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Households, family structures, and living arrangements in Africa: Variation across time and space

Maria Louisa Christine Pohl

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Doctoral Thesis

Doctoral Program in Demography

Households, family structures, and living arrangements in Africa: Variation across time and space

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Abstract

Over the last six decades, sub-Saharan African countries have experienced significant socioeconomic and demographic transitions that have reshaped households, family structures, and living arrangements. The scale and pace of rising life expectancy, fertility decline, shifts in family formation, urbanization, and economic development differ considerably across and within countries, resulting in variations in demographic patterns and trends. This thesis explores these spatiotemporal variations by adopting diverse perspectives to examine the complex interplay between macro- and micro-level factors driving demographic and social processes. The first chapter introduces the three research chapters and outlines the core concepts applied to analyze variations in households, family structures, and living arrangements. The second chapter examines household characteristics including size and composition, across five regions, 49 countries, and 415 subnational areas from the 1960s through the 2020s. The third chapter employs micro- and macro-level perspectives to explore the stability of child fostering in Senegal between 1986 and 2019, with a focus on maternal and household characteristics. The fourth chapter analyzes the associations between children's school enrollment and living arrangements, examining how these relationships have shifted over time using 60 census samples from 24 sub-Saharan African countries. Collectively, the three research chapters highlight variations in residential organization, social practices, and living arrangements while offering insights into the drivers and outcomes associated with diverse household contexts. The fifth chapter summarizes the key results, draws conclusions, discusses methodological limitations, and identifies avenues for future research. Overall, this thesis establishes a foundation for the further study of African households and families while highlighting the utility of comparative approaches in studying complex demographic and social dynamics across various spatial and temporal scales. The results demonstrate that living arrangements serve as a lens through which to study changes in family structures, social practices, and the implications of varying household contexts for children.

Keywords: *Sub-Saharan Africa, Living Arrangements, Households, Families, Child Fostering*

For Elisabeth, whose memories are slipping away but who keeps remembering how proud she is of me.

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Preface

This dissertation consists of three essays that explore temporal and spatial variations in households, family structures, and living arrangements in sub-Saharan Africa. The vast size of the African continent, the diversity of its countries, and the distinct historical, cultural, economic, and social trajectories of its societies make a comprehensive account of the family a challenging endeavor. Nonetheless, these three essays showcase approaches and perspectives, based on harmonized census and survey data, that allow for comparative studies of households and families over time and across different spatial levels. Together, the articles establish a foundation for further research aimed at improving the understanding of fundamental dimensions of societal organization, such as household contexts and living arrangements, and their implications for the human capital accumulation of children.

When I began my research for my dissertation within the Coresidence project at the Universitat Autònoma de Barcelona and the Centre d'Estudis Demogràfics in the summer of 2023, I knew that I wanted to explore topics within the realm of family demography and in the African context. Within the project, we worked on building a harmonized database on households from a global perspective, where I was responsible for checking census and survey samples from Africa for data quality, variable availability, consistency, and response categorization. I undertook this responsibility based on my interest in African family demography, which was sparked by literature and conversations during my previous interdisciplinary studies. It became apparent that many theories, concepts, and perceptions of demographic and social change were predominantly based on research from high-income countries. Additionally, despite the vast and rich body of family demography literature from and on Africa, many aspects of household and family arrangements remained underexplored, especially from a comparative perspective. One notable gap was the lack of a comparative overview of basic household characteristics, such as size and composition, for many African countries.

For the first essay, "*African households: National and subnational trends from censuses and surveys,*" presented in Chapter 2 of this dissertation, I set out to fill this gap in the literature by providing a comparative overview of African households, while highlighting variations in size and composition across and within countries, as well as over time. The article, which was published in the journal Population Studies, was co-authored with Albert Esteve and Juan Galeano, who guided and encouraged me during the research process and taught me about the importance of effective data visualization. The results illustrate the variations of household sizes across Africa and reveal clear regional patterns and intra-country heterogeneity in household characteristics. Differences in household size appear to be linked to the number of children, extended relatives, and non-relatives of the household head, suggesting the influence of polygyny in some regions as well as the role of extended families in shaping household contexts.

As part of the literature review for the first essay, I encountered an article by Cassandra Cotton, published in 2021 in Population and Development Review, in which she demonstrates that the share of mothers who out-foster a child remained broadly stable over time in the majority of the 36 African countries included in her analysis. The article inspired me to explore possible determinants of this stability, which initially seemed surprising, given the demographic, economic, and social changes occurring in many of these countries. Taking advantage of the unique opportunity provided in Senegal with the availability of the continuous DHS, I decided to explore the stability of child fostering between 1986 and 2019 based on the case of Senegal for the second essay of the dissertation. The article, "*The Stability of Child Fostering in Sub-Saharan Africa: The Case of Senegal,*" co-authored with Ewa Batyra and Albert Esteve, was published in Studies in Family Planning in 2025. We show that counteracting fertility and child mortality dynamics contribute to stable levels of out-fostering among mothers over time. The results further indicate that individual-level characteristics and household environments are closely linked to mothers' out-fostering propensity.

The research questions for the third essay emerged similarly to those of the second. During the literature review for the second essay, I engaged with the rich literature on the implications of fostering and parental absence for children, which particularly focuses on the consequences of fostering in the context of orphanhood or major life-course events, such as parental separation. Additionally, several studies explore links between living arrangements involving parental absence and child outcomes in various African countries. However, to the best of my knowledge, no study had compared the links between different living arrangements and educational outcomes across countries and over time. Thus, the third essay, "*School Enrollment and Living Arrangements of Children in Sub-Saharan Africa*," co-authored with Ewa Batyra and Albert Esteve, came about and was published in Population and Development Review in 2026. Using census data for 24 African countries, we explored how associations between children's living arrangements and school enrollment changed between the 1970s and 2019. Our results show that while school enrollment has increased in all countries but substantial variation in enrollment persists. Children living in households without both of their parents or with only their biological father face a disadvantage in school enrollment compared to children living in a household with both biological parents. In around two-thirds of countries, living with the biological mother only, is associated with higher school enrollment compared to living with both parents. Based on the results, we argue that living arrangements are an understudied component in understanding inequalities in the human capital accumulation of children in Africa.

Overall, this dissertation did not result from a linear research process with predetermined questions, but is the result of serendipity, of reading a particular paper at the right moment, and of having inspiring and challenging exchanges colleagues. The three essays are a reflection of the collaborative, surprising, and curious nature of research, and I hope that they are helpful and motivating for others interested in studying variations in households, family structures, and living arrangements. The results from the three chapters illustrate the variations in different aspects of family life across different spatial and temporal contexts.

Within this dissertation, I aim to highlight that concepts of family and family support are broad, diverse, and context-dependent, and that they transcend household boundaries. Moreover, while the notion of what constitutes a household or family might differ between and within countries or over time, the family and the household environment remain vital. A better understanding of the conceptualization and the lived realities of family relationships in diverse contexts can help policymakers and researchers to improve care provision within kin networks, the well-being of individuals, and the human capital accumulation of children and young adults. My research for this thesis was developed within the Coresidence project and supported by the European Research Council (ERC) under Grant No. 101052787. This funding did not only allow me to follow my research interests but also supported research visits to El Colegio de Mexico and the University of California, Berkeley, as well as my participation in several international conferences, workshops, and seminars.

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1 Introduction

This thesis provides a comparative overview of variations in households, living arrangements, and families across Africa in recent decades. The core of the thesis consists of three research articles grounded in the overarching premise that sub-Saharan African countries have undergone substantial socioeconomic and demographic transitions in recent decades, such as increases in life expectancy, fertility decline, changes in family formation processes, rapid urbanization, and economic development. These changes have significant implications for households, families, and individuals (Bongaarts, 2001; Bongaarts & Zimmer, 2002; Cleland & Machiyama, 2017; Dorius, 2008; Eastwood & Lipton, 2011; Evans et al., 2022; Hertrich, 2017). The speed and the magnitude of these transitions are heterogeneous (Bongaarts, 2017; Hertrich, 2017; Lesthaeghe, 2020; Pesando & GFC team, 2019; Tabutin & Schoumaker, 2004) and this diversity contributes to variations in the trajectories and patterns of demographic and social dynamics across different spatial levels. Exploring such variations through multiple perspectives and approaches offers a better understanding of the complex interplay between macro- and micro-level factors. These insights help clarify demographic and social processes and serve as a basis for future research on family demography in the African context.

Nearly all sub-Saharan African countries have entered the first demographic transition. As part of this process, many countries experienced declines in mortality, especially among infants and children, and increases in life expectancy (Tabutin et al., 2020). Fertility has declined in most African countries, though the decline has been somewhat slower than in countries in other world regions that underwent the first demographic transition. The first demographic transition is accompanied by population growth, and the relatively slow decline in fertility in many parts of Africa has driven rapid and substantial population growth (Bongaarts, 2009, 2017; Bongaarts & Casterline, 2013; Reher, 2011). Further changes are driven by macro-level dynamics, such as uneven economic development, educational expansion, and urbanization, climate change, conflict, and complex political trajectories following decades of colonialism (Cleland & Machiyama, 2017; Hoeffler, 2019; Juju et al., 2020; Serdeczny et al., 2017; Tabutin & Schoumaker, 2004). Moreover, mortality patterns, influenced by epidemics such as HIV/AIDS, and relatively high levels of migration shape population and family structures (Beegle et al., 2009; Cebotari & Mazzucato, 2016; Hampshire et al., 2015; Mazzucato & Schans, 2011; Tabutin et al., 2020). Combined, these dynamics lead to heterogeneous macro- and micro-level changes that are reflected in households, family structures, and living arrangements, as well as in human capital development and child outcomes.

A substantial body of literature has examined household dynamics, traditional family practices, and the implications of children's living arrangements for their well-being. Within this literature, authors have examined the links between household composition, family structure, and child outcomes across diverse settings (Adjiwanou et al., 2021; Esteve et al., 2025; McLanahan & Percheski, 2008; Sweeney, 2010). In the African context, researchers have explored the impact of parental absence and child fosterage, for example,

in the context of parental migration (Cotton & Oduor, 2024; Mazzucato & Schans, 2011), divorce and stepfamilies (Adjiwanou et al., 2021; Chae, 2016; Crespin-Boucaud & Hotte, 2021), or orphanhood (Beegle et al., 2006; Beegle, De Weerdt, et al., 2010) on child well-being. Other research has sought to understand the prevalence of traditional social practices such as child fostering, commonly defined as children living temporarily or permanently apart from their parents (Cotton, 2021; Madhavan, 2004). While this existing body of literature suggests that households, family structures, and children's living arrangements in Africa are diverse and context-dependent, several research gaps remain.

First, the literature lacks a comparative overview of changes and patterns in core household characteristics, such as size and composition. Substantial research has been conducted using individual data sources or grouping countries by continental regions (*e.g.*, Bongaarts, 2001; Gabrielli et al., 2018; Ruggles & Heggeness, 2008), yet often without providing an overview of trends over time or a comparative analysis of dynamics across different spatial levels. New data harmonization efforts now make it feasible to compare variations in household size across spatial levels and over time. Second, further research is needed to explore how traditional social practices in African family systems evolve alongside socioeconomic and demographic changes. One example is child fostering, which reflects and is influenced by kinship networks, household organization, and family structures (Cotton, 2021; Evans et al., 2022; Isiugo-Abanihe, 1985; Madhavan, 2004; Vandermeersch & Chimere-Dan, 2002). While much research has explored various aspects of child out-fostering, such as motivations and implications (Bachan, 2014; Serra, 2009), it is less understood why and how the practice remains common despite broader societal changes, and to what extent the individual propensity to participate in child fostering has evolved over time.

A third gap in the literature concerns the implications of children's living arrangements for their educational outcomes. Living arrangements and household contexts shape the immediate environments in which children grow up and are closely linked to human capital accumulation, for instance, through intra-household resource allocation (Esteve et al., 2025). In line with this argument, several studies have identified the potential importance of living arrangements for child outcomes, namely school enrollment (Adjiwanou et al., 2021; Chae, 2016; Esteve et al., 2025; Lewin & Sabates, 2012; McLanahan & Percheski, 2008). Much of the literature from high-income countries has focused on the potential mechanisms and determinants through which living arrangements might influence child outcomes (*e.g.*, Guetto et al., 2022; Guetto & Panichella, 2019; Sweeney, 2007; Teachman, 2008). In the African context, the focus has primarily been on studying specific circumstances, such as orphanhood, child fostering, and parental divorce, and their links to school outcomes (Adjiwanou et al., 2021; Beegle, Filmer, et al., 2010; Chae, 2016; Crespin-Boucaud & Hotte, 2021; Hampshire et al., 2015). However, to date, relatively little is known about how broader residential arrangements are linked to children's school enrollment. While the relationship is expected to be moderated by various individual and household-level factors, such as age, gender, and household size, specific household compositions could be positively or negatively associated with school enrollment.

Parental absence, for example, could negatively affect school enrollment if the child lives in a household with limited resources, where priority in resource allocation might be given to the household head's direct descendants (Adjiwanou et al., 2021; Case et al., 2004; Lopus, 2017). Conversely, the links between household composition and school enrollment are not straightforward: parental absence could be positively associated with school enrollment if the child is out-fostered specifically to access educational opportunities or to pursue religious schooling (Akresh, 2009; Bachan, 2014; Evans et al., 2022; Isiugo-Abanihe, 1985; Serra, 2009).

A better understanding of these associations could provide insights into the heterogeneity of school enrollment across African countries and over time. Thus, in order to address the outlined research gaps and contribute new insights to the literature into spatiotemporal variations in households, family structures, and living arrangements in Africa, this thesis aims to answer the following overarching research questions: (1) What patterns and trends in household characteristics do we observe over time, and which household members are driving the observed changes?; (2) What are the demographic determinants of child out-fostering prevalence, and how are maternal and household characteristics associated with the practice?; and (3) What are the links between children's living arrangements and school enrollment in sub-Saharan Africa, and how do they differ across countries and over time?

In the following sections, I first provide an overview of the importance and limitations of studying households in African family research before elaborating on the necessity of analyzing spatiotemporal variations to understand past, present, and future trends and trajectories of families across Africa. I then present additional approaches to studying variations in family structure and discuss change and stability in living arrangements and their possible implications, before describing the data used for the three research articles that form the basis of this thesis. The introduction closes with an outline of the three research chapters: Chapter 2, "African Households: National and Subnational Trends from Censuses and Surveys"; Chapter 3, "The Stability of Child Fostering in Sub-Saharan Africa: The Case of Senegal"; and Chapter 4, "School Enrollment and Living Arrangements of Children in Sub-Saharan Africa."

1.1 The household in family research

Households are a fundamental dimension of societal organization, and their characteristics reflect demographic reproduction, aging processes, and socioeconomic and cultural factors (Bongaarts, 2001; Cherlin, 2012; Esteve et al., 2024; Pesando & GFC team, 2019). Literature suggests that households in Africa, on average, tend to be larger than those in other world regions, driven by the relatively higher number of children, as well as kin- and non-kin beyond the nuclear family (Esteve et al., 2024; van de Walle, 2006). However, little is known about the core characteristics, namely size and composition, of households in Africa across different spatial levels and over time. Existing research on households in Africa tends to focus on regional averages, specific data sources, or population sub-groups, such as older adults (Bongaarts,

2001; Bongaarts & Zimmer, 2002; Gabrielli et al., 2018; Ruggles & Heggeness, 2008). Thus, the literature lacks a comparative overview of regional and country-level heterogeneity in core household characteristics.

To conduct a household-level analysis, it is crucial to carefully consider the household as a concept and as a unit of enumeration. A household is defined by the United Nations as "a small group of persons who share the same living accommodation, who pool some, or all, of their income and wealth and who consume certain types of goods and services collectively, mainly housing and food" (United Nations, 1993). As this dissertation relies exclusively on secondary data, applied definitions of the household might diverge from this concept, as household enumeration in censuses and surveys; for instance, coresidence in a compound rather than resource pooling during the data collection might be the defining characteristics for a household. Differences also arise between data collection efforts that include absent household members (*de jure*) and those that do not (*de facto*).

Within the literature on family demography, several additional limitations of the household concept have been discussed, such as the difficulty in defining physical boundaries of the household, and challenges associated with the enumeration of members of polygynous families, where family members might live in different localities and husbands may only being enumerated in one location (Hertrich et al., 2020; Rabe, 2008; Randall et al., 2011; Randall & Coast, 2015). Parental absence and shared child-rearing responsibilities within the kinship network further complicate the definition of clear household boundaries. These limitations highlight that households are not necessarily synonymous with families and that definitions vary across data sources and over time (Netting et al., 1984; Rabe, 2008; van de Walle, 2006). Chapter 2 provides a further discussion of the household concept and its applicability in the African context.

Despite limitations in the comparability of the household concept, the household perspective allows for the study of coresidential units over time, as household rosters are commonly collected in population censuses and in demographic surveys, such as the Demographic and Health Surveys (DHS) and the Multiple Indicator Cluster Surveys (MICS). From the household roster, household size is easily identifiable. Additionally, to study household composition, researchers can usually obtain basic demographic information, such as age and sex, for all household members, as well as identify relationships within the household via the relationships constructed around the household head. While the definition and identification of this reference person differ across data infrastructures, countries, and time (Trias-Prats & Esteve, 2025), these relationships nonetheless help identify and understand household composition. Furthermore, "pointer variables" offer information about intra-household relationships, for example, by allowing the direct identification of parents and children in the household, even if they are not directly related to the household reference person.

Studying household characteristics over time can further provide insights into demographic dynamics, such as declines in fertility and in the number of children in the household, which contribute to decreases in average household size and changes in household composition (Cherlin, 2012; Dorius, 2008; Glick, 1976; Pesando & GFC team, 2019). Similarly, household size and composition can highlight changes in mortality and life expectancy, for instance, through the prevalence of intergenerational households or households consisting of widows living alone (Bongaarts & Zimmer, 2002; Kamiya & Hertog, 2020). Household characteristics might also be associated with other macro-level dynamics, such as economic development and cultural factors (Esteve & Reher, 2024; Reher & Requena, 2018). Given the demographic and economic developments that have occurred in many African countries in recent decades, it is expected that household characteristics have changed significantly, with heterogeneous implications across and within countries.

In addition to demographic and economic dynamics, household characteristics also reflect the prevailing family systems and the associated cultural norms and values (Esteve et al., 2024; Gabrielli et al., 2018; Pesando & GFC team, 2019). Thus, household size and composition, despite being rather simple indicators, can be used to study and compare nuptiality regimes – for instance, based on the rate of household formation upon marriage or the creation of extended or intergenerational households if marriage is followed by coresidence with parents or in-laws. Beyond nuptiality, family systems differ with respect to patrilineality, property rights, polygyny, gender relations, and kinship structures (Therborn, 2004, 2014). As these aspects of family systems evolve, life-course trajectories, living arrangements, and household characteristics inevitably change. Recent literature highlights such shifts, including the increase in cohabitation across sub-Saharan Africa (Odimegwu et al., 2018), declines in polygyny (Therborn, 2014), or the impact of demographic change and rapid urbanization (Cleland & Machiyama, 2017; Tabutin et al., 2020). Thus, while households are not synonymous with families, they are embedded in family systems and provide a useful starting point for comparative analyses in family demography, as Chapter 2 emphasizes.

1.2 Spatiotemporal variations

The three research articles that comprise the core of this dissertation focus on spatiotemporal variations in households, family structures, and living arrangements. Within this thesis, spatial variations are conceptualized as heterogeneity across different spatial levels. For instance, the research article presented in Chapter 2 focuses on differences in household characteristics across African regions (North, East, Southern, Central, and West Africa), countries, and subnational areas. The underlying idea of this approach is that broad spatial categories, such as regions or countries, can obscure heterogeneity within countries. Even for relatively simple metrics, such as household size, regional or national averages can mask significant within-country variation.

In sub-Saharan Africa, where uneven economic development and urbanization processes have unfolded in recent decades (Cleland & Machiyama, 2017; Hoeffler, 2019; Juju et al., 2020; Tabutin & Schoumaker,

2004), the lived realities of individuals in different parts of a country vary significantly, with direct implications for living arrangements and family structures. While in some contexts internal variations may be less pronounced, rendering country-level approaches sufficient for studies of households and families (García-Gómez et al., 2025), a better understanding of variations across spatial levels is needed first to choose the appropriate framework for future research.

The second critical dimension of variation that guides this thesis is time. The organization and characteristics of families, households, and living arrangements are likely to change alongside other socioeconomic factors. However, such changes do not necessarily follow a linear trajectory as they are shaped by macro-level contextual dynamics and are stratified by micro-level factors. Consequently, heterogeneities within and between societies are reflected in household characteristics and living arrangements. Depending on the level of analysis, studying change and stability over time provides insights into macro- and micro-level societal dynamics, and changes and their absence indicate compelling dynamics to explore. In Chapter 2, temporal variations and trends in household characteristics are examined, along with the outlined analysis of spatial variations.

Chapter 3 examines the stability of child fostering in Senegal over time. The analysis was inspired by Cotton (2021), who highlights that across a number of sub-Saharan African countries, the proportion of women living in a household separated from at least one of their children has remained relatively stable. This stability suggests that prevalence of participation in child out-fostering has remained consistent despite numerous socioeconomic and demographic shifts. In the case of Senegal, data spanning nearly three decades are utilized to explore this temporal stability in the context of broader social changes, while also examining stratification in mothers' propensity to out-foster.

The third research article (Chapter 4) analyzes changes in school enrollment by children's living arrangements aged 7-14 across countries and over time. To conduct a comparative analysis, the study includes samples from 24 African countries. In the article, countries are grouped by continental regions (*i.e.*, East Africa, Southern Africa, and West Africa) to facilitate easier visualization and communication of the descriptive findings. While the analysis focuses primarily on country-level comparisons, it discusses trends in school enrollment by living arrangement that are consistent with the continental regional groups. In addition to comparing cross-country heterogeneity, the analysis also studies change in school enrollment among children over time. The article uses 60 census samples covering the period from the late 1970s to 2019; for most countries, at least two points in time are included, with the exception of South Sudan, Sudan, Burkina Faso, Liberia, and Togo, for which only one sample each could be obtained or used in the analysis. The logic of combining a comparative analysis across space and time is that while many African countries have undergone substantial transitions, differences in baseline conditions and heterogeneous contexts mean that the links between living arrangements and child outcomes might vary across comparative axes.

1.3 Additional approaches to studying variations in family structures

To enrich the household-level perspective, macro- and individual-level perspectives can offer additional analytical lenses through which researchers can study families and kinship practices, thereby gaining further insights into family structures over time. In the African context, families and their configurations are often shaped by traditional kinship practices, such as the conceptualization of child rearing as a shared responsibility within the wider kinship network, which frequently extends beyond a single household or residential compound (Akresh, 2009; Cotton, 2021; Isiugo-Abanihe, 1985; Madhavan, 2004). With demographic, economic, and social changes, the role of traditional practices of social and familial organization, such as child fostering, and the characteristics and propensities of people who participate in these practices might evolve, even if prevalence persist at the country level.

An important body of literature documents the prevalence of child fostering and explores the drivers and motivations of households participating in child fostering, as well as the possible determinants and consequences for children (Akresh, 2009; Bachan, 2014; Beck et al., 2015; Cotton et al., 2022; Grant & Yeatman, 2012; Verhoef & Morelli, 2007). Cotton (2021) indicates that, at the country level, child out-fostering has remained relatively stable over time in most of the 36 African countries studied, with approximately one-quarter of mothers in sub-Saharan Africa engaging in the practice in the most recent DHS sample. While some countries, particularly in coastal West Africa, experienced a decline in the number of mothers with at least one child out-fostered and some in Southern Africa experienced increases, nearly 20 countries witnessed changes of around 2 percent or less. The analysis further suggests that macro-level indicators such as the share of never-married mothers and the average number of children ever born, are significantly associated with out-fostering (Cotton, 2021). Despite the observed stability of out-fostering and the identified association at the macro-level, less is known about other macro-level determinants or how mothers' individual-level propensity to out-foster has changed over time.

Fostering is a process that involves at least two households: a sending household and a receiving one. However, most nationally representative surveys, such as the DHS, do not provide information on the origin of children on the household roster. While foster children can be identified with relative certainty, information about their biological families is limited to what is captured in their current household. Similarly, it is possible to identify children not residing with their mother based on the mother's birth history, but the child's current residence remains unknown (Cotton, 2021). Furthermore, because relationships within the household are generally constructed in reference to a household head, children not related to the head of the household and without a biological parent, present may have unidentified relationships to other members. Consequently, it can be difficult to discern whether a child resides with kin or non-kin. It may also not be possible to identify whether the fostered child is orphaned, as survival information for parents not present in the household roster might not be available. Longitudinal data that

would allow for changes in living arrangements and family structures over time or data that collect information on family networks beyond the household, are scarce in many African countries. Existing efforts, such as data from the *Jamaa na Ajya ya Mtoto* (JAMO) study, produce important context-specific insights but are not nationally representative.

In light of existing data challenges, researchers must use specific definitions of fostering to study a practice that spans multiple households even when information is available only for one of the participating households. Moreover, researchers have to carefully consider whose perspective on fostering they analyze and ensure it aligns with their research focus. In this thesis, I study fostering from the maternal perspective, to better understand which individual and household characteristics of mothers are associated with fostering and how this has changed over time. I follow Cotton's (2021) definition, identifying mothers who out-foster as those who do not co-reside with at least one of their living children. I limit this definition to children aged 0-14 to avoid including individuals in the group of out-fostered children and in the youngest age groups of mothers. Using birth histories as the reference point allows us to capture a woman's children who do not reside in her household and to use mothers as the unit of analysis. For children who do not live with their mothers no additional information about their residence is available, subsequently some children who are captured in the analyses as out-fostered could be residing with their biological fathers. However, research suggests that this fraction is small across African countries, and that experiences of children living in father-only households might be comparable to those of children who are out-fostered (Cotton, 2021).

In Chapter 3, my collaborators and I apply a two-step approach: first, we explore macro-level demographic determinants of out-fostering; second, we focus on mothers' propensity to out-foster based on individual-level characteristics and household position. At the macro-level, we consider whether counteracting trends in fertility and child mortality contribute to stable levels of out-fostering. At the micro-level, while the data do not capture kinship outside the household, they offer information about the position of mothers within the residential family. Senegal offers a unique opportunity for this analysis, as it implemented a continuous DHS in 2012, in addition to previously conducted standard survey rounds, covering the period from 1986 to 2019. While the data are cross-sectional, they allow us to provide an overview of trends over a relatively long period of time.

1.4 Implications of variations in living arrangements

Living arrangements are the primary context of children's early socialization, family relationships, and parenting practices (Amato & Gilbreth, 1999; Esteve et al., 2025; Lloyd & Desai, 1992; Teachman, 2008). As living arrangements vary across time and place, these differences reflect social stratification and can lead to diverse outcomes for children. The literature consistently links living arrangements to child well-being, including health, nutrition, survival, and educational outcomes. Scholars underscore how parental absence

and the experience of orphanhood can drive inequality in children's outcomes (Beck et al., 2015; Evans & Miguel, 2007; Gaydosh, 2017; Hampshire et al., 2015; Hedges et al., 2019; Lloyd & Blanc, 1996; Mazzucato & Cebotari, 2017; Townsend et al., 2002). Furthermore, studies on parental divorce or polygyny explore how these arrangements impact children and women (Adjiwanou et al., 2021; Gnoumou et al., 2013; Lawson & Gibson, 2018). This thesis positions the variation in children's living arrangements as a potential driver of heterogeneous schooling outcomes.

Within the literature, an emphasis has been placed on understanding the implications of specific family configurations, such as stepfamilies (Adjiwanou et al., 2021), on child outcomes, or on exploring links between children's living arrangements and schooling, focusing within individual countries (Carling & Tønnessen, 2013; Chae, 2016; Chuong & Operario, 2012; Crespin-Boucaud & Hotte, 2021; Eloundou-Enyegue & Williams, 2006; Gaydosh, 2017; Gnoumou et al., 2013; Townsend et al., 2002). However, findings and insights from single-country studies, where family systems exhibit markedly different features, may be limited in their applicability across diverse contexts. A comparative study of trends in children's living arrangements and school outcomes, both across countries and over time, could provide a useful starting point for research seeking to identify patterns and heterogeneity in the relationship between children's household contexts and their educational opportunities.

The relationships between children's living arrangements and their educational outcomes are complex and context-dependent. Biological parents might favor investments in their own children's human capital accumulation when household resources are limited (Adjiwanou et al., 2021; Case et al., 2001; Lopus, 2017), which could negatively affect the school outcomes of non-biological children in the household. On the other hand, children might be fostered-in specifically to access educational opportunities (Akresh, 2009; Bachan, 2014; Serra, 2009), which could result in a positive association between living in a household without their parents and school enrollment. Similarly, while living in a household with only one parent might be associated with poverty, vulnerability, or social stigma, such households could be economically supported by a migrant parent residing elsewhere in the country or abroad through remittances.

Complexity is further introduced by societal norms: in societies where single parenthood is common and socially accepted, children living in these households may not experience negative consequences. Conversely, in societies in which single-parenthood is highly stigmatized and indicative of poverty and social exclusion, children might be more likely to experience adverse implications associated with this living arrangement. Exploring these relationships in more detail in the African context provides nuanced insights into how children's living arrangements, household contexts, and family structures influence their human capital accumulation. However, to study these relationships comparatively and to better understand the implications of children's living arrangements for their school outcomes, it is necessary to establish a descriptive overview of school enrollment and the prevalence of different living arrangements across time

and space, which is presented in Chapter 4. This study aims to examine educational expansion trends and analyze whether living arrangements are associated with heterogeneity in school enrollment. While living arrangements might not be the direct drivers of this variation, they reflect underlying determinants, such as economic inequalities and broader societal structures.

1.5 Data

Different data sources underpin the research presented in Chapters 2, 3, and 4. Chapter 2 utilizes the open-access, open-source Coresidence Database (CoDB), which harmonizes census and survey data from over 150 countries and spans the period from the 1960s to the 2020s. The CoDB data are aggregated at the household level; for African countries, they were primarily sourced from censuses harmonized by IPUMS-International, Demographic and Health Surveys (DHS), and Multiple Indicator Cluster Surveys (Galeano et al., 2024).

In addition to a vast number of household-level indicators, the database includes contextual indicators for each country and year sourced from the United Nations. A key advantage of the CoDB is the availability of subnational-level information and harmonized shapefiles for data visualization (Galeano et al., 2024). The data for the CoDB are available at Zenodo (Esteve et al., 2023). Overall, data from 239 available samples in the CoDB for 49 African countries and 415 subnational areas were used for the analysis in Chapter 2, enabling an analysis across three different spatial levels, while mapping trends over time.

Chapter 3 uses DHS data for Senegal, collected across nine survey rounds from 1986 to 2019. The DHS is a standardized survey administered in low- and middle-income countries to collect information on fertility, health, and households. Senegal is one of the few countries worldwide where the DHS program implemented a continuous survey, allowing for an in-depth analysis of changes over time. While the data are cross-sectional, they enable trend analyses at the country level. Chapter 3 combines an individual-level analysis, with mothers of children aged 0 to 14 as the unit of analysis, with an exploration of macro-level demographic dynamics based on cohorts of women.

For Chapter 4, the analysis relies on 60 nationally representative census samples from 24 sub-Saharan African countries, obtained from IPUMS-International (Ruggles et al., 2025). The aim is to provide a comparative overview of country-level links between children's school enrollment and their living arrangements, while controlling for relevant factors, such as child and household characteristics. Survey samples were selected based on the availability of enrollment data and relevant household variables, with the analytical samples restricted to children aged 7 to 14. The analyses were conducted at both the sample and country levels, with a focus on comparisons across countries and on trends over time.

1.6 Outline of the thesis

The thesis consists of five chapters: this introductory chapter, one chapter each for the three original research articles, and a concluding chapter. The following section provides a brief summary of the three research articles and states the academic journals in which they were published. The first research article (Chapter 2) presents an overview of core household characteristics, namely size and composition, and traces trends in these dimensions, for 49 African countries and 415 subnational areas. While households do not always consist of family members, they offer vital insights about the organization of societies and demographic dynamics, such as fertility and ageing-related measures, and can be used to study family dynamics (Esteve et al., 2024). For many countries, household-based census and survey data serve as the primary source of information on demographic and family changes. The article aims to establish a reference point for comparative research on household and family dynamics over time and across different spatial levels. Thus, the article makes two important contributions to the literature: (1) it provides extensive coverage by combining regional, country-level, and subnational perspectives with an analysis of trends over time, and (2) it utilizes harmonized data to offer a systematic overview of heterogeneity in household characteristics both between and within countries.

The final version of Chapter 2 was peer-reviewed and published in the journal Population Studies in February 2025. The article was developed with guidance and contributions from Albert Esteve and Juan Galeano, who gave support and feedback on the initial manuscript and throughout the review process. A prior manuscript was presented as an oral presentation at the 2024 African Population Conference in Lilongwe, Malawi, and as a poster at the 2024 annual meeting of the Population Association of America (PAA). On both occasions, I received helpful comments and suggestions which improved the manuscript. Additionally, I want to acknowledge my colleagues from the Coresidence Project for their feedback, which greatly benefited me during the early stages of the manuscript.

The second research article (Chapter 3) explores factors associated with the stability of out-fostering in Senegal. Child fostering is widely practiced in many sub-Saharan African countries and refers to children living in households without their biological parents (Cotton & Oduor, 2024; Evans et al., 2022; Isiugo-Abanihe, 1985; Madhavan, 2004; Vandermeersch & Chimere-Dan, 2002). Such arrangements can be temporary or permanent and are often linked to a complex interplay of motivations by the sending and receiving households, as well as by child characteristics. A substantial body of literature focuses on the reasons households and individuals participate in fostering decisions and on the implications of fostering practices on all involved, with a special emphasis on child outcomes. Yet, relatively little is known about the factors associated with fostering stability over time, especially amid demographic and socioeconomic changes. This article contributes to a better understanding of these dynamics, offers insights into macro-level demographic factors driving fostering in Senegal, and explores the links between mothers' individual characteristics and household settings and their propensity to out-foster a child.

Chapter 3 was peer reviewed and published in February 2025 in the Journal Studies in Family Planning. The article was written with Ewa Batyra and Albert Esteve, who provided valuable comments to the initial manuscript and during the review process. I presented the manuscript at the 2025 PAA meeting and the 2025 International Population Conference (IPC) in Brisbane, Australia. While the article was published shortly before these conferences, the feedback and suggestions I received from the audiences on both occasions were helpful for future extensions of the manuscript.

The third research article (Chapter 4) presents an overview of school enrollment in 24 African countries between 1976 and 2019 and explores links between children's living arrangement and their school enrollment and variations in these associations across time and countries. The article was motivated by research highlighting associations between children's household environment and their human capital accumulation (Adjiwanou et al., 2021; Chae, 2016; Esteve et al., 2025; Hampshire et al., 2015; Lewin & Sabates, 2012; McLanahan & Percheski, 2008) and a research gap with respect to comparative studies on this topic in the context of changing African societies. The results of the analysis suggest that, despite increases in school enrollment across all studied countries, heterogeneity in living arrangements persists, with disadvantages emerging for children living in households without their biological mother or without either parent, compared to those coresiding with both parents. In some countries, an apparent "mother-advantage" was observed, where living with only the biological mother among children was associated with higher school enrollment compared to the reference group, net of controls.

This article was peer-reviewed and published in the Journal Population and Development Review in January 2026. The article was co-authored with Ewa Batyra and Albert Esteve, who provided important suggestions and improvements to the manuscript before and during the review process. I presented the manuscript at the 2025 Congreso de la Asociación de Demografía Histórica (ADEH) in Malaga, Spain. The article will serve as a starting point for future research on the links between children's living arrangements and their human capital accumulation and well-being outcomes across African countries.

The thesis closes with a conclusion (Chapter 5), which summarizes the results of the three research chapters, discuss implications, acknowledges limitations, and identifies future research avenues. While the three research articles are designed to stand alone, they form part of a broader research framework by offering complementary perspectives on households, family structures, and living arrangements across spatial levels and over time. When I joined the Coresidence team at the beginning of my PhD, I was motivated to study changes in households and families in Africa. The specific questions and ideas addressed in this thesis were developed over the course of my studies, evolving through literature reviews and inspiring conversations with researchers at conferences, seminars, and team meetings. The three essays are interconnected to other research efforts on living arrangements and families produced by the Coresidence team, work that proved

crucial for the development of this dissertation. The construction of the databases, the exchange about the project with researchers, as well as the various collaborative and individual research endeavors undertaken with and by other team members, have all contributed significantly to my understanding of spatiotemporal variations in households, families, and living arrangements.

2 African households: National and subnational trends from censuses and surveys

Final version available in Population Studies

Pohl, M., Esteve, A., and Galeano, J. (2025). African households: National and subnational trends from censuses and surveys. *Population Studies, 1–21*. https://doi.org/10.1080/00324728.2024.2427580

This article has been placed in the Digital Document Repository (DDD) of the UAB and will become openly accessible on August 26, 2027.

3 The Stability of Child Fostering in Sub-Saharan Africa: The Case of Senegal

Final version available in Studies in Family Planning

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This open-access article has been placed in the Digital Document Repository (DDD) of the UAB.

Abstract

In sub-Saharan Africa, child out-fostering is a traditional social practice, and research suggests stable levels of out-fostering over time, yet the underlying demographic and socioeconomic factors driving this stability have remained largely unexplored. To gain insight into the prevalence and associations of child out-fostering and mothers' individual and household characteristics, we analyzed nine rounds of Demographic and Health Survey (DHS) data of Senegalese mothers of children aged 0-14, collected between 1986 and 2019. Child out-fostering has remained stable, with nearly one-third of mothers of children aged 0-14 living apart from at least one child. Our findings indicate that at the macro-level, counteracting fertility and child mortality dynamics contribute to this stability. At the micro-level, out-fostering is influenced by a complex interplay of maternal demographic, socioeconomic, and household characteristics. The role of demographic macro-level factors demands further research attention in the context of persisting child fostering across sub-Saharan Africa. The results further suggest that changes, such as postponement of motherhood, as well as further declines in fertility and infant mortality, could affect fostering arrangements in the future.

Keywords: *Child Fostering, Fertility, Motherhood, Households, Senegal*

3.1 Introduction

Child fostering is a common practice in sub-Saharan Africa, broadly defined as children living separately from their biological parents, either temporarily or indefinitely (Cotton, 2021, 2024). Extensive literature documents child fostering across and within various countries and cultural contexts (Akresh, 2009; Bachan, 2014; Beck et al., 2015; Cotton et al., 2022; Grant & Yeatman, 2012; Madhavan, 2004). This literature primarily focuses on the implications and motivations of sending and receiving households, and the characteristics of children and mothers associated with fostering (Beck et al., 2015; Hedges et al., 2019; Lachaud et al., 2016; Lloyd & Desai, 1992; Serra, 2009; Verhoef & Morelli, 2007). Macro-level studies show that the practice of child fostering has remained stable in many sub-Saharan African countries in recent decades (Cotton 2021). The aim of this work is to understand, from a demographic perspective, the determinants of this stability in the context of Senegal, a country that has experienced significant demographic and socioeconomic transformations in recent years.

A number of authors highlight the changing living arrangements of children and their parents as societies evolve, with significant socioeconomic consequences (Beegle, Filmer, et al., 2010; Cotton, 2021; Foster, 2000; McDaniel & Zulu, 1996). However, the continued prevalence of child fostering (Cotton, 2021) indicates that certain practices and living arrangements remain in place. To gain a deeper understanding of this stability in the context of change, it is essential to examine the underlying demographic factors and determinants of fostering. At the macro-level, core demographic factors are closely linked to the prevalence of out-fostering: Fertility and child mortality dynamics affect the number of children available to be out-fostered, with potential changes over time and space. At the micro-level, these determinants are likely to be moderated by individual socioeconomic and demographic profiles of mothers. The living arrangements of mothers and their position in the household can also affect the prevalence of non-coresidence among mothers and their biological children.

To address our research aims, we leverage nine samples of Demographic and Health Survey (DHS) data from Senegal, collected between 1986 and 2019, to examine mothers' propensity to out-foster a child. First, we analyze the stability in the prevalence of child out-fostering in Senegal amidst changes, such as fertility declines, survival improvements, and educational expansion. Second, we analyze the relationship between out-fostering and mothers' socioeconomic characteristics as well as the less studied role of household composition on the non-coresidence of mothers and children.

In Senegal, as in other sub-Saharan African countries, child fostering is a common traditional practice (Cotton 2021). By focusing on one country with available data for three decades, we can study demographic factors associated with out-fostering as well as analyze mothers' characteristics and their household environments. Senegal is a suitable case for an in-depth study of child out-fostering in sub-Saharan Africa: Similar to other countries in the region, Senegal has embarked on the first demographic transition and is

witnessing fertility and mortality changes, urbanization, and educational expansion. In line with broader regional trends, the total fertility rate in Senegal decreased from 6.4 in 1986 to 4.7 in 2019 (STATcompiler, 2024). The average household size in Senegal remains relatively large at 8.4 in 2019 (Esteve et al., 2024). While the first demographic transition is progressing relatively slowly in sub-Saharan Africa (Bongaarts, 2017; Bongaarts & Casterline, 2013; Casterline, 2017; Eastwood & Lipton, 2011), the individual-level demographic and socioeconomic characteristics of mothers and their living arrangements may have evolved over time. Therefore, our objective is to contribute to the existing literature by examining aspects of the complex interplay between continuity and change that shapes families and living arrangements in the African demographic context.

3.2 Background

3.2.1 Child fostering in sub-Saharan Africa

The practice of child fostering is a long-standing tradition whereby children are reared by people, mostly relatives, who are not their biological parents. Within the literature and the sub-Saharan African context, the practice is generally "understood as a transfer of parental rights and obligations that is reversible and limited in time, and in this sense very different from adoption" (Serra 2009: 157). Although foster children can remain in the host family for extended or indefinite periods of time, the time children spend away from their mother differs substantially across sub-Saharan African countries (Lloyd and Desai, 1992). Fostering has been characterized as a distinctive feature of the extended family system in Africa, which does not share the common assumptions of the Western family system that links child welfare to residence with parents (McDaniel & Zulu, 1996; Serra, 2009).

The literature distinguishes between voluntary and crisis fostering. The latter is understood to be a response to a crisis, such as the death of one or both parents, often linked to the effects of the HIV/AIDS epidemic, divorce, and economic hardship (Cotton, 2024; Foster, 2000). The former refers to voluntary decisions made by one or both parents to support a child's or family's human capital accumulation and well-being or to strengthen the kinship system (Cotton, 2021). Crisis fostering and voluntary fostering constitute different types of foster arrangements. In crisis fostering, for example following divorce, death of a parent, or socioeconomic issues (Lloyd and Desai, 1992; Foster, 2000), children may be placed with distant relatives or non-relatives, with less emphasis on kinship reciprocity (Beegle et al., 2010; Madhavan, 2004; Serra, 2009). Foster (2000) and Beegle et al. (2010) note that crises like the HIV/AIDS epidemic can place pressure on extended families due to increased adult mortality and orphanhood and lead to unexpected or crisis fostering. Voluntary fostering, however, often depends on kinship and household structures and provides a means to reinforce and leverage kinship networks to share the cost and benefits of childrearing (Madhavan, 2004).

In polygynous families, competing adult demands may affect childcare and resource allocation, while uniparental families may have fewer resources. Fostering can compensate for these shortcomings (Lloyd and Desai, 1992). Thus, out-fostering may be associated with lower household socioeconomic status, while in-fostering may be associated with higher status (Akresh, 2009; Vandermeersch & Chimere-Dan, 2002). Fostering is a crucial feature of the intrafamily care provision systems in sub-Saharan Africa. However, it has been argued that the demographic and socioeconomic changes and crises taking place in the region could weaken family support networks, with negative implications for care provision (Foster, 2000; Mokomane, 2013; Zagheni, 2011).

The definitions of fostering vary across the literature. Some authors consider only formal foster arrangements, whereas others include any children who do not reside with their mothers (Cotton et al., 2022). Cotton (2021) estimates that the share of mothers who out-foster at least one child ranges from 11.5 percent in Burundi to 45.7 percent in Namibia. The author's analysis of DHS data from West Africa indicates that the share ranges from nearly 40 percent of mothers in Côte d'Ivoire to around 20 percent in Nigeria (Cotton, 2021). In Senegal, nearly one-third of mothers had at least one nonresident child in the most recent DHS round. Fostering has been an institutionalized practice in the country for decades (Beck et al., 2015; Evans et al., 2022; Isiugo-Abanihe, 1985) and the Senegalese definition of family traditionally extends beyond the household, with great importance given to elder kin (Evans et al. 2022). However, research points to recent changes in family structures and shifts in familial roles and responsibilities, such as reduced cooperation and solidarity, as a result of urbanization processes, economic and social transformations, family instability and increased migration. While the prevalence of fostering in Senegal has remained stable, norms regarding shared parenting within the kinship network appear to shift in favor of an emphasis on parental responsibilities (Evans et al., 2022).

The heterogeneous settings in which fostering decisions are made, shaped by demographic dynamics, kinship relations, living arrangements, and socioeconomic factors reflect fostering motivations and drivers. In the following section, we briefly present common motivations behind child fostering, before considering demographic determinants of fostering.

3.2.2 What motivates child fostering?

Motivations to foster a child are complex and vary by type of fostering and across sending and receiving households and are often linked to kinship relations (Bachan, 2014; Lloyd & Desai, 1992; Serra, 2009). They can also depend on the child's characteristics, such as age and sex (McDaniel & Zulu, 1996), the mother's characteristics, such as marital status, the availability and characteristics of living relatives, and the household context (Akresh, 2009; Beck et al., 2015; Clark et al., 2017; Cotton, 2024). Children are often sent to live with a relative who is perceived to be in a better position to facilitate the child's educational attainment (Brown, 2011), for instance because the relative lives closer to a school (Beck et al., 2015). In

some countries, such as Senegal, boys in Muslim families are at times sent to Koranic schools to receive a religious education (Evans et al., 2022; Isiugo-Abanihe, 1985). Children are also sent to relatives who need help in the household, either because they do not have enough children or because they rely on additional support. Fostering can also be a cultural custom, such as brides taking a younger relative with them to their new family upon marriage (Vandermeersch & Chimere-Dan, 2002).

The interplay between kinship and demographics is important in explaining the motivations for fostering in the sending and receiving households (Mason, 2001). Fostering can facilitate the rebalancing of skewed dependency ratios in either participating household (Beck et al., 2015) and may also counteract a perceived reproductive shortcoming of one household. In this case, children balance out fertility differences between households within the same kinship network (Vandermeersch & Chimere-Dan, 2002). When women's status is linked to their reproductive success, fostering can help women gain social recognition (Vandermeersch & Chimere-Dan, 2002). Other demographic factors that motivate out-fostering include gender imbalances among children within one household (Akresh, 2009), a lack of sibling spacing (Lloyd & Desai, 1992), or migration of mothers (Cotton & Beguy, 2021).

In the case of voluntary fostering, the process is often associated with reciprocity and mutually beneficial relationships between households (Bachan, 2014; Serra, 2009). The cost of rearing children can be shared by households and systems of exchange can be maintained between rural and urban kin or across generations (Madhavan, 2004; McDaniel & Zulu, 1996). In the context of Senegal, Vandermeersch & Chimere-Dan (2002: 680) further highlight that the practice of out-fostering "may have allowed households to adapt to economic disruptions primarily in response to the difficulties of the moment." Fostering can be a temporary and flexible means for families to respond to the household needs and capabilities in the household in circumstances where the biological parents are not best suited to raise their child(ren).

3.2.3 Drivers of child fostering

Child fostering is driven to some extent by demographic factors. Fertility dynamics, such as the age at transition to motherhood, the number of children, and length of birth intervals, may drive fostering to support the mother, to ensure household well-being, to promote better child outcomes, to allocate labor and resources, and to balance demographic dynamics within the kin network (Beck et al., 2015; Klomegah, 2000; Lloyd & Desai, 1992; Serra, 2009). However, the relationship between fertility and fostering is not linear: in South African countries, such as Namibia, where fostering rates are the highest in Africa, fertility tends to be lower than in other African countries (STATcompiler, 2024). Similarly, the high prevalence of out-fostering in the context of fertility transitions across sub-Saharan Africa suggests the importance of confounding factors. One possibility is that mortality dynamics, such as maternal and child survival, which are linked to the availability of the biological mother and her children, counteract fertility decline.

At the macro-level, there may be variations in the prevalence of child out-fostering over time. Similarly, there may be spatial differences, such as between regions or between rural and urban areas. Rural residence tends to be positively associated with out-fostering, as mothers in rural areas send children to live with relatives in urban areas as part of rural-urban exchange systems (Cotton, 2024; Madhavan, 2004) or to other rural households who need labor (Lloyd & Desai, 1992; Vandermeersch & Chimere-Dan, 2002). The relationship between the type of place of residence and out-fostering could change with urbanization. Mothers in urban areas could face pressure to out-foster a child to participate in the labor market. Mothers who migrate to urban areas may leave children behind, which increases the distance to children and impacts lived experiences (Cotton & Beguy, 2021). Eloundou-Enyegue and Stokes (2002) find that economic downturns and urban poverty affect fostering, with implications for economic mobility of rural children and kinship ties across the rural-urban divide.

At the micro-level, several social, economic, and demographic characteristics of mothers are associated with out-fostering (McDaniel & Zulu, 1996). In a study of mothers in Uganda, Cotton (2024) finds that younger age and higher fertility are positively associated with out-fostering, suggesting that women seek out-fostering as a strategy to cope with relatively higher childcare burdens. Using data from several sub-Saharan African countries, McDaniel and Zulu (1996) observe that younger mothers are more likely to out-foster a child. Never-married, widowed, and divorced mothers, as well as those in polygynous unions, are also more likely to out-foster (Cotton, 2024; Vandermeersch & Chimere-Dan, 2002). This relationship is not causal but indicative of structural factors, such as unmarried mothers potentially facing economic vulnerability or disadvantage, that contribute to out-fostering decisions. In Malawi, Grant and Yeatman (2014) note that maternal remarriage is positively associated with out-fostering, suggesting family change as a determinant of fostering.

The relationships between age, fertility, marriage, and fostering may be moderated by mothers' educational attainment and labor market participation. Working mothers at older ages could rely more on fostering in the absence of institutional childcare. The evidence on maternal education and fostering is mixed, with studies showing positive and negative associations between mothers' educational attainment and the prevalence of out-fostering (Cotton & Beguy, 2021; Isiugo-Abanihe, 1985; McDaniel & Zulu, 1996). Ethnicity and religion are other possible influences on the relationship between demographic dynamics and out-fostering.

Household size, structure, and the mother's position in the household can also be associated with out-fostering (Evans et al., 2022; Isiugo-Abanihe, 1985). Vandermeersch and Chimere-Dan (2002) argue that female-headed households in Senegal participate in in-fostering to gain social recognition if they do not marry or have children of their own. Female-headed households in sub-Saharan Africa are often associated with poverty and social vulnerability, which could contribute to a reliance on out-fostering, although the

evidence suggests a more nuanced picture (Milazzo & van de Walle, 2017). In a study of single mothers in Nairobi slums, Cotton et al. (2022) observe a strong reliance on kin for childrearing support and Madhavan et al. (2018) highlight the importance of kin support for single mothers, even when other kin are also experiencing economic precarity. Female headship is often associated with single-parent households (Trias-Prats & Esteve, 2025); thus, mothers who head their households may out-foster more often. Similarly, mothers who are only distantly related or unrelated to the household head may face pressure to out-foster a child. Larger households also have to share resources among more members, which could influence out-fostering decisions.

Further research is needed to disentangle the associations between maternal characteristics, living arrangements, and fostering. The study of the Senegalese context can provide insights into the demographic dynamics and determinants of the high prevalence of out-fostering among mothers and children across socioeconomic strata and living arrangements.

3.3 Research contribution

Recent research on child fostering has been conducted by Cotton (2021), who conducted an expansive exploration of DHS data to examine fostering prevalence across time in 36 African countries. She finds that out-fostering prevalence, despite some fluctuations, remained remarkably stable over time in many countries and that fostering remains a common feature of African family systems. These findings provide a crucial basis for further in-depth investigation of the stability in the prevalence of out-fostering in Africa and future work aiming to cast light on the determinants of fluctuation in the number of nonresidential children women have across and within countries. We contribute to this literature on child fostering in sub-Saharan Africa by examining the links between women's individual and household characteristics and child out-fostering in Senegal over three decades.

Moreover, by describing and examining the core demographic dynamics of out-fostering, namely fertility and changes in child mortality, we highlight the important roles of the underlying but previously unexplored demographic dynamics in explaining the stability in out-fostering prevalence over time. We argue that it is reasonable to assume that these dynamics are relevant beyond the Senegalese context and warrant further attention. Rather than focusing on child or household outcomes, which are complex to measure and disentangle from confounding factors, we focus on mothers who engage in out-fostering. This approach allows us to examine foster situations distinct from those involving orphans, while still accounting for socioeconomic stratification within the population.

We are adding a new perspective to the literature by aiming to answer the following research questions: (1) What are the demographic determinants of the prevalence of child out-fostering over time? and (2) How are maternal characteristics and household composition associated with child out-fostering? In addition to

the macro-level analysis of demographic factors, we emphasize the importance of individual-level characteristics of mothers as well as their living arrangements and household contexts, in explaining the stability in the prevalence of out-fostering in Senegal and possibly other countries. We test a set of individual-level characteristics chosen on the basis of their links to the macro-level predictors of fostering that are included in the analysis by Cotton (2021). Thus, we contribute an exploratory work that lays the foundation for future comparative research on the stability of child fostering in Africa in the context of changing demographic and socioeconomic dynamics.

3.4 Data and methods

To explore answers to our research questions, we use nine samples of DHS data collected in Senegal between 1986 and 2019. The DHS are standardized, nationally representative cross-sectional surveys, conducted in low- and middle-income countries. They cover a wide range of topics related to the demographic and health characteristics of individuals, families, and households with a focus on women of reproductive age (15-49). Senegal is the only country in Africa where a continuous version of the survey was implemented in 2012. We follow the approach of Cotton (2021) and focus on mothers of living children aged 0-14. In the DHS, women's birth histories provide information on all children ever born, such as age, sex, dates of birth and death, and coresidence with the mother. We use this variable to create a binary variable that indicates if the child resides with the mother or elsewhere. We aggregate this information for each woman to determine whether she has at least one living nonresident child (1) or not (0). This variable constitutes our dependent variable. The DHS does not provide details on the children's locations, their living arrangements, or the duration and reason for their absence. Thus, we cannot determine with certainty whether the child is being fostered or living with the biological father, although children whose mothers are alive but who live with their fathers are relatively rare in sub-Saharan Africa, and some authors suggest that these children might be treated differently in the household (Cotton, 2021). Despite the limited information on children's residence, the DHS provides an opportunity to study child fostering in a context where other data are not available (Cotton, 2021).

We rely on the women's files for birth histories and thus include children whose biological mothers are still alive. We restrict our sample to mothers with at least one living child aged 0-14. While fostering occurs after age 14, many children leave the maternal household at this age for marriage, work, or education, and we cannot distinguish these children from those who are fostered out. We also focus on mothers with at least one living child to consider only women who are "at risk" of out-fostering. The total weighted sample size, shown in Table 2.1, across all surveys is 74,164 mothers, of whom around 26 percent have at least one nonresident child aged 0-14. Table 2.2 provides an overview of the sample of mothers who out-foster, and of those who do not, pooled for all years.

Table 2.1 Sample overview

Survey year	1986	1992-1993	1997	2005	2010-2011	2012-2014	2015-2016	2017	2018-2019
Sample	3,094	4,285	5,639	8,864	9,689	10,413	10,853	10,295	11,031
Fostering	27.0	27.6	25.4	26.7	23.5	26.4	25.0	25.4	25.6

Note. Sample refers to the weighted total number of mothers. Fostering refers to the proportion of mothers who out-foster. **Source**. DHS Data.

First, we examine how the practice of out-fostering children has evolved over time in Senegal. Mothers were grouped into 10-year birth cohorts, with the earliest and latest cohorts including mothers born between 1936 and 1945 and between 1996 and 2005, respectively. We chose birth cohorts over survey years to avoid overlap of women across data collection rounds, even though the DHS data are cross-sectional. We grouped women into five-year age groups. We also conducted a bivariate analysis of individual and household predictors to examine their relationship to the dependent variable. In addition to the bivariate analysis, we examine the births and deaths of children among mothers in our sample and visualize our descriptive findings. We obtained information about the mothers' individual characteristics and birth histories from the women's individual files. For the household characteristics, we relied on the information provided by the household files. We use the weights provided by the DHS. A complete overview of sample characteristics can be found in the Appendix (Appendix Tables A2.1 and A2.2). Note that household information is not available for the 1986 survey.

Table 2.2 Sample characteristics

	Sample (%)	Mothers who out-foster (%)	Mothers who do not out-foster (%)
Age group			
15-19	5.1	1.3	6.4
20-24	16.2	8.4	18.9
25-29	21.7	20.9	21.9
30-34	20.1	26.0	18.0
35-39	16.8	21.0	15.3
40-44	12.1	14.1	11.4
45-49	8.2	8.4	8.1
Children	2.8	3.3	2.5
Marital status			
Never married	3.2	2.8	3.3
Currently married	90.8	88.5	91.6
Formerly married	6.0	8.8	5.1
Polygynous			
No	56.8	45.1	60.8
Yes	33.6	43.0	30.4
Don't know	9.6	12.0	8.8
First Union	18.2	17.7	18.3
Educational level			

< Primary	83.5	88.5	81.7
Primary	13.8	10.2	15.1
> Primary	2.7	1.3	3.2
Employment			
No	50.2	45.2	51.9
Yes	49.8	54.9	48.1
Ethnicity			
Wolof	39.0	39.0	39.0
Poular	27.5	26.3	27.9
Serer	15.1	14.7	15.3
Other	18.4	20.1	17.9
Place of residence			
Rural	58.2	62.4	56.8
Urban	41.8	37.6	43.2
Relationship to household head			
Head	8.1	9.0	7.8
Wife/Co-spouse	41.0	46.3	39.2
Daughter (in law)	28.0	19.2	31.0
Other/Non-relative	23.0	25.5	22.1
Age of household head	52.8	52.1	53.0
Mean household size	13.4	12.8	13.6
Household structure			
1-2 related adults	12.2	14.8	11.3
3+ related adults	71.1	68.1	72.1
Unrelated adults	16.7	17.1	16.7
N.	**74,164**	**18,994**	**55,170**

Note. Children refer to the mean living children aged 0-14. **Source**. DHS Data.

Second, we test the relationship between out-fostering and the covariates by estimating two sets of logistic regression models. We pool survey years and control for the year of the survey. The dependent variable across models remains the same binary variable (no out-fostered children 0; at least one out-fostered child 1). The reference survey round is 1986 in the first three and 1992-1993 in the last three models. We account for the complex survey design of the DHS by including weights, strata, and PSU, using the survey package in R to estimate the regression models (Lumley, 2023). The results of all models are reported as odds ratios (OR). We also tested models for each individual survey year and several other interaction terms. However, the model fits did not improve significantly.

In the first model, we analyze the effects of time (survey year) and place (type of residence) on the likelihood of out-fostering. In the second model, we add mothers' demographic characteristics while controlling for socioeconomic variables. We focus on mothers' age (five-year age groups), number of children alive below or equal to age 14, marital status (never married; currently married; ever married), and union type (polygynous yes; no; don't know), while controlling for educational attainment (less than primary; primary;

more than primary), employment (unemployed; employed), and ethnicity (Wolof; Poular; Serer; other). In the third model, we include an interaction term between the mother's age and fertility.

In the second set of models, we focus on the associations between out-fostering and mothers' living arrangements. In the first of these models, Model 4, we include information on the household size, the age of the household head, and the relationship to the household head (head; wife or co-spouse; daughter or daughter-in-law; other or nonrelative). In Model 5, we include a variable for the household structure (one or two related adults; three or more related adults; unrelated adults) instead of the relationship to the household head. In the last model, we add both the relationship and structure variables. In Models 4 through 6, we control for time, space, and individual characteristics of the mothers. We include mean-centered variables for the number of children, the household size, and the age of the household head.

3.5 Results

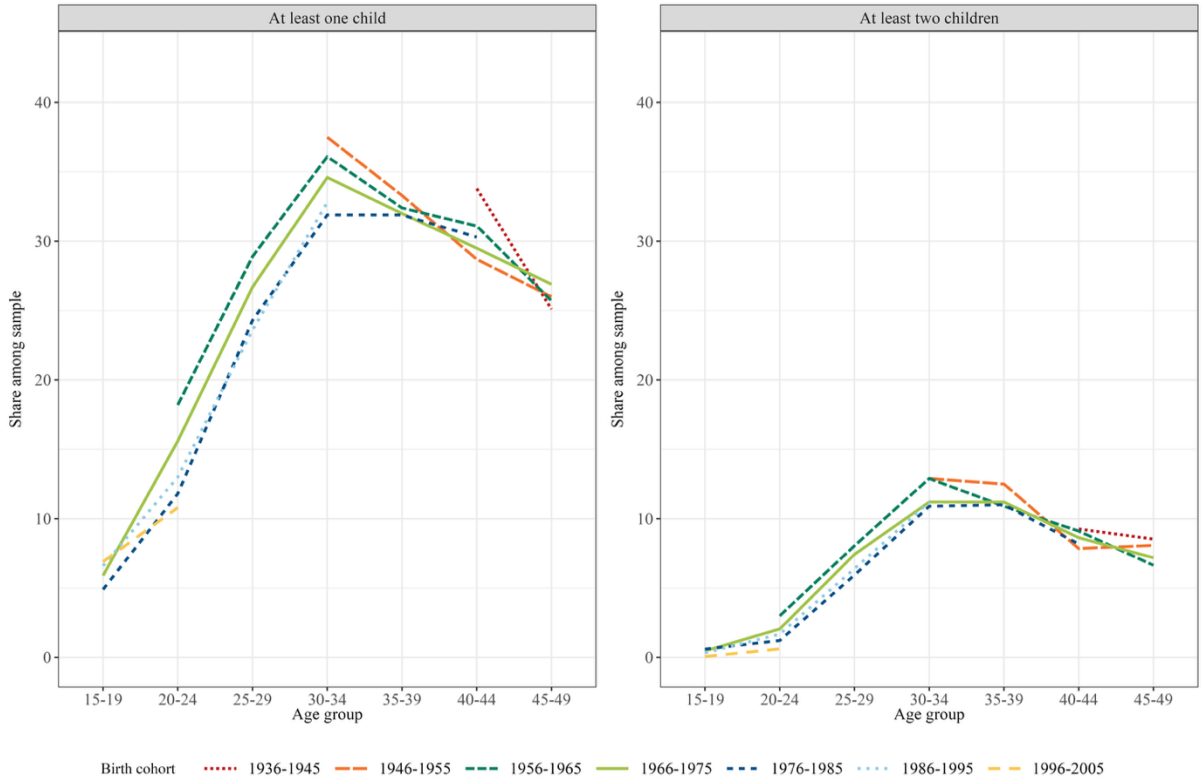
3.5.1 Trends in child out-fostering in Senegal over time

The prevalence of out-fostering in Senegal has remained constant over the period studied: In 1986, 27 percent of mothers had at least one nonresident child, compared to 25.6 percent of mothers in 2018-19 (see Table 2.1). Figure 2.1 shows the share of mothers with at least one (left panel) and at least two (right panel) nonresident children by mother's birth cohort and age group. While younger cohorts have not yet reached higher ages, we can compare all cohorts between 1956 and 1995 for the age groups 20-24 up to 30-34. The proportion of mothers with at least one nonresident child has declined at younger ages in all birth cohorts, but at ages 30-34 the differences between these cohorts are less than 5 percent. Moreover, the differences in out-fostering for nearly all ages across cohorts are not statistically significant.

In addition, at ages 35-39 and 40-44, the share of mothers with at least one nonresident child in the 1976-85 birth cohort exceeds that of the previous two and previous three cohorts, respectively. For the share of mothers with at least two nonresident children, changes across cohorts are negligible. The figure shows that out-fostering peaks between the ages of 30 and 39. Overall, a population-level analysis of fostering prevalence emphasizes stability across cohorts but masks distinct age-specific patterns.

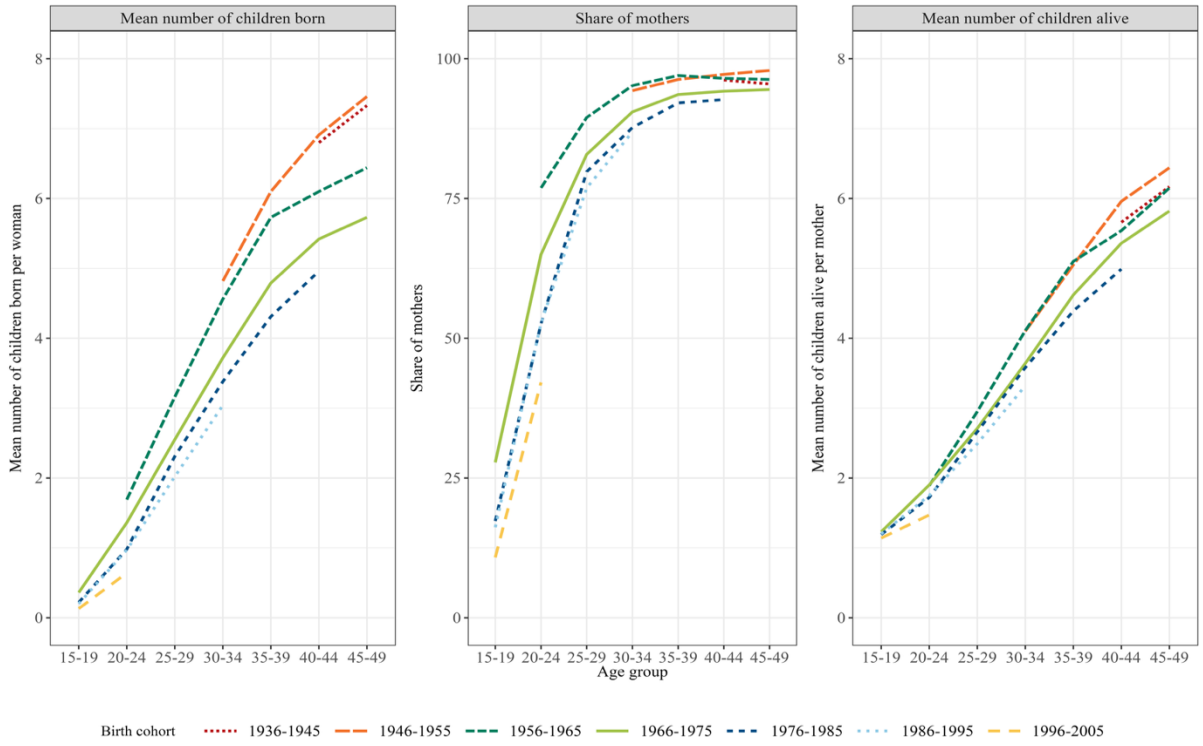
Several factors contribute to the stable prevalence of out-fostering in Senegal. The most fundamental are demographic factors: fertility and mortality. Women must have children to be able to out-foster, and children must be alive to be out-fostered. We compared the number of children born among all survey respondents, the proportion of mothers, and the number of children alive per mother by age and birth cohort (Figure 2.2).

Figure 2.1 Prevalence of out-fostering by age and cohort



Source. DHS Data.

Figure 2.2 Underlying demographic dynamics of out-fostering by age and cohort



Source. DHS Data.

Based on the average number of children born among respondents, we observe that entry into motherhood is postponed over time and that fertility per capita declines. The left panel shows that at ages 20-24, the difference between the 1956-1965 and 1996-2005 birth cohorts is almost one child, although a part of the younger cohort may still have years left in this age group. Toward the end of the reproductive career, we observe a substantial decline of more than one child in the average number of children born per woman between the earliest birth cohorts (1936-1945) and the latest to have reached that age group (1966-1975). The middle panel highlights the postponement of motherhood across cohorts but near-universal motherhood at higher ages.

Figure 2.2 illustrates an important dynamic. Infant and under-five mortality in Senegal declined substantially between 1986 and 2019, from 88 to 29 per 1000 live births and from 195 to 37 per 1000 live births, respectively (STATcompiler, 2024), and it appears that mortality improvements offset fertility declines and the postponement of motherhood**.** Subsequently, the number of live children per mother at the middle and end of their reproductive careers (right panel) has not declined substantially. Among mothers, we observe that at older ages the differences between cohorts are small, with women in all cohorts whose members reach ages 45-49 having about six living children. Thus, the risk of out-fostering in terms of demographic availability remains similar across cohorts, as almost all women enter motherhood (middle panel) and mothers of younger generations have similar numbers of living children available to be fostered out as earlier generations. Despite changes at the individual level, demographic dynamics continue to drive the stability of child out-fostering over time. The age-cohort analysis of fertility patterns suggests that out-fostering may decline in the future but that mothers, in the absence of institutional childcare, continue to rely on relatives to provide such care.

3.5.2 Characteristics of mothers in Senegal over time

While the population-level prevalence of fostering has remained relatively constant over time, the characteristics of mothers who out-foster may have changed. In the following section we profile the individual and household characteristics (Table 2.3) of all mothers aged 30-34 over time and compare them to those of mothers who out-foster (Table 2.4). In this age group, more than a third of mothers foster out at least one child, and the prevalence of fostering increases compared to younger age groups. Most women in Senegal entered childbearing at younger ages, which increases the likelihood of having more children to out-foster by age 30-34. While the differences across cohorts are not statistically significant, pairwise comparisons of proportions suggest that differences over age groups are statistically significant.

Table 2.3 Characteristics of mothers aged 30-34 with at least one child aged 0-14

	1986	1992-1993	1997	2005	2010-2011	2012-2014	2015-2016	2017	2018-2019
Children	3.8	3.9	3.7	3.4	3.4	3.3	3.3	3.3	3.2
Marital status									
Never	1.0	1.8	1.9	0.6	2.4	2.0	1.4	2.7	2.2
Currently	94.3	93.5	91.0	93.1	91.5	92.9	91.8	91.5	89.9
Formerly	4.7	4.7	7.1	6.3	6.1	5.1	6.8	5.7	8.0
Polygynous									
No	42.4	47.6	45.8	54.3	56.2	61.7	61.7	60.9	59.7
Yes	51.9	45.1	43.3	37.1	35.3	31.1	30.1	30.6	30.2
Don't know	5.7	7.4	10.9	8.7	8.6	7.2	8.2	8.5	10.1
First Union	16.8	16.6	17.7	18.4	18.9	19.2	19.3	19.2	19.3
Educational level									
< Primary	78.5	84.3	78.1	83.6	86.0	88.3	86.0	82.7	84.9
Primary	13.0	13.0	17.9	13.8	12.2	9.3	11.0	11.8	10.8
> Primary	8.5	2.7	4.0	2.6	1.8	2.4	2.9	5.6	4.3
Employment									
No	66.6	47.2	33.4	57.2	54.1	45.0	50.5	40.1	43.1
Yes	33.4	52.8	66.6	42.8	45.9	55.0	49.5	60.0	56.9
Ethnicity									
Wolof	47.1	40.2	39.3	38.5	38.2	40.2	42.4	37.6	42.0
Poular	19.5	23.7	22.9	27.4	26.4	27.3	25.9	25.8	25.6
Serer	15.6	17.3	16.2	14.5	17.9	14.0	16.4	16.7	13.7
Other	17.8	18.9	21.7	19.6	17.6	18.5	15.2	19.9	18.7
Place of residence									
Rural	57.6	60.2	59.8	53.9	54.9	52.8	52.8	54.7	55.5
Urban	42.4	39.8	40.2	46.1	45.1	47.3	47.2	45.3	44.5
Relationship to household head									
Head		4.5	5.2	6.7	6.6	8.5	8.7	8.4	8.0
Wife/Co-Spouse		61.4	52.6	47.6	44.0	42.0	39.7	35.8	34.1
Daughter (in law)		17.7	23.7	21.6	26.2	24.4	28.8	31.3	32.5
Other/Non-relative		16.4	18.5	24.1	23.3	25.1	22.9	24.5	25.4
Age of household head		50.0	51.2	50.7	51.6	50.4	51.8	52.6	54.0
Household size		13.2	13.3	13.2	13.8	14.0	13.3	14.0	13.6
Household structure									
1-2 related adults		14.6	14.0	14.3	13.9	14.5	18.5	15.8	14.7
3+ related adults		77.8	79.2	31.4	63.4	68.9	71.2	71.0	73.4
Unrelated adults		7.6	6.7	54.3	22.7	16.6	10.3	13.2	12.0
N.	**601**	**816**	**1,059**	**1,721**	**1,869**	**2,068**	**2,220**	**2,231**	**2,319**

Note. Children refer to the mean living children aged 0-14. First union refers to the mean age at first union. **Source**. DHS Data.

Table 2.3 shows that around 90 percent of mothers aged 30-34 in Senegal are married, although the proportion of married mothers among all mothers declined by 5 percent. Mothers who out-foster are more likely to be in the formerly married group than all mothers. Substantial changes can be observed with respect to the type of union. In 1986, more than half of the mothers were in a polygynous union, but by 2018-19

this share had fallen to around 30 percent. About 10 percent of mothers report not knowing whether they are in a polygynous union. This share includes women whose union is not polygynous at the time of data collection but could become polygynous. Mothers who foster out are more likely to be in a polygynous union over time than all mothers (Table 2.4).

Table 2.4 Characteristics of mothers aged 30-34 with at least one out-fostered child aged 0-14

	1986	1992-1993	1997	2005	2010-2011	2012-2014	2015-2016	2017	2018-2019
Children	4.2	4.2	4.0	3.9	4.0	3.9	3.8	3.9	3.7
Marital status									
Never	0.9	1.6	2.0	0.0	2.1	1.9	1.7	2.1	2.5
Currently	89.8	91.9	89.1	91.4	89.3	91.5	88.6	89.5	87.3
Formerly	9.3	6.5	8.9	8.6	8.7	6.6	9.7	8.4	10.3
Polygynous									
No	33.3	44.2	38.4	43.3	48.4	53.5	52.7	48.7	51.9
Yes	56.5	46.5	49.1	46.5	40.8	38.0	35.9	40.9	35.4
Don't know	10.2	9.4	12.6	10.2	10.9	8.5	11.4	10.5	12.7
First Union	16.6	16.2	17.3	17.9	17.7	18.2	18.1	18.0	18.0
Educational level									
< Primary	81.0	88.7	83.1	88.3	88.2	93.6	91.0	88.7	88.5
Primary	14.8	10.0	15.5	9.8	11.3	5.7	8.5	9.4	9.7
> Primary	4.2	1.3	1.5	1.9	0.5	0.7	0.5	1.9	1.9
Employment									
No	68.5	42.6	31.0	55.5	50.3	47.3	52.5	40.9	41.3
Yes	31.5	57.4	69.0	44.5	49.7	52.7	47.5	59.1	58.7
Ethnicity									
Wolof	43.1	36.5	36.5	38.8	34.0	38.0	39.3	40.2	37.2
Poular	19.4	21.0	20.2	26.9	29.5	29.3	27.6	24.9	27.5
Serer	14.8	21.6	20.6	14.2	16.5	11.2	16.8	15.5	12.2
Other	22.7	21.0	22.8	20.1	20.0	21.5	16.3	19.4	23.1
Place of residence									
Rural	52.3	61.3	68.3	60.5	61.2	61.7	58.7	63.6	58.7
Urban	47.7	38.7	31.7	39.5	38.8	38.4	41.3	36.4	41.3
Relationship to household head									
Head		5.8	6.9	5.7	4.8	5.2	10.3	9.3	8.1
Wife/Co-Spouse		62.3	55.3	49.3	49.8	49.9	43.7	41.0	40.8
Daughter (in law)		16.1	18.4	15.5	22.8	18.2	21.1	25.5	22.1
Other/Non-relative		15.8	19.4	29.5	22.7	26.7	25.0	24.2	29.0
Age of household head		49.5	50.5	50.8	51.7	49.9	50.3	51.7	52.5
Household size		12.9	12.3	12.7	13.3	12.9	12.3	13.4	13.0
Household structure									
1-2 related adults		14.8	15.8	13.2	14.8	19.5	21.6	16.1	17.4
3+ related adults		76.8	77.6	31.2	65.0	66.3	67.0	71.2	70.0
Unrelated adults		8.4	6.7	55.6	20.1	14.2	11.3	12.8	12.6
N.	**310**	**371**	**596**	**559**	**712**	**705**	**702**	**760**	**760**

Note. Children refer to the mean living children aged 0-14. First union refers to the mean age at first union. **Source**. DHS Data.

Progress in educational attainment, in terms of the highest level of education completed, has been relatively slow among mothers, with the vast majority not completing primary education. The proportions of women who have completed primary or secondary education have remained fairly stable. More than two-thirds of women with higher education in all survey years are excluded from our sample because they are not mothers. It is important to note that there is educational stratification across mothers and nonmothers, with women in the latter group more likely to be less educated. Employment, measuring whether the respondent is currently working, has increased significantly among the sample, from 33.4 percent in 1986 to 56.9 percent in 2018-2019. The same trend can be observed if we look only at mothers who out-foster.

Looking at all mothers, we observe little change in the type of residence over time, with similar proportions living in urban areas in 1986 and in the most recent round of the survey available. Mothers who out-foster slightly more often live in rural areas as compared to the full sample. Regarding mothers' position in the household, we observe variation in the distribution according to their relationship to the household head over time. In 1992-93, the earliest sample for which this information is available, about 61 percent of the group reported being the wife or co-spouse of the household head compared to less than 34 percent in 2018-19. This change is driven by more women in this group reporting to be either a daughter/daughter-in-law or other/nonrelative of the household head. This could suggest an increase in intergenerational or extended household arrangements for mothers in Senegal. We do not find substantial changes over time in the household structure, with the exception of the year 2005. This suggests that households were possibly categorized differently in 2005, increasing the share of households in which coresident adults are considered to be unrelated.

We conducted a bivariate analysis using chi-squared tests within the survey package (results not shown), to analyze the relationship between the mothers' individual and household characteristics and the dependent variable. In the weighted sample, 25.7 percent of women have at least one nonresident child, with less than 5 percent variation across samples. The bivariate relationships suggest that women aged 30-34 are most likely to out-foster and that mothers who out-foster have a higher number of children, are more likely to be in a polygynous union, live in a rural area, be less educated, participate in the labor market, and have a lower average age at marriage than those who do not out-foster. The bivariate analysis suggests that all associations between the covariates and the dependent variable are statistically significant (p-value < 0.001), except for the sex of the household head.

Overall, the descriptive statistics reveal small but crucial changes that took place among mothers in Senegal over the past three decades. These changes, such as a decline in fertility and the number of polygynous unions, and an increase in the average age at childbearing and marriage, can contribute to a decline in the

propensity to out-foster among mothers. Households appear to be evolving, with more female-headed households and declining polygyny contributing to changes in the relationship between mothers and household heads. The internal composition of households in Senegal might be changing but their urban-rural ratio has remained constant over time, as has their average size. Since our sample consists only of mothers, it is possible that broader societal changes are occurring among women who have not (yet) entered motherhood. Selection effects in female migration could also contribute to the stability and demand further research attention.

Based on the descriptive findings, we find that child fostering remains prevalent in Senegal across social groups and strata. However, we find nuanced differences between mothers who foster and those who do not, such as lower educational attainment and higher polygyny among the former. Fostering also appears to be a rural practice, which is consistent with the literature suggesting that out-fostering can be a means of accessing opportunities for children from rural areas. Mothers who foster out tend to have more children; thus out-fostering may be associated with a higher need for care support.

3.5.3 Mothers' characteristics associated with child out-fostering

Table 2.5 shows the results of the logistic regression models. In Model 1, we test the relationships between time, place, and out-fostering. We observed small, statistically insignificant effects across all survey years, except for 2010-11. For this year, the OR associated with out-fostering is lower compared to 1986, and the effect is statistically significant. We observe a statistically significant effect for the space variable, suggesting that, in the absence of other controls, women in urban areas are less likely to out-foster a child than their rural counterparts.

In Model 2, we focus on the demographic characteristics of the mothers, controlling for time, place, and socioeconomic variables. We observe large, statistically significant age effects, especially for the 30-34 age group, relative to the reference group. The effect of having more children is pronounced, suggesting that for each additional child a woman has, the odds of out-fostering increase by 47 percent relative to the mean number of children among women in the sample. Thus, mothers with more than the average number of children have higher odds of out-fostering compared to mothers with fewer than average children. In line with our expectations, women who are unmarried, in polygynous marriages, have less education, and participate in the labor market are more likely to foster out at least one child.

In Model 3, we include an interaction term for age and the number of children aged 14 or younger that a woman has. The ORs for the age groups now represent the baseline effect of being in that age group on out-fostering, assuming that the number of children a mother has is at the mean. To find the effect of each additional child above the mean on the odds of out-fostering for women in a given age group, we multiply the effect for the number of children (OR 3.8) by the interaction term for that age group. For mothers aged

30-34, the baseline odds of out-fostering are reduced by 20 percent (OR 0.8) compared to mothers aged 15-19. For each additional child above the mean, the odds of out-fostering for mothers aged 30-34 increase by a factor of 1.52 (OR 3.8*0.4) from this lower baseline. The pronounced age effect for mothers aged 30-34 suggested by the descriptive statistics and Model 2 diminishes; however, the baseline difference for this group and the reference group is statistically insignificant. More generally, for all age groups, both the baseline odds of out-fostering and the effect of number of children are lower than for the reference group, indicating that the youngest mothers have the highest baseline odds of out-fostering and are most affected by having additional children. The interaction term shows that having more children still increases the odds of out-fostering for other age groups, but the increase is less pronounced than for the youngest mothers.

Table 2.5 Regression models

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	OR	**Sig.**	**OR**	**Sig.**	**OR**	**Sig.**	**OR**	**Sig.**	**OR**	**Sig.**	**OR**	**Sig.**
(Intercept)	0.4	***	0.2	***	0.8	***	0.6		0.8		0.7	
Survey year												
1986	*Ref.*		*Ref.*		*Ref.*							
1992-1993	1.0		0.9		0.9		*Ref.*		*Ref.*		*Ref.*	
1997	0.9		0.8	**	0.8	**	0.9		0.9		0.9	
2005	1.0		1.0		1.0		1.1		1.0		1.0	
2010-2011	0.8	*	0.8	*	0.8	*	1.0		0.9		0.9	
2012-2014	0.9		1.0		1.0		1.1		1.1		1.1	
2015-2016	0.9		0.9		0.9		1.0		1.0		1.0	
2017	0.9		0.9		0.9		1.1		1.1		1.0	
2018-2019	0.9		1.0		1.0		1.1		1.1		1.1	
Residence *(ref. rural)*												
Urban	0.8	***	0.9	***	0.9	***	0.8	***	0.8	***	0.8	***
Age (*ref. 15-19)*												
20-24			1.9	***	0.6	**	0.5	***	0.5	**	0.5	***
25-29			2.8	***	0.7		0.6	*	0.7	*	0.6	*
30-34			3.0	***	0.8		0.7		0.7		0.7	
35-39			2.6	***	0.7		0.6	**	0.6	*	0.6	**
40-44			2.6	***	0.7		0.6	**	0.6	**	0.6	**
45-49			2.7	***	0.7		0.6	**	0.6	**	0.6	**
Number of children			1.5	***	3.8	***	4.1	***	3.8	***	4.1	***
Marital status (*ref. never)*												
Married			0.6	*	0.5	**	0.6	*	0.6	*	0.6	*
Formerly			1.2		1.1		1.1		1.1		1.1	
Polygynous *(ref. no)*												
Polygynous			1.6	***	1.6	***	1.8	***	1.7	***	1.8	***
Don't know			1.6	*	1.6	*	1.7	*	1.7	*	1.7	*
Educational level *(ref. <primary)*												
Primary			0.8	***	0.9	***	0.9	***	0.8	***	0.8	***
>Primary			0.5	***	0.5	***	0.5	***	0.4	***	0.5	***
Employment *(ref. not employed)*												

Employed	1.1	***	1.1	***	1.1	***	1.1	***	1.1	***
Ethnicity *(ref. Wolof)*										
Poular	1.0		0.9		0.9	**	0.9	**	0.9	**
Serer	0.9		0.9		0.9	**	0.9	**	0.9	***
Other	1.2	***	1.2	***	1.2	***	1.2	***	1.2	***
Age*number of children										
20-24*nchild			0.5	***	0.5	***	0.5	***	0.5	***
25-29*nchild			0.4	***	0.4	***	0.4	***	0.4	***
30-34*nchild			0.4	***	0.4	***	0.4	***	0.4	***
35-39*nchild			0.4	***	0.4	***	0.4	***	0.4	***
40-44*nchild			0.4	***	0.4	***	0.4	***	0.4	***
45-49*nchild			0.4	***	0.4	***	0.4	***	0.4	***
Household size					1.0	***	1.0	***	1.0	***
Age of household head					1.0	***	1.0	***	1.0	***
Relation to household head *(ref. head)*										
Wife/Co-spouse					1.0				1.0	
Daughter (in law)					0.9				1.0	
Other/Non-relative					1.8	***			1.9	***
Structure *(ref. 1-2 related adults)*										
3+ related adults							0.9	***	0.8	***
Unrelated adults							1.1	*	1.0	*

Note. Significance levels (Sig.). OR: odds ratios; Ref.: Reference category; children: mean living children aged 0-14; Models 1-3: 74,164; Models 4-6: 71,070. *p <0.05. **p <0.01. ***p <0.001. **Source**. DHS Data.

In the second set of models, we examine the effects of mothers' living arrangements on out-fostering, while controlling for their socioeconomic and demographic factors. In Model 4, we control for mean-centered variables for the household size and age of the household head and focus on testing the effect of mothers' relationship to the household head on out-fostering. We find that compared to mothers who are the head of their household, mothers who are other-/nonrelatives of the head of the household are 83 percent more likely to have a nonresident child. Mothers who are daughters or daughters-in-law of the household head have around 10 percent lower odds of out-fostering a child compared to the reference category.

In Model 5, we focus on household structure rather than relationship to the household head, keeping all the controls from Model 4. We observe that mothers living with three or more related adults are less likely to foster out a child than those living with one or two other relatives. No statistically significant effect is observed for women living with nonrelatives compared to the reference group. However, women in this group may also be living with relatives in addition to nonrelatives, which could explain the lack of an effect. Model 6 retains the same controls, but we include both the relationship and household structure variables. We observe that controlling for the relationship to the household head allows us to see the effect of household structure on out-fostering more clearly. We find that women who live with more than two other relatives and those who live with unrelated adults have lower odds of out-fostering.

3.6 Discussion

Using nine rounds of cross-sectional DHS data, this research investigates the stable prevalence of child out-fostering in Senegal over the period of 1986 to 2019, during which nearly one-third of mothers of children aged 0-14 lived apart from at least one of their children. This work extends research by Cotton (2021), by investigating the remarkable stability of out-fostering over time to contribute to a better understanding of the persistent features of the African family systems in the context of broader socioeconomic and demographic dynamics. This paper opens further research avenues for studies of child fostering and differences in long-term trends across and within countries.

The first novel finding of this research is that the stability in child out-fostering is at least partially driven by macro-level demographic factors: Improvements in child mortality counteract fertility decreases; mothers in Senegal face a similar "risk" of out-fostering at the end of their reproductive careers because the number of children available for out-fostering has remained fairly stable over three decades. However, by focusing on mothers' birth cohorts and women's entry into motherhood, we find that women in younger cohorts enter motherhood later than older cohorts and tend to have fewer children.

The prevalence of child out-fostering in Senegal and other sub-Saharan African countries may change in the coming years as they continue their demographic transitions. Socioeconomic transformations and changes in fertility trends have an impact on the number of women who enter motherhood and on the characteristics of mothers. However, the link between such changes and behavior of mothers and families with respect to out-fostering is complex. If fewer women enter motherhood, the absolute number of women who out-foster may change but the prevalence among mothers could remain stable. It has been argued that demographic and socioeconomic changes can threaten the provision of intergenerational support and weaken family networks (Mokomane, 2013). In the absence of welfare state policies and services, this could be detrimental to the well-being of children and families; therefore, more research is needed to understand the interplay between demographic dynamics and out-fostering across and within African countries.

The second key result of our study is that, at the micro-level, the role of demographic factors for the non-coresidence of mothers and biological children is also crucial. Exploratory analysis suggests that middle-aged mothers are particularly likely to have at least one nonresident child and that this effect is positively associated with the number of children a woman has. However, a more nuanced picture emerges when analyzing the effect of the interaction between age and fertility on out-fostering. Whereas the effect of additional children remains pronounced, the youngest mothers are most affected by having additional children: Having more children increases the odds of not living with at least one of them, but the increase across age groups is less pronounced than for younger mothers; however, the difference across age groups in the youngest age group is not statistically significant for the 30-34 age group. Thus, mothers in this age

group may have a similar baseline risk of out-fostering at least one child compared to women in the 15-19 age group. These findings suggest that child out-fostering is driven, at least to some extent, by an interplay of demographic factors and necessity. Mothers who are very young or in their prime working years may already need or want more help with childcare, with additional children contributing positively to this association. Importantly, however, it may not be the number of children that influences the decision to out-foster, but whether that number exceeds the ideal or desired family size (Cotton, 2021; Mason, 2001).

The demographic dynamics are moderated by mothers' individual and household characteristics. Mothers who are less educated, in polygynous unions, or unmarried, who participate in the labor market, and who live in rural areas are more likely to out-foster. Consistent with previous literature on child fostering in Senegal, we find that mothers living in more traditional contexts (*e.g.*, polygynous unions; rural place of residence) are more likely to participate in a traditional practice (Vandermeersch and Chimere-Dan, 2002). Fostering children for human capital accumulation is common (Akresh, 2009; Beck et al., 2015; Serra, 2009) and often reflects rural-urban kinship ties (Eloundou-Enyegue & Stokes, 2002); however, the literature suggests that fostering pathways in sub-Saharan Africa are not as simple as rural-urban but depend on a variety of complex factors (Madhavan et al., 2018), such as kin availability, labor needs, and household resources, among others. We further emphasize that these relationships are not causal and reflect selection effects, for example, into union types.

Nevertheless, our findings suggest that out-fostering is a practice that is highly stratified by education, and that childcare provided by kin or social networks may be particularly relevant for working mothers in the absence of institutional childcare. Research on living arrangements in South Africa (Madhavan & Brooks, 2015) indicates that the presence of kin changes over the life course and that fostering should be conceptualized in the context of kin networks. Due to data limitations, we do not have information on the duration and dynamics of living arrangements for mothers and their children. However, it is likely that changes in living arrangements occur partly in response to labor market conditions and migration, but also in response to union instability and formation. Thus, in line with Madhavan and Brooks (2015), we emphasize the importance of data that allow us to study the temporal aspects of living arrangements and kinship ties beyond the household.

We observe that mothers who are spouses or daughters (in-law) of the household head are as likely to out-foster as mothers who head their own household. This result is consistent with the findings of Beck et al. (2015) who found that female-headed households in Senegal are not more likely to out-foster children compared to other households. However, kin relations are particularly important for single mothers (Clark et al., 2017; Cotton et al., 2022). One possible explanation for our results could be the lack of suitable kin to foster a child for single mothers due to small social networks or economic disadvantages and precarity their kin also face (Cotton et al., 2022). Another, rather simple, explanation could be that headship is a poor

predictor of fostering decisions in the Senegalese context because fostering is common among mothers in different circumstances and is not only a practice driven by need, but also because the relationship between female headship and poverty varies across countries (Milazzo & Van De Walle, 2017) and remains understudied in Senegal (Braithwaite et al., 2020). Still, Senegalese mothers who live alone or with only one other related adult face higher odds of out-fostering compared to mothers who live with multiple related adults or other unrelated adults. This finding raises the question of whether mothers who live with multiple related adults do not out-foster because the relatives who would foster the child already live in the same household (*i.e.*, grandparents).

Our analysis also indicates that mothers who have a non-nuclear relationship with the household head are more likely to foster out a child than mothers who head their own household. Not being part of the household nucleus might increase the pressure on mothers to out-foster a child. Whereas our analysis suggests that household size appears to have a small, albeit statistically significant, effect on out-fostering, we are not able to analyze the reason for living with non- or distant relatives. Possible factors could be mothers' migration status (Cotton & Oduor, 2024) or life course events such as union dissolution (Cotton et al., 2022). A closer examination of mothers who live with people outside their kinship network or with distant relatives, such as in the case of migrant women, could be informative.

Several limitations should be considered when interpreting the results of our analysis. While we identify women who have at least one nonresident child aged 0-14, we do not have information on the living arrangements of the children. It is possible that the children are only temporarily absent, that they live with their biological father, and that the mothers are involved in the life and upbringing of these children. Nonetheless, the number of children residing with only their biological father has remained at around 3 percent of all children in the household roster in the earliest and latest rounds of the DHS in Senegal for which household data are available. In addition, as pointed out by Cotton (2024), some of these children may be attending boarding school or living on their own. In the context of Senegal, a share of boys considered out-fostered in our approach could indeed be living at Koranic schools. Thus, our estimates of child out-fostering may overestimate the prevalence of the practice in Senegal.

Foster care arrangements are diverse (Verhoef & Morelli, 2007), and knowing more about who children live with, where they live, and for how long could provide important insights into child out-fostering and household composition. Income, type of employment, or household wealth are potentially important factors in predicting whether or not women out-foster a child. However, we do not have a comparable variable across surveys to include in our analysis and the available household wealth might differ between the time of the survey and when the decision to out-foster was made. Similarly, several unobserved characteristics are likely to play an important role, such as child characteristics, the availability of nearby kin, and the strength, size, and characteristics of family networks. Finally, as a cross-sectional survey, the DHS

is not ideal for studying processes and relationships over time but to our knowledge, longitudinal data on childcare in Senegal are not available for the period covered by the DHS.

3.7 Conclusion

Overall, we show that declines in fertility and child mortality offset each other, resulting in similar numbers of living children per woman across cohorts that can be fostered out. We also find that beyond the role of commonly identified associations, such as single motherhood or polygyny, household characteristics are important in understanding fostering. Despite the broad macro-level changes that took place in Senegal over the past three decades, maternal characteristics have remained fairly stable, even as households appear to be changing in structure and organization. We find that the postponement of fertility and marriage is likely to contribute to a peak in the prevalence of fostering at later ages and may lead to lower levels of child fostering among younger cohorts. Because we focus on mothers, it is possible that the demographic and socioeconomic changes observed in Senegal are more pronounced in the population as a whole, with implications for social reproduction and organization.

Lastly, it is important to emphasize the diversity of fostering arrangements and the contextual nature of the practice. We aim to highlight the circumstances in which mothers are embedded, such as the composition of the households in which they live, when discussing the motivations and implications of fostering as a social practice. We argue that comparative data and research on the living arrangements of women, children, and families in sub-Saharan Africa over time could be particularly insightful in understanding the persistence of traditional practices, such as child fostering, in changing demographic and socioeconomic contexts. Our findings suggest that demographic factors are important pieces of the puzzle that explain the persistence of child fostering in sub-Saharan Africa in the context of broader changes and they warrant further research attention.

3.8 Appendix

Table A2.1 Characteristics of mothers of at least one child aged 0-14

	1986	1992-1993	1997	2005	2010-2011	2012-2014	2015-2016	2017	2018-2019
Age group									
15-19	7.3	6.4	5.8	5.8	5.3	4.7	4.5	4.4	3.7
	1.2	*1.5*	*1.0*	*1.5*	*1.9*	*1.2*	*1.1*	*1.3*	*0.9*
20-24	20.4	18.2	16.6	17.0	17.5	16.3	15.0	14.5	14.3
	13.6	*10.3*	*8.8*	*8.2*	*9.2*	*8.8*	*6.6*	*7.0*	*7.2*
25-29	24.1	20.7	20.9	20.7	22.1	22.7	23.0	20.6	20.8
	25.1	*20.8*	*22.5*	*20.2*	*20.7*	*21.5*	*21.1*	*19.8*	*19.1*
30-34	19.4	19.0	18.8	19.4	19.3	19.9	20.5	21.7	21.0
	25.8	*26.2*	*25.9*	*25.2*	*24.6*	*25.9*	*25.9*	*26.9*	*26.9*
35-39	14.2	16.9	18.5	15.9	16.8	16.1	16.8	16.5	18.1
	17.5	*21.6*	*22.1*	*20.9*	*21.0*	*19.6*	*23.4*	*20.1*	*21.4*
40-44	7.9	11.9	11.7	12.3	11.8	11.6	12.9	13.5	12.6
	9.6	*13.5*	*12.3*	*14.6*	*15.7*	*14.1*	*14.7*	*15.2*	*14.3*
45-49	6.8	6.8	7.7	8.9	7.2	8.7	7.5	8.8	9.5
	7.2	*6.1*	*7.6*	*9.4*	*7.0*	*8.9*	*7.2*	*9.8*	*10.2*
N. of children	4.5	4.7	4.6	4.2	3.9	3.9	3.8	3.8	3.7
	5.3	*5.6*	*5.4*	*5.1*	*4.9*	*4.8*	*4.8*	*4.8*	*4.7*
Marital status									
Never	3.2	3.9	4.1	1.4	3.7	3.7	2.6	3.4	3.0
	2.9	*2.4*	*2.9*	*0.9*	*3.4*	*3.8*	*2.1*	*3.2*	*2.9*
Currently	91.3	90.9	89.6	92.0	90.6	90.3	91.5	90.5	90.5
	87.4	*90.0*	*89.7*	*88.8*	*88.5*	*87.5*	*89.6*	*88.0*	*87.5*
Formerly	5.5	5.2	6.3	6.6	5.7	6.1	5.9	6.2	6.5
	9.7	*7.7*	*7.5*	*10.3*	*8.1*	*8.7*	*8.3*	*8.8*	*9.7*
Polygynous									
No	47.8	47.3	45.1	54.0	58.5	59.9	62.0	60.5	61.5
	37.3	*39.8*	*36.1*	*41.5*	*45.6*	*47.9*	*51.3*	*46.6*	*49.1*
Yes	43.4	43.2	42.4	36.7	32.1	30.3	29.5	29.8	29.0
	49.8	*49.1*	*51.6*	*46.0*	*42.9*	*39.7*	*38.3*	*41.3*	*38.4*
Don't know	8.8	9.6	12.6	9.3	9.4	9.8	8.5	9.7	9.5
	12.9	*11.2*	*12.3*	*12.5*	*11.5*	*12.5*	*10.4*	*12.1*	*12.6*
Age first union	16.4	16.4	17.3	17.7	18.2	18.6	18.7	19.0	19.1
	16.2	*16.1*	*17.0*	*17.4*	*17.8*	*18.2*	*18.2*	*18.6*	*18.3*
Edu. achievement									
< Primary	82.7	86.8	82.3	87.3	86.5	85.5	83.3	80.0	79.5
	83.6	*89.4*	*85.7*	*89.9*	*90.7*	*91.2*	*89.5*	*86.4*	*87.7*
Primary	11.3	11.9	14.9	11.6	11.7	12.5	14.1	16.5	16.8
	11.8	*9.8*	*13.5*	*9.2*	*8.7*	*8.3*	*9.9*	*11.6*	*10.5*
> Primary	6.0	1.3	2.8	1.2	1.8	2.0	2.6	3.5	3.8
	4.6	*0.8*	*0.8*	*0.9*	*0.6*	*0.5*	*0.6*	*2.1*	*1.9*
Employment									
No	71.2	50.8	36.0	58.3	56.4	48.5	51.9	42.4	45.9
	68.1	*45.5*	*30.3*	*53.3*	*50.6*	*43.0*	*47.0*	*37.9*	*40.5*
Yes	28.8	49.2	64.0	41.7	43.6	51.6	48.1	57.6	54.1

	31.9	*54.5*	*69.7*	*46.7*	*49.4*	*57.0*	*53.0*	*62.1*	*59.5*
Ethnicity									
Wolof	42.2	39.9	38.7	37.4	37.6	39.5	39.7	36.4	40.8
	40.4	*41.4*	*38.1*	*38.1*	*35.5*	*40.3*	*39.3*	*38.1*	*39.9*
Poular	23.0	24.1	25.7	27.3	28.5	29.1	29.6	27.5	28.2
	20.2	*20.1*	*23.4*	*25.4*	*29.5*	*28.3*	*28.7*	*25.6*	*29.4*
Serer	15.0	16.8	14.8	16.4	14.8	13.6	14.8	16.9	13.8
	14.7	*18.3*	*16.2*	*15.2*	*13.9*	*12.5*	*14.0*	*16.5*	*12.7*
Other	19.9	19.2	20.7	19.0	19.2	17.8	15.9	19.2	17.2
	24.6	*20.2*	*22.2*	*21.4*	*21.1*	*18.8*	*18.0*	*19.9*	*18.1*
Observations	3,094	4,285	5,639	8,864	9,689	10,413	10,853	10,295	11,031
	836	*1,184*	*1,435*	*2,364*	*2,273*	*2,749*	*2,717*	*2,611*	*2,825*

Note. In Italics: Mothers with at least one out-fostered/non-resident child below or equal to age 14. **Source**. DHS Data.

Table A2.2 Characteristics of mothers of at least one child aged 0-14

	1986	1992-1993	1997	2005	2010-2011	2012-2014	2015-2016	2017	2018-2019
Place of residence									
Rural	63.83	63.87	61.93	58.09	56.8	55.81	57.19	56.44	56.81
	59.1	*66.3*	*65.3*	*60.4*	*63.4*	*59.9*	*61.9*	*63.4*	*62.7*
Urban	36.2	36.1	38.1	41.9	43.2	44.2	42.8	43.6	43.2
	40.9	*33.7*	*34.7*	*39.6*	*36.6*	*40.2*	*38.1*	*36.7*	*37.3*
Rel. to head									
Head	.	5.1	5.8	7.8	6.9	8.3	9.6	9.2	9.5
	.	*6.8*	*7.6*	*8.7*	*6.6*	*8.2*	*11.6*	*11.1*	*9.3*
Wife/Co-spouse	.	52.2	50.7	44.2	40.3	39.5	38.3	37.0	35.4
	.	*56.2*	*55.2*	*47.2*	*47.2*	*43.9*	*44.4*	*42.6*	*41.6*
Daughter (in law)	.	22.4	24.1	23.2	29.1	26.8	29.3	30.5	32.8
	.	*16.0*	*16.4*	*17.1*	*19.2*	*17.3*	*19.7*	*21.1*	*23.8*
Other/Non-relative	.	20.4	19.4	24.7	23.7	25.5	22.9	23.2	22.3
	.	*21.0*	*20.9*	*26.9*	*27.1*	*30.6*	*24.3*	*25.3*	*25.3*
Sex of head									
Male	.	85.9	82.9	78.4	76.9	73.5	70.7	71.6	70.8
	.	*85.5*	*81.7*	*77.5*	*77.6*	*74.1*	*70.6*	*73.0*	*71.9*
Female	.	14.1	17.1	21.6	23.1	26.5	29.4	28.4	29.2
	.	*14.5*	*18.3*	*22.5*	*22.4*	*25.9*	*29.4*	*27.0*	*28.1*
Age of head	.	51.8	52.4	51.4	52.9	51.9	52.6	53.4	54.6
	.	*51.4*	*51.8*	*51.6*	*52.4*	*51.2*	*51.4*	*52.3*	*54.0*
Household size	.	13.3	13.2	13.0	13.9	13.8	13.2	13.6	13.1
	.	*12.9*	*12.3*	*12.3*	*13.4*	*13.4*	*12.4*	*13.0*	*12.6*
Household structure									
1-2 Rel. adults	.	11.5	11.3	11.3	10.2	11.5	14.2	13.0	13.3
	.	*12.8*	*14.4*	*13.0*	*12.2*	*14.2*	*18.5*	*15.4*	*16.1*
3+ Rel. adults	.	81.6	81.9	35.0	69.4	74.0	76.0	73.8	75.4
	.	*79.1*	*78.8*	*32.6*	*68.7*	*70.9*	*70.5*	*71.1*	*72.9*
Unrelated Adults	.	6.9	6.8	53.7	20.4	14.5	9.8	13.2	11.4
	.	*8.1*	*6.9*	*54.4*	*19.2*	*14.8*	*10.9*	*13.4*	*11.0*

Note. In Italics: Mothers with at least one out-fostered/non-resident child below or equal to age 14. **Source**. DHS Data.

4 School Enrollment and Living Arrangements of Children in Sub-Saharan African

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Abstract

School enrollment has increased in many sub-Saharan African countries over recent decades, alongside substantial socioeconomic and demographic transitions. However, gains in educational enrollment have not been equal, raising questions about the determinants of access to and variability in school enrollment. The living arrangements of children constitute one possible factor associated with this variability. We leverage 60 census samples, provided by IPUMS International, to analyze links between living arrangements and school enrollment for 24 African countries between 1976 and 2019, and explore how these associations have changed across countries and over time. The results suggest that school enrollment among children aged 7-14 increased in all countries, but variability in enrollment by children's living arrangement persists. Children living in households without both of their parents or without their mother face a disadvantage compared to those in households with both parents. Among recent samples, living in households with a mother only is associated with higher school enrollment in around two-thirds of countries, even when controlling for individual and household characteristics. The persistent heterogeneity in children's school enrollment across households demands further attention to better understand the links between family and developmental processes, and to inform policies aiming to increase children's school enrollment.

4.1 Introduction

This study aims to explore and compare links between school enrollment and children's living arrangements across African countries and over time. The expansion of school enrollment in many sub-Saharan African countries has, despite improvements, not been equal (Eloundou-Enyegue et al., 2020; Lewin, 2009; Lewin & Sabates, 2012; Moja, 2020), raising questions about determinants of variability in school enrollment in the context of educational expansion. Research from high-income countries highlights the importance of household and family influences for child outcomes (McLanahan & Percheski, 2008; Sweeney, 2007). However, in the African context, the household environment and children's living arrangements tend to be more diverse compared to other world regions due to relatively high levels of adult mortality, linked for instance to HIV/AIDS among other things, migration, union dissolution and re-partnering, and well-established foster systems (Adjiwanou et al., 2021; Cotton, 2021; Cotton & Oduor, 2024; Evans et al., 2022; Hampshire et al., 2015). Thus, the links between living arrangements and variation in school enrollment demand further research attention.

An existing body of literature focuses on examining links between parental absence, orphanhood, and the educational outcomes of children in sub-Saharan Africa (Akwara et al., 2010; Beegle et al., 2006; Beegle, Filmer, et al., 2010; Case et al., 2004; Case & Ardington, 2006; Evans & Miguel, 2007; Hampshire et al., 2015; Monasch & Boerma, 2004), yet less literature has explored associations between children's household environment and school outcomes within changing educational contexts. The studies that have been conducted, tend to focus on individual countries, such as Cameroon (Eloundou-Enyegue & Williams, 2006), Burkina Faso (Gnoumou et al., 2013), Malawi (Carling & Tønnessen, 2013; Chae, 2016), Senegal (Crespin-Boucaud & Hotte, 2021), South Africa (Chuong & Operario, 2012; Townsend et al., 2002), and Tanzania (Gaydosh, 2015, 2017), or on specific dimensions of the household context, such as stepfamilies (Adjiwanou et al., 2021).

We describe and explore changes in school enrollment within countries and differences across countries based on 60 census samples for 24 African countries, provided by IPUMS-International (Ruggles et al., 2025). We then analyze associations between living arrangements and school enrollment of children aged 7-14 covering four decades, from 1976 to 2019. We further explore how associations between living arrangements and school enrollment have changed over time and differ between countries. We aim to answer the following questions: (1) *What are the links between children's living arrangements and school enrollment in sub-Saharan Africa?*; (2) *How do these links differ across countries?*; and (3) *How have these links changed over time?* We distinguish between four distinct living arrangements of children: living with both parents; living with the biological mother only; living with the biological father only; and living in a household without biological parents.

With this article, we make two core contributions to the literature. The first contribution lies in the scope of the comparative analysis: we cover a vast number of countries and analyze changes over time, thus adding a long-term comparative perspective to an existing body of literature that tends to focus on individual countries or on the most recent available survey data to study living arrangements and school enrollment. The second contribution is the emphasis on different children's living arrangements, thereby broadening research focusing on the impact of specific groups, such as orphans, or events, such as parental divorce, on school enrollment. While these contributions are relevant from research and policy perspectives, we provide a descriptive overview of links between living arrangements and school enrollment and explore how this relationship might have changed over time, to better understand how living arrangements are associated with the creation of future generations' human capital. Improved understanding of this relationship can contribute to the development of context-specific theories on these associations and form a starting point for further research on the role of living arrangements in the expansion of education in sub-Saharan Africa.

4.2 Background

4.2.1 School enrollment in sub-Saharan Africa

In recent decades, the majority of sub-Saharan African countries witnessed a vast educational expansion, alongside socio-economic and demographic transitions. Gains in school enrollment, however, have not been equal, raising questions about variability in school enrollment in the African contexts (Eloundou-Enyegue et al., 2020; Lewin, 2009; Moja, 2020). Changes in school enrollment within countries and over time differ, driven in part by heterogeneity and inequalities in educational opportunities of children (Kakuba & Golaz, 2023; Lloyd & Hewett, 2009; Temitope Obasuyi & Rasiah, 2019; Tshabangu, 2018; Zoch, 2015). Among the many children in sub-Saharan Africa who do not attend school, some never enroll in primary education, whereas others do not complete primary school, as expansion in first grade enrollment is not followed by enrollment increases in successive grades (Akyeampong, 2009; Lewin, 2009). Estimates suggest a low primary adjusted net school enrollment rate of children in sub-Saharan Africa of 79 percent in 2018 and an even lower primary completion rate of 61 percent (UNESCO Institute for Statistics, 2022). Thus, many African countries are not on track to reach the 2030 Sustainable Development Goals' (SDGs) target of primary education for all children (Fredriksen, 2022; UN DESA, 2024) and enrollment in secondary education remains low in many countries (UNESCO Institute for Statistics, 2019).

Education is necessary for the development of human capital and associated with economic development and productivity (Hannum & Buchmann, 2005; Lutz et al., 2008, 2019). Addressing educational inequalities can boost social mobility and access to opportunities (Azomahou & Yitbarek, 2021), whereas the failure to address such inequalities might keep welfare and economic development low (Temitope Obasuyi & Rasiah, 2019). However, despite international initiatives related to the SDGs, countries in sub-Saharan Africa face substantial challenges to reaching universal (primary) education (Bennell, 2002). Colonial rule left many countries with low rates of school enrollment, even compared to other developing countries (Fredriksen,

2022). Uneven economic growth, persistent poverty, economic crises, political turmoil, rapid population growth, urbanization decoupled from industrialization, and environmental vulnerabilities have added substantial challenges (Cleland & Machiyama, 2017; Hoeffler, 2019; Juju et al., 2020; Serdeczny et al., 2017; Tabutin & Schoumaker, 2004). These challenges, as well as the destruction of public infrastructure and educational systems due to wars and conflicts, can limit educational attendance (Lewin, 2009) and exacerbate inequalities in the educational access and attainment of African youths (Moja, 2020).

Challenges related to achieving universal school enrollment have been extensively studied from macro-level perspectives, yet less research has focused on exploring how the living arrangements of children are linked to variation in school enrollment over time and between countries. However, household characteristics in low- and middle-income countries are often crucial in determining educational access and opportunities for children (Lewin & Sabates, 2012). For instance, public spending on education, which depends on economic factors, tends to be severely constrained in low-and middle-income countries. Consequently, education poses a higher relative economic burden on governmental budgets and on private households, which spend more on education compared to high-income countries (Fredriksen, 2022; Lewin, 2009). The household environment, and living arrangements in particular, might be an overlooked dimension in the literature exploring variation in school enrollment. Living arrangements and family structures of children might reflect factors that contribute to heterogeneity in school enrollment, such as economic inequalities and social relations (Adjiwanou et al., 2021; Beegle, De Weerdt, et al., 2010; Chae, 2016; McLanahan & Percheski, 2008).

4.2.2 Living arrangements of children in sub-Saharan Africa

Historically, children's living arrangements in Africa are diverse (Adjiwanou et al., 2021). Households in sub-Saharan Africa are, on average, larger and have a more complex composition than households in other world regions (Esteve et al., 2024), although their characteristics, such as size and composition, differ across and within countries (Pohl, Esteve, et al., 2025). Globally, families, households, and living arrangements have undergone substantial changes, reflecting demographic, social, political, and economic developments (Esteve et al., 2024; Esteve & Reher, 2024; Pesando & GFC team, 2019). These developments have been accompanied by shifts in values and behaviors that shape the family environment in which children grow up, such as increases in cohabitation, nonmarital childbearing, and union dissolution (Cherlin, 2012; Lesthaeghe, 2020; Pesando & GFC team, 2019). Various distinct family systems and historic and socio-economic contexts further contribute to the continued heterogeneity in households and families (Cherlin, 2012; Furstenberg, 2019; Therborn, 2004). In other words, the diversity in household and family characteristics makes it pertinent to examine the implications of this heterogeneity on dimensions of well-being, such as children's human capital accumulation.

The living arrangements of children in Africa are shaped by a well-established fosterage system (Akresh, 2009; Bachan, 2014; Cotton et al., 2022; Isiugo-Abanihe, 1985; Lloyd & Desai, 1992; Madhavan, 2004), relatively high prevalence of orphanhood (Beegle, Filmer, et al., 2010; Case et al., 2004; Chuong & Operario, 2012), internal and international migration patterns that might cause parental absence (Cotton & Oduor, 2024; Townsend et al., 2002), and by frequent divorce and repartnering (Clark & Brauner-Otto, 2015; Crespin-Boucaud & Hotte, 2021; Lloyd & Blanc, 1996), although these dynamics and their influence on children's living arrangements differ across countries. While aspects of family systems and their links with children's lived realities are context-dependent and can differ over time, existing literature highlights that many children in sub-Saharan Africa do not reside with their biological parents or live in a household with only one biological parent present (Cotton, 2021). For instance, an analysis of data from Tanzania suggests that parental absence is common even among children born into two-parent households, with 25 and 40 percent of these children experiencing maternal or paternal absence, respectively, by age 10. Among children born to single mothers, more than two-thirds experience maternal absence. Parental absences may be driven by marriage patterns, migration, and parental death (Gaydosh, 2015).

Many children who reside without their parents, either due to voluntary fostering decisions or familial crises, such as the death of one or both parents, are fostered by kin or nonrelatives. Such fostering arrangements are a longstanding pillar of the African kinship system, yet fostering prevalence varies across countries. A recent analysis of DHS data from 36 countries shows that fostering is most common in Namibia, where 45.7 percent of mothers report not living with at least one of their children aged 0-15, and with 11.5 percent being the least common in Burundi (Cotton, 2021). Moreover, the analysis suggests that fostering levels have remained stable over time. Similarly, an analysis by Pohl et al. (Pohl, Batyra, et al., 2025) highlights that out-fostering prevalence among Senegalese mothers remained stable over time. Hence, despite broad demographic, social, and economic changes, fostering remains a common practice among mothers and many children are raised and cared for by people other than their biological parents (Beck et al., 2015; Cotton, 2021; Evans et al., 2022; Madhavan, 2004).

Children might reside without either or both parents because of parental migration; however, data on the prevalence of children living in migrant families are scarce. It is estimated that these arrangements are quite common, with nongovernmental reports suggesting that in some sub-Saharan African countries around one-quarter of children are part of a transnational family, meaning at least one of their parents resides abroad (Mazzucato & Schans, 2011). Caarls et al. (2018) highlight that migration literature tends to focus on men and paternal absence, yet already in the 1960s, female migrants accounted for nearly 50 percent of international migrants and migration among women has since increased. In addition to international migration, internal migration is common in many African countries (Cebotari & Mazzucato, 2016). Migration decisions in the African context are supported by notions of family and kinship extending beyond

the household, with shared responsibilities for children (Cebotari & Mazzucato, 2016; Mazzucato & Cebotari, 2017; Mazzucato et al., 2015).

Parental absence in sub-Saharan African households has also been linked to family systems in which marriage, divorce, and repartnering are relatively common (Clark & Brauner-Otto, 2015; Crespin-Boucaud & Hotte, 2021), and polygyny is persistently prevalent in some countries (Somefun et al., 2025), thus contributing to fluid or stretched family arrangements across multiple households (Adjiwanou et al., 2021; Gaydosh, 2015; Mazzucato & Schans, 2011). An analysis of union dissolution for 33 sub-Saharan African countries suggests that, on average, around 25 percent of unions will end in divorce and 8 percent of unions will end due to spousal death 15-19 years after first union (Clark & Brauner-Otto, 2015). The analysis further estimates that the vast majority of women - over 85 percent - experience union dissolution while having a child younger than age 15, hence a substantial number of children will experience a period of coresidence with only one biological parent. This is in line with the finding that up to half of all women in the region might experience single motherhood due to divorce and widowhood (Clark and Hamplová, 2013). Living arrangements, family composition, social and legal norms surrounding union formation and dissolution, as well as the meanings of marriage are diverse and differ across countries in the region (Clark & Brauner-Otto, 2015; Cotton, 2021; Crespin-Boucaud & Hotte, 2021). Some partnership practices have been outlined as distinct to the African context (Somefun et al., 2025) and other aspects, such as kinship ties have been identified as a shared feature among family systems across Africa (Therborn, 2004).

African kinship systems differ with respect to lineage and locality, with patrilineal kinship prevailing among most ethnic groups, despite matrilineal kinship in parts of sub-Saharan Africa (Grant & Yeatman, 2014; Lowes, 2022). Historically, matrilineal ethnic groups in Africa are primarily present in what is sometimes referred to as the "matrilineal belt," a stretch of matrilineal groups across the region from Angola to Tanzania but is also found in other African countries (Lowes, 2022). In patrilineal societies, children belong to their paternal family and patrilocal residence norms prevail for couples, whereas in matrilineal societies residence might be matrilocal, although the boundaries are not always easy to distinguish (Grant & Yeatman, 2014; Lowes, 2022), different practices might exist within ethnic groups (Clark & Brauner-Otto, 2015), and even in some patrilineal societies, children tend to reside with their mother after a divorce (Grant & Yeatman, 2014). As divorce is common in most African societies, many children in sub-Saharan Africa might at least temporarily live in a mother-only household. Since divorce might be higher in African matrilineal societies, compared to patrilineal societies, and divorce rates declining (Clark & Brauner-Otto, 2015), such patterns likely vary across countries and over time.

While remarriage in sub-Saharan Africa is generally common, less than 5 percent of children reside in a household with a stepfather (Adjiwanou et al., 2021). The low prevalence of step-family arrangements, but also of children residing with only their biological fathers if their mothers are alive (Beegle, Filmer, et al.,

2010; McDaniel and Zulu, 1996), might be linked to fostering practices and decisions to out-foster children once a new union is formed. Union formation in the African context can be complex (Somefun et al., 2025) and might be a process rather than a point in time (Hertrich, 2017; Meekers, 1992). Moreover, premarital and nonmarital childbearing are common and can be linked to (temporary) parental absence (Gaydosh, 2015). Single motherhood and polygyny in some contexts might be positively associated with out-fostering (Pohl, Batyra, et al., 2025). Thus, children who experience the death of a parent, are born into a polygynous union, or to a single or divorced mother might reside in a household without either parent.

4.2.3 The role of living arrangements for school enrollment of children in sub-Saharan Africa

The household provides the immediate context of socialization for children and influences the human capital accumulation of children through resource allocation among household members (Esteve et al., 2025). The literature further suggests that living arrangements matter for child outcomes, such as school enrollment (Adjiwanou et al., 2021; Chae, 2016; Esteve et al., 2025; Lewin & Sabates, 2012; McLanahan & Percheski, 2008). As outlined by Adjiwanou et al. (2021), different models and theories emphasize various underlying mechanisms to explain differences in child outcomes across family forms and living arrangements. Research from developed countries, for instance, explores resource availability (McLanahan & Percheski, 2008), repartnering of parents (Sweeney, 2010), and intrafamily instability and conflicts (Osborne & McLanahan, 2007), as explanatory factors. In the African context, a sizable body of research focuses on variability in school outcomes due to orphanhood, child fostering, or parental divorce (Adjiwanou et al., 2021; Beegle, De Weerdt, et al., 2010; Chae, 2016; Crespin-Boucaud & Hotte, 2021; Hampshire et al., 2015). In the following section, we provide an overview of research on determinants of variations in school enrollment and possible individual- and household-level moderators of these relationships. This literature guides our analytical approach, although we do not test for mechanisms or determinants in this study.

Within countries, child outcomes might vary across living arrangements of children due to differences in the availability and distribution of resources within the household (Gaydosh, 2017; Lloyd & Desai, 1992; Van De Walle, 2013). Households with two biological parents often have more resources available than households with single parents. Biological parents might also have more incentives to invest into the human capital accumulation of their children compared to more distant or nonrelatives, as suggested by kin selection theory (Adjiwanou et al., 2021; Case et al., 2004; Lopus, 2017). Thus, children living in households with both biological parents present might fare better in terms of educational outcomes, such as school enrollment, compared to those living in a household with only one or neither biological parent. Children living with only one parent, might face lower school enrollment compared to children living with both their parents due to possible negative socio-economic effects of the events that lead to the absence of either parent, such as union dissolution, death of a parent, or parental migration. Nonetheless, the possible links between these events and child outcomes are complex and shaped by individual and contextual factors.

Parental separation and repartnering can further contribute to the establishment of blended families, and in the context of many sub-Saharan African countries, might take place within a polygynous family. On the one hand, remarriages might involve living with children from prior relationships, which can increase the overall number of children, dilute the resources available to children, and heighten intrahousehold resource competition (Adjiwanou et al., 2021). On the other hand, (re)marriage might provide increased resource access (Crespin-Boucaud & Hotte, 2021). Households with only one parent present might also be indicative of a migrant parent supporting the family (Carling & Tønnessen, 2013) and the educational attainment of children in the household.

Given the well-established fosterage system and the shared social responsibility among kin to rear children, the links between parental absence and educational enrollment in the African context are not straightforward. Children are at times out-fostered to gain access to educational opportunities or improve well-being (Akresh, 2009; Bachan, 2014; Serra, 2009), thus living in a household without parents could be linked to higher school enrollment compared to other living arrangements. However, children are also out-fostered following crises associated with parental death or union dissolution, which could negatively affect child outcomes. Existing research on the impacts of fostering suggests that the effects on child outcomes are shaped by selection effects among the sending and receiving households, the individual characteristics of children, the fostering arrangement, and the circumstances that motivate fostering decisions (Beck et al., 2015; Beegle, Filmer, et al., 2010; Case et al., 2004; Hedges et al., 2019; Lachaud et al., 2014; Madhavan, 2004; Townsend et al., 2002). Since we do not control for selection effects into specific foster arrangements, we expect children living without parents to fare worse in terms of school enrollment compared to children living with both biological parents.

Across countries, variation in school enrollment is linked to a complex interplay of social, economic, demographic, historical, and political factors. However, as education expands and more children are enrolled in school, variation in school enrollment by living arrangement might decline and living arrangements might already be less important for educational outcomes in countries with high school enrollment compared to countries with low school enrollment, where household factors, such as resource availability, play a bigger role. Thus, we anticipate the relationship between living arrangements and school enrollment to vary over time: if enrollment increases, we anticipate lower intracountry variation in school attendance. We further expect to see cross-country variation in the links between children's living arrangements and school enrollment due differences in the prevalence of different household structures. In countries, such as Namibia, where fostering and single-motherhood are common (Cotton, 2021; C. O. Odimegwu et al., 2017), such households are likely to be more socially accepted compared to societies with a strong prevalence of living with both biological parents. Thus, in the latter countries, we anticipate negative selection into single-parent households and households without parents, and increased variation

in school enrollment by living arrangement. In other words, we predict greater differences in school enrollment by living arrangement in countries with homogenous household structures.

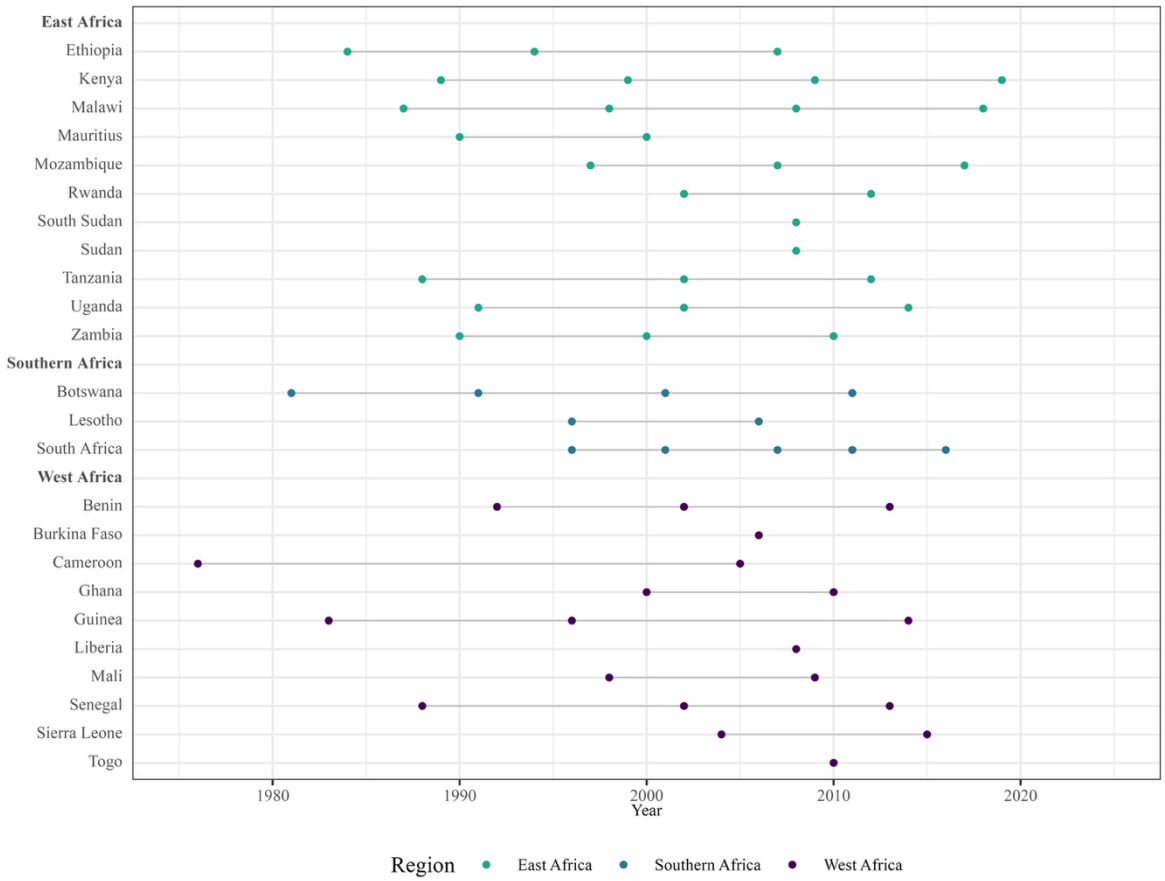
On the individual level, several factors can moderate the relationship between children's living arrangements and educational outcomes, such as age and gender, and household characteristics, such as size and composition (Adjiwanou et al., 2021). On the individual-level, we expect that older children are more likely not to attend school, as primary enrollment exceeds secondary enrollment (UNESCO Institute for Statistics, 2019). Male school enrollment tends to exceed female enrollment; therefore, gender might moderate the relationship between living arrangements and school enrollment. Additionally, children's place of residence might be linked to their school enrollment. In urban areas, access to educational opportunities and resources might be higher, which could positively impact school enrollment; however, urban areas might also disconnect vulnerable parents from their rural kin networks and reduce physical, emotional, and financial help they receive, thus negatively impacting parents' ability to enroll children in school (Adjiwanou et al., 2021).

On the household level, household size and composition can impact children's school enrollment. Households with more children might face difficulties in providing educational access to all children due to resource constraints and dilution, although these relationships differ across contexts and over time (Eloundou-Enyegue & Williams, 2006). Educational attainment and labor force participation among adults can be indicators of household wealth, especially in many sub-Saharan African countries where educational inequalities among the adult population are high, many people participate in the informal labor market, and parental socioeconomic status is linked to children's social mobility (Leibbrandt et al., 2025). Lastly, the age of the household head can be an indicator of a multigenerational household with an older decision maker, who might not emphasize children's educational attainment. Yet, an older household head can also indicate the presence of a grandparent, which can be positively associated with child outcomes (Schrijner & Smits, 2018; Sear et al., 2002).

4.3 Data and methods

We use 60 census samples obtained from the Integrated Public Use of Microdata Series (IPUMS International) for 24 African countries, covering the time span from 1976 to 2019. Figure 3.1 provides an overview of samples included in the analysis, by country and continental subregion. Countries are grouped according to the geoscheme of the United Nations, with the exception of Cameroon (Central Africa) and Sudan (North Africa), which were included in the geographically closest available group. For Burkina Faso, Liberia, Togo, Sudan, and South Sudan only one census sample was available for analysis.

Figure 3.1 Overview of census samples included in the analysis



Source. IPUMS International.

We included samples in the analysis for which information on children's school enrollment was collected in the census and that provided comparable information about individual-level and household-level characteristics that would be needed as controls in the analysis. In addition to school enrollment, samples needed to provide information about age, sex, and parental line numbers, educational attainment, labor force participation, and urban-rural status. However, for Botswana (1981; 2001; 2011), Cameroon (1976), Senegal (1988), Tanzania (1988), and Zambia (2010), no distinction could be made between urban and rural areas. For Botswana (1981), Ethiopia (1984; 1994), and South Africa (2016) information about household residents' labor market participation was not available. For Ethiopia (2007) only respondents who provided answers to the long form census questionnaire were included in the analysis. Most census samples included in the analysis are self-weighting with an expansion factor of 10; however, others require the use of weights. To account for weights and expansion factors, we conducted the analysis using the survey package in R (Lumley, 2023).

We restrict the analysis to households with at least one child aged 7-14. We deliberately set a relatively high lower bound (7 years) because the mandatory starting age for children in sub-Saharan Africa varies across countries and subsequently, the comparability of enrollment levels could be affected when including

younger children. We set the upper limit at age 14 to avoid heterogeneity arising from cross-country differences in the timing of school leaving and in the transition to work and adulthood. Table 3.1 provides an overview of the available sample of children aged 7-14 in each country, grouped by continental regions. The table further shows the proportion of children enrolled in school among the sample. A full sample overview can be found in the Appendix (Appendix Tables A3.1-A3.4).

Table 3.1 Sample overview

Country	Year	Number of children	School enrollment (%)	Country	Year	Number of children	School enrollment (%)
East Africa				**Southern Africa**			
Ethiopia	2007	285,513	38.4	Botswana	2011	32,326	95.2
	1994	1,159,544	15.1		2001	33,378	90.8
	1984	714,126	32.2		1991	29,661	83.2
Kenya	2019	994,345	89.8		1981	16,289	71.7
	2009	813,130	88.1	Lesotho	2006	32,872	89.3
	1999	315,330	81.5		1996	39,252	74.0
	1989	249,190	80.9	South Africa	2016	499,381	96.8
Malawi	2018	408,405	81.1		2011	608,276	94.6
	2008	273,862	74.6		2007	160,232	95.7
	1998	198,039	71.5		2001	661,492	93.9
	1987	171,749	38.1		1996	538,840	88.9
Mauritius	2000	16,149	94.8	**West Africa**			
	1990	17,947	85.7	Benin	2013	212,985	70.2
Mozambique	2017	590,846	62.4		2002	125,813	59.8
	2007	410,924	72.1		1992	99,657	36.2
	1997	296,433	47.3	Burkina Faso	2006	274,506	43.4
Rwanda	2012	210,822	92.2	Cameroon	2005	334,984	76.7
	2002	167,071	65.7		1976	121,769	69.5
South Sudan	2008	120,767	33.8	Ghana	2010	448,729	90.5
Sudan	2008	1,070,934	65.1		2000	384,856	69.5
Tanzania	2012	982,589	80.9	Guinea	2014	205,246	53.4
	2002	791,312	69.7		1996	138,325	42.6
	1988	498,270	51.2		1983	75,142	32.2
Uganda	2014	783,270	89.2	Liberia	2008	68,587	67.6
	2002	569,205	86.4	Mali	2009	295,787	50.6
	1991	325,197	64.9		1998	190,303	32.5
Zambia	2010	283,252	72.8	Senegal	2013	242,225	66.5
	2000	171,524	62.1		2002	209,336	52.4
	1990	170,409	57.2		1988	143,897	42.3
				Sierra Leone	2015	147,317	76.0
					2004	95,454	73.9
				Togo	2010	119,717	83.7

Note. School enrollment estimates are weighted using person weights provided by IPUMS. Countries are grouped according to the geoscheme of the United Nations, except Cameroon (Central Africa) and Sudan (North Africa), which were included in the geographically closest available group. **Source**. IPUMS International.

For each child we categorize the living arrangement based on the information about parental survival and the parental location in the household roster or their absence from the household. We grouped children into four living arrangements: (1) living with both biological parents; (2) living with the biological mother only; (3) living with the biological father only; and (4) living with neither parent. Other household members may or may not be present but are not considered for the categorization of living arrangements, which focuses on the presence or absence of biological parents. The four living arrangements form the basis for the analysis of living arrangements of children by country and over time. We further created a binary variable coded 0 for children not enrolled and 1 for children enrolled in school.

To analyze the association between school enrollment and living arrangements of children, we estimate two sets of logistic regression models: one set of models separately for each sample and one set of models pooling samples for each country. Within the models, we include the categories of children's living arrangement as the main predictor variable, with living with both biological parents forming the reference category. On the individual level, we control for age in 2-year age groups (7-8, 9-10, 11-12, 13-14) and sex (male; female). We further control for additional household characteristics. We consider the urban-rural status; the mean-centered number of children aged 0-14 in the household, the educational attainment of the household head as a categorical variable (low/unknown, medium, high); the number of adults participating in the labor force as a categorical variable (0, 1, 2, 3+); and the age of the household head as a binary variable (<60, 60+). For the second set of models, we choose countries with at least two samples available and include a categorical control for the decade of the census sample (1970, 1980, 1990, 2000, 2010) and an interaction between time and living arrangement.

In addition to clustering at the household level when estimating standard errors, we conducted robustness checks to account for the fact that multiple children from the same household can be included in the analysis. We estimated models using only individual-level characteristics and models randomly selecting one child per household (Appendix Figures A3.5 and A3.6). However, the robustness checks did not reveal any substantial issues including several children from one household. We conducted checks using alternative control variables, such as mean-centered household size rather than the number of children in the household, and the highest education of the household head rather than any household member but this did not improve the model fit. We further estimated models for the most recent sample of each country for children residing only with the biological mother to control by maternal marital status and to examine links between remarriage or a potential migrant father on school enrollment (Appendix Figure A3.9).

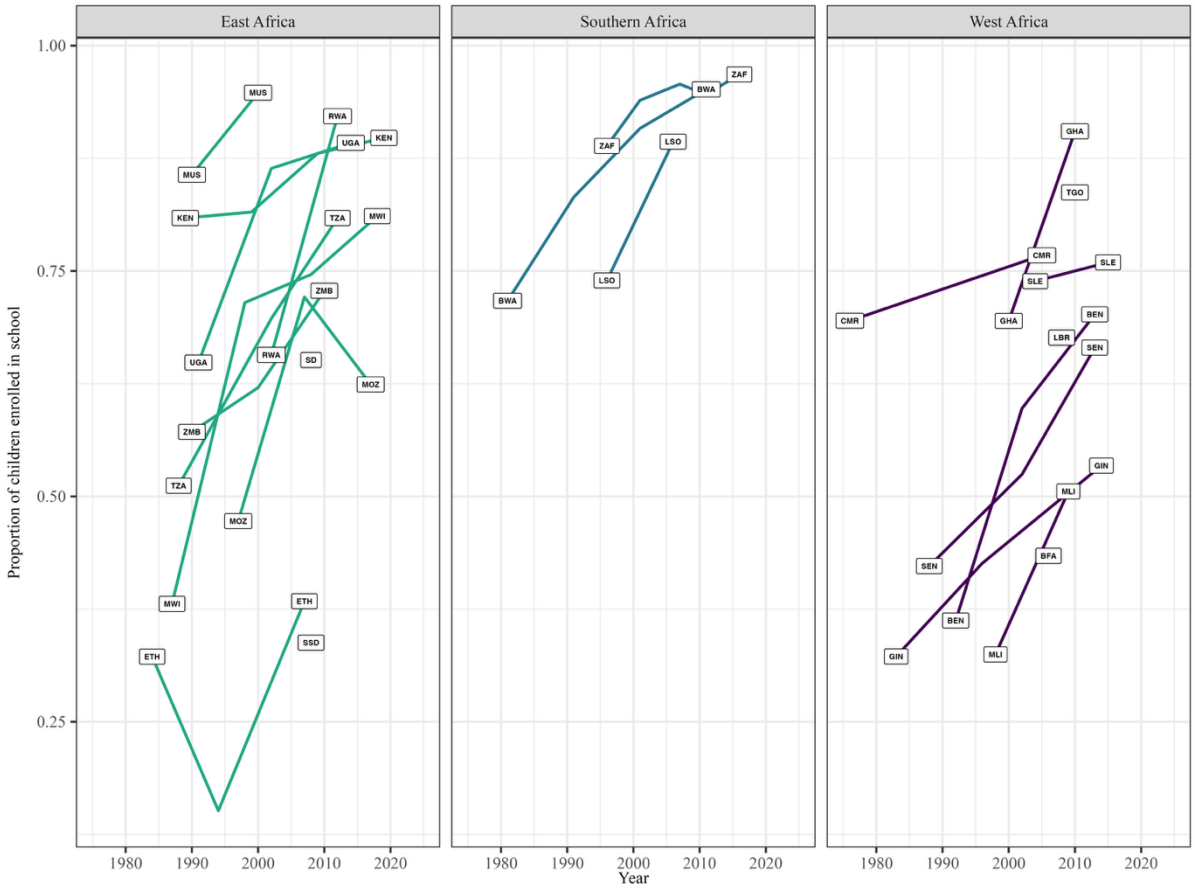
4.4 Results

4.4.1 School enrollment

Figure 3.2 highlights increasing school enrollment of children over time; however, differences emerge across countries. School enrollment is highest among Southern African countries with school

enrollment differences of around 8 percentage points in the most recent sample. Among East African countries, school enrollment is highest in the 2000 sample for Mauritius, with 95 percent of children aged 7-14 being enrolled in school, followed by Rwanda (92 percent, 2012) and Kenya (90 percent, 2019). In Mauritius, school enrollment among children exceeded 85 percent in 1990, while only 66 percent of Rwandan children and 81 percent of Kenyan children were enrolled in school in 2002 and 1989, respectively. For earlier East African samples, school enrollment was lowest in Ethiopia, Mozambique, and Malawi.

Figure 3.2 School enrollment of children aged 7-14 over time by country and continental region



Note. Countries with only one observation are not shown in the figure but the proportion of children enrolled in school can be found in Tables A3.1 and A3.2 in the Appendix. Colors indicate sub-continental regions: East Africa (green), South Africa (blue), and West Africa (purple). **Source**. IPUMS International.

Among the most recent samples, Ethiopia continues to remain at the bottom of the distribution of countries, with a 6-percentage point increase between the 1984 and 2007 census samples, from 32 percent to 38 percent of children enrolled in school. The increase was more pronounced in Mozambique, with a 15 percentage points increase over 20 years, from less than 50 percent of children enrolled in school in 1997 to 62 percent in 2017. Yet, school enrollment in Mozambique remains comparatively low. Malawi, however,

witnessed one of the largest expansions in school enrollment, with an increase of 43 percentage points, from 38 percent of children to 81 percent between 1987 and 2018.

In West Africa, school enrollment of children aged 7-14 remains lower on average compared to countries in East and Southern Africa. In this group, school enrollment is highest in Ghana (2010), with 90 percent of children enrolled in school, representing an increase of 21 percentage points over one decade. However, in all other West African countries recent school enrollment remains below 80 percent and below 60 percent in Guinea (2014) and Mali (2008). Benin, Senegal, Guinea, and Mali witnessed increases in school enrollment of 34, 24, 21, and 18 percentage points between the earliest and latest samples, respectively. Overall, significant gains in enrollment were made in several countries with low enrollment rates in earlier samples, while others experienced minor enrollment increases. Yet, given the population growth over the observed time periods, achieving rather modest increases in the proportion of children enrolled in school represents vast increases in enrollment in absolute numbers of children.

4.4.2 Living arrangements of children

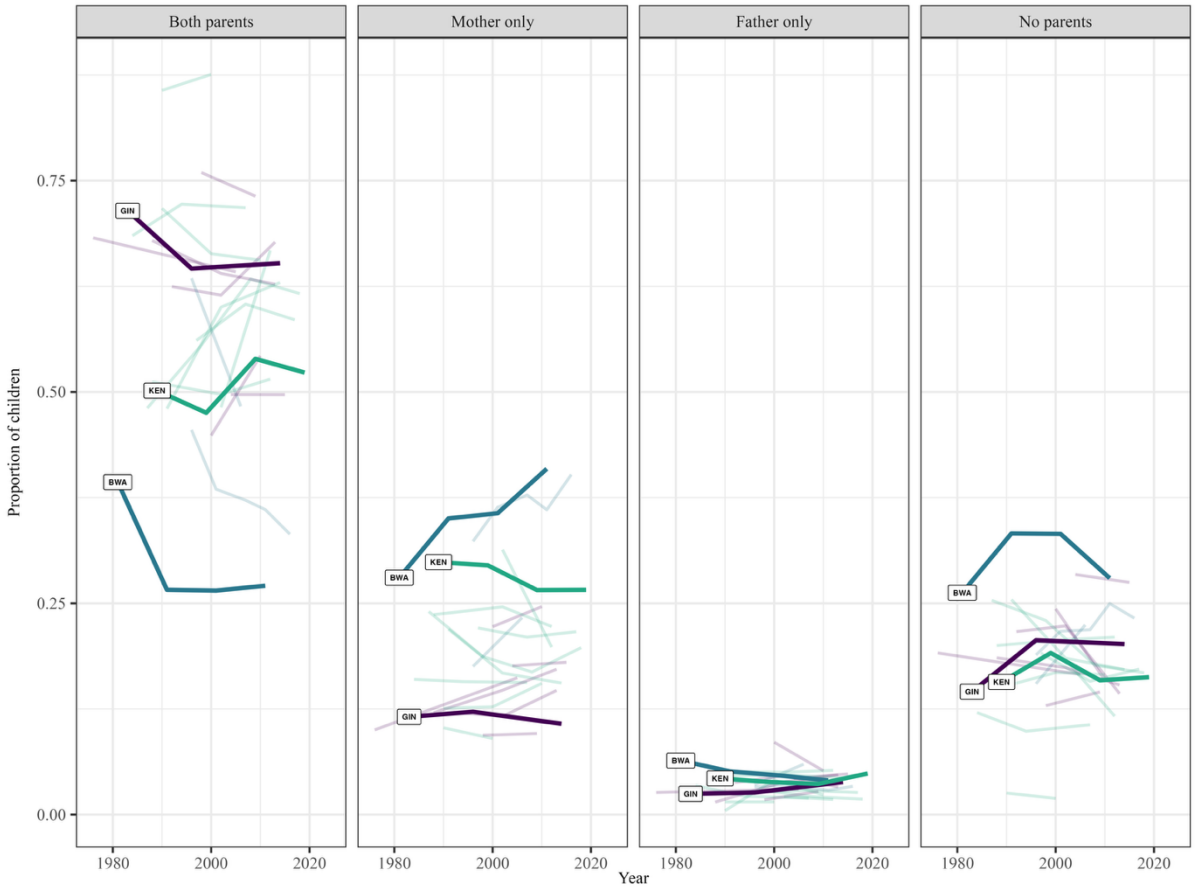
Figure 3.3 provides an overview of living arrangements of children aged 7-14 by country. We focus on four distinct types of living arrangements: (1) living with both biological parents; (2) living with the biological mother only; (3) living in households with the biological father only; and (4) living in households without biological parents. For each continental group, we highlight one country for which we observe at least 30 years: Kenya in East Africa, Botswana in Southern Africa, and Guinea in West Africa.

Across countries, we observe that in the majority of countries around or above 50 percent of children reside with both biological parents. In Kenya, the proportion of children in the group has remained relatively stable, but a few East African countries exhibit slight increases. In 1989, 50 percent of children in Kenya resided in a household with both biological parents, compared to 52 percent in 2019. In Botswana, 39 percent of children resided with both biological parents in 1981, compared to 27 percent in the most recent sample. This decrease is in line with a decline in the proportion of children residing in households with both biological parents across all Southern African countries over time. In Guinea, the share of children residing with both parents declined from 71 percent in 1983 to 65 percent in 2014. However, while there is stability in living with both parents among most countries in East and West Africa, we observe substantial heterogeneity in the proportion of children in this living arrangement, ranging from 0.88 (Mauritius, 2000) to around 0.27 (Botswana, 2001).

The share of children in Kenya living with their mother only, their father only, or without either parent is 27 percent, 5 percent, and 16 percent in 2019, respectively, with little or no change compared to the earliest available sample. For the most part, the proportion of children in each of these living arrangements has remained remarkably stable over time. Fewer than or equal to 5 percent of children in any East African

country reside in households with only their biological father present. We do not observe an increase in children residing only with their mother but emphasize the stability of children residing without either parent over time. In all three Southern African countries, the proportion of children living with their mother only or without parents increased, reaching 41 percent in Botswana in 2011. Similar to East African countries, few children in Southern African countries reside in households with only their biological father.

Figure 3.3 Living arrangements of children aged 7-14 by country and continental region



Note. Countries with only one observation are not shown in the figure but the proportion of children in each living arrangement can be found in Tables A 3.1 and A 3.2 in the Appendix. Colors indicate sub-continental regions: East Africa (green), South Africa (blue), and West Africa (purple). **Source**. IPUMS International.

All countries in West Africa experience slight increases or stability in the proportion of children residing with the mother only, as exemplified by Guinea where 11 percent of children in 2014 and 12 percent in 1983 resided only with their mother. Children not residing with either parent are common in many West African countries. Several countries experienced an increase in this living arrangement, as highlighted by the 5-percentage point increase in Guinea between 1983 and 2014, although increases are not uniform and some West African countries experienced decreases in the proportion of children not residing with either parent. We note substantial differences in the living arrangements of children between countries but on the country-level we observe stability in the prevalence of different living arrangements for children, despite

vast demographic and socio-economic transformations. Given the educational expansion witnessed in many of the countries included in the analysis, the associations between living arrangements and educational enrollment might have changed over time.

4.4.3 Links between school enrollment and living arrangements of children

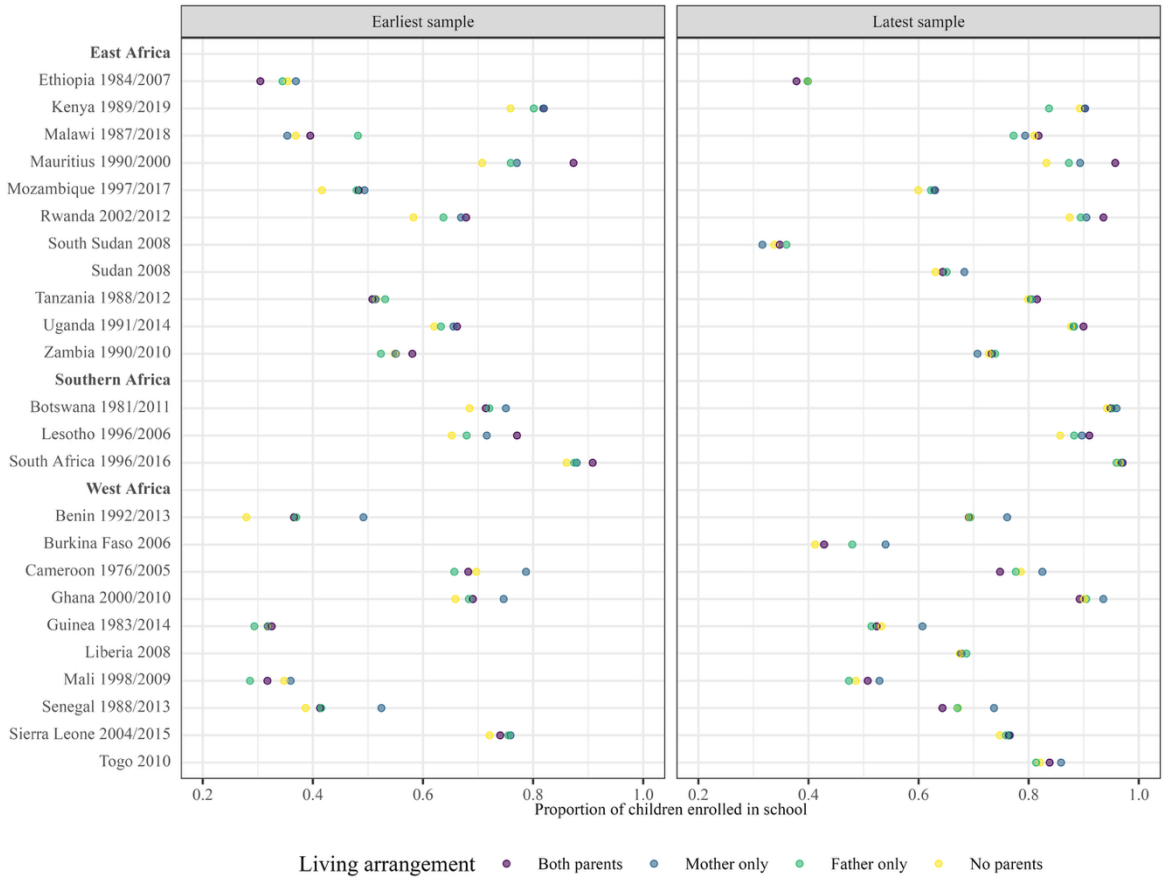
Figure 3.4 shows the school enrollment of children aged 7-14 in the latest (right) and earliest (left) available samples for each country by children's living arrangements. The distribution of the dots highlights the heterogeneity in school enrollment across countries in both panels but also the diversity in change in enrollment and variation across living arrangements. For some countries, such as Kenya, more children are enrolled in school across all living arrangements. Differences by living arrangements persist but the underlying dynamics appear to change - in the earliest sample, enrollment was lowest among children living without parents, whereas enrollment in the most recent sample is lowest among children living with only their father. In Botswana, enrollment increased for all children and differences in the proportion of children enrolled in school disappeared over time. Lastly, in the 1983 sample for Guinea, enrollment was low for all children, with slightly lower enrollment for children living only with the father. Over time, enrollment for children in this living arrangement remains lower compared to other groups: In the latest sample enrollment increased for all groups but a nearly 10-percentage point difference emerged between children living only with the mother compared to those living only with the father.

No clear pattern emerges, suggesting that the link between children's school enrollment and living arrangements differs between countries and over time. Increases in school enrollment appear to contribute to a decline in these differences between children across living arrangements in some countries (*e.g.,* Botswana, Ghana, Uganda) but differences persist or even emerge in other countries (*e.g.,* Benin, Guinea, Mauritius). In several countries, children residing without parents appear to have gained access to education (*e.g.*, Benin, Kenya, Rwanda), although enrollment among them remains lower than for children living with both biological parents. Living only with the father, in many countries, is associated with lower school enrollment. Surprisingly, enrollment is highest for children living with only the biological mother for over one-third of countries, most of which are located in West Africa.

In line with our expectation, we observe small differences in enrollment by living arrangement in countries where school enrollment is already approaching universal levels. In some countries, such as Kenya, enrollment continues to differ by living arrangement, although the underlying dynamics appear to change. The figure further suggests that in countries, such as Mauritius, where the overwhelming majority of children reside with both biological parents, enrollment variations by living arrangement are high, while in countries with diverse living arrangements, such as Botswana, variation in school enrollment appears to be only weakly linked to living arrangements. This supports our expectation that in societies with homogenous

family structures, selection effects might amplify negative school outcomes for children in households without one or both parents.

Figure 3.4 School enrollment by living arrangement, earliest and latest available samples

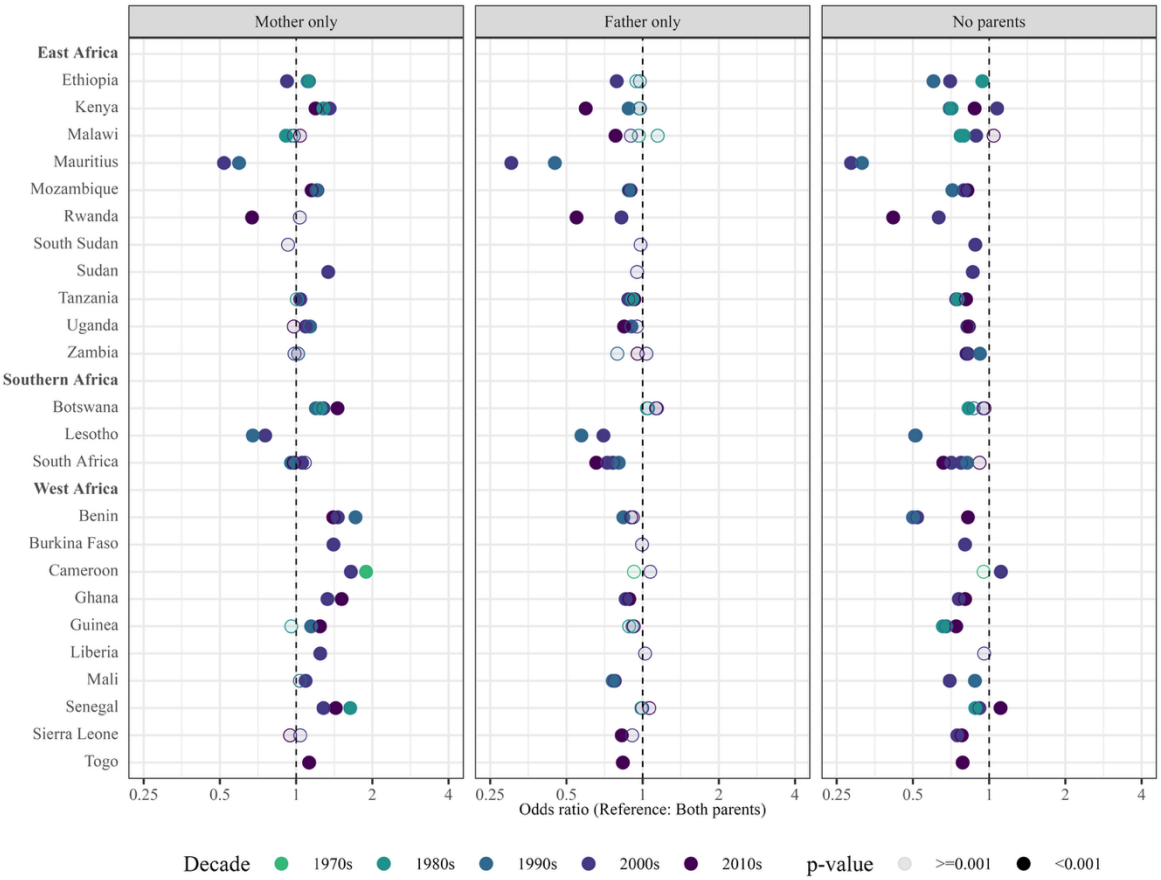


Note. For several countries (South Sudan, Sudan, Burkina Faso, Liberia, Togo) we only have one sample available. Countries are grouped alphabetically within their sub-continental regions. **Source**. IPUMS International.

We estimate logistic regression models for each sample to further analyze the observed pattern and the association between children's school enrollment and living arrangements. Figure 3.5 shows the results of these models based on the exponentiated coefficients for each model by country and living arrangement. Predicted probabilities of school enrollment by living arrangement for all models can be found in the Appendix (Appendix Figures A3.6 and A3.7). We estimate models separately for each sample to obtain estimates that account for differences in enrollment and the prevalence of living arrangements across samples. For all models, living with both biological parents forms the reference category. The aim is to highlight school enrollment differences relative to living with both parents, the prevailing living arrangement in nearly all analyzed countries. The models are not intended to compare differences in the magnitude of associations but rather to explore whether school enrollment varies by living arrangements, while controlling for the individual and household characteristics of children. Dots that are filled out represent coefficients that are statistically significantly different from zero (p-values < 0.001), whereas

empty circles represent coefficients that are not statistically significantly different from zero (p-values >= 0.001). Colors of dots represent the decade in which the census was conducted. Countries are ordered alphabetically and grouped by continental regions.

Figure 3.5 Exponentiated logistic regression coefficients (odds ratios) for children's school enrollment by living arrangement

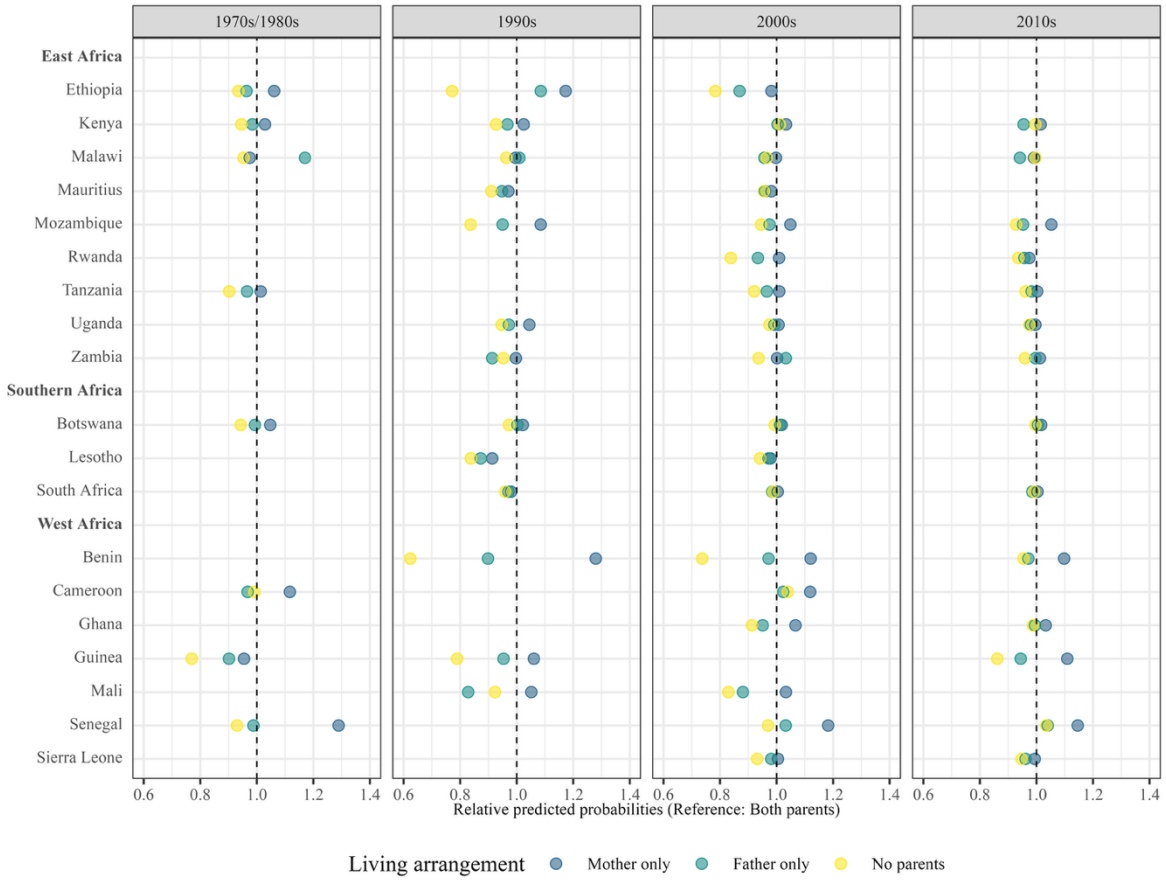


Note. Models were specified for each sample separately. Controls not shown age, sex, urban/rural, number of children in the household, educational attainment of the household head, number of adults participating in the labor force, age of the household head. Dependent variable: school enrollment (0=no, 1=yes). For Botswana, 1981, 2001, and 2011, Cameroon 1976, Senegal 1988, Tanzania 1988, and Zambia 2010, no distinction could be made between urban and rural areas. For Botswana 1981, Ethiopia 1984 and 1994, and South Africa 2016 information about household residents' labor market participation was not available. **Source**. IPUMS International.

In nearly all countries, the odds of being enrolled in school among children living with only the biological father (middle panel) or without the biological parents (right panel) are lower compared to children living with both biological parents, as in these panels the dots are nearly all placed to the left of the horizontal dashed bar (OR = 1). We further observe that for children living without parents, these differences are statistically significant for most samples, while for children residing only with the father, fewer differences between this group and the reference group are statistically significant, potentially due to the small share of children in this group across samples. Still, for children in the majority of countries, this living arrangement

is associated with lower odds of school enrollment. For children in several East African countries, living with the mother only is associated with lower odds of enrollment compared to the reference, but in other countries the results suggest small or no statistically significant differences among these two living arrangements. Among South African countries, this relationship varies: in Botswana, children living only with the biological mother have higher odds of being enrolled in school compared to the reference group, in Lesotho the opposite is the case, and in South Africa, we do not observe differences across these living arrangements. For children in most West African countries living with the mother only is linked to a statistically significant enrollment advantage relative to the reference group.

Figure 3.6 Relative predicted probabilities for children's school enrollment by living arrangement and time



Note. Models were specified separately by country, controlling for time of the census and they include an interaction between time and living arrangement. Predicted probabilities were estimated and then scaled relative to the predicted probability of being enrolled in school for children living with both parents (=1). Other controls included are the same as in prior set of models (Figure 3.5). **Source**. IPUMS International.

We further estimate a second set of models to observe patterns in school enrollment over time. We estimate models separately for each country, pooling all samples by country and controlling for time and we include an interaction between time and living arrangement in each model. Figure 3.6 shows the results as relative predicted probabilities of school enrollment to allow for direct comparisons. The predicted probability of

school enrollment for children living with both parents is scaled to one and serves as a reference. Since the descriptive results highlight that school enrollment increased over time in all countries, dots moving closer to center across panels indicate decreases in the variability across living arrangements over time.

In Kenya, we observe small but persistent differences in the probability of being enrolled in school relative to the reference group, whereas in Botswana, differences over time completely diminish. In Guinea, variability in the probability of being enrolled in school for children by living arrangement persists, although the pattern changes. In the earliest sample, children across living arrangements faced a lower predicted probability of being enrolled in school compared to the reference group. However, in the most recent sample, children living with the mother only have a higher probability of being enrolled in school compared to the reference group. The patterns for Kenya and Botswana are similar to those of other countries from East and Southern Africa. The case of Guinea resembles that of other West African countries, where an advantage for children residing in a household only with their mother emerges.

Overall, the regression results suggest that after controlling for various individual and household characteristics, persistent differences in school enrollment by children's living arrangements can be observed. In particular, living in a household without either biological parent or with the biological father only, compared to living in a household with both biological parents present, is associated with lower odds of school enrollment for children. Children living with the mother only appear to not face this disadvantage in most countries, and even an advantage in some countries. In line with our expectations, we find evidence that the associations between school enrollment and living arrangements differ across countries and over time for individual countries. We observe that as school enrollment increases, differences in enrollment across living arrangements decrease in many, but not all countries.

4.5 Discussion and conclusion

In this article, we provide a systematic overview of school enrollment and living arrangements of children using census data for 24 African countries, covering the time period from 1976 to 2019. We investigate links between children's living arrangements and school enrollment and examine how these associations differ across countries and have changed over time. The analysis focuses on four distinct living arrangements of children: living with both biological parents; living with the biological mother; living with the biological father; and living without biological parents. This work contributes to existing research that focuses on how living arrangements might be linked to variation in school enrollment in sub-Saharan Africa (Adjiwanou et al., 2021; Akwara et al., 2010; Beegle et al., 2009; Case et al., 2004; Case & Ardington, 2006; Chuong & Operario, 2012; Eloundou-Enyegue & Williams, 2006; Evans & Miguel, 2007; Monasch & Boerma, 2004) and other countries undergoing demographic and socio-economic transitions (Esteve et al., 2025). The paper provides the basis for further comparative research on living arrangements and child outcomes, such as education.

One key result of this study is that the links between school enrollment and living arrangements of children are context-dependent. Across countries, school enrollment tends to be highest among children who reside with both biological parents, but we find that in several countries enrollment is highest among children living in households with their mother only. Given the literature on poverty and vulnerability in the context of single motherhood and potential negative outcomes for children (Adjiwanou et al., 2021; Carling & Tønnessen, 2013; Clark & Hamplová, 2013; Gnoumou et al., 2013), this is to some extent a surprising finding. A possible underlying explanation for a potential "mother-advantage" is that some of these mothers might have partners who migrated and are able to support their children through remittances (Carling & Tønnessen, 2013). Another explanation might be that some of these mothers re-partnered to increase their resources, and are thus able to support their children's school enrollment (Crespin-Boucaud & Hotte, 2021), although Adjiwanou et al. (2021) find lower school enrollment for children living with stepfathers compared to those residing with both biological parents or single mothers. However, when we conducted robustness checks among the group of children residing in a household with only their mother and controlled by maternal marital status (Appendix Figure A3.9), we found that differences by maternal marital status are overwhelmingly small and not statistically significant. Children living with a stepfather or having a married mother and migrant father do not appear to be systematically advantaged when it comes to school enrollment, compared to other children in the mother only group. Women might generally have a stronger preference for children's education (Crespin-Boucaud & Hotte, 2021) and mothers who raise their children alone might have higher decision-making autonomy to act on the preference of school enrollment for daughters (Luz & Agadjanian, 2015), thus contributing to higher enrollment. This is in line with family research suggesting that matrilineal kinship is associated with benefits for child outcomes, as women have greater decision-making power and autonomy to invest in their children's education (Lowes, 2022). Future research exploring the emergence of a potential "mother-advantage" could reveal opportunities for policy-makers.

The second key result of the study is that children living with only their biological father or without biological parents are consistently less likely to be enrolled in school, compared to those living with both biological parents. While these differences are in many cases not statistically significant for father-only children, possibly due to smaller case counts, they suggest that children in the African context who reside only with their father are often worse off compared to other children, especially if they are maternal orphans (Case & Ardington, 2006). The disadvantage of children living without either parent is noticeable across most countries and persists over time, albeit differences in the predicted probabilities across living arrangements (Appendix Figures A3.7 and A3.8) are less pronounced if enrollment is higher. The descriptive results show that the prevalence of different living arrangements of children in many countries have remained stable, but enrollment levels have increased. This is in line with our expectation that the living arrangements of children will become less relevant in explaining variation in school enrollment within

a country as enrollment increases. Thus, advances in school enrollment, for instance through the implementation of universal free primary education, could potentially decrease inequalities faced by children in different living arrangements. However, the relationship between school enrollment and living arrangements is shaped by the prevalence of different living arrangements: in countries with homogenous living arrangements where a two-parent household is the norm, such as Mauritius, variation in enrollment by living arrangement remains statistically significant. This observation suggests that prevailing norms and negative selection effects into different household structures can limit the positive effects of educational expansion. To reach universal access to education, policies should seek to counteract disadvantages children face based on their living arrangement.

The group of children living without both parents includes children who live in a foster household because one or both of their parents have died but also children whose parents are alive. In many instances, living without both parents in a foster family might provide educational access and many fostering decisions are motivated by the families' wish to provide educational opportunities to their children (Akresh, 2009; Bachan, 2014; Serra, 2009). This could explain why the differences in enrollment between children in households with both or no biological parents are somewhat small or statistically insignificant in some countries, especially in those with a higher prevalence of foster arrangements such as Malawi, Botswana, or Senegal (Cotton, 2021). As a direction for future research, a nuanced analysis of school enrollment over time and across countries for children living in foster families could provide insights into the underlying dynamics and also test assumptions related to kin selection theory and resource allocation in the household (Adjiwanou et al., 2021; Case et al., 2004; Lopus, 2017). Additional analyses could also focus on possible differences in the observed associations across individual characteristics of children, such as age and sex.

On a positive note, the educational disadvantages of children living without both parents compared to those living with both parents are less pronounced among recent samples, which supports our expectation that increases in enrollment might be linked to lower variation by living arrangement. Additionally, nonparental living arrangements of children have remained quite stable in many countries (Cotton, 2021), yet differences in school enrollment by living arrangements appear to decrease. Thus, school enrollment expansion in some sub-Saharan African countries seems to reach children in all living arrangements and could potentially contribute to decreases in intra-country variation in human capital creation. Further research that considers country-specific historic, economic, social, and policy contexts might provide a better understanding of the associations between educational expansion, educational outcomes, and children's living arrangements.

We acknowledge several limitations that should be considered when interpreting the results of our analysis. Census data are cross-sectional and can only reflect circumstances for a point in time. We are not able to know how long children have been living in a specific living arrangement and we also do not know how long children have been enrolled in school for. While we can analyze country-level trends over time,

longitudinal data would be better suited to understand the educational trajectories of children in different living arrangements. Other household characteristics, such as wealth, are potentially strong predictors of school enrollment of children. However, census data do not provide such information and while we considered building a proxy indicator for household wealth based on dimensions such as ownership of the residence, electricity, and water access, we were unable to do so in this comparative framework as many samples lack the information in part or entirely. Several other factors could have strengthened the analysis but were not available within the data: We do not have information about parents of children who are alive but do not reside in the household, such as migrant parents who might support their children through remittances. Additionally, we cannot control for the survival status of the parents and marital status of the mother or father in our models as they are highly correlated with the primary predictor. The presence and characteristics of other household members, such as grandparents, might also be relevant for educational outcomes. Future research investigating these aspects could provide insights into links between family contexts and school enrollment in sub-Saharan Africa. Lastly, our exploratory analysis is descriptive in nature and cannot identify causal relationships.

Overall, this study highlights the importance of living arrangements in explaining variation in school enrollment in sub-Saharan Africa across countries and over time. We provide an overview of links between children's living arrangements and one of the key developmental outcomes, that can serve as a starting point for further research on the complex links between children's well-being outcomes and their family context. Children living in households without parents or with their biological father only, appear to be disadvantaged in terms of educational opportunities compared to children living with both biological parents. While we find that the importance of family contexts generally decreases if school enrollment increases, children living with only one or neither parent might be particularly at risk of facing barriers to educational participation and human capital creation.

4.6 Appendix

Table A3.1 Complete sample and individual-level covariates (East Africa)

Country	Year	Living Arrangement				Age				Sex	Res.
		Both parents	Mother only	Father only	No parents	7-8	9-10	11-12	13-14	Female	Urban
East Africa											
Ethiopia	2007	0.72	0.16	0.02	0.11	0.29	0.29	0.22	0.20	0.49	0.13
	1994	0.72	0.16	0.02	0.10	0.30	0.29	0.22	0.20	0.48	0.12
	1984	0.68	0.16	0.03	0.12	0.33	0.29	0.21	0.17	0.48	0.16
Kenya	2019	0.52	0.27	0.05	0.16	0.24	0.26	0.25	0.24	0.50	0.24
	2009	0.54	0.27	0.04	0.16	0.27	0.27	0.23	0.22	0.49	0.25
	1999	0.48	0.29	0.04	0.19	0.25	0.27	0.25	0.23	0.50	0.19
	1989	0.50	0.30	0.04	0.16	0.27	0.28	0.23	0.22	0.50	0.12
Malawi	2018	0.62	0.20	0.02	0.17	0.26	0.25	0.25	0.24	0.51	0.14
	2008	0.63	0.17	0.02	0.18	0.29	0.25	0.24	0.22	0.50	0.13
	1998	0.56	0.19	0.03	0.23	0.27	0.26	0.25	0.22	0.50	0.14
	1987	0.48	0.24	0.03	0.25	0.29	0.27	0.23	0.20	0.50	0.10
Mauritius	2000	0.88	0.09	0.02	0.02	0.27	0.26	0.24	0.22	0.50	0.42
	1990	0.86	0.10	0.02	0.03	0.24	0.27	0.26	0.24	0.50	0.35
Mozambique	2017	0.59	0.22	0.03	0.17	0.30	0.27	0.23	0.20	0.50	0.31
	2007	0.60	0.21	0.03	0.16	0.30	0.27	0.23	0.20	0.50	0.30
	1997	0.56	0.22	0.03	0.19	0.28	0.25	0.24	0.22	0.49	0.32
Rwanda	2012	0.67	0.20	0.02	0.12	0.28	0.27	0.25	0.20	0.51	0.14
	2002	0.48	0.31	0.02	0.18	0.25	0.24	0.25	0.26	0.51	0.14
South Sudan	2008	0.48	0.27	0.04	0.21	0.29	0.29	0.22	0.19	0.47	0.24
Sudan	2008	0.68	0.21	0.03	0.09	0.29	0.27	0.24	0.21	0.48	0.29
Tanzania	2012	0.52	0.22	0.05	0.21	0.28	0.26	0.25	0.21	0.50	0.32
	2002	0.50	0.25	0.05	0.21	0.28	0.26	0.25	0.22	0.50	0.21
	1988	0.51	0.24	0.05	0.20	0.28	0.26	0.23	0.23	0.50	.
Uganda	2014	0.63	0.16	0.04	0.17	0.28	0.26	0.23	0.24	0.50	0.20
	2002	0.60	0.17	0.05	0.19	0.28	0.26	0.25	0.22	0.50	0.11
	1991	0.48	0.22	0.05	0.25	0.27	0.26	0.24	0.23	0.50	0.10
Zambia	2010	0.66	0.16	0.02	0.17	0.27	0.28	0.23	0.22	0.50	.
	2000	0.66	0.13	0.04	0.17	0.28	0.27	0.23	0.21	0.50	0.35
	1990	0.72	0.13	0.00	0.15	0.27	0.26	0.24	0.23	0.50	0.39

Note. All proportions refer to the children in the respective categories in each sample. **Source**. IPUMS International.

Table A3.2 Complete sample and individual-level covariates (Southern and West Africa)

Country	Year	Living Arrangement				Age				Sex	Res.
		Both parents	Mother only	Father only	No parents	7-8	9-10	11-12	13-14	Female	Urban
Southern Africa											
Botswana	2011	0.27	0.41	0.04	0.28	0.26	0.25	0.26	0.23	0.50	.
	2001	0.27	0.36	0.05	0.33	0.25	0.26	0.24	0.25	0.50	.
	1991	0.27	0.35	0.05	0.33	0.26	0.27	0.24	0.23	0.51	0.38
	1981	0.39	0.28	0.06	0.26	0.28	0.25	0.24	0.22	0.52	.
Lesotho	2006	0.48	0.23	0.06	0.22	0.24	0.25	0.25	0.26	0.50	0.20
	1996	0.63	0.18	0.04	0.15	0.24	0.26	0.25	0.25	0.50	0.15
South Africa	2016	0.33	0.40	0.03	0.23	0.26	0.26	0.25	0.23	0.50	0.57
	2011	0.36	0.36	0.03	0.25	0.25	0.24	0.25	0.25	0.49	0.54
	2007	0.37	0.38	0.03	0.22	0.24	0.25	0.26	0.26	0.50	0.50
	2001	0.38	0.36	0.03	0.22	0.24	0.26	0.25	0.24	0.50	0.46
	1996	0.46	0.32	0.03	0.19	0.25	0.25	0.25	0.25	0.50	0.46
West Africa											
Benin	2013	0.68	0.15	0.03	0.14	0.30	0.27	0.22	0.20	0.49	0.42
	2002	0.61	0.12	0.05	0.22	0.31	0.28	0.23	0.18	0.48	0.38
	1992	0.62	0.12	0.04	0.22	0.33	0.28	0.22	0.17	0.47	0.40
Burkina Faso	2006	0.72	0.07	0.01	0.19	0.30	0.27	0.22	0.20	0.49	0.20
Cameroon	2005	0.64	0.16	0.03	0.17	0.28	0.26	0.24	0.22	0.49	0.46
	1976	0.68	0.10	0.03	0.19	0.31	0.27	0.22	0.20	0.48	.
Ghana	2010	0.54	0.25	0.05	0.16	0.27	0.27	0.24	0.23	0.49	0.47
	2000	0.45	0.22	0.09	0.24	0.28	0.28	0.23	0.21	0.49	0.41
Guinea	2014	0.65	0.11	0.04	0.20	0.32	0.26	0.21	0.21	0.49	0.33
	1996	0.65	0.12	0.03	0.21	0.34	0.27	0.21	0.18	0.47	0.31
	1983	0.71	0.12	0.02	0.15	0.33	0.26	0.20	0.21	0.47	0.33
Liberia	2008	0.53	0.20	0.05	0.22	0.28	0.28	0.22	0.21	0.49	0.49
Mali	2009	0.73	0.10	0.03	0.15	0.30	0.27	0.22	0.21	0.49	0.20
	1998	0.76	0.09	0.02	0.13	0.32	0.26	0.22	0.20	0.48	0.26
Senegal	2013	0.63	0.17	0.05	0.15	0.30	0.25	0.22	0.23	0.50	0.40
	2002	0.64	0.15	0.04	0.17	0.30	0.26	0.22	0.22	0.50	0.37
	1988	0.68	0.12	0.01	0.19	0.30	0.26	0.23	0.22	0.51	.
Sierra Leone	2015	0.50	0.18	0.05	0.27	0.31	0.29	0.21	0.18	0.50	0.39
	2004	0.50	0.18	0.04	0.28	0.30	0.28	0.21	0.20	0.50	0.40
Togo	2010	0.59	0.17	0.03	0.21	0.31	0.27	0.23	0.20	0.49	0.32

Note. All proportions refer to the children in the respective categories in each sample. **Source**. IPUMS International.

Table A3.3 Complete sample and household-level covariates (East Africa)

Country	Year	Children	Adults in the labor force				Education head			Age head
		Mean	0	1	2	3+	Low/ unknown	Medium	High	<60
East Africa										
Ethiopia	2007	3.76	0.06	0.28	0.46	0.20	0.87	0.10	0.03	0.86
	1994	4.06	.	.	.	.	0.93	0.05	0.02	0.84
	1984	3.91	.	.	.	.	0.96	0.03	0.01	0.79
Kenya	2019	3.80	0.05	0.26	0.45	0.23	0.39	0.38	0.23	0.86
	2009	4.12	0.05	0.28	0.41	0.25	0.41	0.38	0.20	0.87
	1999	4.20	0.04	0.27	0.37	0.31	0.49	0.35	0.16	0.87
	1989	4.95	0.05	0.30	0.38	0.28	0.62	0.29	0.09	0.86
Malawi	2018	3.62	0.07	0.27	0.48	0.18	0.65	0.23	0.12	0.87
	2008	3.94	0.08	0.26	0.48	0.18	0.69	0.23	0.09	0.87
	1998	3.99	0.02	0.27	0.49	0.22	0.73	0.20	0.07	0.84
	1987	4.26	0.05	0.32	0.43	0.20	0.84	0.13	0.03	0.81
Mauritius	2000	2.37	0.03	0.46	0.38	0.13	0.20	0.68	0.12	0.92
	1990	2.93	0.03	0.47	0.34	0.16	0.37	0.55	0.07	0.91
Mozambique	2017	3.90	0.27	0.32	0.31	0.10	0.74	0.19	0.07	0.88
	2007	4.02	0.08	0.33	0.43	0.16	0.85	0.13	0.03	0.89
	1997	3.87	0.11	0.32	0.38	0.19	0.90	0.08	0.02	0.89
Rwanda	2012	3.66	0.17	0.24	0.44	0.15	0.66	0.30	0.04	0.89
	2002	3.89	0.03	0.29	0.47	0.22	0.75	0.23	0.02	0.88
South Sudan	2008	4.78	0.01	0.38	0.30	0.31	0.87	0.09	0.03	0.89
Sudan	2008	4.61	0.15	0.47	0.22	0.15	0.82	0.14	0.04	0.86
Tanzania	2012	4.30	0.07	0.25	0.39	0.28	0.37	0.55	0.09	0.84
	2002	4.36	0.06	0.25	0.38	0.31	0.49	0.45	0.06	0.83
	1988	4.91	0.03	0.19	0.35	0.43	0.74	0.23	0.03	0.82
Uganda	2014	4.64	0.04	0.18	0.47	0.31	0.49	0.43	0.09	0.86
	2002	4.75	0.19	0.30	0.35	0.16	0.53	0.39	0.08	0.85
	1991	4.91	0.06	0.33	0.36	0.25	0.62	0.36	0.02	0.84
Zambia	2010	4.36	0.11	0.38	0.34	0.17	0.36	0.45	0.19	0.89
	2000	4.44	0.10	0.39	0.33	0.18	0.42	0.42	0.17	0.90
	1990	5.30	0.14	0.44	0.23	0.19	0.55	0.34	0.11	0.86

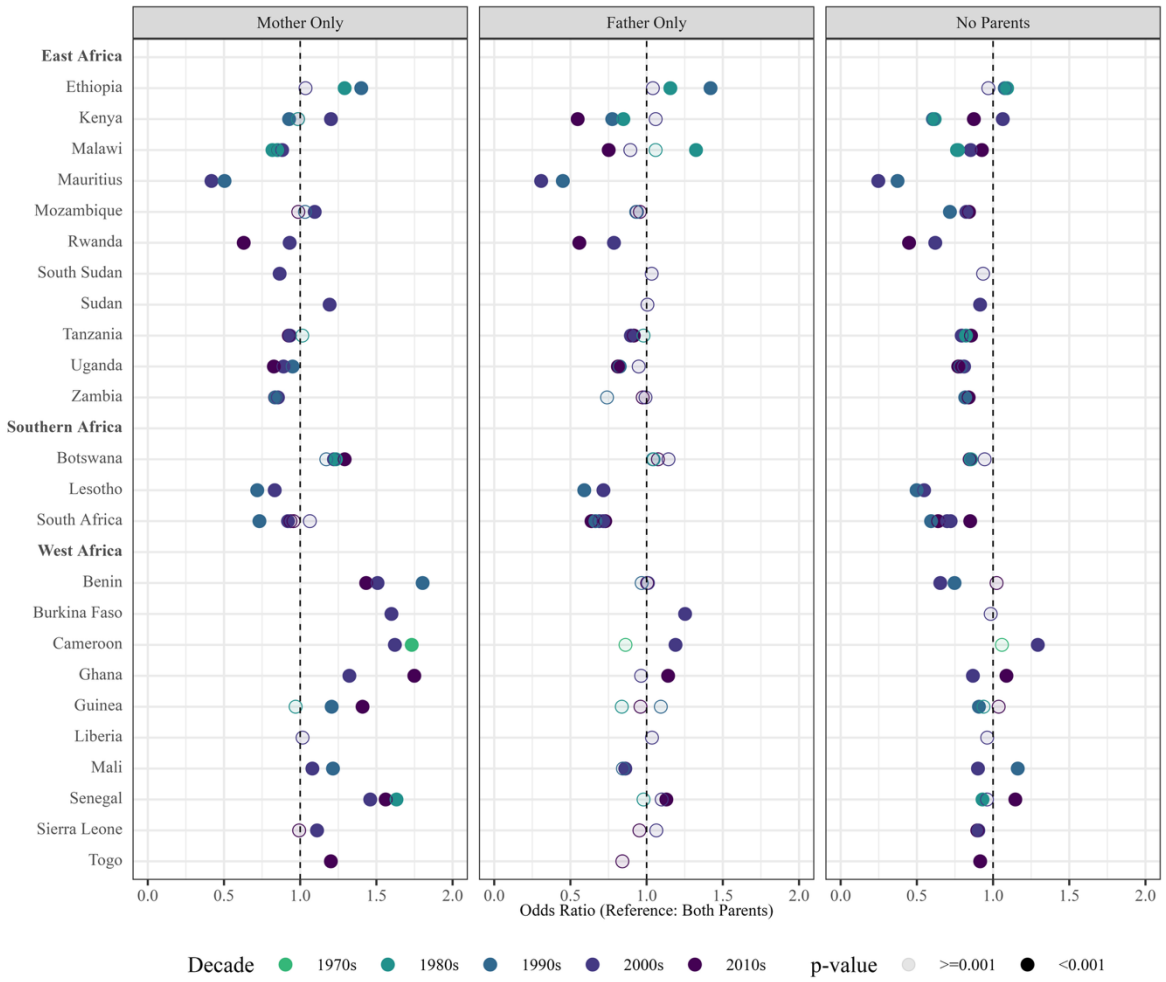
Note. All proportions refer to the children in the respective categories in each sample. The mean number of children indicates with how many children each child, on average, lives in the same household. Adults in the labor force refers to adults in the household who report participating in the labor force. The head refers to the head of the household.
Source. IPUMS International.

Table A3.4 Complete sample and household-level covariates (Southern and West Africa)

Country	Year	Children	Adults in the labor force				Education head			Age head
		Mean	0	1	2	3+	Low/ unknown	Medium	High	<60
Southern Africa										
Botswana	2011	3.80	0.13	0.33	0.29	0.25	0.41	0.43	0.16	0.78
	2001	4.34	0.25	0.33	0.24	0.18	0.58	0.33	0.08	0.75
	1991	5.03	0.21	0.35	0.24	0.20	0.70	0.26	0.04	0.77
	1981	5.25	.	.	.	.	0.84	0.13	0.02	0.72
Lesotho	2006	3.19	0.21	0.40	0.24	0.14	0.66	0.27	0.07	0.77
	1996	3.77	0.14	0.42	0.26	0.18	0.77	0.19	0.05	0.79
South Africa	2016	2.97	.	.	.	.	0.30	0.41	0.29	0.76
	2011	2.96	0.21	0.28	0.32	0.20	0.33	0.40	0.26	0.79
	2007	3.23	0.13	0.29	0.34	0.23	0.41	0.43	0.16	0.77
	2001	3.45	0.18	0.30	0.31	0.20	0.47	0.37	0.16	0.78
	1996	3.24	0.19	0.34	0.34	0.13	0.47	0.40	0.13	0.82
West Africa										
Benin	2013	5.57	0.07	0.38	0.31	0.24	0.73	0.21	0.06	0.84
	2002	5.54	0.03	0.23	0.33	0.41	0.75	0.19	0.06	0.83
	1992	6.22	0.03	0.26	0.28	0.43	0.81	0.15	0.04	0.78
Burkina Faso	2006	5.61	0.03	0.23	0.26	0.48	0.91	0.07	0.03	0.82
Cameroon	2005	5.01	0.13	0.34	0.30	0.24	0.43	0.47	0.10	0.84
	1976	5.58	0.03	0.34	0.28	0.35	0.80	0.18	0.02	0.85
Ghana	2010	4.06	0.04	0.22	0.40	0.34	0.49	0.39	0.12	0.80
	2000	4.39	0.04	0.20	0.35	0.41	0.55	0.31	0.13	0.78
Guinea	2014	6.26	0.04	0.25	0.26	0.45	0.80	0.12	0.08	0.75
	1996	6.23	0.03	0.18	0.24	0.54	0.85	0.09	0.07	0.77
	1983	5.97	0.05	0.31	0.23	0.42	0.90	0.06	0.05	0.80
Liberia	2008	4.33	0.20	0.30	0.32	0.19	0.53	0.22	0.25	0.86
Mali	2009	5.69	0.07	0.35	0.26	0.32	0.87	0.09	0.04	0.82
	1998	5.64	0.06	0.36	0.25	0.33	0.90	0.08	0.03	0.81
Senegal	2013	7.18	0.09	0.23	0.21	0.47	0.77	0.16	0.06	0.74
	2002	7.50	0.04	0.20	0.21	0.54	0.82	0.13	0.05	0.72
	1988	7.78	0.05	0.25	0.23	0.47	0.85	0.11	0.03	0.75
Sierra Leone	2015	4.36	0.07	0.24	0.37	0.33	0.73	0.14	0.12	0.82
	2004	5.05	0.07	0.23	0.28	0.42	0.74	0.21	0.05	0.78
Togo	2010	4.61	0.02	0.24	0.38	0.36	0.59	0.35	0.07	0.84

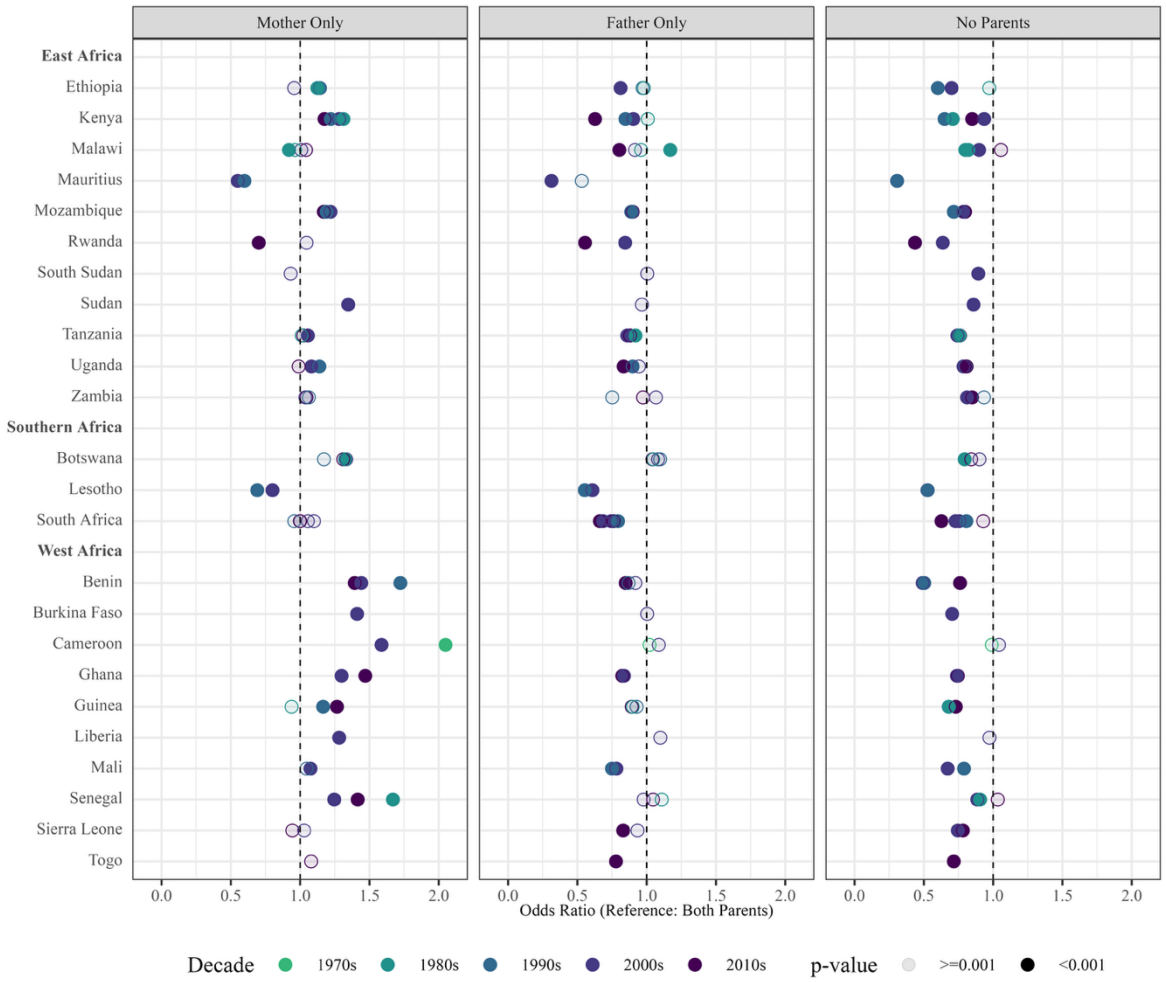
Note. All proportions refer to the children in the respective categories in each sample. The mean number of children indicates with how many children each child, on average, lives in the same household. Adults in the labor force refers to adults in the household who report participating in the labor force. The head refers to the head of the household.
Source. IPUMS International.

Figure A3.5 Model results when controlling only for individual-level factors



Note. Models were specified for each sample separately. Controls not shown: age and sex. Dependent variable: school enrollment (0=no, 1=yes). **Source**. IPUMS International.

Figure A3.6 Model results when randomly selecting one child per household



Note. Models were specified for each sample separately. Controls not shown: age, sex, urban/rural, number of children in the household, educational attainment of the household head, number of adults participating in the labor force, age of the household head. Dependent variable: school enrollment (0=no, 1=yes). For Botswana, 1981, 2001, and 2011, Cameroon 1976, Senegal 1988, Tanzania 1988, and Zambia 2010, no distinction could be made between urban and rural areas. For Botswana 1981, Ethiopia 1984 and 1994, and South Africa 2016 information about household residents' labor market participation was not available. We randomly selected one child per household. **Source**. IPUMS International.

Table A3.7 Predicted probabilities of school enrollment by country, year, and living arrangement (East Africa)

Country	Year	Both Parents	Mother Only	Father Only	No Parents
East Africa					
Ethiopia	2007	0.19	0.17	0.15	0.14
	1994	0.04	0.05	0.04	0.03
	1984	0.13	0.15	0.13	0.13
Kenya	2019	0.59	0.64	0.47	0.56
	2009	0.69	0.75	0.68	0.70
	1999	0.54	0.60	0.51	0.45
	1989	0.52	0.58	0.51	0.44
Malawi	2018	0.59	0.60	0.53	0.60
	2008	0.63	0.63	0.61	0.61
	1998	0.65	0.63	0.64	0.59
	1987	0.16	0.15	0.18	0.13
Mauritius	2000	0.99	0.98	0.97	0.96
	1990	0.96	0.94	0.92	0.89
Mozambique	2017	0.39	0.42	0.36	0.35
	2007	0.51	0.56	0.49	0.46
	1997	0.24	0.28	0.22	0.19
Rwanda	2012	0.41	0.42	0.37	0.31
	2002	0.84	0.78	0.74	0.69
South Sudan	2008	0.20	0.19	0.20	0.18
Sudan	2008	0.43	0.51	0.42	0.40
Tanzania	2012	0.45	0.46	0.43	0.40
	2002	0.34	0.35	0.31	0.28
	1988	0.13	0.13	0.12	0.10
Uganda	2014	0.69	0.69	0.66	0.65
	2002	0.75	0.77	0.74	0.71
	1991	0.43	0.46	0.40	0.38
Zambia	2010	0.39	0.39	0.37	0.34
	2000	0.26	0.26	0.27	0.23
	1990	0.20	0.20	0.16	0.18

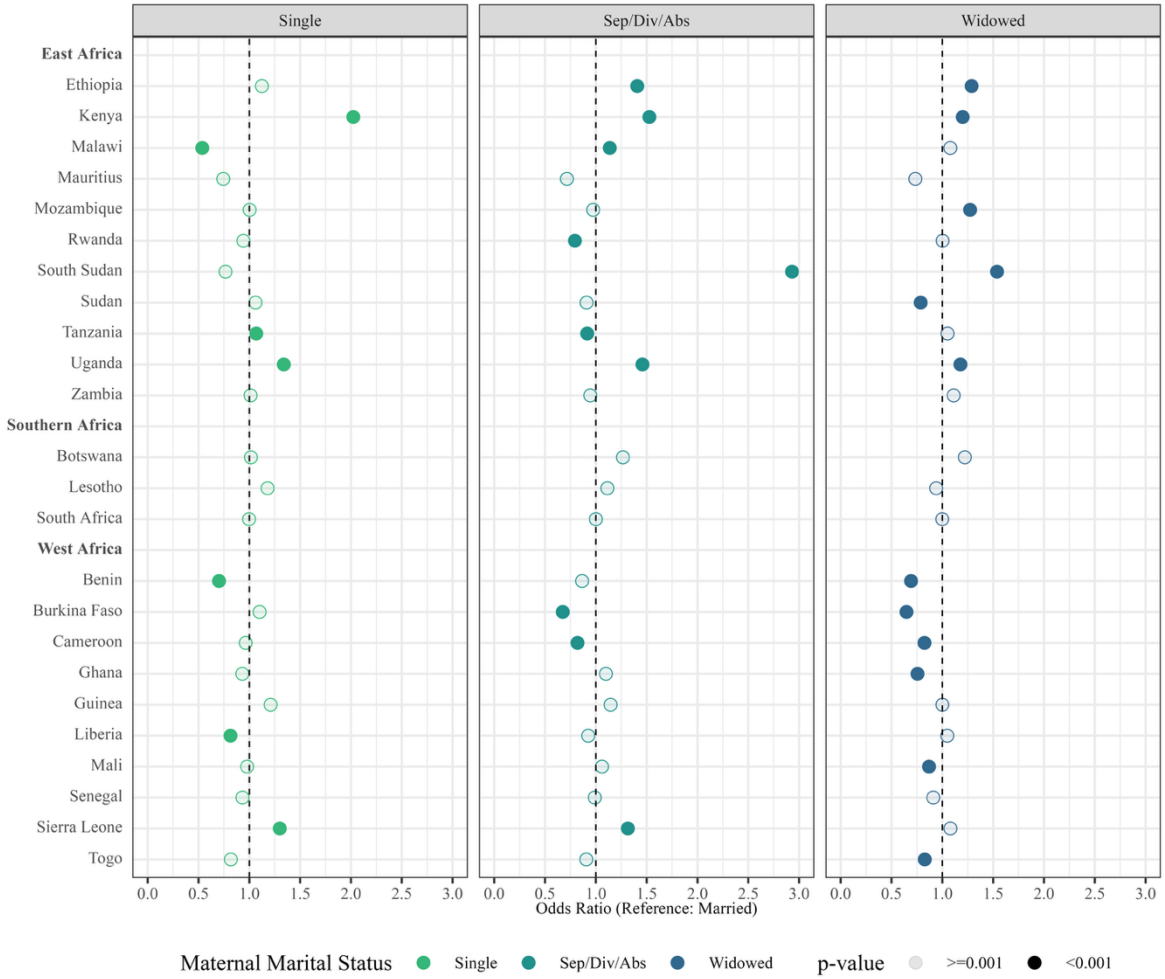
Note. Models were specified for each sample separately. Predicted probabilities were estimated for the reference categories of the categorical variables and for the mean number of children in the household. Controls not shown: age, sex, urban/rural, number of children in the household, educational attainment of the household head, number of adults participating in the labor force, age of the household head. Dependent variable: school enrollment (0=no, 1=yes). **Source**. IPUMS International.

Table A3.8 Predicted probabilities of school enrollment by country, year, and living arrangement (Southern and West Africa)

Country	Year	Both Parents	Mother Only	Father Only	No Parents
Southern Africa					
Botswana	2011	0.86	0.90	0.87	0.85
	2001	0.75	0.79	0.77	0.74
	1991	0.55	0.59	0.56	0.51
	1981	0.52	0.58	0.53	0.48
Lesotho	2006	0.75	0.69	0.68	0.60
	1996	0.44	0.34	0.31	0.28
South Africa	2016	0.96	0.96	0.95	0.96
	2011	0.94	0.94	0.91	0.91
	2007	0.95	0.96	0.93	0.93
	2001	0.88	0.89	0.85	0.85
	1996	0.64	0.63	0.59	0.59
West Africa					
Benin	2013	0.65	0.72	0.62	0.60
	2002	0.69	0.76	0.67	0.53
	1992	0.42	0.55	0.38	0.27
Burkina Faso	2006	0.44	0.52	0.44	0.38
Cameroon	2005	0.59	0.70	0.61	0.61
	1976	0.71	0.82	0.69	0.69
Ghana	2010	0.81	0.86	0.79	0.77
	2000	0.55	0.62	0.51	0.48
Guinea	2014	0.49	0.55	0.47	0.42
	1996	0.42	0.45	0.40	0.33
	1983	0.18	0.18	0.17	0.13
Liberia	2008	0.43	0.48	0.43	0.42
Mali	2009	0.39	0.41	0.33	0.31
	1998	0.27	0.27	0.22	0.24
Senegal	2013	0.51	0.60	0.53	0.54
	2002	0.39	0.45	0.39	0.37
	1988	0.50	0.62	0.49	0.47
Sierra Leone	2015	0.68	0.67	0.64	0.63
	2004	0.70	0.71	0.68	0.64
Togo	2010	0.87	0.88	0.85	0.84

Note. Models were specified for each sample separately. Predicted probabilities were estimated for the reference categories of the categorical variables and for the mean number of children in the household. Controls not shown: age, sex, urban/rural, number of children in the household, educational attainment of the household head, number of adults participating in the labor force, age of the household head. Dependent variable: school enrollment (0=no, 1=yes). **Source**. IPUMS International.

Figure A3.9 Model results when controlling for maternal marital status among children in the "Mother only" category



Note. Models were specified for each sample separately, selecting only the most recent sample for each country. Controls not shown: age, sex, urban/rural, number of children in the household, educational attainment of the household head, number of adults participating in the labor force, age of the household head. Dependent variable: school enrollment (0=no, 1=yes). For Botswana 2011 and Zambia 2010, no distinction could be made between urban and rural areas. For South Africa 2016 information about household residents' labor market participation was not available. We restricted the samples to children who reside in a household with only their biological mother ("Mother Only") to control for effects of maternal marital status. **Source**. IPUMS International.

5 Conclusion

5.1 Overview

This thesis offers a comparative perspective on heterogeneity in households, living arrangements, and families across Africa in recent decades. Using data from censuses and surveys, the three research articles that comprise the core of the thesis explore aspects of family demography in contexts of socioeconomic and demographic transitions. Key contributions of the articles presented include the spatial and temporal coverage of the data used in the analyses, as well as the combination of different analytical perspectives. Given the vast size of the African continent, the number of countries, and the heterogeneity across and within societies with respect to historic demographic, economic, and social trajectories, studying families in Africa can be challenging. Comparative approaches are well-suited to provide a better understanding of the complex demographic and social dynamics observed across different spatial levels.

The three research chapters of this thesis are based on published, peer-reviewed articles that focus on distinct but interrelated aspects of family demography. The article presented in Chapter 2, titled "African households: National and subnational trends from censuses and surveys," explores trends and patterns in household characteristics, namely size and composition, across different spatial levels and over time. Additionally, the analysis investigates which household members are driving the changes observed in households over time and how these contributions differ across continental regions, countries, and subnational areas. Chapter 3 presents the article "The Stability of Child Fostering in Sub-Saharan Africa: The Case of Senegal," which uses Senegal as a case study to investigate how macro-level demographic dynamics contribute to the stable levels of out-fostering observed in many sub-Saharan African countries. Out-fostering is a traditional social practice in which children temporarily or permanently live in households without either of their biological parents. The article analyzes associations between mothers' individual and household characteristics and their propensity to out-foster at least one of their children. In the article "School Enrollment and Living Arrangements of Children in Sub-Saharan Africa," presented in Chapter 4, children's living arrangements are considered as a possible determinant of heterogeneity in school enrollment between and across countries.

Together, the three research articles offer answers to the three overarching research questions: (1) What patterns and trends in household characteristics do we observe over time, and which household members are driving the observed changes?; (2) What are the demographic determinants of the prevalence of child out-fostering over time, and how are maternal and household characteristics associated with child out-fostering?; and (3) What are the links between children's living arrangements and school enrollment in Sub-Saharan Africa, and how do they differ across countries and over time? From the findings of the three articles presented in Chapters 2-4 of this thesis, new questions and ideas for future research emerge regarding the spatiotemporal heterogeneity in households, living arrangements, and family structure.

In the following sections, I first present a summary of the key findings from each chapter. I then discuss limitations to consider when evaluating the findings of the presented analysis, and I identify avenues for future research that emerged from the three research chapters. Lastly, I conclude with final remarks on the research findings presented.

5.2 Summary of key findings from each chapter

In the study presented in Chapter 2, I, my co-authors Juan Galeano and Albert Esteve and I show that African households are heterogeneous in their characteristics, not only across countries but also within countries. Based on data from nearly 50 countries and more than 400 subnational areas, we provide a descriptive overview of regional patterns in household size and composition. Additionally, we analyze trends in household characteristics for six decades. Based on this analysis, three key findings emerged: The first is that, on average, households in Africa are decreasing in size, yet household size continues to differ widely across countries. At the national level, we observe differences in household size of 4.9 people per household between Senegal, which has among the largest average household sizes in Africa, with 8.4 people per household in 2016, and South Africa, which has the smallest average household size in Africa, with 3.5 people per household in 2013. These differences are reflected in regional patterns with distinct family systems. For instance, in West Africa, households tend to be larger on average than in other regions of Africa, and extended and polygynous households are relatively more common (Bongaarts, 2001; Whitehouse, 2018; Van de Walle and Gaye, 2006).

Regional groupings do not adequately highlight the stark internal differences in household size observed in many West African countries. In Nigeria and Benin, for example, internal subnational differences in household size are the highest among all African countries. Both countries have average household sizes below the regional average of 5.8 people per household, and subnational regions with household sizes far above and below that average. In Benin, the average subnational household size ranges from 4.0 to 7.75 people per household, and in Nigeria, the highest subnational average household size is 5.99, compared to the lowest of 3.53. Thus, neither the regional average of 5.8 people per household nor the national averages of 5.32 and 4.63 for Benin and Nigeria, respectively, would adequately represent the internal diversity of either country. Further research focusing on internal diversity and between-country heterogeneity could take into account population size across subnational areas and examine how weighting by population size might affect averages at the continental and country levels.

The second main finding from Chapter 2 is that heterogeneity in household characteristics within and across countries is driven by differences in the number of children and other realatives or non-relatives in the household. Children stand out as a core driver of differences in household size in many countries, yet, especially in West Africa, the prevalence of large households is also driven by the presence of other relatives or non-relatives of the household head. These findings align with research on West African family structures

that highlight the importance of polygyny and extended kinship networks in the region (Alber et al., 2010; Evans et al., 2021; Van de Walle and Gaye, 2006; Whitehouse, 2018). Still, we observe that large household size is not necessarily an indicator of complexity, as small households can also be internally complex, meaning that other relatives, beyond spouses and children, or non-relatives of the household head are present. In Southern African countries, where average household size tends to be smaller, the presence of kin or non-kin in the household, who are not part of the nuclear family, can increase complexity, especially as the relative weight of these household members is greater in small households. Thus, household complexity might increase, even as countries experience further fertility declines and fewer children in the household. These changes, however, are also influenced by demographic dynamics. As fertility declines, the number of extended kin available for coresidence in a complex household might decrease (Murphy, 2011; Furstenberg et al., 2015). Life expectancy increases further complicate any predictions, as they might increase the number of years generations share and can prolong periods of coresidence in intergenerational households (Esteve and Reher, 2021).

Lastly, our study showed that it is feasible and insightful to analyze harmonized household data across different spatial levels and over time in the African context. The anticipated diversity in household characteristics across the different regions, countries, and subnational areas posed a challenge for the visualization and communication of our results. However, the results show that comparisons across different and similar spatial units provide important starting points for future inquiries on household and family dynamics in Africa. This finding is in line with a recent article by García-Gómez and colleagues (2025), who show that country-level averages can mask important variation in the context of subnational heterogeneity. We argue, based on the results from Chapter 2, that sub-national analysis, beyond the dichotomous sorting of areas into rural and urban categories, can enrich studies of household and family dynamics, especially in countries that are internally heterogeneous.

Overall, we were able to provide an answer to the first main research question presented in the introduction of this thesis: (1) What patterns and trends in household characteristics do we observe over time, and which household members are driving the observed changes? Based on the analysis presented in Chapter 2, we show that patterns and trends in household characteristics differ across regions, countries, and subnational areas in Africa, with households being relatively larger in West Africa compared to other regions. On the sub-national level, we observe diversity in household characteristics, primarily driven by the contributions of children and other relatives, as well as non-kin of the household head. Over time, we observe declines in average household size at the country level; however, countries differ in their starting points and the pace of decline.

In Chapter 3, together with Ewa Batyra and Albert Esteve, I explored the underlying demographic and socioeconomic drivers of stability in levels of child out-fostering in Senegal, based on nine samples of DHS

data covering the period from 1986 to 2019. We focused on child out-fostering, a traditional social practice in many sub-Saharan African countries that illustrates the lived conceptualization of shared child-rearing and family structures beyond household boundaries. We confirm, in line with the literature on fostering (Cotton, 2021), that child out-fostering levels in Senegal have remained remarkably stable over time. Looking at trends over time, we group mothers across the different rounds of samples by birth cohorts. We observe that, while the share of mothers below age 35 is lower in more recent cohorts, among women aged 35 to 44, the proportion of mothers who out-foster at least one child in the 1976-1985 birth cohort is higher than in the two previous cohorts. We also note that differences across cohorts in the vast majority of age groups are not statistically significant, which emphasizes the stability of out-fostering over time.

At the macro level, our results suggest that this stable prevalence of out-fostering is driven by counteracting demographic dynamics. Entry into motherhood in Senegal across cohorts is postponed, and fertility is declining. While we do not have data for all birth cohorts at all ages, we find that among younger cohorts, the number of children at the beginning and middle of the reproductive career is far below the number of children born per woman in earlier cohorts. For example, at age 30-34, the difference between the 1946-1955 and 1986-1995 cohorts exceeds 1.5 children per woman. For cohorts that have already reached the end of their reproductive careers, the difference between the number of children born per woman in 1936-1945 and 1966-1975 is above 1. This reflects the postponement of motherhood across cohorts, with women entering motherhood later, although nearly all women observed at age 30-34 have become mothers. The decline in fertility suggests that mothers have fewer children available to out-foster and that fewer women at younger ages have any children available to out-foster. However, this decline in fertility is offset by substantial reductions in infant and under-five mortality over the period 1986-2019. Overall, most women in Senegal become mothers, and the number of living children they have in the middle and later stages of their reproductive careers remains steady over time.

On the micro-level, we explored whether mothers' characteristics have changed and how their individual-level characteristics and household context are associated with out-fostering, despite macro-level stability in the prevalence of out-fostering. Our results emphasize important links between mothers' age and the number of living children. Mothers aged 30-34 in Senegal are particularly likely to out-foster a child, and having more children increases the odds of having a non-coresident child. Among young mothers (aged 15-19), the baseline risk of out-fostering is similar to that of mothers aged 30-34, but the youngest mothers' propensity to out-foster is most strongly influenced by having more children. In light of these results, we argue that out-fostering in Senegal is driven by demographic factors and the necessity for mothers to rely on help with childcare. The findings also suggest that mothers' household composition matters for out-fostering decisions. Mothers who are not related to the household head face even higher odds of out-fostering a child than mothers who head their own household. Lastly, the results suggest that out-fostering

is a stratified social practice, as mothers who are less educated, unmarried or in a polygynous union, and living in rural areas are more likely to out-foster a child than their counterparts.

Based on these key findings from the study presented in Chapter 3, we are able to answer the second overarching question stated in the introduction of this thesis: (2) What are the demographic determinants of the prevalence of child out-fostering over time, and how are maternal and household characteristics associated with child out-fostering? We chose to study variations in family structures through the lens of child out-fostering and to explore both macro-and micro-level factors associated with the stable level of out-fostering noted in the literature (Cotton, 2021). The article aligns with the broader research aim of the thesis, which is to study and understand variations in family structures over time. Focusing on a case study allowed us to harness the rich data of the continuous DHS implemented in Senegal and to study a social practice that reflects and is shaped by relationships beyond the household over nearly three decades.

Chapter 4 explores links between children's living arrangements and their school enrollment across 24 countries from 1976 to 2019. Together with Ewa Batyra and Albert Esteve, I aimed to answer the third main research question of this thesis: What are the links between children's living arrangements and school enrollment in Sub-Saharan Africa, and how do they differ across countries and over time? In other words, the analysis presented in this study explored variations and trends in children's living arrangements over time and space, while also examining possible implications of observed changes and variations for child outcomes. Thus, we first provided an overview of country-level trends in children's living arrangements and school enrollment. We then used logistic regression models to explore individual-level associations between living arrangements and school enrollment for children aged 7-14. To facilitate a comparison across 60 census samples, we categorized children into four mutually exclusive living arrangements: (1) living with both biological parents; (2) living with the biological mother; (3) living with the biological father; and (4) living without either biological parent.

The first main result of the study is that school enrollment increased among children across all countries included in the analysis, yet large variations in enrollment remain. School enrollment is particularly high in Southern Africa and some East African countries, and tends to be lower in West African countries. Still, several countries in East and West Africa have achieved large improvements in school enrollment over time, and Rwanda and Mauritius in East Africa, and Ghana in West Africa, have achieved school enrollment of 90 percent or more among children aged 7-14 in the most recent samples. Despite improvements, school enrollment remains below 75 percent in some East African countries, such as Ethiopia and Mozambique, as well as in most West African countries. As mentioned in the study, we emphasize that, due to population growth, increases in the proportion of children enrolled in school can represent significant gains in the absolute number of children enrolled.

The second key result of the study is that children's living arrangements in many countries have remained relatively constant over time, and in most countries, the majority of children live in households with both biological parents present. Yet, large shares of children in many countries live in households with only their biological mother or neither parent present. With respect to these three living arrangements, we observe regional differences: living with only the mother or without a parent is more common in Southern African countries than in other regions, and, on average, living in a household with both parents is most prevalent in West African countries. While we observe broad regional trends, we also emphasize that there are outliers, especially among the larger groups of West and East Africa. In line with the literature, we find that few children reside in households with only their biological father present in any of the studied countries. Despite the patrilineal norms of many ethnic groups in African societies, children might reside with their mother or be out-fostered to parental kin following a divorce (Cotton, 2021; Grant and Yeatman, 2014; Isiugo-Abanihe, 1985; Lowes, 2022; McDaniel and Zulu, 1996)

When connecting living arrangements and school enrollment over time, we find that in nearly all countries included in our analysis, living with only the biological father or without biological parents is associated with lower odds of school enrollment compared to living with both biological parents. These differences are statistically significant across nearly all samples regarding living without parents. We also observe that, in around two-thirds of countries, living in a household with only the biological mother is associated with higher school enrollment than living with both parents. Based on relative predicted probabilities for children's school enrollment by living arrangement and time, we find that variation in school enrollment across living arrangements tends to decrease as school enrollment increases. However, this trend is not observed in all countries, as the advantages of living with the mother only persist or emerge in some countries, despite increases in school enrollment. We conducted several robustness checks to identify possible underlying factors that contribute to a "mother-advantage", such as the possibility that mothers are married to a stepfather or a migrant father who supports their children's school enrollment. Yet, we do not find substantial differences in school enrollment by maternal marital status among children residing with their mother only, suggesting that other factors are important for understanding the observed "mother-advantage" in school enrollment, particularly in West Africa.

Overall, the fourth chapter highlights the persistent role of living arrangements in the context of variation in child outcomes and human capital accumulation of children across time and space in Africa. The findings also illustrate that links between child outcomes and living arrangements are context-dependent and might be shaped by the historic, economic, policy, and cultural settings associated with different living arrangements, aspects that we could not explore further in this comparative study. Nonetheless, we note increases in school enrollment across all countries over time and find that as school enrollment increases, living arrangements appear to matter less for children's school enrollment. Thus, improvements in children's educational attainment opportunities can potentially help to overcome disadvantages in human

capital accumulation brought about by their household contexts, particularly for children living in households without both of their biological parents.

5.3 Limitations and future research avenues

While the limitations of each research article are discussed in the respective chapters, several overarching limitations need to be acknowledged and considered when interpreting the overall results of this thesis. The following section provides an overview of key limitations and discusses potential avenues for future research in the context of the challenges encountered during the research for the three main thesis chapters.

The first, and perhaps most important, limitation is that the diversity of countries in Africa poses a major challenge to conducting comparative analyses of families. While this thesis aims to provide an overview of variations in household, family, and living arrangements across the continent, the research presented should be understood as an initial contribution that provides a starting point for further research. To study different aspects of variation in families across time and space, each of the three research chapters prioritizes specific perspectives over alternatives. The article presented in Chapter 2, while offering a broad overview of trends in household size and composition across 49 countries and 415 subnational areas, cannot delve into the possible reasons for the observed heterogeneity. Thus, we can describe patterns and trends but cannot identify the causal mechanisms that generate them. Future research seeking to expand upon our findings might use the presented analyses as a starting point to better understand the causal processes underlying subnational variation in household characteristics. Similarly, Chapter 4 offers a comparison of variation in outcomes associated with children's living arrangements across time and space. While this comparative perspective helps to identify regional patterns or trends, it does not allow for an in-depth study of context-specific mechanisms that might drive the observed variations.

By comparison, the article included in Chapter 3 provides a detailed analysis of the Senegalese context, yet the extent to which these findings are generalizable beyond this specific setting needs to be further explored. For Senegal, we can analyze long-term macro- and micro-level changes in demographic and socio-economic factors that may influence whether women participate in traditional practices such as child fostering. Yet, some of the dynamics we observe, such as counteracting fertility declines and improvements in infant and child mortality, might play out differently in other countries. In other words, the macro-level demographic dynamics that underpin the stability of child out-fostering in Senegal may differ in contexts where other aspects, such as parental death due to HIV/AIDS, increase fostering prevalence despite fertility declines. It is possible that high levels of fostering could also be associated with stable fertility over time or with changes in the characteristics of mothers overall, or specifically of mothers who engage in fostering, and further research is needed to test whether the observed associations hold in other countries.

The second limitation of this thesis concerns the different perspectives and data sources chosen to address the three main questions. In Chapter 2, my co-authors and I rely on a household-level perspective to study trends in patterns in household characteristics across different spatial levels. For this project, we used the Coresidence database, which provides harmonized data from censuses and surveys (Galeano et al. 2024a). The indicators in the two iterations of the database are provided at the country and sub-national levels and are mostly aggregated at the household level. Thus, indicators include, for example, the average household size for a country or subnational region, or the average number of children of the household head for each spatial unit. These indicators are well suited for comparative studies because they are intuitive metrics for household size and composition. However, the database does not provide information on other demographic or socioeconomic characteristics of households, as they are either not readily available in the source data or cannot be harmonized across samples, such as household wealth, education, marital status, and household members' occupations.

Additionally, relationships within the source data are constructed with reference to a so-called household head. Indicators such as the number of children, spouses, other relatives, or non-relatives in the household are based on the household head's perspective. Subsequently, these indicators do not reflect the lived realities of each household member and can also create challenges in accounting for specific groups within multigenerational, extended, blended, or polygynous households. For instance, children who are not directly related to the household head could be counted as non-relatives and would not be included in the variable representing children in the household head. Moreover, these relationship variables are constrained to the household, meaning they do not consider relationships and kin beyond the household roster. A household head might have children who live in another household, but they also would not be included in the count of children for that household head. Chapter 2 includes an in-depth discussion of the limits of the household perspective and of relationship variables coded based on the household roster and in reference to the household.

The limits of the household perspective and of relationships constrained to the household are also relevant in the context of Chapters 3 and 4. In the third chapter, the analysis defines children as out-fostered if they do not reside with their biological mothers, based on information about the children obtained from mothers' birth histories. However, we do not know with certainty whether these children are out-fostered, meaning living in a household without either parent, or if they live with their biological father. While research suggests that few children in African countries live in households with only their biological father present, a finding corroborated by our analysis in Chapter 4, some do. Since the DHS data do not include information on family members beyond the household, we cannot track with whom children reside or for how long they have been living apart from their mothers. Information on mothers' kin networks and relationships beyond the household could provide additional insights into shared child-rearing responsibilities and how child-rearing practices are conceptualized.

Moreover, even if we focused on children who do not reside with their mother and studied their household composition, we might not be able to determine whether they reside with kin or non-kin, as household relationships are defined only in reference to the household head. Thus, a child living with an aunt who is not related to the household head or categorized as an "other relative" would likely be coded as living with non-kin, simply because the relationship between the child and the aunt could not be determined from the data. Consequently, our analysis highlights the need to collect data on family members and relationships beyond the household roster. This issue is particularly relevant in the African context, where households tend to be larger on average than in other world regions and kinship networks form a crucial part of societal and familial organization (Alber et al. 2010; Bongaarts, 2001; Bongaarts and Zimmer, 2002; Evans et al. 2022; Madhaven et al. 2022; Therborn, 2004; Van de Walle, 2006). Longitudinal studies of children's living arrangements could support a more in-depth understanding of the duration and changes in their household context throughout childhood. While longitudinal data are available in some countries, there is a need for comparative, nationally representative surveys that follow the same sample of children and their kin over time.

In the fourth chapter, the categories of children's living arrangements are based on the available data that are constrained to the household level. Thus, we group children into four living arrangements based on whether their parents are present in the household. While this perspective provides initial insights into associations between living arrangements and children's school enrollment, the analysis could be augmented to include additional information on family members beyond those living within the household. Children residing in a household with an absent parent may have a migrant parent supporting the household financially, which could positively influence children's ability to enroll in school. We can approximate this scenario based on the present parent's marital status, but this approach provides only limited information. We can determine that a child's mother is married and that her spouse is absent from the household; however, we have no additional information about the whereabouts or economic activity of the absent parent. Additional information on key family members could help fill this research gap, particularly when studying associations between child outcomes and their family context. Implications for the well-being of children in transnational families have gained attention in the literature (*e.g.*, Mazzucato and Cebotari, 2017; Mazzucato and Schans, 2011; Nobles, 2011), but further research on the support provided by parents not in the household could foster a better understanding of caregiving strategies and kinship networks in contexts of internal migration, divorce, or polygyny.

Categories of living arrangements based on the presence or absence of household members can offer only a limited perspective on how relationships and family structures unfold in practice, as living arrangements are situational and context-dependent and cannot easily be captured in broad categories. While these categories can be associated with specific child outcomes, such as school enrollment, on the macro level,

diversity within categories might be hidden. Children who reside with both parents might be hypothesized to fare better in school outcomes than children living in a household without their parents, but they may also face barriers to schooling (Hampshire et al. 2015). Groupings of children by living arrangement do not provide insights into structural inequalities, such as poverty or limited educational access in rural areas, nor do they offer information on how much time children spend with their parents or on the quality and perception of their relationships. Additionally, much of what we know from the literature about links between children's well-being and educational outcomes and their household context is based on high-income societies and cultures in which the nuclear family tends to be the prevailing norm (*e.g.*, Sweeney, 2007; Case et al. 2010; Marsh et al. 2020; McLanahan et al. 2013; Potter, 2010). Future research in settings where coresidence with both parents is not the only socially accepted or preferred form of child-rearing could improve understanding of how norms shape the links between family context and child outcomes. Such studies could also benefit from insights based on qualitative data on the conceptualization of kin relations and parenthood.

The observed heterogeneity, while at times illustrating regional similarities, highlights the vast diversity of households, family structures and practices, and outcomes associated with living arrangements. Therefore, the three analyses of temporal and spatial variation presented in this thesis aim to motivate future research on the respective topics. All three articles adopt a comparative perspective by contrasting trends and patterns across or within regions, countries, and subnational areas, yet, given the limited scope of each individual research article, some aspects remain beyond the realm of the analyses, and, at the same time, the results of the analyses bring about new questions and insights that demand research attention. On the one hand, the diversity of families across a vast number of countries in Africa poses a limitation to the research presented in this thesis, but on the other hand, it offers opportunities for further studies in the field of family demography to contribute to a better understanding of family variations across time and space.

5.4 Final remarks

This thesis presents a snapshot of households, family structures, and living arrangements in Africa. The three main chapters situate research on variations over time and space and cover different aspects of family demography within the context of rapid, heterogeneous socio-economic and demographic changes across the continent in recent decades. The dissertation also seeks to discuss the implications of these changes for the prevalence of, and participation in, traditional social practices, such as child out-fostering, and for the human capital accumulation of future generations. To acknowledge the heterogeneity in trends and patterns of family organization, the articles integrate multiple research perspectives across various spatial levels.

The findings of the three articles highlight that families in Africa are changing, but the magnitude, pace, and even direction of these changes differ across spatial levels and over time. Further research into the

determinants of such changes and the observed heterogeneity is needed to better understand the future trajectories of families and familial organization. Comparative research and the use of subnational data can provide insights into how changes in families and households might affect their members, particularly children, and inform policymakers seeking to counteract inequalities and support families. However, the results of this study also show that data on family members beyond those coresiding in a single household are needed, especially in contexts where families extend across multiple households, kin networks share child-rearing responsibilities, and parents live temporarily or permanently apart from their children.

Overall, this dissertation seeks to illustrate the value of comparative family demography and provide a foundation for future research on households, family structures, and living arrangements. The descriptive overview of households presented in the second chapter showcases the diversity in core household characteristics across and within countries. The third chapter outlines the importance of demographic dynamics in understanding changes and stability in family structures and social customs over time. The fourth chapter examines how living arrangements may constitute an overlooked factor in understanding variability in child outcomes across and within African countries. Combined, the three chapters serve as an invitation to other researchers to explore and contextualize the observed patterns and trends to better understand future family dynamics amid changing demographics and socioeconomic conditions.

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