. Where we see emerging social stratification, it is in the pattern we expected, where gains to the median age of first birth and marriage are occurring more rapidly among those with higher as compared to lower levels of education. For the age at first marriage, in particular, we see evidence that these gains are taking place among those with the highest level of education in countries experiencing a recent rise in income inequality in particular. For the age of first birth, we see evidence of the influence of higher social status (measured here as educational attainment) regardless of income inequality trends. Our findings for nonmarital childbearing are much more mixed and require further analysis to make conclusions. While we find evidence of divergence in these patterns, the magnitude and direction of these changes varies substantially both across countries and educational groups within countries.

As the Sustainable Development Goals emphasize, it is important to identify and mitigate the potential for many being left behind in the project of Development. If family formation patterns are becoming stratified, it will confirm the need for targeted interventions to mitigate the intergenerational health and social consequences for disadvantaged mothers and their children. Importantly, our descriptive evidence suggests that women in the lowest educational categories are being left behind by overall change in the age of marriage, and first birth. The lack of gains made among this group for these characteristics may explain the mixed findings we note with respect to nonmarital childbearing across education. In future studies we will need to account for the age of marriage, and identify possible solutions to accounting for contraceptive use at aggregated levels of analysis, perhaps, to adjust for the role of access to contraceptive use in this outcome.

There are limitations with our analyses. First, we recognize it is likely that our outcomes of interest and educational attainment are driven by factors that preceded our point of observation. This limitation is partially mitigated by the reasonable assumption that these selection effects have not changed much over time, and our interest is in trends rather than effect sizes at any one time point. Related, we cannot identify the precise pathways through which education attainment is impacting our outcomes. To do so we would need to conduct structural equation modelling to estimate both indirect and direct effects. For models describing first birth and nonmarital birth, we should address the role of contraceptive use. We may be able to do this in future analyses by leveraging the contraceptive use calendar data. Third, as well documented in the literature, the measurement of the timing of marriage is difficult in the DHS and large-scale surveys in SSA. Without more precise data on different union formalization processes, it is difficult to appreciate the extent of change. Likewise, we cannot easily account for the variation in within-country social approval or disapproval of nonmarital childbearing or informal cohabiting unions, which is important for the meaning of these findings. As we develop this analysis further, we will draw on in-depth qualitative data and case studies to facilitate the interpretation of our findings for these outcomes.

## TABLES AND FIGURES

Table 1: DHS countries, survey and levels of inequality

<b>Country</b>	<b>Available Waves, DHS</b>	<b>Trend in Inequality 1990-2010</b>	<b>Recent Income Inequality level<sup>42</sup></b>
Burkina Faso	1992, 98, 2003, 10	Falling	very low
Cameroon	1991, 98, 2004, 11	Falling	Medium
Cote d'Ivoire	1994, 98, 2011	Rising	Low
Ghana	1988, 93, 98, 2003,08, 14	Rising	Low
Kenya	1988, 93, 98, 2003, 08, 14	Rising	Medium
Madagascar	1992, 97, 2004, 09	Falling	Low
Malawi	1992, 2000, 04, 10, 16	U shape	Medium
Mali	1987, 95, 2001, 06, 12	Falling	very low
Namibia	1992, 2000, 06, 13	Falling	High
Niger	1992, 98, 2006, 12	Falling	very low
Nigeria	1990, 2003, 08, 13	U shape	Low
Rwanda	1992, 2000, 05, 10, 15	inverted U	medium
Senegal	1986, 92, 97, 2005, 10, 14-16	Falling	low
Tanzania	1991, 96, 99, 2004, 09, 16	U shape	very low
Uganda	1988, 95, 2000, 06, 11, 16	Rising	low
Zambia	1992, 96, 2001, 07, 13	U shape	high
Zimbabwe	1988, 94, 99, 2005, 10, 15	Falling	low

Figure 1

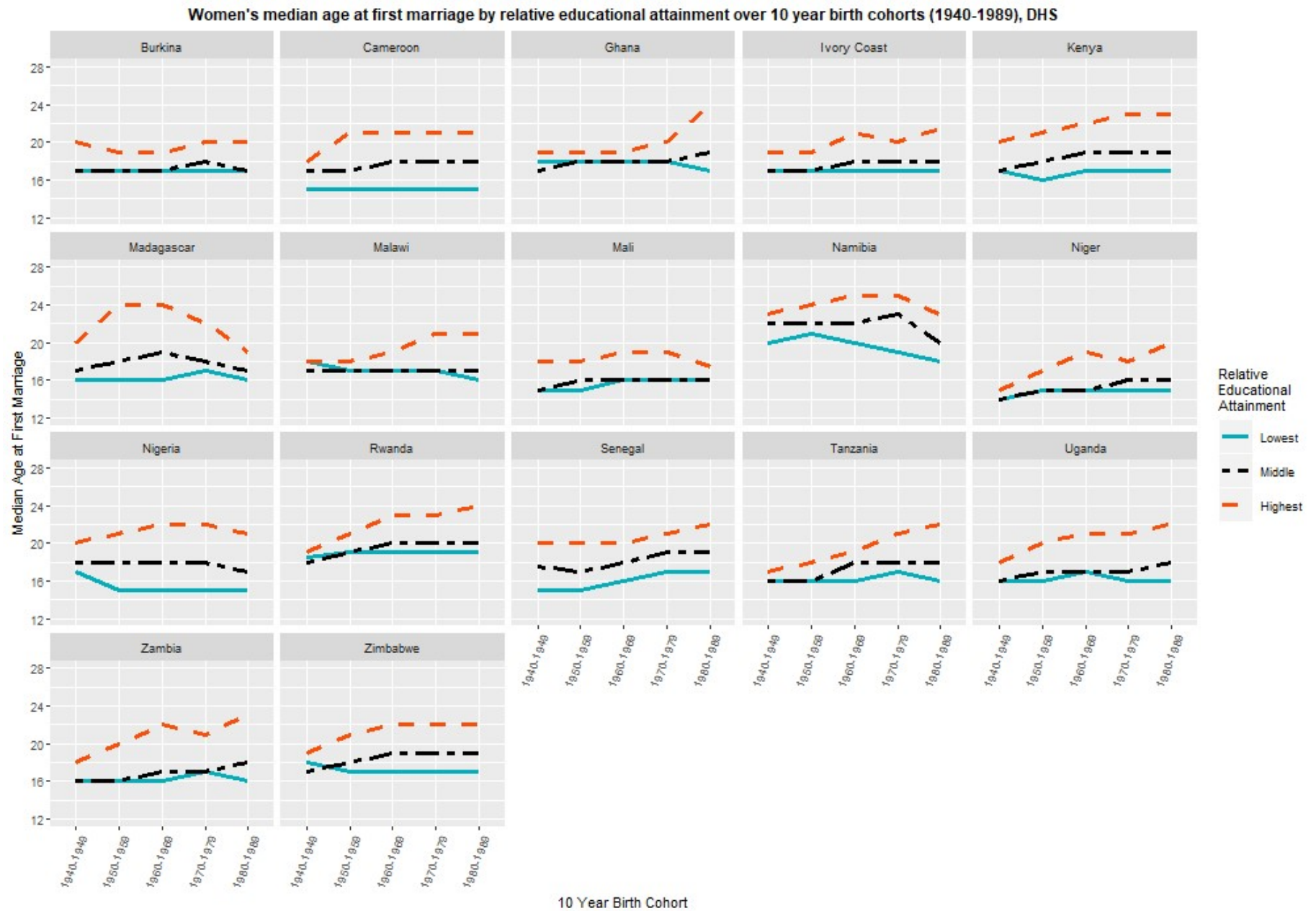


Table 2a: Trends in the age of first marriage by educational attainment among women ages 15-34 born between 1960-1989, DHS data; in those countries where economic inequality has been rising (1990-2010)

Age at First Marriage	Ivory Coast		Ghana		Kenya		Uganda	
	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>
<b>Birth Cohort (ref. 1960-1969)</b>								
<i>1970-1979</i>	-0.575 (0.115)***	-0.655 (0.113)***	-0.144 (0.114)	-0.529 (0.119)***	0.540 (0.112)***	0.490 (0.111)***	-0.133 (0.106)	-0.505 (0.132)***
<i>1980-1989</i>	0.545 (0.115)***	0.298 (0.119)**	-0.158 (0.117)	-0.803 (0.129)***	0.471 (0.104)***	0.504 (0.107)***	0.181 (0.107)*	0.190 (0.142)
<b>Relative Educational Attainment Category (ref. lowest 25%)^</b>								
<i>Middle</i>	0.932 (0.176)***	0.748 (0.179)***	-0.177 (0.120)	-0.071 (0.126)	2.270 (0.104)***	1.963 (0.104)***	0.691 (0.107)***	0.698 (0.123)***
<i>Highest</i>	2.810 (0.249)***	2.487 (0.252)***	1.324 (0.124)***	1.445 (0.134)***	5.961 (0.213)***	5.508 (0.212)***	4.074 (0.193)***	3.992 (0.215)***
<b>Birth Cohort*Relative Educational Attainment Interaction (ref. lowest education category in 1960-1969)</b>								
<i>1970-1979*Middle</i>	-0.049 (0.224)	-0.065 (0.222)	0.826 (0.161)***	0.644 (0.163)***	-0.156 (0.132)	-0.143 (0.130)	-0.138 (0.129)	-0.054 (0.159)
<i>1970-1979*Highest</i>	0.100 (0.407)	0.012 (0.400)	1.065 (0.204)***	0.884 (0.204)***	0.152 (0.287)	0.188 (0.282)	0.428 (0.247)*	0.629 (0.361)*
<i>1980-1989*Middle</i>	0.015 (0.237)	-0.144 (0.240)	1.723 (0.167)***	1.483 (0.172)***	-0.168 (0.121)	-0.209 (0.123)*	0.410 (0.130)***	0.789 (0.163)***
<i>1980-1989*Highest</i>	0.437 (0.363)	0.346 (0.367)	4.356 (0.248)***	4.106 (0.253)***	-0.119 (0.239)	-0.086 (0.239)	0.973 (0.237)***	1.184 (0.270)***
<i>R<sup>2</sup></i>	0.06	0.08	0.09	0.11	0.17	0.21	0.13	0.18
<i>N</i>	8,874	8,862	12,498	12,466	25,733	25,683	21,929	12,858
<b>Controls, by country</b>								
<i>Childhood Place of Residence</i>		No		No		No		No
<i>Religion</i>		Yes		Yes		Yes		Yes
<i>Ethnicity</i>		No		Yes		Yes		Yes
<i>Region</i>		No		No		No		No

Table 2b: Trends in the age of first marriage by educational attainment among women ages 15-34 born between 1960-1989, DHS data; in those countries where economic inequality has been U-shaped (1990-2010)

Age at First Marriage	Malawi		Nigeria		Tanzania		Zambia	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1970-1979	-0.191 (0.122)	-0.334 (0.186)*	0.318 (0.083)***	0.456 (0.076)***	0.338 (0.113)***	0.230 (0.115)**	0.209 (0.100)**	0.179 (0.100)*
1980-1989	-0.492 (0.116)***	-0.763 (0.181)***	0.416 (0.075)***	0.695 (0.070)***	0.230 (0.113)**	-0.582 (0.123)***	0.175 (0.103)*	0.129 (0.103)
Middle	0.258 (0.137)*	-0.007 (0.222)	3.763 (0.112)***	1.949 (0.114)***	1.942 (0.113)***	1.756 (0.115)***	1.249 (0.104)***	1.218 (0.103)***
Highest	2.051 (0.183)***	1.730 (0.309)***	6.997 (0.284)***	4.910 (0.282)***	3.182 (0.240)***	3.127 (0.236)***	5.597 (0.208)***	5.517 (0.208)***
1970-1979*Middle	0.356 (0.150)**	0.523 (0.231)**	-0.825 (0.137)***	-0.759 (0.131)***	-0.841 (0.132)***	-0.881 (0.133)***	-0.292 (0.122)**	-0.278 (0.122)**
1970-1979*Highest	1.825 (0.208)***	1.960 (0.325)***	-0.025 (0.303)	-0.187 (0.296)	0.789 (0.281)***	0.638 (0.275)**	-1.001 (0.264)***	-0.977 (0.264)***
1980-1989*Middle	0.743 (0.144)***	0.977 (0.225)***	-1.457 (0.123)***	-1.315 (0.122)***	-0.352 (0.133)***	-0.613 (0.146)***	0.146 (0.125)	0.165 (0.124)
1980-1989*Highest	2.510 (0.204)***	2.721 (0.321)***	-1.374 (0.291)***	-1.541 (0.286)***	2.429 (0.280)***	0.469 (0.355)	0.692 (0.283)**	0.698 (0.284)**
R <sup>2</sup>	0.13	0.15	0.31	0.38	0.12	0.12	0.14	0.16
N	34,283	31,781	37,387	37,077	22,406	15,232	19,999	19,919
Childhood Place of Residence		No		No		Yes		No
Religion		Yes		Yes		Yes		Yes
Ethnicity		Yes		Yes		No		Yes
Region		No		No		Yes		No

Table 2c: Trends in the age of first marriage by educational attainment among women ages 15-34 born between 1960-1989, DHS data; in those countries where economic inequality has been falling (1) (1990-2010)

Age at First Marriage	Burkina Faso		Cameroon		Madagascar		Mali		Namibia	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1970-1979	-0.032 (0.052)	-0.016 (0.051)	0.626 (0.123)***	0.087 (0.128)	0.302 (0.139)**	0.290 (0.136)**	0.212 (0.052)***	0.193 (0.052)***	-0.317 (0.272)	-0.408 (0.263)
1980-1989	-0.213 (0.052)***	-0.147 (0.053)***	0.807 (0.117)***	-0.374 (0.135)***	-0.304 (0.138)**	-0.223 (0.135)	0.112 (0.052)**	0.062 (0.053)	-1.243 (0.272)***	-1.379 (0.265)***
Middle	0.603 (0.193)***	0.469 (0.189)**	3.162 (0.143)***	2.305 (0.149)***	2.458 (0.144)***	1.871 (0.141)***	0.504 (0.154)***	0.500 (0.154)***	1.770 (0.263)***	1.373 (0.257)***
Highest	3.001 (0.185)***	2.711 (0.182)***	5.552 (0.242)***	4.440 (0.250)***	7.238 (0.291)***	6.330 (0.288)***	3.041 (0.201)***	3.052 (0.202)***	3.902 (0.583)***	3.202 (0.579)***
1970-1979*Middle	0.280 (0.213)	0.239 (0.209)	-0.151 (0.168)	-0.506 (0.168)***	-0.834 (0.166)***	-0.849 (0.162)***	0.132 (0.188)	0.137 (0.188)	0.612 (0.318)*	0.464 (0.307)
1970-1979*Highest	-0.050 (0.235)	-0.014 (0.232)	0.108 (0.305)	-0.309 (0.305)	-1.919 (0.337)***	-1.878 (0.333)***	-0.005 (0.254)	-0.050 (0.255)	1.105 (0.681)	1.040 (0.670)
1980-1989*Middle	0.230 (0.208)	0.145 (0.203)	-0.847 (0.160)***	-1.321 (0.164)***	-1.358 (0.163)***	-1.389 (0.160)***	-0.205 (0.179)	-0.204 (0.179)	0.506 (0.319)	0.063 (0.309)
1980-1989*Highest	-0.125 (0.229)	-0.106 (0.227)	-0.391 (0.296)	-1.221 (0.302)***	-3.702 (0.326)***	-3.686 (0.322)***	-1.023 (0.237)***	-1.062 (0.237)***	1.011 (0.681)	0.385 (0.668)
R <sup>2</sup>	0.10	0.15	0.19	0.26	0.16	0.20	0.06	0.07	0.09	0.17
N	20,431	20,363	15,456	15,390	17,319	17,307	26,355	26,285	6,816	6,797
Childhood Place of Residence		No		No		No		No		No
Religion		Yes		Yes		Yes		Yes		Yes
Ethnicity		Yes		Yes		No		Yes		Yes
Region		No		No		Yes		No		No



Table 2d: Trends in the age of first marriage by educational attainment among women ages 15-34 born between 1960-1989, DHS data; in those countries where economic inequality has been falling (2) (1990-2010)

Age at First Marriage	Niger		Senegal		Zimbabwe		Rwanda	
	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>
<i>1970-1979</i>	0.553 (0.055)***	0.451 (0.056)***	0.707 (0.063)***	0.799 (0.062)***	0.343 (0.126)***	-0.215 (0.163)	-0.256 (0.124)**	-0.054 (0.147)
<i>1980-1989</i>	0.898 (0.053)***	0.464 (0.059)***	1.099 (0.054)***	1.245 (0.054)***	0.159 (0.124)	-0.886 (0.170)***	0.306 (0.119)**	0.553 (0.131)***
<i>Middle</i>	1.644 (0.188)***	1.089 (0.181)***	1.670 (0.210)***	1.511 (0.204)***	1.996 (0.128)***	2.060 (0.174)***	1.011 (0.132)***	0.815 (0.148)***
<i>Highest</i>	4.372 (0.204)***	3.573 (0.208)***	3.610 (0.165)***	3.427 (0.165)***	5.611 (0.335)***	5.519 (0.373)***	3.203 (0.211)***	3.021 (0.231)***
<i>1970-1979*Middle</i>	-0.237 (0.238)	-0.174 (0.228)	0.629 (0.244)***	0.588 (0.237)**	0.031 (0.152)	-0.338 (0.190)*	0.027 (0.157)	0.355 (0.186)*
<i>1970-1979*Highest</i>	-0.879 (0.260)***	-0.881 (0.253)***	-0.283 (0.217)	-0.345 (0.217)	-1.091 (0.397)***	-1.702 (0.430)***	0.081 (0.272)	0.508 (0.322)
<i>1980-1989*Middle</i>	-0.344 (0.218)	-0.691 (0.219)***	0.105 (0.219)	0.106 (0.213)	-0.042 (0.147)	-0.383 (0.187)**	-0.078 (0.152)	0.103 (0.166)
<i>1980-1989*Highest</i>	-0.108 (0.258)	-1.145 (0.299)***	0.857 (0.197)***	0.760 (0.197)***	-0.987 (0.367)***	-1.408 (0.403)***	0.776 (0.267)***	0.922 (0.281)***
<i>R<sup>2</sup></i>	0.16	0.19	0.12	0.15	0.13	0.17	0.08	0.09
<i>N</i>	17,753	12,907	34,581	34,572	17,703	16,403	18,181	14,325
<i>Childhood Place of Residence</i>		Yes		No		No		No
<i>Religion</i>		Yes		No		Yes		Yes
<i>Ethnicity</i>		Yes		Yes		No		No
<i>Region</i>		No		No		Yes		No

Figure 2



Table 3a: Trends in the age of first birth by educational attainment among women ages 15-34 born between 1960-1989, DHS data; in those countries where economic inequality has been rising (1990-2010)

Age at First Birth	Ivory Coast		Ghana		Kenya		Uganda	
	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>
<b>Birth Cohort (ref. 1960-1969)</b>								
<i>1970-1979</i>	-0.807 (0.101)***	-0.876 (0.100)***	-0.242 (0.115)**	-0.634 (0.120)***	0.457 (0.097)***	0.273 (0.097)***	-0.202 (0.104)*	-0.604 (0.132)***
<i>1980-1989</i>	0.238 (0.100)**	0.011 (0.105)	-0.364 (0.114)***	-0.990 (0.126)***	0.670 (0.089)***	0.391 (0.093)***	-0.195 (0.102)*	-0.293 (0.128)**
<b>Relative Educational Attainment Category (ref. lowest 25%)^</b>								
<i>Middle</i>	-0.313 (0.136)**	-0.208 (0.138)	-0.499 (0.123)***	-0.194 (0.129)	1.677 (0.088)***	1.548 (0.088)***	0.180 (0.102)*	0.453 (0.118)***
<i>Highest</i>	1.582 (0.236)***	1.555 (0.237)***	1.222 (0.124)***	1.559 (0.134)***	5.499 (0.216)***	5.211 (0.212)***	2.982 (0.181)***	3.155 (0.198)***
<b>Birth Cohort*Relative Educational Attainment Interaction (ref. lowest education category in 1960-1969)</b>								
<i>1970-1979*Middle</i>	0.393 (0.172)**	0.404 (0.171)**	1.008 (0.163)***	0.852 (0.166)***	-0.130 (0.114)	0.013 (0.113)	0.128 (0.123)	0.160 (0.156)
<i>1970-1979*Highest</i>	0.339 (0.365)	0.377 (0.360)	0.813 (0.206)***	0.636 (0.206)***	0.592 (0.292)**	0.734 (0.287)**	0.931 (0.239)***	1.524 (0.379)***
<i>1980-1989*Middle</i>	0.469 (0.182)**	0.310 (0.184)*	1.727 (0.163)***	1.501 (0.169)***	-0.272 (0.104)***	-0.017 (0.106)	0.632 (0.120)***	0.928 (0.146)***
<i>1980-1989*Highest</i>	0.789 (0.322)**	0.704 (0.324)**	3.727 (0.248)***	3.446 (0.253)***	-0.359 (0.242)	-0.013 (0.239)	1.692 (0.225)***	2.010 (0.248)***
<i>R<sup>2</sup></i>	0.05	0.06	0.08	0.10	0.16	0.19	0.13	0.20
<i>N</i>	9,397	9,381	11,872	11,843	26,841	26,786	21,501	12,584
<b>Controls, by country</b>								
<i>Childhood Place of Residence</i>		No		No		No		No
<i>Religion</i>		Yes		Yes		Yes		Yes
<i>Ethnicity</i>		No		Yes		Yes		Yes
<i>Region</i>		No		No		No		No

Table 3b: Trends in the age of first birth by educational attainment among women ages 15-34 born between 1960-1989, DHS data; in those countries where economic inequality has been U-shaped (1990-2010)

Age at First Birth	Malawi		Nigeria		Tanzania		Zambia	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
<i>1970-1979</i>	-0.022 (0.117)	-0.252 (0.181)	0.019 (0.095)	0.066 (0.095)	0.221 (0.101)**	0.092 (0.102)	0.130 (0.096)	0.096 (0.096)
<i>1980-1989</i>	-0.408 (0.111)***	-0.763 (0.176)***	-0.260 (0.085)***	-0.130 (0.087)	0.136 (0.100)	-0.599 (0.115)***	-0.048 (0.097)	-0.105 (0.098)
<i>Middle</i>	0.343 (0.131)***	0.096 (0.211)	1.915 (0.116)***	0.956 (0.123)***	1.148 (0.096)***	1.061 (0.097)***	0.540 (0.097)***	0.531 (0.097)***
<i>Highest</i>	1.547 (0.176)***	1.349 (0.304)***	4.872 (0.291)***	3.799 (0.287)***	3.025 (0.216)***	3.046 (0.216)***	4.323 (0.215)***	4.279 (0.216)***
<i>1970-1979*Middle</i>	0.154 (0.143)	0.352 (0.219)	-0.245 (0.141)*	-0.255 (0.141)*	-0.435 (0.117)***	-0.410 (0.118)***	-0.280 (0.114)**	-0.279 (0.114)**
<i>1970-1979*Highest</i>	1.355 (0.202)***	1.426 (0.320)***	0.130 (0.310)	-0.134 (0.304)	0.611 (0.259)**	0.546 (0.259)**	-1.126 (0.265)***	-1.103 (0.266)***
<i>1980-1989*Middle</i>	0.450 (0.137)***	0.700 (0.214)***	-0.575 (0.126)***	-0.602 (0.131)***	-0.032 (0.118)	-0.286 (0.136)**	0.170 (0.115)	0.171 (0.115)
<i>1980-1989*Highest</i>	2.200 (0.199)***	2.344 (0.317)***	-0.629 (0.297)**	-0.919 (0.292)***	1.972 (0.270)***	-0.144 (0.420)	0.145 (0.293)	0.163 (0.293)
<i>R<sup>2</sup></i>	0.10	0.12	0.19	0.23	0.10	0.10	0.10	0.11
<i>N</i>	32,969	30,746	35,060	34,766	21,905	14,722	20,370	20,288
<i>Childhood Place of Residence</i>		No		No		Yes		No
<i>Religion</i>		Yes		Yes		Yes		Yes
<i>Ethnicity</i>		Yes		Yes		No		Yes
<i>Region</i>		No		No		Yes		No

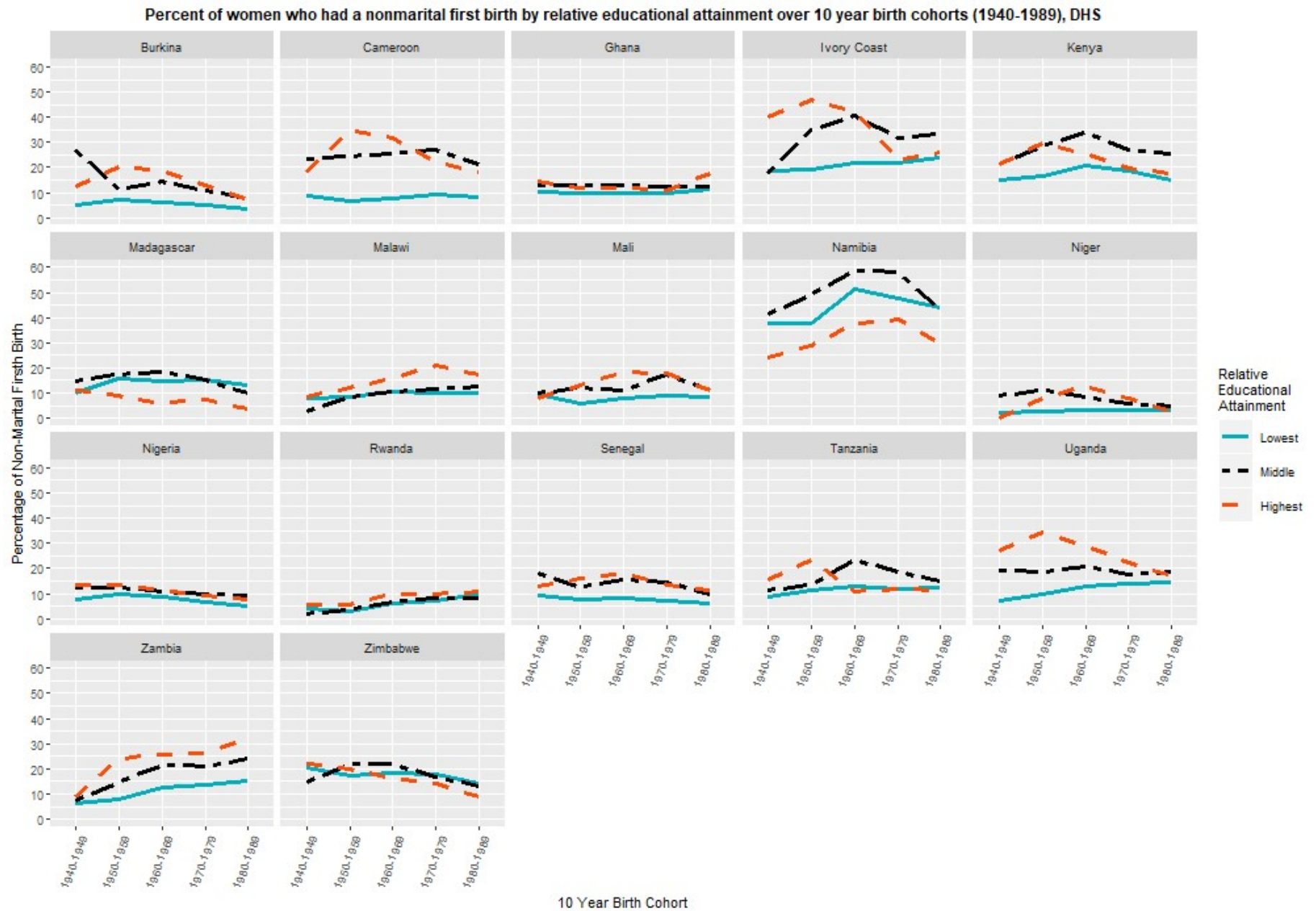
Table 3c: Trends in the age of first birth by educational attainment among women ages 15-34 born between 1960-1989, DHS data; in those countries where economic inequality has been falling (1) (1990-2010)

Age at First Birth	Burkina Faso		Cameroon		Madagascar		Mali		Namibia	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1970-1979	-0.079 (0.062)	-0.070 (0.063)	0.221 (0.150)	-0.398 (0.153)***	0.173 (0.138)	0.147 (0.137)	-0.236 (0.060)***	-0.251 (0.061)***	-0.410 (0.158)***	-0.443 (0.157)***
1980-1989	-0.310 (0.062)***	-0.274 (0.063)***	-0.127 (0.142)	-1.361 (0.156)***	-0.546 (0.137)***	-0.471 (0.138)***	-0.698 (0.060)***	-0.733 (0.061)***	-0.868 (0.155)***	-0.979 (0.155)***
Middle	-0.155 (0.204)	-0.202 (0.203)	1.253 (0.152)***	0.884 (0.158)***	1.758 (0.142)***	1.209 (0.141)***	-0.084 (0.148)	-0.077 (0.148)	1.479 (0.161)***	1.346 (0.160)***
Highest	1.962 (0.188)***	1.781 (0.187)***	3.765 (0.258)***	3.198 (0.262)***	7.063 (0.308)***	6.113 (0.308)***	2.009 (0.194)***	2.017 (0.195)***	3.648 (0.575)***	3.232 (0.551)***
1970-1979*Middle	0.666 (0.225)***	0.624 (0.224)***	0.140 (0.177)	0.019 (0.177)	-0.510 (0.163)***	-0.484 (0.161)***	0.128 (0.179)	0.151 (0.179)	0.422 (0.189)**	0.384 (0.186)**
1970-1979*Highest	0.498 (0.240)**	0.513 (0.238)**	0.529 (0.338)	0.354 (0.331)	-2.012 (0.358)***	-1.909 (0.357)***	-0.085 (0.240)	-0.085 (0.241)	1.521 (0.657)**	1.689 (0.634)***
1980-1989*Middle	0.788 (0.218)***	0.706 (0.217)***	0.194 (0.168)	0.043 (0.172)	-0.854 (0.161)***	-0.850 (0.160)***	0.199 (0.178)	0.217 (0.178)	0.298 (0.185)	0.117 (0.183)
1980-1989*Highest	0.341 (0.237)	0.354 (0.235)	0.539 (0.315)*	0.087 (0.317)	-3.034 (0.360)***	-3.017 (0.361)***	-0.337 (0.236)	-0.329 (0.236)	0.615 (0.647)	0.465 (0.623)
R <sup>2</sup>	0.05	0.08	0.12	0.18	0.14	0.19	0.03	0.04	0.10	0.14
N	18,891	18,830	14,710	14,644	16,534	16,523	23,985	23,920	11,730	11,697
Childhood Place of Residence		No		No		No		No		No
Religion		Yes		Yes		Yes		Yes		Yes
Ethnicity		Yes		Yes		No		Yes		Yes
Region		No		No		Yes		No		No

Table 3d: Trends in the age of first birth by educational attainment among women ages 15-34 born between 1960-1989, DHS data; in those countries where economic inequality has been falling (2) (1990-2010)

Age at First Birth	Niger		Senegal		Zimbabwe		Rwanda	
	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>
<i>1970-1979</i>	0.060 (0.068)	-0.112 (0.068)*	0.577 (0.069)***	0.624 (0.069)***	0.281 (0.112)**	-0.150 (0.143)	-0.377 (0.120)***	-0.155 (0.146)
<i>1980-1989</i>	-0.011 (0.065)	-0.636 (0.073)***	0.772 (0.058)***	0.863 (0.059)***	0.163 (0.109)	-0.738 (0.150)***	-0.042 (0.113)	0.165 (0.126)
<i>Middle</i>	0.650 (0.164)***	0.413 (0.169)**	0.861 (0.183)***	0.829 (0.182)***	1.507 (0.114)***	1.660 (0.152)***	0.822 (0.127)***	0.503 (0.144)***
<i>Highest</i>	2.607 (0.184)***	2.255 (0.186)***	2.193 (0.140)***	2.127 (0.141)***	5.426 (0.373)***	5.434 (0.406)***	2.290 (0.209)***	1.811 (0.237)***
<i>1970-1979*Middle</i>	0.243 (0.224)	0.200 (0.226)	0.809 (0.217)***	0.783 (0.215)***	0.281 (0.135)**	-0.161 (0.167)	-0.017 (0.152)	0.408 (0.183)**
<i>1970-1979*Highest</i>	-0.237 (0.239)	-0.354 (0.233)	-0.180 (0.192)	-0.192 (0.192)	-1.087 (0.435)**	-1.747 (0.464)***	0.320 (0.270)	1.100 (0.322)***
<i>1980-1989*Middle</i>	0.294 (0.199)	0.051 (0.215)	0.569 (0.193)***	0.552 (0.192)***	0.204 (0.130)	-0.202 (0.163)	-0.028 (0.144)	0.281 (0.160)*
<i>1980-1989*Highest</i>	0.898 (0.250)***	-0.459 (0.308)	1.522 (0.173)***	1.505 (0.173)***	-0.837 (0.401)**	-1.318 (0.433)***	0.652 (0.261)**	1.090 (0.283)***
<i>R<sup>2</sup></i>	0.07	0.09	0.08	0.10	0.13	0.16	0.05	0.06
<i>N</i>	16,202	11,481	31,912	31,903	17,453	16,200	18,308	14,578
<i>Childhood Place of Residence</i>		Yes		No		No		No
<i>Religion</i>		Yes		No		Yes		Yes
<i>Ethnicity</i>		Yes		Yes		No		No
<i>Region</i>		No		No		Yes		No

Figure 3



Tables 4a-d: The influence of relative educational attainment and birth cohort on the likelihood of nonmarital first birth in sub-Saharan Africa, DHS, presented by trends in income inequality over time

Table 4a: Trends in the odds of nonmarital first birth by educational attainment among women ages 15-34 born between 1960-1989, DHS data; in those countries where economic inequality has been rising (1990-2010)

Non-Marital First Birth	Ivory Coast		Ghana		Kenya		Uganda	
	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>
<i>1970-1979</i>	0.972 (0.071)	0.969 (0.071)	1.058 (0.134)	0.999 (0.127)	0.745 (0.054)***	0.808 (0.060)***	1.000 (0.101)	0.793 (0.108)*
<i>1980-1989</i>	1.132 (0.082)*	1.093 (0.082)	1.486 (0.177)***	1.219 (0.151)	0.525 (0.036)***	0.685 (0.050)***	1.138 (0.111)	1.453 (0.175)***
<i>Middle</i>	2.420 (0.221)***	2.027 (0.189)***	1.567 (0.202)***	1.351 (0.180)**	1.592 (0.103)***	1.383 (0.092)***	1.979 (0.189)***	1.529 (0.170)***
<i>Highest</i>	2.528 (0.302)***	2.143 (0.263)***	1.178 (0.154)	1.000 (0.138)	0.973 (0.131)	0.862 (0.118)	2.576 (0.322)***	1.860 (0.270)***
<i>1970-1979*Middle</i>	0.652 (0.074)***	0.645 (0.074)***	0.749 (0.123)*	0.701 (0.116)**	0.854 (0.070)*	0.789 (0.066)***	0.696 (0.081)***	0.656 (0.102)***
<i>1970-1979*Highest</i>	0.368 (0.059)***	0.348 (0.057)***	0.868 (0.160)	0.833 (0.154)	0.735 (0.135)*	0.692 (0.129)**	0.684 (0.110)**	0.588 (0.138)**
<i>1980-1989*Middle</i>	0.672 (0.080)***	0.634 (0.076)***	0.725 (0.111)**	0.646 (0.101)***	1.210 (0.094)**	0.926 (0.075)	0.720 (0.080)***	0.778 (0.104)*
<i>1980-1989*Highest</i>	0.447 (0.072)***	0.410 (0.068)***	1.424 (0.263)*	1.222 (0.234)	1.238 (0.190)	0.919 (0.144)	0.508 (0.078)***	0.486 (0.088)***
<i>N</i>	12,880	12,863	18,084	18,035	36,653	36,547	27,665	15,501
<i>Childhood Place of Residence</i>		No		No		No		No
<i>Religion</i>		Yes		Yes		Yes		Yes
<i>Ethnicity</i>		No		Yes		Yes		Yes
<i>Region</i>		No		No		No		No



Table 4b: Trends in the odds of nonmarital first birth by educational attainment among women ages 15-34 born between 1960-1989, DHS data; in those countries where economic inequality has been U-shaped (1990-2010)

Non-Marital First Birth	Malawi		Nigeria		Tanzania		Zambia	
	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>
<i>1970-1979</i>	0.694 (0.081)***	0.709 (0.123)**	0.981 (0.095)	0.895 (0.089)	0.746 (0.067)***	0.708 (0.066)***	1.108 (0.115)	1.081 (0.115)
<i>1980-1989</i>	0.843 (0.091)	0.819 (0.136)	0.671 (0.062)***	0.614 (0.058)***	0.803 (0.072)**	0.589 (0.067)***	1.326 (0.136)***	1.283 (0.136)**
<i>Middle</i>	0.891 (0.120)	0.898 (0.188)	1.646 (0.172)***	1.211 (0.133)*	2.062 (0.167)***	1.813 (0.151)***	2.225 (0.222)***	2.270 (0.233)***
<i>Highest</i>	1.478 (0.224)***	1.331 (0.332)	1.540 (0.303)**	0.928 (0.193)	0.963 (0.151)	0.956 (0.153)	2.732 (0.418)***	2.754 (0.436)***
<i>1970-1979*Middle</i>	1.433 (0.219)**	1.426 (0.318)	0.790 (0.100)*	0.683 (0.087)***	0.777 (0.079)**	0.807 (0.085)**	0.773 (0.090)**	0.778 (0.092)**
<i>1970-1979*Highest</i>	1.783 (0.313)***	1.990 (0.527)***	0.799 (0.170)	0.738 (0.165)	0.877 (0.171)	0.814 (0.163)	0.790 (0.140)	0.801 (0.147)
<i>1980-1989*Middle</i>	1.429 (0.205)**	1.400 (0.301)	1.343 (0.158)**	1.023 (0.123)	0.611 (0.062)***	0.456 (0.061)***	0.798 (0.091)**	0.811 (0.095)*
<i>1980-1989*Highest</i>	1.261 (0.211)	1.377 (0.356)	1.012 (0.208)	0.862 (0.186)	0.936 (0.178)	0.534 (0.172)*	0.951 (0.175)	0.995 (0.189)
<i>N</i>	40,133	36,798	49,290	48,900	30,851	22,596	27,224	27,099
<i>Childhood Place of Residence</i>		No		No		Yes		No
<i>Religion</i>		Yes		Yes		Yes		Yes
<i>Ethnicity</i>		Yes		Yes		No		Yes
<i>Region</i>		No		No		Yes		No

Table 4c: Trends in the odds of nonmarital first birth by educational attainment among women ages 15-34 born between 1960-1989, DHS data; in those countries where economic inequality has been falling(1) (1990-2010)

Non-Marital First Birth	Burkina Faso		Cameroon		Madagascar		Mali		Namibia	
	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>	<i>Unadjusted</i>	<i>Adjusted</i>
<i>1970-1979</i>	0.688 (0.057)***	0.701 (0.060)***	0.765 (0.120)*	0.617 (0.103)***	0.869 (0.087)	0.871 (0.089)	1.244 (0.092)***	1.241 (0.092)***	0.720 (0.065)***	0.689 (0.061)***
<i>1980-1989</i>	0.390 (0.035)***	0.397 (0.037)***	0.847 (0.125)	0.430 (0.071)***	0.721 (0.077)***	0.694 (0.075)***	1.328 (0.097)***	1.282 (0.094)***	0.770 (0.069)***	0.651 (0.058)***
<i>Middle</i>	2.692 (0.521)***	2.507 (0.505)***	3.764 (0.546)***	1.904 (0.297)***	1.331 (0.133)***	1.669 (0.174)***	1.733 (0.267)***	1.711 (0.266)***	1.223 (0.112)**	1.182 (0.108)*
<i>Highest</i>	2.499 (0.336)***	2.306 (0.321)***	3.427 (0.607)***	1.488 (0.283)**	0.174 (0.058)***	0.316 (0.107)***	3.022 (0.386)***	3.035 (0.394)***	0.864 (0.221)	0.903 (0.225)
<i>1970-1979*Middle</i>	0.737 (0.160)	0.715 (0.160)	1.191 (0.204)	0.971 (0.175)	0.760 (0.089)**	0.724 (0.085)***	1.384 (0.243)*	1.387 (0.245)*	1.295 (0.137)**	1.263 (0.132)**
<i>1970-1979*Highest</i>	0.935 (0.156)	0.929 (0.159)	1.037 (0.222)	0.880 (0.197)	2.381 (0.857)**	2.074 (0.755)**	0.803 (0.123)	0.788 (0.122)	0.859 (0.248)	0.842 (0.239)
<i>1980-1989*Middle</i>	0.891 (0.194)	0.865 (0.194)	0.810 (0.131)	0.731 (0.127)*	0.539 (0.067)***	0.511 (0.064)***	0.755 (0.133)	0.753 (0.133)	0.784 (0.082)**	0.714 (0.075)***
<i>1980-1989*Highest</i>	0.826 (0.150)	0.801 (0.149)	0.750 (0.154)	0.570 (0.125)**	1.519 (0.580)	1.297 (0.500)	0.441 (0.069)***	0.432 (0.069)***	0.627 (0.176)*	0.491 (0.138)**
<i>N</i>	25,677	25,597	21,244	21,162	23,414	23,398	30,534	30,461	17,866	17,802
<i>Childhood Place of Residence</i>		No		No		No		No		No
<i>Religion</i>		Yes		Yes		Yes		Yes		Yes
<i>Ethnicity</i>		Yes		Yes		No		Yes		Yes
<i>Region</i>		No		No		Yes		No		No

Table 4d: Trends in the odds of nonmarital first birth by educational attainment among women ages 15-34 born between 1960-1989, DHS data; in those countries where economic inequality has been falling(2) (1990-2010)

Non-Marital First Birth	Niger		Senegal		Zimbabwe		Rwanda	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
<i>1970-1979</i>	1.102 (0.152)	1.070 (0.151)	0.834 (0.058)***	0.885 (0.063)*	0.860 (0.081)	0.690 (0.089)***	1.014 (0.147)	1.019 (0.181)
<i>1980-1989</i>	1.183 (0.157)	0.893 (0.146)	0.679 (0.042)***	0.728 (0.047)***	0.744 (0.072)***	0.408 (0.055)***	1.541 (0.203)***	1.977 (0.311)***
<i>Middle</i>	4.705 (1.029)***	2.297 (0.521)***	2.296 (0.313)***	2.011 (0.286)***	1.331 (0.126)***	1.441 (0.190)***	1.193 (0.183)	1.288 (0.239)
<i>Highest</i>	6.447 (1.169)***	2.595 (0.513)***	2.641 (0.242)***	2.393 (0.233)***	0.777 (0.199)	1.015 (0.292)	1.999 (0.382)***	2.476 (0.558)***
<i>1970-1979*Middle</i>	0.531 (0.146)**	0.618 (0.173)*	0.821 (0.130)	0.707 (0.117)**	0.726 (0.081)***	0.661 (0.096)***	0.988 (0.176)	0.910 (0.197)
<i>1970-1979*Highest</i>	0.478 (0.108)***	0.531 (0.123)***	0.617 (0.074)***	0.499 (0.063)***	0.989 (0.307)	0.615 (0.210)	0.641 (0.155)*	0.552 (0.158)**
<i>1980-1989*Middle</i>	0.339 (0.089)***	0.346 (0.111)***	0.705 (0.102)**	0.615 (0.093)***	0.701 (0.078)***	0.663 (0.096)***	0.712 (0.117)**	0.660 (0.129)**
<i>1980-1989*Highest</i>	0.145 (0.040)***	0.156 (0.056)***	0.733 (0.083)***	0.537 (0.064)***	0.753 (0.217)	0.548 (0.175)*	0.568 (0.122)***	0.395 (0.097)***
<i>N</i>	20,811	15,758	45,023	45,010	25,031	22,627	30,532	22,946
<i>Childhood Place of Residence</i>		Yes		No		No		No
<i>Religion</i>		Yes		No		Yes		Yes
<i>Ethnicity</i>		Yes		Yes		No		No
<i>Region</i>		No		No		Yes		No

Table 5: Summarizing union and family formation trends over time across educational attainment categories, by trends in income inequality

Country	Most recent DHS	Most recent Income Inequality level	Evidence of Divergence in Union and Family Formation by educational attainment (birth cohorts 1960-1989)?		
			Age at First Marriage	Age at First Birth	Percent nonmarital first birth*
<b>Income Inequality trend: Rising from 1990-2010</b>					
Ivory Coast	2011	low	none	strong	strong
Ghana	2014	low	strong	strong	none
Kenya	2014	medium	none	minimal	moderate
Uganda	2016	low	strong	strong	strong
<b>Income Inequality trend: U-shaped from 1990-2010</b>					
Malawi	2016	medium	strong	strong	none
Nigeria	2013	low	none	none	none
Tanzania	2016	very low	moderate	minimal	moderate
Zambia	2013	high	minimal	none	none
<b>Income Inequality trend: Falling from 1990-2010</b>					
Burkina	2010	very low	none	strong	none
Cameroon	2011	medium	none	minimal	minimal
Madagascar	2009	low	none	none	strong
Mali	2012	very low	none	none	minimal
Namibia	2013	high	none	moderate	moderate
Niger	2012	very low	none	none	strong
Senegal	2014	low	minimal	strong	strong
Zimbabwe	2015	low	none	none	strong
Rwanda	2015	medium	minimal	moderate	none
*Indicates when an interaction terms reflects a diminishing odds of nonmarital childbearing for high and middle educational attainment groups as compared to the low educational attainment group, not indicated when interaction term reflects an increasing odds of nonmarital birth among higher educational attainment groups					

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