# Ancestral Beliefs and Fertility in Sub-Saharan Africa

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**Abstract**

This paper examines why the demographic transition in sub-Saharan Africa has started later, from higher fertility levels, and has occurred at a slower pace. I study the demographic consequences of a traditional belief system with a primary emphasis on the influence of ancestors on the everyday lives of the living, that emphasizes the importance of continuing the lineage and equates fertility with virtue and spiritual approval. Combining first-hand data with original ethnographic information and both historical and contemporary surveys, I show a positive relationship between beliefs in ancestors and fertility in different contexts and time periods, that holds across ethnic groups, across individuals from the same country, and across migrants who live in the same city and were born in the same area but whose beliefs in ancestral influence differ. Guided by a simple model where the motive to continue the family line differs by kinship system, I examine mechanisms: the positive influence of ancestral beliefs on fertility is driven by patrilineal societies, where parents and children belong to the same lineage, and is more pronounced in lineage-based societies, where the motive to continue the family line plays a central role. Consistent with free-rider behavior in a setting where the motive to continue the lineage drives fertility upwards, male fertility decreases with the number of men in the family who can continue the lineage, but only in patrilineal societies with strong ancestral beliefs. Similarly, there is a negative relationship between women's fertility and the number of sisters in matrilineal societies with strong ancestral beliefs.

***Keywords:*** Fertility, Sub-Saharan Africa, Culture, Supernatural Beliefs, Kinship

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# 1 Introduction

The fertility decline associated with the demographic transition has been a key factor in moving from stagnation to sustained economic growth. Moreover, high fertility rates combined with reductions in infant mortality lead to high child dependency ratios, are detrimental to maternal and child health, and are associated with low educational attainment and poor living standards (Stover and Ross, 2010; African Union, 2007). Understanding the obstacles to the demographic transition is therefore critical for development.

In sub-Saharan Africa (hereafter SSA), the fertility transition has been different from that in other low- and middle-income countries. It started later, from higher fertility levels, and has occurred at a slower pace (Bongaarts and Casterline, 2013; Bongaarts, 2017; Shapiro and Hinde, 2017; Schoumaker and Sánchez-Páez, 2024). However, while there is near consensus that Africa is different in terms of fertility decline, there is no consensus as to why (Casterline, 2017). Conventional demographic transition theory fails to predict Africa's fertility trends, and supply-side interventions aimed at curbing fertility rates have often been disappointing (Dupas et al., 2024).

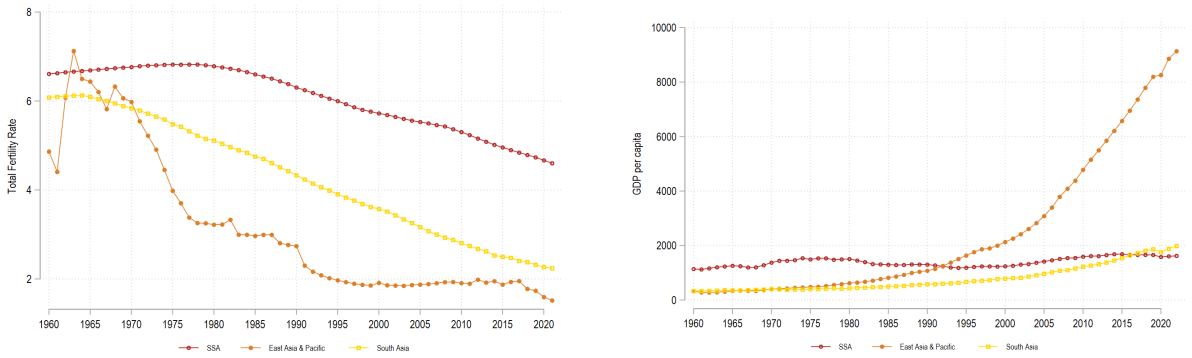
Yet most of the literature has focused on the role of factors related to the region's (low) economic development or the economic returns to children (e.g., World Bank 1986; National Reseach Council 1993; Rossi and Godard 2022).[1] However, SSA has historically had the highest ideal family size at a given stage of the demographic transition, and has shown greater resistance to fertility decline despite better economic conditions than other regions undergoing demographic transition (Figure 1). The limitations of conventional demographic transition theory suggest room for alternative explanations related to cultural specificities and aspects of the social organization of African societies (Caldwell and Caldwell, 1987, 1988, 1990). In particular, African traditional beliefs have been overlooked in economics, despite being widespread and significant to human behaviour (Butinda et al., 2023).

This paper studies the demographic consequences of a traditional belief system that characterizes many societies in SSA. This belief system, embedded in a social structure organized around descent and kinship, emphasizes the importance of continuing the family line and equates fertility with virtue and spiritual approval. The key feature of this traditional belief system is the belief that the ancestors, the spirits of the dead, continue to influence society (Radcliffe-Brown, 1922; Fortes, 1965). The close relationship between fertility and the belief in ancestor spirits lies in the nature of African kinship, where the living are only a small part of a lineage that extends into eternity. The primary goal of both living members and ancestors is the reproduction of the lineage. To this end, ancestors bless their progeny's fertility, bring wealth, health and children, and reincarnate. The resulting belief system operates to sustain high fertility by attributing great importance to the con-

[1] Among these, the National Reseach Council (1993) highlights income, infant mortality, education, participation in agriculture, urbanization, and access to health and family planning services.

tinuation of the family line, and has molded societies in such a way to reward (both socially and spiritually) high fertility. Most powers attributed to ancestors are therefore related to family survival, and high fertility is morally associated with right living, joy, and the approval of ancestors, while low fertility, miscarriage or infertility is associated with sin and misfortune, and shows ancestral disapproval and punishment.

Figure 1: TFR and GDPpc in SSA, East Asia and the Pacific, and South Asia, 1960-2020




(a) Total Fertility Rate (b) GDP per capita

*Notes*: The data comes from the World Bank and OECD National Accounts (https://data.worldbank.org/). The SSA sample includes Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo,Dem.Rep., Congo,Rep., Cote d'Ivoire, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Somalia, South Africa, South Sudan, Tanzania, Togo, Uganda, Zambia and Zimbabwe. South Asia includes Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. East Asia and the Pacific includes Cambodia, China, Fiji, Indonesia, Kiribati, Korea Dem. People's Rep., Lao PDR, Malaysia, Marshall Islands, Micronesia, Mongolia, Myanmar, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu and Vietnam.

I build on a rich demographic and anthropological literature and combine first-hand data with novel ethnographic information and historical and contemporary surveys to explore the relationship between beliefs in the influence of ancestors are fertility in SSA. I find that, across different samples, econometric specifications, and time periods, there exists a positive relationship between ancestral beliefs and fertility rates. Guided by a simple model, I then show that the motive to continue the family line is the main mechanism driving these results.[2]

I begin by analyzing first-hand data collected among pineapple producers in contemporary southern Benin. This is mostly a rural context, where the clan-based structure of the society is still pervasive and traditional beliefs are widespread despite the success of modern religions. The sample includes above 800 fairly similar men (they all work in the same sector and activities), and contains useful information that enables to disentangle alternative mechanisms such as the economic returns to children or the possibility to externalize the costs of bearing children when extended families are important. I find that holding strong beliefs in ancestors is associated with about one additional child. The magnitude of the coefficient is comparable to the effect size of having attended

[2]I will use the term "*ancestor worship*" as a synonym of beliefs in ancestors throughout the paper. However, there is controversy about the adequacy of the term ancestor worship in the African context. For example, Kenyatta (1965) prefers the term "*communion with the ancestors*", as he mentions that communing with the ancestors is an aspect of the everyday life of the African (ancestors are still members of the community), and their attitude towards ancestors is very different than their attitude towards the deity (who is truly worshipped). Similarly, Grande (2024) notes that "Ancestorism is not always a matter of ancestor worship. It is most often a matter of ancestral spirits helping sustain the living family while being sustained by it in return (through rituals)."

primary school, or to the difference in births per women between SSA and other low-income regions.

Second, I focus on the context of post-independence Democratic Republic of the Congo (DRC) and match original information on beliefs in ancestors at the ethnic group level, digitized from Vansina (1966), with individual-level birth histories for about 70,000 women from two unexplored demographic surveys conducted in the west part of Congo between 1975 and 1977. The nature of one of the surveys, composed mainly of migrants from rural areas, allows me to exploit the heterogeneity in ancestral beliefs while holding both the origin and destination of respondents constant, thus isolating both economic conditions and local institutions from beliefs. I find that the practice of ancestor worship at the ethnicity level increases the total number of children ever born by about 0.25-0.8 depending on the specification.

Third, I explore whether the same relationship holds in the wider context of sub-Saharan Africa by using individual-level information on contemporary supernatural beliefs from 25,000 respondents distributed across 19 SSA countries coming from Pew Research Center (2009). This dataset contains explicit questions on supernatural beliefs, including beliefs in ancestors, witchcraft, and other traditional beliefs. As before, I show that beliefs in ancestors are associated with 0.2-0.5 more children (8 to 25% of the sample mean), even after controlling for a wide range of individual characteristics.[3] These results are not driven by alternative interpretations such as higher overall religiosity or the importance of other supernatural beliefs and traditional practices such as witchcraft, use of traditional religious healers, practice of adult initiation rituals, or belief in miracles.

Fourth, I show that there exists a link between beliefs in ancestors and fertility in the oral traditions of pre-industrial societies, where ancestral beliefs were widespread. Since culture is transmitted from generation to generation through myths, folklore, or proverbs, it is expected that the remaining positive influence of beliefs in ancestors on fertility be reflected in the folklore of ethnic groups. I use information on 2,564 folkloric motifs from the oral traditions of nearly 1,000 ethnic groups from Berezkin (2015) to examine the scope and relevance of beliefs in ancestors and its relationship to fertility at the global level and within sub-Saharan Africa in pre-industrial societies. I proxy the prevalence of beliefs in ancestors by looking at the proportion of folkloric motifs in an ethnic group's oral tradition related to the word *ancestor* (or similar), and the importance of fertility by looking at the proportion of folkloric motifs in an ethnic group's oral tradition related to the word *birth* (or similar). I show that beliefs in ancestors were widespread in ancient times, and that their presence is associated with a higher proportion of folkloric motifs related to words such as birth or fertility. These results are robust to the inclusion of an extensive set of ethnic-level controls and to alternative definitions of both the dependent and independent variables, and suggest that my

[3]These control variables include age, age squared, gender, whether the individual lives in a urban or rural area, whether he/she is Christian/Muslim or from other religion, a dummy variable that equals one if the respondent has completed primary education, a dummy that equals one if the respondent is married, a dummy variable that equals one if the respondent finds himself/herself in a good economic situation, and a dummy equal to one if the respondent did not have money at some point during the last year to buy food for his/her family.

former findings are not driven by different post-colonial fertility trajectories.[4]

Finally, to better understand my empirical findings and unveil the mechanisms through which strong beliefs in ancestors affect fertility behavior, I develop a simple model of fertility that incorporates the motive to continue the family line as a driver of fertility. Importantly, the motive to continue the family line matters differently by kinship system due to the asymmetry in marital allegiances (Fox, 1983; Berggreen and Gokmen, 2023).[5] In patrilineal societies, both spouses and the children belong to the husband's lineage. However, in matrilineal societies, the husband does not belong to his wife's lineage, and the children belong exclusively to the wife's lineage. Therefore, the motive to continue the family line is particularly strong in patrilineal societies with strong beliefs in ancestors, where it drives fertility upwards. This results has additional implications. In patrilineal societies with strong beliefs in ancestors, there may be a negative relationship between one's own fertility and the number of children of the husband's brothers, since they also contribute to the continuation of the husband's lineage. Similarly, from the woman's perspective, there may be a negative relationship between female fertility and the number of children of the woman's sisters in matrilineal societies.

Consistent with these predictions, I find that: 1) the positive influence of ancestor worship on fertility is driven by ethnic groups where patrilineality is the main type of descent, both at the global level in the folkloric data and in contemporary DRC;[6] and 2) there is negative relationship between one's fertility and the number of family members capable of continue one's lineage with their own children. Using survey data from the DRC DHS (where there is information on household composition) and ethnographic information from Vansina (1966) (where there is information on ancestor beliefs) and Murdock (1967) (where there is information on descent types), I show that there is a negative relationship between male fertility and the number of men aged 15-49 living in the household, but only in patrilineal societies with strong ancestral beliefs.[7] Similarly, using the same data (now with accurate information on respondents' siblings), I show that there is a negative relationship between women's fertility and the number of sisters (but not brothers) they have, but only in matrilineal societies with strong beliefs in ancestors.

[4] These control variables include the total number of motifs in an ethnic group's oral tradition, the number of publishers of the sources in the group's oral tradition, the earliest year of publication in the group's oral tradition, whether the domestic organization is around independent nuclear families, whether people are part of localized clans that live as segmented communities, whether the ethnic group is patrilineal, political complexity, whether monogamy is dominant, whether the group practices pastoralism, use of historical plough, historical economic development, practice of intensive agriculture, the share of motifs in an ethnic group related to "supernatural", presence of tropical climate, precipitation, ruggedness, land quality (population weighted), and agricultural suitability.

[5] See Appendix R for a simple introduction to kinship systems.

[6] Similarly, in the DRC context, I find that the positive effect of patrilineality on fertility is only present when ancestor worship is practiced, which helps to better understand the positive relationship between patrilineality and fertility suggested in different contexts (BenYishay et al., 2017; Okafor et al., 2021; Fontenay et al., 2024). I provide supportive evidence that group membership (parents and children belong to the same lineage or not) is a key mechanism for understanding the relationship between kinship structure and fertility.

[7] Unfortunately, the DHS does not include information on siblings for men, so I use the number of men in the household aged 15-59 as a proxy for the number of men able to continue the respondent's lineage by having children.

Finally, to further explore the mechanisms at play, I examine the interaction between ancestral beliefs and social organization. Since ancestral beliefs are closely linked to kinship and lineage structures (they represent the extension of the core elements of many African societies – ancestry, kinship and descent relations – to the supernatural sphere and emphasize the importance of extending one's lineage) I examine the question of whether ancestral beliefs will disappear as the clan-based structure of societies becomes less salient. First, I show in the context of contemporary Benin that the positive effect of ancestral beliefs on fertility is stronger when the influence of the clan or the extended family is pervasive. Second, I made use of the distinction between lineage- or kin-based societies and age set societies. I focus on Kenya and use information from Moscona and Seck (2024) to distinguish between age-based and lineage-based societies. I show that the relationship between ancestor worship and fertility is stronger in lineage-based societies.

Overall, these results are consistent with a setting where the motive to continue the family line drives fertility upwards. I highlight the importance of taking into account how belief systems interact with important elements of the social structure in shaping economic behavior. Furthermore, this analysis suggests that future fertility decline will probably be accelerated by factors that contribute to the dissolution of clan-based institutions centred on the lineage and the extended family (e.g., increases in population density and the emergence of private property rights), which in turn impact the persistence of traditional belief systems that sustain high fertility.

This paper contributes to several strands of the literature. First, it contributes to the broad literature on the importance of cultural characteristics for socioeconomic outcomes (e.g., Luttmer and Singhal 2011; Alesina et al. 2013; Alesina and Giuliano 2015). In particular, it adds to a growing literature on the effects and consequences of traditional supernatural beliefs.[8] For example, Le Rossignol et al. (2022) use a series of lab-in-the-field experiments in northern DRC to show that individuals with strong traditional beliefs are treated less pro-socially. In another paper, Gershman (2016) finds a negative relationship between witchcraft beliefs and trust and other prosocial attitudes, both within Africa and globally. In the context of Benin, Stoop et al. (2019) find that voodoo adherence is associated with lower demand for health care and worse child health outcomes. Sievert (2023) shows that supernatural beliefs about the cause of illness are very common and relevant for health behavior, resulting in lower use of modern medicine, lower beliefs about the effectiveness of modern medicine, and higher stigma toward those with illness. Finally, in a recent paper, Butinda et al. (2023) argue that African traditional religions influence economic decision-making by showing that, in the context of beer sellers in the eastern Democratic Republic of the Congo, religious rituals correct overly pessimistic beliefs about the risk of theft. However, most of the work in this area has focused on witchcraft beliefs.[9] This paper contributes to the understanding of globally

[8] Indirectly, it also complements the literature on the persistence of traditional beliefs in Africa (Platteau, 2009; Nunn and Sanchez de la Sierra, 2017; Le Rossignol et al., 2022; Igboin, 2022).

[9] See Gershman (2022) for a review of witchcraft beliefs in economics.

prevalent system beliefs that have received little attention, such as ancestor worship. Most of the effort dedicated to the recent study of ancestor worship comes from social anthropology. Indeed, no paper has examined the economic and social consequences and implications of beliefs in ancestors in the context of sub-Saharan Africa from a quantitative perspective, despite being recognized that these beliefs are prevalent and relevant to economic behaviour.[10]

Second, this paper contributes to the scarce but growing literature on the relationship between religion and fertility in Sub-Sahara Africa (e.g., Ishak and Gradstein (2022), Berger and Dasré (2024), or Götmark and Turner (2023) for a review). These papers use large-scale demographic surveys to examine the relationship between religious affiliation and fertility outcomes. They mostly focus on the differences between major religious groups, Christians and Muslims (and, sometimes, African Traditional Religions). The general consensus is that Muslims have higher fertility than Christians, while followers of African Traditional Religions and Islam have similar fertility levels. However, these papers have important limitations. First, conventional demographic surveys such as the DHS are very problematic to study these questions since they under-report the importance and the coverage of traditional beliefs (which, although more common among followers of African Traditional Religions, are transversal to religious affiliations) and people cannot report having more than one religion. I circumvent these limitations by focusing on the influence of specific beliefs, not on declared religion.

Finally, I contribute to existing analyses of the determinants of high fertility in SSA (see Church et al. (2023) for a recent review), and in particular to the literature on the relationship between cultural norms, social organization and fertility. More than 70 years ago, Lorimer (1954) noted the relationship between high and stable fertility and unilineal descent groups, although he did not include in his analysis their interaction with supernatural beliefs. Three decades later, a growing literature complemented Lorimer's analysis by linking the importance of descent in many African societies to their belief systems and certain aspects of their social organization, which focused on maintaining the family line and reverence for ancestors (Caldwell and Caldwell, 1985, 1987, 1988, 1990; Lesthaeghe, 1989; Caldwell et al., 1992). In the same line, Bauer et al. (2006) showed that individuals with strong clan linkages in rural Uganda want more children than similar individuals without those linkages. Fernández and Fogli (2009) study how culture influences fertility by looking at the behaviour of second-generation American women. They proxy cultural beliefs in their country of ancestry by using the total fertility rates in those countries 20 years before the data they use, and show that the cultural proxies have a positive and significant effect on the number of children that

[10] There exist studies investigating the role of ancestor worship practices and fertility in other contexts, such as China. For instance, Zhang (2024) exploits a natural experiment, the Kuomingtang's Retreat to Taiwan, which resettled approximately one million Chinese in Taiwan between 1945 and 1954, to show that ancestor worship (a cultural feature of the Chinese population) contributed to the transmission of son preference and high fertility rates. Hu and Tian (2018) examine the case of contemporary China. They find a positive correlation between current ancestor worship practices and childbearing and marriage outcomes. In the same context, Yang and Spencer (2022) find that the number of male siblings have a negative influence on fertility decisions, especially when individuals attribute high importance to family continuity. As the authors suggest, these findings are consistent with a free-rider behaviour in the context of a patrilineal kinship system where fertility is at least partially driven by the motive to continue a family line.

second-generation American women have. More recently, some papers in economics have explored whether today's fertility preferences and behaviours may be shaped by some features of social systems such as inheritance rules (Fontenay et al., 2024; Sage, 2023), need for old-age security due to the lack of social pensions (Chen and Roth, 2023), the occupational structure of SSA societies (Zipfel, 2022), perception of social norms (Dupas et al., 2024) or by responses in family institutions to disruptions in traditional practices and modes of production triggered by colonial institutions such as Christian missions (Guirkinger and Villar, 2022) or forced labor migration (Dupas et al., 2023). I add to this literature by, on the one hand, exploring the influence of an alternative explanation (the importance of the traditional belief system present in many sub-Saharan African societies) and its relationship with the social organization of societies and, on the other hand, by focusing in particular on men. In fact, it is surprising that, although it is well recognized that men in sub-Saharan Africa have higher bargaining power than their spouses and are in many cases the sole decision-makers regarding fertility, most papers examining fertility outcomes focus exclusively on the role of women's characteristics.

The remainder of the paper is organized as follows. Section 2 introduces and describes the hypothesis to test and the conceptual framework of the paper. Section 5 proposes a theory of change to rationalize the empirical findings and to better understand the interaction of ancestor worship with existing social structures. Section 3 presents the different datasets and variables used in the empirical analysis. Section 4 describes the different specifications and depicts the main results. Section 6 explores some of the implications of my findings and tests some theoretical predictions. Section 7 concludes.

## 2 Traditional religion and ancestorism in Africa

An exhaustive description of African Traditional Religions (ATR) is beyond the scope of this paper (see Idowu (1973), Mbiti (1975), Opoku (1993) or, more recently, Olupona (2014) for definitions). For our purposes here, we will focus on the elements that have usually been highlighted as the main components of the structure of ATR. According to Idowu (1973), five elements go into the making of ATR: belief in God, belief in the divinities, belief in spirits, belief in the ancestors, and the practice of magic and traditional medicine. Of course, the weight of each of these components varies from society to society, ranging from very prominent in some areas to virtually absent in others. In this section I argue that of these five elements, belief in ancestors is crucial to understanding high fertility in sub-Saharan Africa.

According to Asante (2009), "ancestors are those who once lived in human society and, having fulfilled certain conditions, are now in the realm of the spirits".[11] Ancestor worship, or the cult of the

[11]The question of who established these criteria is not entirely clear (Igboin, 2022). However, some of these conditions, often of a moral and social nature, are common to different societies. For example, one must have lived an exemplary life

ancestors, broadly defined as the set of rituals, practices, and beliefs designed to venerate deceased family members and perpetuate the lineage (Hu and Tian, 2018), has often been considered a crucial element of the traditional belief system of many African societies (Fortes, 1965). In contrast to cults of the dead, anthropologists have observed that the key characteristic of ancestor worship is the belief that the dead person continues to influence society (Radcliffe-Brown, 1922). This view can be summarized as follows:

> "Ancestors are vested with mystical powers and authority. They retain a functional role in the world of the living, specifically in the life of their living kinsmen [...]. African kin-groups are often described as communities of both the living and the dead [...]. The African emphasis is clearly not on how the dead live but on the manner in which they affect the living (Kopytoff (1971), p.129)".

Therefore, ancestors, or the living dead, are seen as dispensers of both favor and misfortune, and their powers are most often used to ensure the survival of the lineage, for example, by contributing to the unification of families and people, or by protecting them from disease, evil, or enemies. However, ancestors are also believed to be the source of illness, misfortune, or disruption in the lives of their descendants, with their ultimate power being the curse that brings sterility and child death (Fortes, 1965; Caldwell and Caldwell, 1987; Ezenweke, 2008).

## 2.1 Prevalence of ancestral beliefs in SSA

Before attempting to link belief in the influence of ancestors to fertility behavior, it is worth discussing why the belief in ancestors is more influential in sub-Saharan Africa than in any other region of the world. In fact, ancestor worship is not historically unique to SSA. For example, Caldwell and Caldwell (1987) hypothesized that ancestor worship may have been the original religion – understood here as a set of beliefs that structure the interaction between a community and the supernatural forces it perceives in the world – in many parts of the world, including Eurasia and the Americas.[12] Perhaps the most prominent and studied example outside SSA is South Asia, especially China, where it has been shown to influence fertility and son preference historically and even today (Ahern, 1973; Hu, 2016; Hu and Tian, 2018; Zhang, 2024).[13]

There are several factors that may explain the higher prevalence of beliefs in ancestors in sub-Saharan Africa compared to other regions of the world. First, the geographic isolation of SSA beyond the Sahara and the presence of several diseases prevented foreigners from gaining political power

by the standards of the community, respected the elders, married, and had children. In addition to having children, an additional criterion often mentioned is to have at least one son who will worship him, while having only female children may not be enough to become an ancestor. On the other hand, death should be natural and at a mature age, and proper burial rites must have taken place.

[12] This hypothesis may be traced back to Victorian anthropologist Herbert Spencer, who believed ancestorism to be "the root of every religion" (Grande, 2024).

[13] Other ancient societies, such as the Greeks, did not develop ancestor worship but rather a cult of the dead. This distinction is important. For example, Catholic societies have a cult of the saints and organize masses for the dead, but they are not considered to be ancestor worshippers either (Fortes, 1965). As already emphasized, the main difference between ancestor worship and the worship of the dead is the strong belief of the former in the influence of the ancestors in the affairs of the living. Death is a necessary but not a sufficient condition for becoming an ancestor.

in the interior until the end of the $19^{th}$ century, limiting their presence to coastal trading posts and thus preventing the spread of alternative belief systems that emphasized the relationship between individuals and external gods and undermined kinship ties (Caldwell and Caldwell, 1987; Schulz et al., 2019; Schulz, 2022).[14] Only the generalized use of quinine around 1850, which significantly reduced European mortality rates (Curtin, 1961), and the construction of railroads and roads facilitated the expansion of European powers into the interior of the continent, although this happened much later than in other regions (Jedwab et al., 2022).

Second, the long tradition of high land-to-man ratios in SSA has prevented the erosion of lineage and clan structures in which ancestor worship is embedded (Boserup, 1965, 1985; Platteau, 2000). In fact, ancestor worship is the extension of these relations to the supernatural sphere (Fortes, 1965; Caldwell and Caldwell, 1985). Collective farms in land-abundant societies based on production activities such as shifting cultivation are efficiently managed by extended families or lineages. As population density increases and land abundance decreases, private property rights tend to emerge and family structures shift towards the conjugal family (Platteau, 2000; Guirkinger and Platteau, 2014). Thus, agrarian societies in SSA are characterized by the presence of free peasants, free land, and the absence of non-working landowners, which reinforces lineage-based organization. For this reason, the *de facto* influence of beliefs in ancestors nowadays is stronger in sub-Saharan Africa than in regions where ancestor worship was traditionally widespread (e.g., Southeast Asia). As Platteau (2000) notes: "Asian societies have a strong tradition of settled agriculture, and property rights on arable lands have long been established with significant class differentiation or stratification in terms of land and other assets. Contrary to African societies which are centered around the lineage and are therefore permeated by values of extended solidarity, Asian societies, like all peasant societies (including European societies), have evolved over centuries social and family patters based on the conjugal family".

As a result of low population density and the prevalence of lineage-based systems of social organization, the intensity of kinship ties and the emphasis on descent are higher in SSA than in any other region of the world, which has hindered the dissolution of ancestral beliefs, since ancestors often symbolize the continuation of a social structure centered on lineage and descent, and therefore organized hierarchically by age, with the oldest person often occupying the position of authority (Alidou and Verpoorten, 2019).[15]

Finally, historical and institutional factors specific to SSA have traditionally favored the repro-

[14] One example is the spread of Islam. As Michalopoulos et al. (2018) show, proximity to the pre-600 CE trade network is a robust predictor of Muslim adherence today, but in the case of sub-Saharan Africa these trade routes are virtually absent, and even if we look at pre-1800 CE trade networks, their development in most of SSA is also very precarious.

[15] In fact, age (and gender) are the two main dimensions along which African societies are stratified. Again, this is closely related to the high land-to-man ratios in SSA. In contrast, Asian village communities have well-established property rights, and (scarce) land is more subject to market exchange, which tends to concentrate ownership in the hands of a class of landowners. Moreover, lineage organization and ancestral beliefs reinforce each other because elders are often considered closest to the ancestors, as in the case of the Bakongo in the DRC or the Kaguru in Tanzania. In addition, because the hierarchy does not end with death, ancestors acquire greater authority than any living person and thus the power to intervene in the lives and affairs of their descendants.

duction and persistence of cultural traits over time (Platteau, 2009). In particular, the existence of strong kinship ties, in which ancestral beliefs are embedded, was facilitated by the existence of weak states and the need for protection against raids during the Arab slave trade (c. 950-1950), and reinforced by the impact of colonialism and indirect rule on the social and political structure of African societies. In fact, due to the colonial administration's interest in increasing the power of local authorities, the system of indirect rule reinforced the clan-based structure of societies and increased ethnic consciousness by benefiting from the creation of uniform groups composed of individuals identified as members of a particular ethnic group and placed under the control of an African official regarded as a tribal or village chief (Ekeh, 2004; Ellis and Ter Haar, 2004; Platteau, 2009).

Because of these contextual barriers, the new religions that spread rapidly in the $20^{th}$ century have had only a limited impact on African traditional supernatural beliefs (Platteau, 2009; Igboin, 2022). Instead, modern religions have adapted to coexist with traditional supernatural beliefs, combining faith in a High God with supernatural beliefs (Platteau, 2014).[16] The prevalence of traditional supernatural beliefs have been noted in several recent studies, although the focus has often been put on witchcraft beliefs (van de Grijspaarde et al., 2013; Leistner, 2014; Stoop and Verpoorten, 2020). With respect to beliefs in ancestors, Igboin (2022) and McCall (1995) highlight that, although ancestors remain a central feature of many (mainly rural) communities in Africa, there is little attention paid to ancestors and ancestor-related practices by scholars of African society and culture, in part due to the dominance of Western scholarship in this area of research.

For instance, data from the 2009 Pew data collection project on spiritual life (Pew Research Center, 2009), that contains information on traditional beliefs for around 25.000 respondents from 19 sub-Saharan African countries, confirms this intuition and shows that 45.6% of respondents believed in witchcraft, while 41% believed in reincarnation, and about 30% believed in ancestors.[17] In the case of my sample in Southern Benin, 50% of men think that their ancestors care about the continuation of the lineage (43% among those who do not report traditional religion as their main religion) or, in the same vein, Le Rossignol et al. (2022) find that in the northwestern DRC, 92% of their sample report believing either "strongly" or "very strongly" in Christianity, and at the same time, 75% of them also report believing "strongly" or "very strongly" in witchcraft.

[16] The success of the Pentecostal church in SSA may be due in part to its ability to adapt to pre-existing belief systems (Auriol et al., 2020). For example, "the descent of the Holy Spirit in the Pentecostal doctrine is described as a trance, and the believers continue to think that witchcraft is powerful but are persuaded that they are now protected by a superior, divine power (Platteau (2009), p.679)".

[17] Beliefs were recorded as 'yes' or 'no' answers to the question 'Which, if any, of the following do you believe in?' and assigned to various categories such as witchcraft, the evil eye, evil spirits, heaven, or reincarnation. Ancestral beliefs were recorded as a 'yes' or 'no' answer to the question 'Do you believe that sacrifices to spirits or ancestors can protect you from bad things happening?'.

## 2.2 Implications of Ancestor Worship on Fertility in SSA

Why are beliefs in the ancestors closely related to fertility behavior in SSA? To answer this question, it is important to emphasize that ancestor worship belongs to the realm of kinship and lineage structures (Fortes, 1965; Gong et al., 2021). As Fortes (1965) notes, ancestor worship is a lineage cult in many African societies – that is, a cult of the basic politico-jural unit of many African societies, rather than of the domestic sphere.[18] Similarly, Turaki (2000) mentions that "the ancestors are the most powerful, basic and primary component of the *kinship system* of an African community". In fact, ancestor worship is the extension of the core elements of many African societies – ancestry, kinship and descent relations – to the supernatural sphere (Fortes, 1965; Caldwell and Caldwell, 1985).

The belief in the intervention of ancestral spirits in everyday life and the need for descendants to ensure the survival of the lineage is continuous with the social structure. The lineage is therefore understood as "a descent group stretching back infinitely and with an enormous spiritual investment in reaching indefinitely into the future" (Caldwell and Caldwell, 1987). Only part of the whole lineage is alive at any one time, and its extension into the future should be the central concern of both living lineage members and ancestors. Ancestors maintain their connection with the lineage after death, and each new birth into the lineage provides the vehicle for the return of an ancestor through reincarnation (Mbiti, 1975).[19] In fact, some authors consider that an African community consists of the unborn living (those who are about to be reincarnated), the living and the living dead (those who are deceased but still influence the living) (Turaki, 2000). These factors indicate the importance of the *quantity* of children and emphasise the importance attached to the continuation of the family line. Consequently, the end of a family is not only a social disaster but also a spiritual one (Caldwell and Caldwell, 1987).

The emphasis on ancestry and descent and the consolidation of lineage - that is, the succession of generations - as a key element of these societies can have important demographic consequences. Molnos (1973), who mentions that continuing the lineage and commemorating ancestral spirits is one of the precise reasons for wanting "as many children as possible" among societies in East Africa, states:

[18] This is easily seen in matrilineal societies, where it is the mother's brother who becomes an ancestor, rather than the father himself.

[19] For example, among the Fon of Benin, the Yoruba of Nigeria or the Beng people of Côte d'Ivoire, new children born into the family are believed to be reincarnated when an old person has recently died, and children are often named to identify the ancestors reborn in their form (Caldwell and Caldwell, 1987; Osanyìnbí and Falana, 2016). Ancestors may return in more than one child in a family. For example, (Idowu, 1973) notes for the Yoruba that "it is believed that [ancestors] reincarnate not only in one grandchild or great-grandchild, but also in several contemporary grandchildren and great-grandchildren who are brothers and sisters and cousins, aunts and nephews, uncles and nieces, *ad infinitum*". Similarly, in the context of urban South Africa, Anderson (1993), p.27, reports: "One respondent said that in 1986 she had a dream in which she saw she was pregnant. Someone took her to a big stone (probably a gravestone) on which was written the name "Isaac." The following day she enquired from an older family member, who said that Isaac was a grandfather who had died many years previously. A month later the respondent fell pregnant and a baby boy was born, whom she had to call Isaac. She then prayed and thanked the ancestors for their gift of the child. The child thereby, following traditional custom, received the "ancestor spirit" of the deceased ancestor Isaac."

> "The paramount objective of having children was that there should always be a living descendant to remember and honour the departed. Children meant the continuation of the lineage and the perpetuation of the family name and spirit. Descendants were needed to perform funeral ceremonies, to ensure that the parents, unlike childless people, be buried, and that the ancestral spirits be commemorated by erecting shrines, pouring out libations and offering food [...]. Among the Chaga of the north-eastern section of the United Republic of Tanzania, for instance, children were seen as a sign of approval of the parents' marriage by their forebears, and lineages competed by producing numerous offspring for the favour of ancestors on whom their welfare was deemed to depend (Molnos (1973), p.129)".

In fact, the argument presented above can be interpreted as an extension of the well-known "old-age security motive", whereby people's needs for old-age support raise the demand for children.[20] In vertical systems of transmission where the continuation of the family line is of central importance due to the influence of ancestors, the question of "security" has two different facets (Goody, 1973). In addition to the standard security in old age, there is the security in the after-life which drives the demand for children in the same way as the former, and which can be obtained by making provision for the continuity of the family estate.[21]

Maintaining the lineage remains one's responsibility, whether in the human world or in the ancestral world. To this end, ancestors bless their progeny's fertility, provide wealth, health and children to the family, and undergo reincarnation (Grande, 2024; Olupona, 2014). It is therefore not surprising that the most common use of ancestral powers is related to lineage survival and the well-being of the kinship group. Crucially, high fertility is associated with joy, ancestral approval and recognition, and right living. On the contrary, ancestors show disapproval by causing barrenness, miscarriage and low fertility, which are associated with misfortune, sin, mistreatment and marginalization.[22] Rituals or other reparations are usually performed to reverse these situations (Caldwell and Caldwell, 1987).[23]

# 3 Data

The empirical analysis relies on multiple datasets, belonging to different societies and at different points in time. I start by examining the relationship between beliefs in the influence of ancestors and fertility in the specific context of contemporary rural Benin, where I can accurately measure tra-

[20] See Lambert and Rossi (2016) or Rossi and Godard (2022) for evidence of the old-age security motive for fertility in the African context.

[21] In this regard, Olupona (2014) notes that a proverb about the Yoruba says "If the land of the ancestors is full of gold and diamons, they will not return to the human community to solicit gifts", and, importantly, he recognises that it emphasises that the ancestors need their descendants to sustain themselves in the afterlife as much as the living need them in old age.

[22] There is no consensus about ancestral punishment. As Mekoa (2019) notes: "Although childlessness is sometimes blamed on angry ancestors, it is usually called the work of the witches because ancestors are generally interested in the growth of their own clan".

[23] Fear to infertility has been shown to be an important barrier to modern contraceptive methods uptake in SSA (Ochako et al., 2015), and therefore shifts in beliefs rather than focusing on supply side frictions may be important to address the low contraceptive take-up. However, beliefs are difficult to change, and more research is needed in this area (Dupas et al., 2024).

ditional beliefs and disentangle a number of alternative explanations. I then replicate the analysis in different contexts, samples, and at different aggregation levels. First, I use original ethnicity-level information on ancestor worship to examine its influence on the fertility of people born in colonial DRC, which allows me to mimic the epidemiological approach proposed by Fernández and Fogli (2009). Using a large sample of people living in seven main cities of post-independence DRC (but born in all 145 territories of the country), I can compare migrants from same origin and destination whose beliefs in ancestors are different. In an attempt to examine the external validity of the previous analysis performed in two specific contexts, I use individual-level information on contemporary supernatural beliefs from 25.000 respondents in 19 SSA countries. Finally, to show that this relationship is not driven by other factors affecting the post-independence fertility trajectories of societies, I explore whether the relationship between beliefs in ancestors and fertility exists in the oral traditions of pre-industrial societies accross the globe, where ancestral beliefs were prevalent worldwide. I use information on 2,564 folkloric motifs from the oral traditions of nearly 1,000 ethnic groups from Berezkin (2015) to examine the scope and relevance of beliefs in ancestors and its relationship to fertility both at the global level and within sub-Saharan Africa well before colonization, when ancestor worship has been suggested to be widespread worldwide (Caldwell and Caldwell, 1987).

## 3.1 Contemporary Benin

My empirical analysis first examines a sample from southern Benin. It consists of 943 households living in a rural area. The respondents were randomly selected, subject to inclusion criteria (e.g., having more than 0.5 hectares of land), as part of a large project to support women in pineapple production.[24] The main survey was conducted in 2024 in a standard face-to-face setting. Respondents were also randomly assigned to enumerators to minimize enumerator bias. Along with a comprehensive set of socioeconomic characteristics and fertility outcomes, I collected data on the strength of traditional ancestral beliefs. I included two questions related to traditional belief in ancestors: 1) *Do you believe that the spirits of your ancestors have an influence on the events of your life?*; and 2) *Do you believe that the spirits of your ancestors are concerned about the survival of your extended family and the continuity of the family line?*[25] I interpret these two questions as measures of the *strength* of individuals' traditional beliefs in ancestors. In fact, qualitative interviews revealed that it is possible for the answer to these questions to be negative while individuals still believe in the *existence* of ancestors. Figure C1 in Appendix B shows the correlates of having a strong belief in ancestors.

[24] Both husband and wife were supposed to be interviewed in each household. However, because the project focused on women, some households only included the woman (71/943) because she is not married or because the husband was not present at the time of the survey (29/872).

[25] An example was provided after each question to clarify its meaning. Regarding the first question: "For example, do you think that if you are lucky in your income-generating activities, it is because your ancestors are behind you? Regarding the second question: "For example, do your ancestors influence the health of your children or protect them from bad events?".

## 3.2 Zaïre and contemporary Democratic Republic of Congo

*West Zaire Surveys (1975-77) and Jan Vansina's Congo's Ethnography.*– I use original information from two demographic surveys conducted in the western part of the DRC between 1975 and 1977 (see Appendix F for details of these surveys). The first contains individual-level information on 250,000 individuals in 43,000 households living in seven major cities in the DRC (in tables I refer to this survey as the urban sample). The second includes individual-level information on almost 50,000 individuals in 11,000 households distributed across four regions, and covers both rural and urban areas, excluding the large cities included in the urban survey (in tables I refer to this survey as EDOZA). Moreover, each woman over the age of 13 reported her birth calendar, including the exact dates of birth, the sex of the children, and the dates of death where applicable. In addition to socioeconomic characteristics and birth calendars, respondents' ethnicity was also recorded and coded according to the classification of Vansina (1966), which allows me to link these surveys to the ethnicity-level information on beliefs in ancestors present in Vansina (1966).[26]

Vansina (1966) is the main ethnographic source that I use to measure the prevalence of beliefs in ancestors at the ethnicity-level in the DRC. From this book I have digitized original ethnic-level information on the practice of ancestor worship. I constructed a dummy variable that equals one if it is explicitly mentioned that an ethnic group practices ancestor worship. For example, this variable will take the value of one for the ethnic groups of the Balese-Komo region, as Vansina (1966) says:

> "The Creator was often equated with the first ancestor. But a cult of the Creator is only mentioned among the Balese [...]. Ancestor worship was present everywhere. Chickens were sacrificed and offerings made [...]. A few protective charms, which ensured human fertility, were common (Vansina (1966), p.100)".

This ethnographic source has two clear advantages. First, it contains explicit information on the main variable of interest so no proxy is needed. Second, it provides a much more detailed description of the ethnographic landscape of the DRC than traditional datasets such as the Ethnographic Atlas. For example, while the EA records 60 ethnic groups in the territory of the present-day DRC, and about 400 for the entire SSA, this number increases to more than 250 ethnicities in Vansina (1966). Of these, 66% practice ancestor worship and 28% also make sacrifices to ancestors. The matching procedure used here has also the advantage of taking migration into account, compared to matching techniques using purely geographical characteristics, and will allow me to exploit variations in ethnicity-level beliefs in ancestors among migrants of the same origin and destination, thus isolating beliefs from local economic conditions and institutions. Overall, I am able to match about 60,000 women over the age of 13 with the information provided by Vansina (1966).[27] Although this information has been used by demographers at the aggregate level (see, for example, Tabutin (1982) or

[26] Cogneau and Dupraz (2015) wonder to what extent the classifications of ethnic groups made by anthropologists have influenced the classifications used by the surveys. In the case of the demographic survey used here, their codebook explicitly mentions that they adapted the questionnaires to record ethnicity as classified by Vansina (1966)

[27] This figure represents about 70% of the total number of women over the age of 13 included in the demographic surveys. Of the non-compliant subsample, 30% are individuals born in a country other than the DRC.

Shapiro (1996)), the use of the combined microdata as employed here is unique.

*DRC Demographic and Health Surveys (DHS).*– To complement the analysis and shed some light on the mechanisms and implications of beliefs in ancestors, I use the two available rounds of the Demographic and Health Surveys for the Democratic Republic of the Congo (2007-2013), a nationally representative survey that provides detailed information on education, literacy, occupation, religion, fertility preferences, and contraceptive methods. I use data from both the men's and women's questionnaires. In total, there is information on about 40,000 individuals living in 785 clusters. I follow the methodology of previous studies (i.e., Lowes, 2022) and use location to match the DHS data with the ethnographic information.[28] To do this, I combine the location of each DHS cluster with a digitized version of the map of ethnicities from Vansina (1966). The matching procedure is shown in Appendix C.

## 3.3 Sub-Saharan Africa: Pew Research Center's Forum on Religion and Public Life

Current data on beliefs in ancestors for sub-Saharan Africa come from a survey conducted between December 2008 and April 2009 by the Pew Research Center's Forum on Religion and Public Life (Pew Research Center, 2009). It includes individual-level information on religious beliefs, practices, knowledge, and attitudes toward other faiths for about 25,000 respondents in 19 sub-Saharan African countries. I measure the strength of ancestral beliefs by using the responses to the following question: "*Do you ever participate in traditional African ceremonies or perform special acts to honor or celebrate your ancestors?*".[29] Finally, this survey also contains information on socio-demographic characteristics such as age, gender, education, marital status, religion, number of children, region of residence within the country, or self-reported income status.[30] Appendix D shows the spatial distribution of the main explanatory variables.

## 3.4 Berezkin's Folklore and Mythology Catalogue and Ethnographic Atlas

Beliefs in ancestral influence may have been widespread in preindustrial societies. To test this hypothesis and to assess the extent and pervasiveness of ancestral beliefs worldwide, I rely on ethnic-level information about life in pre-industrial societies. The most widely used data set in economics

[28] Using self-reported ethnicity to match the DHS data with Vansina's information on ancestor worship is less satisfactory because the information on ethnicity in the DHS for the DRC is very limited, and the match of the DRC ethnicities with the Ethnographic Atlas is quite difficult. In fact, only 7 different ethnicities (or groups of ethnicities) are recorded in the DHS (compared to about 130 after matching with Vansina).

[29] I show that my results do not change when using different measures of ancestral beliefs. For example, I construct a dummy variable that equals one if the respondent answers "*yes*" to the question "*Do you believe that sacrificing to spirits or ancestors can protect you from bad things happening?*". Another alternative is to construct a dummy variable equal to one if the respondent answers "*yes*" to the following question: "*Which, if any, of the following do you believe in? Reincarnation*".

[30] The use of this survey is valuable for an additional reason: it does not consider ethnicity as the only vector of cultural transmission, since the analysis here does not rely on ancestral ethnic group's characteristics.

for the study of pre-industrial societies is the Ethnographic Atlas (EA), which collects detailed ethnographic information on 1,265 ethnic groups spread across the globe (Murdock, 1967). However, the EA does not include information on fertility or ancestor worship. Therefore, to test the proposed hypothesis, I supplement the EA with data on more than 2,500 folkloric motifs in 958 oral traditions from Berezkin's Folklore and Mythology Catalogue (Berezkin, 2015).[31] This information can be particularly valuable because culture is transmitted from generation to generation through oral traditions such as myths, folklore, stories, or proverbs.[32] I measure ancestor beliefs in pre-industrial societies by looking at the proportion of folkloric motifs in an ethnic group's oral tradition related to the word *ancestor* and the word *worship*. Similarly, I proxy the importance of fertility in pre-industrial societies by looking at the proportion of motifs related to the word *birth* in an ethnic group's oral tradition.[33] These motifs are considered to be the building blocks of oral traditions, representing their characteristics, important experiences, events and images (Galor et al., 2023).

# 4 The influence of ancestor worship on fertility

## 4.1 Evidence from Contemporary Benin

I start by examining the relationship between beliefs in ancestors and fertility using first-hand data collected among a sample of (married) pineapple producers in southern Benin. This is a valuable context that allows me to disentangle alternative mechanisms: it is highly rural (98% of men have agricultural fields), fertility is still very high (the average number of children ever born is close to 8 for men and above 5 for women, and 42% of married households are polygamous), beliefs in the influence of ancestors are widespread (44% of men believe that ancestors have an influence on the events of their life or 50% of men think that ancestors care about the survival of their extended family and the continuation of the family line), and the clan-based structure of the society is still pervasive (45% of men have received pressure from their extended family or clan to increase their number of children).

The baseline specification, estimated through ordinary least squares, takes the following form:[34]

$$Y_i = \alpha + \beta_1 \textit{AncestralBeliefs}_i + X_i'\Phi + \epsilon_i \tag{1}$$

Where $Y_i$ is the total number of children ever born and $\textit{AncestralBeliefs}_i$ is a dummmy variable

[31] Michalopoulos and Xue (2021) validate the content of the catalog, link the groups in Berezkin's collection to the EA, and provide a dataset that includes the proportion of motifs in an ethnic group's oral tradition related to different concepts.

[32] Even in recent times, the presence of ancestors in the oral and written traditions of African societies is widespread. For example, Appendix A shows a poem written by the Senegalese writer Birago Diop (1906-1989) in 1960.

[33] I also use alternative measures. For example, I show that my results remain unchanged if I use the word *ancestral* or *fertility* instead.

[34] Appendix G shows that results do not change when I estimate an exponential regression model using a pseudo-Poisson maximum likelihood estimator.

that equals one if the respondent answers *yes* to the question *Do you believe that the spirits of your ancestors influence the events of your life?*.[35] The vector $X_i'$ includes an extensive set of control variables, divided in two categories. First, as baseline controls, I always include age, education, and whether the household has access to electricity. Second, I add additional control variables that help me to disentangle alternative mechanisms: total number of agricultural fields (to account for the economic returns to children in the form on child labor in agriculture), whether the household has a TV (as a proxy for income and wealth in a context where TV is a luxury good), and a dummy variable that takes the value 1 if respondent have experienced pressure from their extended family or clan to increase their number of children (to distinguish between the clan-based structure of the society, which decreases the opportunity costs of children and externalizes children's costs from the traditional belief system). Finally, I also include religion fixed effects (five categories: Catholic, Celestial Church of Christ, Evangelical, Vodoun, and Other). Since men are the main decision-makers regarding the number of children in this context, I focus on men in the main analysis. Appendix G.3 replicates these results for women, as well as when both spouses hold strong beliefs in ancestors.[36]

Table H5 presents the estimates for equation 1 while sequentially including different vectors of control variables. Columns (1)-(3) do not include religion fixed effects, while column (4)-(6) do. Columns (1) and (4) do not include control variables, while columns (2) and (5) include baseline controls (age, education, and access to electricity). Finally, columns (3) and (6) include the full list of controls. Robust standard errors are reported in parenthesis. Across all specifications, I find a positive, stable and statistically significant relationship between beliefs in ancestors and fertility: holding strong traditional beliefs in the influence of ancestors is associated with more than one additional child. From a comparative perspective, these results are large. In fact, once controlling for standard macro-level factors such as GDP per capita, education, child mortality or urbanization, fertility rates remain on average about one birth per woman higher in SSA compared to other low- and middle-income countries (Bongaarts, 2017). Similarly, the coefficient associated with beliefs in ancestors is similar to the coefficient of having attended school (-1.6) or with having around 4 more agricultural fields. The results suggest that traditional beliefs in ancestors are still an important factor determining fertility outcomes. Appendix G provides several robustness tests of the relationship between beliefs in ancestors and fertility. In addition to the use of Poisson regression and alternative definitions of the explanatory variable, I show in specification curves that these results are robust to the inclusion of additional control variables, such as polygamy, overall religiosity (measured as an indicator if the respondent donates money to the church when COVID happened), household size,

[35] The results are robust to alternative definitions of the explanatory variable. Appendix G shows that the results do not change when I measure beliefs in ancestors by using a dummy variable that equals one if the respondent answers *yes* to the question *Do you think that your ancestors' spirits care about your extended family and the continuation of the family line?*, or when I combine both measures and generate a third variable that equals one when at least one of the two variables takes the value one.

[36] Interestingly, the size of the coefficients is higher when both spouses hold strong beliefs in the influence of ancestors, rather than the husband alone. These effects suggest some degree of complementarity between spouses and room for non-negligible importance of women's decision making.

or having livestock.

Table 1: Beliefs in ancestors and fertility in contemporary Benin

| | Number of children ever born | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Ancestral beliefs | 1.949*** | 1.743*** | 1.239*** | 1.565*** | 1.349*** | 1.217*** |
| | (0.376) | (0.343) | (0.292) | (0.386) | (0.349) | (0.350) |
| Baseline controls | No | Yes | Yes | No | Yes | Yes |
| Extended controls | No | No | Yes | No | No | Yes |
| Religion FE | No | No | No | Yes | Yes | Yes |
| Mean Y | 7.905 | 7.923 | 7.923 | 7.914 | 7.923 | 7.923 |
| N | 832 | 820 | 820 | 827 | 820 | 820 |

NOTE. Data: First-hand data collected in southern Benin. The table reports OLS estimates. The outcome variable is the total number of children ever born. "Ancestral beliefs" is a dummy variable that equals one if the respondent answers *yes* to the question *Do you believe that the spirits of your ancestors influence the events of your life?*. Baseline controls include age, whether the household has electricity and education. Extended controls include the number of agricultural fields, whether the household owns a TV, whether the household has been part of a program to encourage the production of pineapple, and whether the respondent has received pressure from the extended family to have children. Religion fixed effects includes five categories: Vodoun, Roman Catholic, Evangelic, Celeste and other. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

## 4.2 Epidemiological approach: Congo

I then examine the same relationship in a different context. An important asset of this paper is the use of unique individual-level data from women born during the colonial period in the Democratic Republic of the Congo (DRC). Examining these data is interesting for several reasons. First, because the digitization of Vansina (1966) allows me to directly identify the existence of ancestor worship at a granular ethnic group level.[37] Second, because the DRC is one of the most prominent examples of delay in the fertility transition in Tropical Africa. In fact, fertility in the DRC was increased during the second half of the $20^{th}$ century (Romaniuk, 2011). Third, the nature of the 1970s Demographic Urban sample, composed mainly of post-independence migrants from rural areas to seven major cities of the DRC, allows me to replicate the epidemiological approach introduced by Fernández and Fogli (2009). I exploit the heterogeneity in ancestral beliefs while holding constant the environment in which individuals grew up by comparing migrants who were born in the same territory and who live in the same city at the time of the survey, but whose beliefs in ancestors differ. This strategy is useful to rule out confounding factors related to the environment of individuals (either economic conditions or institutions).

Therefore, the equation I estimate now takes the following form (with small variations depending on the specification). Let $i$ denote individuals, $e$ denote ethnicity, $c$ denote city of residence, and $r$ denote territory (or city) of birth.[38]

[37] Although I expect beliefs in ancestors to be more important for men, measuring them at the ethnic group level is an advantage when the sample is only composed of women, since inter-ethnic marriages were rare in post-independence Congo, and therefore the beliefs of husbands are likely to be similar.

[38] The territory is the second administrative unit in the Democratic Republic of the Congo, smaller than the province. The 25 provinces of DR Congo are divided into 145 territories and 32 cities.

$$Y_{iect} = \beta_0 + \beta_1 \textit{AncestralBeliefs}_e + X_i'\Phi + \alpha_{cr} + \epsilon_{iect} \quad (2)$$

Where $Y_{iect}$ is a fertility outcome, $\textit{AncestralBeliefs}_e$ is a dummy variable that equals one if the respondent belongs to an ethnic group that traditionally practiced ancestor worship. The vector $X_i'$ includes an extensive set of individual-level control variables, such as age, whether the place of birth was rural or urban, education, whether the respondent is a migrant, whether respondent's father is alive at the time of the survey, employment status, and whether the respondent works in agriculture (only available for the urban sample). Finally, $\alpha_{cr}$ denotes city of residence $\times$ territory of birth fixed effects. $\epsilon$ is an error term, and standard errors are clustered at the ethnic group level, since the treatment is constructed at that level. The presence of city of residency $\times$ territory of birth fixed effects means that, when estimating equation 2, the effect of ancestor worship is identified by comparing respondents from different ethnicities, and thus with potential different reliance on ancestor worship, living in the same city at the time of the survey and born in the same territory.[39]

This strategy builds on the work of Fernández and Fogli (2009), who study how culture influences fertility by examining the behaviour of second-generation American women. They use past values of total fertility rates in their country of ancestry to proxy for cultural beliefs, and show that they still have a significant explanatory power for their number of children. The key underlying assumption is that culture is easier to carry across space than local institutions and economic conditions. Then, by comparing second-generation American women, they hold market and institutions constant while they may differ culturally as their parents' country of origin is different. The empirical strategy employed here differs in several aspects. First, it is more demanding since it uses within-country variation in cultural beliefs. Moreover, I compare individuals born close to each other (but from different ethnicity and with different beliefs in ancestors) instead of in different countries, I hold constant both economic conditions and institutions also at the place of origin. Third, I carefully control for the year of installation in the city of residence at the time of the survey, which allows me to eliminate concerns related to a potential correlation between time since migration and the prevalence of ancestral beliefs, which could confound identification and is often ignored in the literature (Bertoli et al., 2024). Finally, I contribute to the existing discussion by bringing a new explanation for the origin of different fertility preferences across individuals and social groups.

Table 2 shows the results. I find a positive relationship between ancestor worship and the total number of children ever born in the different samples.[40] For each survey, I report the results on the total number of women over the age of 13 (columns 1, 3, 5 and 7) and restricting on those over the age of 30 (columns 2, 4, 6 and 8), since most of childless women are really young (75% of women

[39] The variation in the number of ethnicities by territory of birth is surprisingly high: on average, people from about 27 different ethic groups (tribes) are born in a territory (out of 220 in my sample). This ranges from only one ethnicity in 17% of territories, to 119 ethnicities in Kinshasa. See appendix H for details.

[40] Appendix I shows the same regressions using age-specific fertility rates instead of total number of children ever born. The conclusions barely change.

younger than 20 are childless). First, belonging to an ethnic group with ancestor worship is associated with an increase in the number of children of about 20% in the full sample. The difference between urban and rural areas is not very large: the effect of ancestor worship on fertility in the EDOZA (rural) sample of women over 30 represents 22% of the mean, while it represents 16% in the urban sample (note that, when using the urban sample, I use city of residence FE instead of region of residence FE).[41] The urban sample allows me to include city of residence $\times$ territory of birth fixed effects (columns 7 and 8). The results remain robust and highly significant, although the magnitude of the coefficient is reduced, from about 19% of the urban sample mean when using city of residence fixed effects to about 8% when including the interaction with territory of birth. Overall, these results suggest that there is still a positive relationship between ancestor worship and fertility in the context of urban post-independence Congo. Due to the high prevalence of zeros in the dependent variable (37% of women over the age of 13 in my sample),[42] I show in Appendix J that these results do not change when I use a pseudo-poisson maximum-likelihood estimator.

Table 2: Ancestor worship and fertility in the DRC

| | Number of children ever born | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Full sample | | EDOZA | | Urban sample | | | |
| | All | +30 | All | +30 | All | +30 | All | +30 |
| Ancestor worship | 0.509*** | 0.853*** | 0.545** | 1.055*** | 0.507*** | 0.827*** | 0.221*** | 0.355*** |
| | (0.0861) | (0.204) | (0.244) | (0.392) | (0.0639) | (0.174) | (0.0495) | (0.129) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| City x Territory FE | No | No | No | No | No | No | Yes | Yes |
| Mean Y | 2.883 | 5.322 | 3.546 | 4.866 | 2.703 | 5.542 | 2.700 | 5.537 |
| R-squared | 0.393 | 0.239 | 0.313 | 0.264 | 0.446 | 0.238 | 0.464 | 0.268 |
| N | 60064 | 23195 | 12825 | 7552 | 47239 | 15643 | 47055 | 15491 |

NOTE. Data: Demographic Survey of 1970s and EDOZA. Columns 1 and 2 combine both the Urban Demographic survey and EDOZA. Columns 3 and 4 use only the EDOZA sample. Columns 5-8 use only the urban sample. In columns 2, 4, 6 and 8, the sample is restricted to women older than 30 years old. The table reports OLS estimates. The outcome variable is the total number of children ever born. "Ancestor worship" is a dummy variable that equals one if the ethnic group $e$ practice ancestor worship. Controls include age, whether the place of birth was urban or rural, whether the respondent has primary education, dummy equal to one if migrant, dummy equal to one if the father's respondent is alive, dummy equal to one if the respondent is working, dummy equal to one if the respondent is a farmer (only available in the urban sample), number of household members, and year of installation in the current city. City/region fixed effects include city of residence in the case of the urban sample and region of residence in the case of EDOZA. Standard errors clustered at the Vansina's ethnic group-level in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Although these results are robust both to the inclusion of origin and destination fixed effects and to the inclusion of an extensive set of control variables, the main remaining concern is that of omitted variables. In this setting, as noted by Fernández and Fogli (2009), unobserved differences in human capital (once woman's education is controlled for) may bias the results if the unobserved component that depends on parental human capital varies with ethnicity in a way that is correlated with ancestor worship. For example, societies in which ancestor worship is important may

[41] Interestingly, the fertility rates of women over the age of 30 are higher in the urban sample than in EDOZA. This is consistent with earlier works examining the fertility rates in big cities like Kinshasa (Shapiro, 1996).

[42] This is a well know fact in certain areas of Central Africa, known as the "infertility belt", specially before the 1990s (Bongaarts et al., 1984; Larsen, 2003). Infertility rates among married women could reach 25%.

have been less receptive to missionaries, which could have lowered the human capital of the ethnic network, broadly defined, relative to neighboring groups, affecting the probability of marriage or obtaining a job. To address this concern, I follow Fernández and Fogli (2009) and examine whether ancestor worship is somehow related to wages. Indeed, if unobserved human capital accounts for part of the results, it should be reflected in wages. To do this, I resort to an expenditure survey which includes 1/50 of the total number of households identified in the same seven cities of the 1970s Urban Demographic Survey.[43] Table L1 in Appendix K reports the results from the regression of log wages on ancestor worship and a vector of control variables, including education. Ancestor worship remains insignificant in every specification, suggesting that unobserved human capital is not responsible for the results.

An important limitation of the 1970s datasets is that they do not contain any information on religious beliefs. More importantly, the rapid expansion of Christianity in the context of the DRC took place hand in hand with missionaries' activities, which may have weakened family and ethnic lineages, and emphasized universal over family/ethnicity-centered moral values (Platteau, 2009; Reybrouck, 2014; Bergeron, 2023).[44] At the same time, exposure to missionary presence in colonial Congo had important effects on education (Alvarez-Aragon et al., 2023) and fertility outcomes (Guirkinger and Villar, 2022). In Appendix L, I construct a measure of exposure to missionary presence at birth for all individuals born before 1948 in the DRC using both the EDOZA sample and the urban demographic survey, and show that the positive influence of ancestor worship on fertility is not affected when I control for exposure to Christian missions.

## 4.3 Evidence from contemporary sub-Saharan Africa

Next, I zoom out and study the wider context of sub-Saharan Africa. Using data from the PEW research center, which collected detailed information of different types of contemporary supernatural beliefs, I estimate the follwing equation:

$$Y_{ic} = \alpha + \beta \textit{AncestralBeliefs}_i + X_i'\Phi + \phi_c + \epsilon_{ic} \tag{3}$$

Let $i$ denote individuals and $c$ denote countries. Then $Y_{ic}$ is the fertility outcome of individual $i$ living in country $c$, defined either as the total number of children ever born or as a dummy variable equal to one if the respondent has more than 4 children. $\textit{AncestralBeliefs}_i$ is the main explanatory variable and is constructed as a binary variable equal to one if the respondent answers "*Yes*" to the question "*Do you ever participate in traditional African ceremonies or perform special acts to honor or*

[43] See Appendix F for details about this survey.

[44] The relationship between missionaries and the practice of ancestor worship is controversial. While some authors suggest that Christian and Islamic doctrines prohibited ancestor worship, other authors suggest that ancestor worship is often allowed to continue because it is considered a cultural rather than a religious practice (Caldwell and Caldwell, 1990; Olupona, 2014). In fact, this is what I observe in Benin: there is no correlation between being Catholic and beliefs in the influence of ancestors.

*celebrate your ancestors?*".[45] The vector $X_i'$ contains a set of individual-level covariates that vary according to the specification, and may include age, age squared, gender, whether the respondent lives in a urban or rural area, whether the respondent is Christian/Muslim or from another religion, a dummy variable that equals one if the respondent has completed primary education, a dummy variable that equals one if the respondent is married, and a dummy variable that equals one if the respondent finds himself/herself in a good economic situation. Finally, the analysis exploits within-country variation by including $\phi_c$, which represents country fixed effects, to account for any country-level time-invariant characteristics that may be correlated with both fertility levels and traditional beliefs.[47] Robust standard errors are included in parenthesis.[48]

The results are shown in Table 3. I find a positive and robust relationship between ancestral beliefs and fertility outcomes. In terms of magnitude, the coefficient ranges from 0.5 (25% of the outcome mean) more children in column (1) to about 0.2 more children (8% of the outcome mean) in column (4), once we include the full set of control variables. This effect is similar to the coefficient associated with living in a rural area (0.2) and almost the same as the influence of having less than primary education (0.3). Interestingly, ancestral beliefs are also associated with an increase in the probability of having more than four children of about one percentage point (10% of the outcome mean).

Table 3: Ancestor worship and fertility in sub-Saharan Africa

| | Number of children | | | | P($\geq$ 5 children) | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Ancestral beliefs | 0.507*** | 0.248*** | 0.233*** | 0.172*** | 0.0364*** | 0.0157*** | 0.0139*** | 0.0101** |
| | (0.0378) | (0.0302) | (0.0301) | (0.0292) | (0.00493) | (0.00456) | (0.00452) | (0.00459) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Extended Controls 1 | No | No | Yes | Yes | No | No | Yes | Yes |
| Extended Controls 2 | No | No | No | Yes | No | No | No | Yes |
| Mean Y | 2.092 | 2.086 | 2.086 | 2.096 | 0.0978 | 0.0975 | 0.0975 | 0.0975 |
| R-squared | 0.0635 | 0.417 | 0.424 | 0.480 | 0.0418 | 0.174 | 0.179 | 0.187 |
| N | 22926 | 22791 | 22791 | 21997 | 22926 | 22791 | 22791 | 21997 |

NOTE. Data: PEW research forum 2008-2009 Survey. The outcome variables are defined as follows: in columns (1)-(4), it is the total number of children, and in columns (5)-(8) it is the probability of having at least 5 children. The explanatory variable is an indicator equal to one if the respondent answers "yes" to the question "Do you ever participate in traditional African ceremonies or perform special acts to honor or celebrate your ancestors?". Basic controls include age, age$^2$ and sex. Extended controls 1 also include whether the individual lives in a urban or rural area and whether he/she is christian/muslim or from other religion. Finally, extended controls 2 also include a dummy variable that equals one if the respondent has completed primary education, a dummy that equals one if the respondent is married, a dummy variable that equals one if the respondent finds himself/herself in a good economic situation, and a dummy equal to one if the respondent did not have money at some point during the last year to buy food for his/her family. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

[45] In the Appendix M, I proxy for the importance of contemporary ancestor worship using alternative variables. First, I construct a dummy variable that equals one if the respondent answers "*yes*" to the question "*Do you believe that sacrificing to spirits or ancestors can protect you from bad things happening?*". Second, I construct a dummy variable equal to one if the respondent answers "*yes*" to the following question: "*Which, if any, of the following do you believe in? Reincarnation*".[46] The results are not affected when using these different proxies.

[47] Table N3 in the Appendix M leverages within-region variation by using region fixed effects instead of country fixed effects, and shows that the results are robust to the inclusion of region fixed effects.

[48] Since the sample design in Pew Research Center (2009)'s survey was a stratified random sample at the regional level (province, region or district depending on the country), an alternative is to cluster the standard errors at the regional level. Table N4 in Appendix M shows that this choice does not matter for my results, even if clustered standard errors at this level may inflated, since the number of clusters in the sample equals the number of clusters in the population (Abadie et al., 2022).

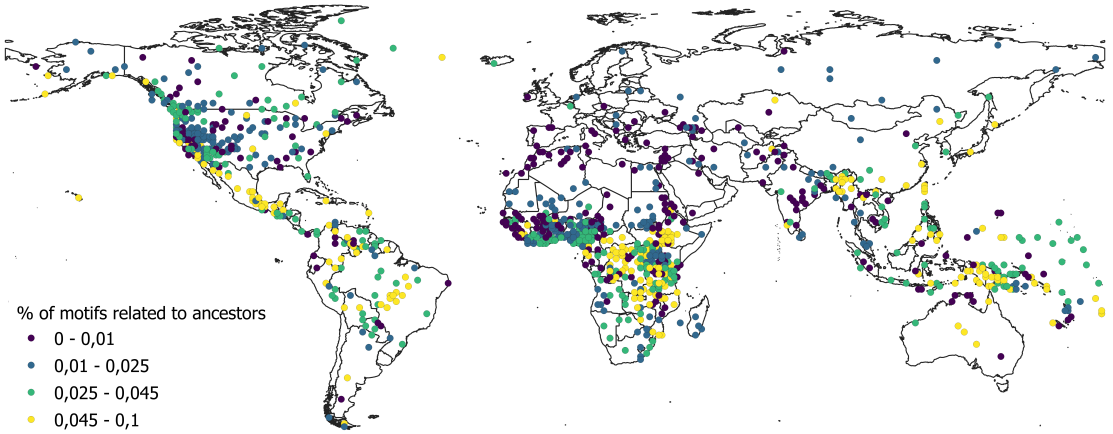
Perhaps the main concern here is that the measures of beliefs in ancestors may be capturing something related to traditional religious beliefs that may not be necessarily related to ancestors. I show that my results are nor driven by potential confounders such as overall religiosity or the importance of alternative traditional magico-religious beliefs. Indeed, religiosity has been shown to be positively related to fertility (Hayford and Morgan, 2008; Herzer, 2019). Therefore, even though religion is controlled for in all specifications, the results would still be biased if the measure of ancestral beliefs is correlated with residual religiosity (not captured by religious affiliation). Table N5 in Appendix M shows that the coefficient on ancestor worship remains unchanged after controlling for the frequency of religious service attendance (Herzer, 2019) and the importance of religion in respondents' lives (Hayford and Morgan, 2008), which are the two most common ways to measure religiosity in the literature. A second potential confounder relates to the importance of traditional magical-religious beliefs, which have been shown to have an important influence on economic life (Platteau, 2014; Le Rossignol et al., 2022). Table N6 in Appendix M shows that alternative measures of traditional supernatural beliefs, such as the use of traditional religious healers, belief in miracles, participation in initiation rituals, beliefs in witchcraft, or knowledge about ancestral, tribal, animist or other traditional African religions, do not affect the results, suggesting that my proxies effectively capture something related specifically to the belief in ancestors.

## 4.4 Traditional ancestral beliefs: scope and relevance

Ancestral beliefs have possibly been widespread before the spread of modern religions and alternative belief systems. In this section I draw on information from Berezkin (2015), which likely represents a period well before the European colonization of Africa, to examine the extent and importance of ancestor worship at both continental and global scales.[49] Figure 2 plots the distribution of the share of motifs in an ethnic group's oral tradition related to ancestors. As it is clearly visible, the presence of ancestors in the folklore of ethnic groups is not specific of sub-Saharan Africa. We find extensive presence of ancestors in the oral tradition of societies in America and South Asia and the Pacific.

[49] The term "precolonial" used in many empirical papers that rely on data from the Ethnographic Atlas is sometimes confusing. In fact, the EA is based on ethnographic data collected mostly in the early $20^{th}$ century, although anthropologists have tried to represent the situation as it was before European influence (i.e., for SSA, only 5% of ethnic groups have information collected before 1890, while 73% of ethnicities have information collected between 1900 and 1930, and 20% of ethnicities have information collected between 1930 and 1960). Thus, the EA approximates $19^{th}$ century institutions, and the results of analyses using ethnographic information at any other point in time would likely be different. It is therefore important not to consider these variables as time-invariant, "deep-rooted" factors, thus neglecting the massive process of cultural change that has always occurred in Africa across time and space. In contrast, Michalopoulos and Xue (2021) argue that the data from Berezkin's catalog likely represent a period long before that recorded in the EA.

Figure 2: Distribution of Motifs related to ancestors in the Ethnographic Atlas




*Note*: The figure displays the location of the 1.265 groups in the Ethnographic Atlas (Murdock, 1967), and the distribution of the share of motifs related to the word "ancestors".

As an additional step towards understanding the scope and importance of ancestral beliefs at a large scale, I explore the relationship between the share of motifs related to fertility or birth and the share of motifs related to ancestors in a regression framework.[50] In their paper analyzing the Folklore data, Michalopoulos and Xue (2021) transform their dependent variables using log(0.01+Y) to account for the skewed nature of concept intensity across oral traditions. However, these "log-like" transformations have well known problems (Chen and Roth, 2023). Instead, I follow the seminal paper of Silva and Tenreyro (2006) and use a pseudo-poisson maximum-likelihood estimator, which is well behaved when the proportion of zeros in the dependent variable is large (Gourieroux et al., 1984a,b; Santos Silva and Tenreyro, 2011).[51] I therefore estimate the following model:

$$Y_e = \exp\left(\alpha + \beta \textit{AncestralBeliefs}_e + X_e'\Phi\right)\epsilon_e \tag{4}$$

Table 4 shows the conditional correlations. The vector $X_e'$ includes ethnicity-level controls divided in three categories. The folklore controls include the total number of motifs in an ethnic group's oral tradition, the number of publishers of the sources used to identify those motifs, and the earliest year of publication in the group's oral tradition. The vector of ethnographic controls includes domestic organization around extended families and the presence of segmented communities and localized clans (according to Enke (2019), these are two key characteristics that reflect strong extended family networks, and therefore help me to disentangle the influence of an extended supportive kinship

[50] One concern may be related to whether oral traditions are a good proxy of the actual relevance of these concepts. Here, I assume that, if the share of motifs related to ancestors in an ethnic group's oral tradition is large, then the beliefs in ancestors are likely to be strong. Although beliefs in ancestors and fertility change over time and therefore these measures are difficult to validate, Michalopoulos and Xue (2021) show that episodes in folklore accurately reflect the physical environment of ethnic groups (i.e., proximity to earthquake zones or the intensity of lightning strikes), which increases my confidence in using the motifs as proxies for the importance of fertility and ancestor worship.

[51] Table O4 in Appendix N shows that the results do not change when I estimate a linear regression model by ordinary least squares.

network from the importance of ancestral beliefs), whether patrilineality is the main descent type, political complexity, the prevalence of monogamy, the importance of pastoralism, the use of the plow, and the proportion of motifs related to the word "supernatural" (to disentangle the influence of ancestor worship from the importance of alternative supernatural beliefs). Finally, I also control for a number of geographic covariates, including tropical climate, precipitation, ruggedness, land quality (population-weighted), and agricultural suitability. Continent fixed effects are always included when I focus on the global sample. The appendix E provides a detailed description of how the variables were constructed.

I find a positive relationship between the share of motifs related to ancestors and the share of motifs related to birth at both the global and African levels, suggesting that ancestral beliefs may have contributed to historically high fertility levels worldwide (Caldwell and Caldwell, 1987). One percentage point increase in the share of motifs related to ancestors increase the share of motifs related to birth by about 5%. These results are robust to the inclusion of an extensive set of control variables and to alternative measures of both fertility and ancestral beliefs (see Appendix N).

Table 4: Ancestor worship and fertility in Folklore

| | Share of motifs related to *birth* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | SSA Sample | | | | Global Sample | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Ancestral beliefs | 0.0517*** | 0.0484*** | 0.0396*** | 0.0380*** | 0.0499*** | 0.0472*** | 0.0472*** | 0.0461*** |
| | (0.00324) | (0.0109) | (0.0132) | (0.0121) | (0.00360) | (0.00468) | (0.00615) | (0.00643) |
| SSA Sample | Yes | Yes | Yes | Yes | No | No | No | No |
| Folklore controls | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Ethnographic controls | No | No | Yes | Yes | No | No | Yes | Yes |
| Geographic controls | No | No | No | Yes | No | No | No | Yes |
| Mean Y | 4.177 | 4.177 | 3.895 | 3.908 | 4.086 | 4.086 | 3.877 | 3.848 |
| N | 407 | 407 | 307 | 306 | 1245 | 1245 | 951 | 862 |

NOTE. Data: Ethnographic Atlas and Folklore. In columns (1)-(4), the sample is restricted to SSA. The table reports Pseudo-Poisson Maximum Likelihood (PPML) estimators. The outcome variable is the share of motifs related to "birth" in the oral tradition of an ethnic group. "Ancestor worship" is the share of motifs related to "ancestors" in an ethnic group's oral tradition. Folklore controls include the total number of motifs in an ethnic group's oral tradition, the number of publishers of the sources in the group's oral tradition, and the earliest year of publication in the group's oral tradition. Ethnographic controls include whether the domestic organization is around independent nuclear families, whether people are part of localized clans that live as segmented communities, whether the ethnic group is patrilineal, political complexity, whether monogamy is dominant, whether the group practices pastoralism, use of historical plough, historical economic development, practice of intensive agriculture, and the share of motifs in an ethnic group related to "supernatural". Geographic controls include tropical climate, precipitations, ruggedness, land quality (population weighted), and agricultural suitability. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

# 5 Conceptual Framework: Mechanisms

To better understand the mechanisms by which ancestral beliefs may influence fertility behavior and its implications, I model the intuition presented above using a simple toy model. The couple head maximizes the utility of the couple in a unitary framework. Since most societies in sub-Saharan Africa are strongly patriarchal, I assume that the couple head is always male. I therefore assume that the husband has the final say in fertility decisions and that they are not made by other members of the extended family (e.g., the maternal uncle in the case of matrilineal societies). This

assumption seems reasonable in the sense that husbands are likely to have more control over their wives than other family members, and it is standard in the context of SSA (see Dupas et al. (2023) or Fontenay et al. (2024)). In Appendix Q, I discuss the case where the woman contributes to the decision on the number of children, and the additional implications in this situation.[52] The agent derives utility from three components: 1) consumption ($c_i$), the net monetary benefit of having children ($n_i$), and the total number of children belonging to his lineage ($N$). Additive separability is assumed to represent preferences:

$$U_i = u(c_i) + b(n_i) + \beta\ell(N)$$

Where the functions $u(.)$, $b(.)$, and $\ell(.)$ satisfy the standard assumptions that $u' > 0$, $b' > 0$, $\ell' > 0$, $u'' < 0$, $b'' < 0$, $\ell'' < 0$. The extra term ($\ell$) represents the utility that the individual derives from extending his lineage into the future, or in other words, it represents the motive to continue the family line. In fact, in societies with strong ancestral beliefs, the extension of the lineage into the future and the importance attached to the succession of generations is the primary concern of both the living members of the lineage and the ancestors. The parameter $\beta$ takes the value 0 if ancestral beliefs are absent in the society and 1 if ancestral beliefs are prevalent.[53] The composition of the total number of children belonging to the lineage (N) depends on the structure of the kinship system.[54] In patrilineal societies, the father and his own children belong to the same lineage, as do the children of his male siblings. On the other hand, in matrilineal societies, the father and his children belong to different lineages, and only the children of his sisters continue his lineage. Therefore, the total number of children belonging to the lineage of the (male) head of the couple is:

$$N = \begin{cases} n_i + \sum_{j \neq i} n_j & \text{if patrilineal, j indexes male siblings} \\ \sum_{k \neq i} n_k & \text{if matrilineal, k indexes female siblings} \end{cases}$$

Therefore, the maximization problem becomes:

$$\begin{aligned} \max_{c_i, n_i} \quad & U_{\text{i}} = u\left(c_i\right) + b\left(n_i\right) + \beta\ell(N) \\ \text{s.t.} \quad & c_i + n_i \leq y_i \\ & N = \begin{cases} n_i + \sum_{j \neq i} n_j & \text{if patrilineal} \\ \sum_{k \neq i} n_k & \text{if matrilineal} \end{cases} \end{aligned}$$

[52] The assumption of men being the main decision-takers regarding fertility is not crucial for the results. In fact, I would get the same main predictions if I assume that both spouses have the same bargaining power, since their preferences are aligned in patrilineal societies (both spouses belong to the same kin group and therefore expand their lineage by having children) but are non-aligned in matrilineal societies (the husband belongs to a different lineage than his wife and children, and therefore only the mother expands her lineage by having children).

[53] The parameter $\beta$ could take values between 0 and 1 and be interpreted as a factor representing the intensity of ancestral beliefs. For example, it could be the subjective probability that the ancestors will be reincarnated in each of the new children belonging to the lineage.

[54] See Appendix R for a simple introduction to kinship systems.

## 5.1 Matrilineal case

I first study the solution under matrilineality. In matrilineal societies, the lineage of the couple head is expanded through the children of his female siblings. Thus, the maximization problem becomes:

$$\max_{c_i,n_i} \; U_{\text{i}} = u(c_i) + b(n_i) + \beta\ell(\sum_{k\neq i} n_k)$$

$$\text{s.t.} \quad c_i + n_i \leq y_i$$

The first-order conditions for an interior solution gives the following optimality condition:

$$\frac{\partial U_i(c_i, n_i, N)}{\partial c_i} = u'(c_i) = b'(n_i) = \frac{\partial U_i(c_i, n_i, N)}{\partial n_i} \tag{5}$$

This condition says that the marginal utility of private consumption must be equal to the marginal utility of having children. Note that since men cannot continue their family line with their own children, the third term of the utility function disappears, and we are back to the case where the motive to continue the family line does not play a role in fertility behavior.[55]

## 5.2 Patrilineal case

Let's now turn to the patrilineal case. Now, the lineage of the household head is expanded through his own children as well as through the children of his male siblings. The maximimzation problem then becomes:

$$\max_{c_i,n_i} \; U_{\text{i}} = u(c_i) + b(n_i) + \beta\ell(n_i + \sum_{j\neq i} n_j)$$

$$\text{s.t.} \quad c_i + n_i \leq y_i$$

The first-order conditions for an interior solution gives the following optimality condition:

$$u'(c_i) = b'(n_i) + \beta\ell'(n_i + \sum_{j\neq i} n_j) \tag{6}$$

Note that since the term $\beta\ell'(n_i + \sum_{j\neq i} x_j)$ is always positive, the optimal number of children is now higher than in the matrilineal case. In this case, an individual's utility depends not only on his own number of children, but also on the total number of children of his male siblings (i.e., the number of newborns who continue the lineage). Therefore, we need to better understand the interaction between the two. We can define the best response function as:

[55] This result follows from the simplifying assumption that men are the sole decision-makers regarding the number of children. If, instead, women also participate in the decision to have children, the motive to continue the family line would be present even in matrilineal societies, where the mother and her children belong to the same lineage. However, it would be less important than in patrilineal societies, where the children of the couple continue the lineage of both the mother and the father, since the wife is now part of her husband's lineage. An additional implication is that the difference in fertility preferences between patrilineal and matrilineal societies due to the motive to continue the family line will be more important for men than for women. This is because men have an additional motive for fertility only in patrilineal societies (continuation of the family line), while women have this motive in both patrilineal and matrilineal societies.

$$r_i(n_j) = \text{argmax}_{n_i} U_i(c_i, n_i, N)$$

Substituting it in the optimality condition of equation Q.1, we have that for interior solutions:

$$F = u'(c_i) - b'(r_i(n_j)) - \beta \ell'(r_i(n_j) + \sum_{j \neq i} n_j) = 0$$

Using the implicit function theorem:

$$\frac{dr_i(n_j)}{dn_j} = -\frac{\frac{\partial F}{\partial n_j}}{\frac{\partial F}{\partial r_i(n_j)}} = -\frac{\frac{\partial^2 U_i(c_i, n_i, ni + \sum n_j)}{\partial ni \partial n_j}}{\frac{\partial^2 U_i(c_i, n_i, ni + \sum n_j)}{\partial n_i^2}} < 0 \tag{7}$$

The expression Q.1 means that if $n_i$ and $n_j$ are both positive, each time one increases, the other will decrease to maintain the equilibrium between the marginal utility of consumption and children. In other words, there is a negative relationship between the number of children of the agent's male siblings and the agent's own number of children. This is because the two are strategic substitutes: when the number of children of the agent's male siblings is high, he does not "need" to have children to continue his family line. On the contrary, when the number of children of the agent's male siblings is very low, he increases his number of children to extend his lineage. This result mirrors the standard free-rider problem, where each consumer has an incentive to enjoy the benefits of the public good provided by others while providing an inadequate amount of it herself.[56]

So far, the analysis I have made assumes that the husband exerts a major influence on reproductive decisions. However, specially in matrilineal societies, women may have some degree of autonomy in decision making (Lowes, 2022; Tène, 2024). Interestingly, if we solve the problem from the woman's perspective (see Appendix Q for details), we get an additional prediction. Following the same logic, we now find that, in matrilineal societies with strong beliefs in ancestors, there is a negative relationship between female fertility and the number of children of the woman's sisters. This is because in matrilineal societies your sisters' children belong to your lineage, while the children of your brothers belong to the lineage of their wives.

This simple model is consistent with the following predictions: 1) On average, fertility is higher in societies with ancestral beliefs; 2) The positive influence of ancestral beliefs on fertility is driven by patrilineal ethnic groups, where both parents and the children belong to the same lineage; 3) In patrilineal societies with strong beliefs in ancestors, there is a negative relationship between one's own fertility and the number of male siblings' children, since they are part of the same lineage; 4) Similarly, in matrilineal societies with strong beliefs in ancestors, there is a negative relationship

[56] Note that this result cannot be fully explained from an evolutionary perspective. In evolutionary terms, inclusive fitness (the ability of an individual to pass on its genes-both through its offspring and through the offspring of close relatives with whom it shares genes) is increased when siblings have children, and thus the pressure to do so from one's own offspring is reduced. The difference with an evolutionary explanation is that it is not just the total number of siblings that matters, but also their sex composition. In patrilineal societies with ancestor worship, we expect a negative relationship between the number of *male* siblings and one's own fertility.

between female fertility and the number of your sisters' children. In the next section, I provide empirical evidence to support these predictions.

# 6 Mechanisms

I have shown that ancestral beliefs contribute to higher fertility rates in sub-Saharan Africa. I have argued that because of the central role of descent and lineage in societies with strong beliefs in ancestors, where both living and dead lineage members work together to extend the lineage into the future, the motive to continue the family line plays an important role in these societies. Moreover, high fertility is socially rewarded and morally associated with joy, recognition, and right living, while low fertility is associated with misfortune and sin. In the previous section I have highlighted that the motive to continue the lineage differs by kinship system: while both parents and children belong to the same lineage in patrilineal societies, the husband does not belong to the lineage of his wife in matrilineal societies, and children belong exclusively to the lineage of the wife. Because of the assymetries in marital alleagiances, the motive to continue the family role is particularly strong in patrilineal societies. Furthermore, if the motive to continue the family line plays an important role driving fertility when beliefs in ancestors are strong, there could be a negative relationship between male (female) fertility and the number of children that your brothers (sisters) have in patrilineal (matrilineal) societies, since they continue your lineage. In this section, I take these predictions to the data.

## 6.1 Kinship structure, ancestral beliefs and fertility behavior

I start by investigating the relationship between ancestral beliefs and fertility by kinship system. I test the the second prediction of the model, namely that the positive influence of ancestral beliefs on fertility is driven by patrilineal ethnic groups, in two different settings. First, focusing on the Democratic Republic of Congo, I combine the ethnicity-level information on the practice of ancestor worship from Vansina (1966) with the type of kinship system from Murdock (1967), and match this information to the DRC DHS clusters using ethnic group boundaries.[57] About half of the sample lives in a DHS cluster belonging to the ancestral territory of a patrilineal ethnic group, and 13% live in clusters belonging to the ancestral territory of an ethnic group that did not practice ancestor worship. In all specifications I include a vector of individual-level control variables such as age, age squared, gender, whether the respondent is Catholic, single years of education, whether the respondent lives in a urban or rural area, whether the respondent belongs to the top 40% of the wealth distribution, and dummies for provinces. Finally, since the variable measuring ancestral beliefs is defined at the DHS cluster level, I cluster the standard errors at that level. Second, I use

[57] The matching procedure between DHS clusters and Vansina (1966)' information is described in Section 3.

ethnicity-level information at a global scale from Berezkin (2015)'s catalog and the Ethnographic Atlas (Murdock, 1967).

Tables 5 and 6 reports the results. Consistent with the theoretical framework, I find that, in both cases, the positive influence of ancestral beliefs on fertility is driven by patrilineal ethnic groups, even at the global level during precolonial times. In the DRC, individuals from ethnic groups who practiced ancestor worship have higher fertility levels, larger ideal family sizes, and want more children in the future, but only if they belong to a patrilineal ethnic group. Overall, these results provide evidence for the theoretical mechanism emphasizing that the motive to continue the family line is particularly relevant in patrilineal societies with strong beliefs in ancestors, where both parents and the children belong to the same lineage.

Table 5: Ancestor worship, fertility, and kinship structures

| | (1) Children ever born | (2) Ideal Nb of children | (3) Want more children |
|---|---|---|---|
| Ancestor worship | -0.165 | -0.0988 | -0.0346 |
| | (0.104) | (0.228) | (0.0268) |
| Ancestor worship x Patrilineal | 0.263** | 0.422* | 0.0593** |
| | (0.126) | (0.254) | (0.0293) |
| Province FE | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes |
| Mean Y | 3.086 | 6.445 | 0.760 |
| R-squared | 0.622 | 0.241 | 0.221 |
| N | 35891 | 33188 | 29568 |

NOTE. Data: Demographic and Health Surveys of DRC (2007 and 2013-2014). The table reports OLS estimates. The outcome variable in column (1) is the total number of children ever born. In column (2), it is the ideal number of children. Finally, in column (3) it is a dummy variable that equals one if the respondent wants to have an additional child. "Ancestor Worship" is a dummy variable that equals one if the DHS cluster $c$ of individual $i$ belongs to the ethnic homeland of an ethnic group that traditionally practice ancestor worship as reported in Vansina (1966). "Patrilineality " is a dummy variable that equals one if the DHS cluster $c$ of individual $i$ belongs to the ethnic homeland of an ethnic group that traditionally practice ancestor worship as reported in Murdock (1967). Both interaction terms are included as controls. Controls also include age, age squared, gender, a dummy variable that equals one if the respondent is catholic, single years of education, whether the DHS cluster is urban, whether the respondent works, whether the respondent works in agriculture and a dummy variable that equals one if the respondent is in the top 40% of the wealth distribution. Standard errors clustered at the DHS cluster-level in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table 6: Ancestor worship, fertility and kinship in Folklore

| | Share of motifs related to *birth* | | | | Share of motifs related to *fertility* | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Ancestral beliefs | 0.00983 | 0.00648 | 0.00181 | -0.0142 | 0.0160 | -0.00549 | -0.00926 | -0.00266 |
| | (0.0150) | (0.0160) | (0.0204) | (0.0266) | (0.0318) | (0.0311) | (0.0351) | (0.0402) |
| Ancestral beliefs x Patrilineal | 0.0430*** | 0.0441*** | 0.0498** | 0.0650** | 0.124*** | 0.131*** | 0.125*** | 0.122*** |
| | (0.0151) | (0.0153) | (0.0200) | (0.0259) | (0.0320) | (0.0315) | (0.0357) | (0.0408) |
| Folklore controls | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Ethnographic controls | No | No | Yes | Yes | No | No | Yes | Yes |
| Geographic controls | No | No | No | Yes | No | No | No | Yes |
| Mean Y | 4.102 | 4.102 | 3.877 | 3.848 | 0.736 | 0.736 | 0.687 | 0.660 |
| N | 1228 | 1228 | 951 | 862 | 1228 | 1228 | 951 | 862 |

NOTE. Data: Ethnographic Atlas and Folklore. In columns (1)-(4), the outcome variable is the share of motifs related to "birth" in the oral tradition of an ethnic group, while in columns (5)-(9), it is the share of motifs related to "fertility". The table reports Pseudo-Poisson Maximum Likelihood (PPML) estimators. "Ancestor worship" is the share of motifs related to "ancestors" in an ethnic group's oral tradition. "Patrilineality" equals one if the major descent type of the ethnic group is patrilineal descent. Both interaction terms are included as controls. Folklore controls include the total number of motifs in an ethnic group's oral tradition, the number of publishers of the sources in the group's oral tradition, and the earliest year of publication in the group's oral tradition. Ethnographic controls include whether the domestic organization is around independent nuclear families, whether people are part of localized clans that live as segmented communities, whether the ethnic group is patrilineal, political complexity, whether monogamy is dominant, whether the group practices pastoralism, use of historical plough, historical economic development, practice of intensive agriculture, and the share of motifs in an ethnic group related to "supernatural". Geographic controls include tropical climate, precipitations, ruggedness, land quality (population weighted), and agricultural suitability. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

These results contribute to understand how kinship systems influence individuals' behavior. Although the influence of kinship systems on developmental outcomes has received considerable attention in economics in recent years (e.g., Moscona et al., 2020; Lowes, 2021, 2022; Bau and Fernández, 2021), the influence of descent structure on fertility has not been extensively studied, despite Lorimer (1954)'s efforts to link resistance to fertility decline to unilineal descent groups as early as 70 years ago.[58] More specifically, little is known about the effect of the nature of group membership – either determined by men (patrilineal societies) or by women (matrilineal societies) – on fertility outcomes. Interestingly, those few studies that have examined the influence of lineage or clan on fertility emphasize that this influence is particularly important in patrilineal societies (Okafor et al., 2021; Church et al., 2023), although the mechanism driving these results remained unclear.

A promising avenue for future research concerns the systematic study of the relationship between patrilineality and fertility, especially in the context of sub-Saharan Africa. To the extent of my knowledge, there are only two recent papers in economics that mention the potential relationship between kinship structure and fertility. First, BenYishay et al. (2017) show that matrilineal inheritance leads to smaller average household size and total population village, but they do so in the very specific context of the Solomon Islands, and only when exploring the implications of their main research question (whether reef density, their proxy for the quality of the marine environment, systematically predicts the prevalence of female land inheritance). Their explanation is related to inclusive fitness (Holden et al., 2003): "under a patrilineal inheritance system, the additional number of offspring that can result from transmitting an asset to sons needs to outweigh the loss in terms of paternal certainty". Second, Fontenay et al. (2024) include patrilineality as a control in their main

[58] In unilineal descent systems, kin is determined only through one gender. In the case of patrilineal societies, kin is determined through the father's side. On the contrary, kin is determined through the mother's side in matrilineal societies.

regression (they are interested in the effect of impartible inheritance on fertility in SSA), showing a positive and significant coefficient. However, they do not provide any explanation regarding the mechanisms underlying this relationship. Among other mechanisms, this paper highlights that one important channel behind the positive relationship between patrilineality and fertility is the motive to continue the family line. Athough a systematic exploration of the relationship between kinship systems and fertility is beyond the scope of this paper, I slightly advance in this direction.

Table 7 shows the relationship between ideal family size and patrilineality. I find that, on average, individuals in patrilineal societies want 0.5 (10%) more children (column 1), although there are no important differences between men and women (column 2).[59] However, this relationship is completely driven by societies with strong beliefs in ancestors (columns 3 and 4).[60]

I argue that this difference is (at least partly) due to the different nature of the relationship between children and their biological father. In matrilineal societies, the father is not a member of his children's lineage, and the children belong exclusively to his wife's lineage.[61] In contrast, both spouses and children in patrilineal societies belong to the husband's lineage, and women are compelled to have at least one son to gain respectability in marriage, as well as to inherit property and maintain the family line (Okafor et al., 2021).[62] The decision to reproduce is rarely an individual one, and a woman's reproduction is a matter for her husband and his lineage, who, on the other hand, bear almost no costs of additional children and whose reproductive obligations are solely to their lineage and ancestry.[63]

[59]This result may be surprising since, as mentioned in 5, the motive to continue the family line for men only applies in patrilineal societies, while it applies independently of the kinship structure for women. The lack of differences between the ideal number of children for women and for men might be due to the well-known problems associated with the concept of *ideal* number of children (INC). The INC is the number of children that a woman or man would have if they could go back to the time when they did not have any children and could choose accurately the number of children to have in their total life. However, we know that there is an important correlation between desired and actual number of children. This might be because people may adjust their ideal number of children upwards as their actual number of children increases. However, in Appendix O, where I explore these results separately for sons and daughters, the differences between men and women emerge. Moreover, if we look at whether respondents want an additional child (see Table S1 in Appendix S), we observe that the influence of patrilineality is stronger for men, specially when beliefs in ancestors are strong.

[60]Note that the difference between columns (3)-(4) and columns (5)-(6) is not only statistical significance. Also point estimates are much closer to zero when the ethnic group does not practice ancestor worship.

[61]Men's lineage is perpetuated through their nephews. In these societies, the central figure for children is the mother's brother, and the link between husband and wife is usually considered weak (Paulme, 1960). The instability of marriage in matrilineal societies is well documented. For example, Elleamoh and Dake (2019) shows that divorce rates are higher among women of matrilineal descent, and the risk of divorce is about 90% higher, due to greater female autonomy and lower divorce costs for women.

[62]As Okafor et al. (2021) notes in the context of southeastern Nigeria, which is under patrilineal descent: "Maintaining a limited family size without a male child may not be widely supported among economically independent women here compared to other places in the world where women's economic independence is gradually eroding the idea of large family size. As has been pointed out in relation to women's economic independence and son preference, in a traditional system where patrilineal descent dominates inheritance and lineage continuity, no woman will risk her marriage and family pride. Therefore, in such kinship systems, where all major decisions are usually in the hands of a woman's relatives, women can only increase their status and security through their sons.

[63]In this sense, marriage in an institution that goes beyond the couple. In patrilineal societies, marriage is considered stronger than in matrilineal societies, and divorce is low or forbidden. The fact that marriage belong to kinship and lineage structure is made clear by the fact that the death of the husband is usually not enough to break it. In such cases, the wife remains in her husband's family and is married to the deceased husband's brother (levirate marriage).

Table 7: Ancestor worship and fertility preferences in the DRC

| | Ideal Nb of Children | | | | | |
|---|---|---|---|---|---|---|
| | All | | Ancestor Worship = 1 | | Ancestor Worship = 0 | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Patrilineal | 0.491*** | 0.558*** | 0.637*** | 0.655*** | 0.0748 | 0.138 |
| | (0.117) | (0.130) | (0.163) | (0.174) | (0.266) | (0.336) |
| Female | | -0.443*** | | -0.421*** | | -0.725*** |
| | | (0.0485) | | (0.0499) | | (0.206) |
| Patrilineal x Female | | -0.0981 | | -0.0272 | | -0.0903 |
| | | (0.0717) | | (0.0792) | | (0.239) |
| Province FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Mean Y | 6.413 | 6.413 | 6.428 | 6.428 | 6.561 | 6.561 |
| R-squared | 0.238 | 0.238 | 0.256 | 0.256 | 0.179 | 0.179 |
| N | 35626 | 35626 | 28904 | 28904 | 4284 | 4284 |

NOTE. Data: Demographic and Health Surveys of DRC (2007 and 2013-2014). The table reports OLS estimates. The outcome variable is the ideal number of children. The sample is restricted to ethnic groups with ancestor worship in columns (3) and (4) and to ethnic groups without ancestor worship in columns (5) and (6). "Patrilineal" is a dummy variable that equals one if the ethnic group $e$ has patrilineal descent. Controls include age, age squared, gender, a dummy variable that equals one if the respondent is catholic, single years of education, whether the DHS cluster is urban, whether the respondent works, whether the respondent works in agriculture and a dummy variable that equals one if the respondent is in the top 40% of the wealth distribution. Standard errors clustered at the DHS cluster-level in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

These results suggest that children's kin membership is an important determinant of fertility. Note that if the fertility differences between patrilineal and matrilineal societies are due to alternative explanations such as differences in women's decision-making and empowerment in favor of women in matrilineal societies (Tene, 2020; Lowes, 2022), or to higher economic returns of children and the need of having sons for old age support in patrilineal societies (Rossi and Godard, 2022), the practice of ancestor worship should not play a role. However, the higher fertility in patrilineal societies is found only where ancestor worship is important, underscoring the importance of kin membership in explaining these fertility differences.[64] Finally, Appendix O splits these results by the sex of the children and shows that this relationship is seems to be more important with respect to the ideal number of sons. However, the difference is not striking.[65]

[64]Moreover, although some papers suggest that women's decision-making and material conditions are better in matrilineal societies, it is incorrect to compare matrilineality to matriarchy or to a utopian feminist society. For example, Coontz and Henderson (1986) argues that it is patrilocality – that is, the system in which women move to their husband's kin group upon marriage – that has enabled men to use and appropriate women's labor and products. Because of the emphasis on the importance of residence rules over unilineal descent, it is argued that matrilineal societies without matrilocality – that is, societies in which the wife must still live with her husband's kin group – are just as restrictive for women as patrilineal and patrilocal societies, despite the fact that inheritance and kinship membership are traced through female lines. In my sample, none of the matrilineal ethnic groups are matrilocal. Moreover, as Mizinga (2000) notes for the matrilineal Tonga society in southern Zambia, authority is still concentrated in men who exercise control over marriage. What is changing is the composition of those who concentrate power. Instead of the husband and his lineage, power is concentrated in the men of the matrikin, especially the maternal uncle. Moreover, marriage is virilocal and bridewealth is practiced, so women are not entrusted with control of property as they leave their households upon marriage.

[65]The fact that women in patrilineal societies can only increase their status and security through sons, and men need at least one son to perpetuate the family line, may lead to a preference for boys (Lesthaeghe, 1989). However, the absence of son preference is a well-known empirical regularity of African societies (Caldwell and Caldwell, 1985; Baland et al., 2023). This contradiction can be explained by two factors. First, the existence of bridewealth may compensate for these unequal preferences. Second, the high average level of fertility may render the stopping rule useless. For example, if the target number of sons is two, but the total fertility rate is about five, it is quite possible that this number will be achieved, but if fertility declines, the stopping rule may become more important. Examining these factors in more detail is interesting research that could help us better understand the dynamics of son preference in sub-Saharan Africa, but it is beyond the scope of this

## 6.2 Free-rider behavior

The second set of predictions generated by the model states that there could be a negative relationship between one's own fertility and the number of family members able to continue one's lineage with their own children.[66]

I use data from the DRC Demographic and Health Surveys to explore this question in two steps. First, I examine whether there exists a negative relationship between fertility and the number of husband's brothers in patrilineal societies with strong beliefs in ancestors for both men and women. Unfortunately, the DHS does not include information on siblings' gender for men. However, I do have some information on household composition. For example, I know the total number of eligible men (those aged 15-59) in the household. I use this measure as a proxy for the presence of family members capable of extending the family line.[67] Second, I focus on women and examine the relationship between female fertility and the number of sisters. For women, the DHS provides information of the gender and number of siblings, so I can accurately test the model's prediction.

Tables 8 shows the results regarding the relationship between one's fertility and the number of family male members able to continue one's lineage. Consistent with the intuition in section 5, I find that the number of eligible men in the household is associated with lower fertility, but only in patrilineal ethnic groups. Moreover, the negative effect of the number of eligible men on fertility is driven by ethnic groups with strong ancestral beliefs, since the trade-off between one's own fertility and the number of brothers is particularly salient when the motive to continue the family line plays an important role in fertility behavior.

paper.

[66] This result helps to rationalize some empirical findings in other contexts where ancestor worship still exists to some degree, such as China. For example, Yang and Spencer (2022) find that "while the number of siblings of husbands and wives is of little or no consequence, the number of brothers of husbands matters: couples in which husbands have more brothers have fewer children. This is consistent with free-riding in a patrilineal kinship system, where fertility is at least partly driven by the motive to continue a family line.

[67] There are similar proportions of eligible men in the household by kinship system (52% of male respondents live in a household with at least one other eligible man in patrilineal societies, versus 45% in matrilineal societies). The main limitation of this analysis is that I only have information on the type of relationship to the household head for respondents, not for other household members, and therefore there may be compositional differences. For example, the probability that the other eligible male is a brother may be higher in patrilineal (and patrilocal) ethnic groups, and therefore my measure of eligible men in the household may be a better proxy for the number of male siblings in patrilineal ethnic groups.

Table 8: Kinship network, ancestor worship and fertility

| | Total number of children even born | | | |
|---|---|---|---|---|
| | | | Ancestor worship=1 | Ancestor worship=0 |
| | (1) | (2) | (3) | (4) |
| Nb eligible men | 0.0136 | 0.0362 | 0.0326 | 0.0133 |
| | (0.0270) | (0.0268) | (0.0270) | (0.169) |
| Patrilineal x Nb men | -0.114*** | -0.0932** | -0.111*** | -0.0319 |
| | (0.0376) | (0.0376) | (0.0417) | (0.172) |
| Province FE | Yes | Yes | Yes | Yes |
| Basic controls | Yes | Yes | Yes | Yes |
| All controls | No | Yes | Yes | Yes |
| Mean Y | 3.111 | 3.099 | 3.054 | 3.432 |
| R-squared | 0.635 | 0.641 | 0.655 | 0.578 |
| N | 12233 | 12049 | 9706 | 1515 |

NOTE. Data: Demographic and Health Surveys of DRC (2007 and 2013-2014). The table reports OLS estimates. The outcome variable is the total number of children even born. The sample is restricted to men. The sample is restricted to ethnic groups with ancestor worship in column (3) and to ethnic groups without ancestor worship in column (4). "Patrilineal" is a dummy variable that equals one if the ethnic group $e$ has patrilineal descent. "Nb of eligible men" is the number of men aged 15-59 in the household. Basic controls include age, age squared and gender. All controls also include a dummy variable that equals one if the respondent is catholic, single years of education, whether the DHS cluster is urban, whether the respondent works, whether the respondent works in agriculture and a dummy variable that equals one if the respondent is in the top 40% of the wealth distribution. Standard errors clustered at the DHS cluster-level in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Finally, Table 9 shows the results on the relationship between women's fertility and the number of sisters. I find that there is a negative relationship between the number of sisters and women's fertility in matrilineal societies, but only if beliefs in ancestors are widespread. Moreover, I do not find any negative relationship between the number of brothers and women's fertility in matrilineal societies with strong beliefs in ancestors, since the brothers' children belong to the lineage of their wives, and therefore do not continue one's family line. Overall, the combination of these results are consistent with the hypothesis that the motive to continue the family line is strong in societies where beliefs in the influence of ancestors are important, which contributes to sustain high fertility.

Table 9: Kinship network, ancestor worship and fertility

| | Total number of children even born | | | |
|---|---|---|---|---|
| | | Ancestor worship=1 | Ancestor worship=0 | Ancestor worship=1 |
| | (1) | (2) | (3) | (4) |
| Nb sisters | 0.0520*** | 0.0454*** | 0.0595** | |
| | (0.00898) | (0.0102) | (0.0230) | |
| Matrilineal x Sisters | -0.0310** | -0.0270* | -0.00360 | |
| | (0.0142) | (0.0155) | (0.0534) | |
| Nb brothers | | | | 0.0380*** |
| | | | | (0.0109) |
| Matrilineal x Brothers | | | | -0.00581 |
| | | | | (0.0155) |
| Province FE | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes |
| Mean Y | 3.074 | 3.048 | 3.277 | 3.048 |
| R-squared | 0.614 | 0.627 | 0.549 | 0.627 |
| N | 26445 | 21437 | 3233 | 21437 |

NOTE. Data: Demographic and Health Surveys of DRC (2007 and 2013-2014). The table reports OLS estimates. The outcome variable is the total number of children even born. The sample is restricted to women. The sample is restricted to ethnic groups with ancestor worship in columns (2) and (4) and to ethnic groups without ancestor worship in column (3). "Patrilineal" is a dummy variable that equals one if the ethnic group $e$ has patrilineal descent. "Nb sisters" is the number of sisters that the respondent has ever had. "Nb brothers" is the number of brothers that the respondent has ever had. Basic controls include age, age squared and gender. All controls also include a dummy variable that equals one if the respondent is catholic, single years of education, whether the DHS cluster is urban, whether the respondent works, whether the respondent works in agriculture and a dummy variable that equals one if the respondent is in the top 40% of the wealth distribution. Standard errors clustered at the DHS cluster-level in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

## 6.3 Additional results: ancestral beliefs and social organization

Underlying the relationship between patrilineality, ancestors, and fertility, there is the more fundamental institution of lineage playing a pivotal role in these societies. In fact, ancestor worship belongs to the realm of kinship and lineage structures, since the whole system of beliefs, rituals and practices is centered around the clan or the extended family, and ultimately represents the extension of these aspects of the social organization to the supernatural sphere (Fortes, 1965). One interesting question then arises: will the traditional belief system of African societies, with a primary emphasis on the influence of ancestors on the everyday life of people, erode as the clan-based structure of societies dilutes?

I explore this question in two different contexts. First, in the context of rural Benin, I asked people about whether they have received pressure from their clan or extended family to increase their number of children. I use this variable as a proxy for the pervasiveness of clan-based organization. I expect beliefs in ancestors to be more relevant where clan-based organization is still strong and pervasive, as kinship ties and family links are tightest. Table 10 reports the results. I find that the positive effect of ancestral beliefs on fertility is stronger when the clan is strong: holding strong beliefs in ancestors in a context where the clan is pervasive is associated with about 2 more children.

Table 10: Beliefs in ancestors, clan-based organization and fertility

| | Number of children ever born | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Ancestral beliefs | 1.156*** | 1.101*** | 1.013*** | 0.816* | 0.711* | 0.656* |
| | (0.446) | (0.401) | (0.389) | (0.454) | (0.404) | (0.398) |
| Ancestral beliefs x Pressure | 1.341* | 1.027 | 1.213* | 1.287* | 1.054 | 1.236* |
| | (0.764) | (0.704) | (0.688) | (0.758) | (0.692) | (0.677) |
| Baseline controls | No | Yes | Yes | No | Yes | Yes |
| Extended controls | No | No | Yes | No | No | Yes |
| Religion FE | No | No | No | Yes | Yes | Yes |
| Mean Y | 7.905 | 7.923 | 7.923 | 7.914 | 7.923 | 7.923 |
| N | 832 | 820 | 820 | 827 | 820 | 820 |

NOTE. Data: First-hand data collected in southern Benin. The table reports OLS estimates. The outcome variable is the total number of children ever born. "Ancestral beliefs" is a dummy variable that equals one if the respondent answers *yes* to the question *Do you believe that the spirits of your ancestors influence the events of your life?*. *Pressure family* is a dummy variable that indicates whether the respondent has received pressure from the extended family to have children. Baseline controls include age, whether the household has electricity and education. Extended controls include the number of agricultural fields, whether the household owns a TV, and whether the household has been part of a program to encourage the production of pineapple. Religion fixed effects includes five categories: Vodoun, Roman Catholic, Evangelic, Celeste and other. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Second, I make use of the distinction between lineage-based and age-based societies to examine whether the effect of beliefs in ancestors on fertility is stronger in lineage-based societies (Moscona and Seck, 2024). In kin-based or lineage-based societies, the main social group is the extended family, and social loyalty is within the kin group. In age-based societies, on the other hand, the main social group is the age group, i.e., a group of individuals of similar age who enter adulthood at the same time.[68] As one of the primary goals of both of living members and ancestors is the extension of the lineage into the future, I expect ancestor worship to play little role in age-based societies (where "horizontal" organization is key) as compared to lineage-based societies (where "vertical" organization is key). I follow the classification of Moscona and Seck (2024) to identify in the contemporary PEW data which ethnic groups are organized along age lines and which ethnic groups are dominated by lineage organization. Although they focus on both Kenya and Uganda, I focus only on respondents from Kenya because I have almost no variation in Uganda (96% of respondents from Uganda belong to an ethnic group where lineage structure dominates, versus 27% in Kenya). Table 11 shows the results. Although the estimates are less precise due to the reduced sample size, I find a positive relationship between ancestral beliefs and fertility in kinship-based societies, while this relationship is weaker in age-based societies and becomes null when the full set of controls is included in the specifications (columns 2, 4, and 6).

[68] One question that follows from the description of age-set societies and the earlier interpretation of the role of ancestors and their direct connection to kinship structure is whether ancestor spirits should exist at all in societies that are not organized around kinship. First, it is important to note that, as Moscona and Seck (2024) mention, it is possible for an ethnic group to have both kinship and age-set structures. Although many groups have either a strong lineage structure or a strong age structure, there is a continuum of possibilities in between. From this perspective, it is not inconceivable to have variations in the strength of beliefs in ancestors within both lineage and age-based societies. Second, there may be different sets of ancestral spirits. For example, Kenyatta (1965) notes for the Gukuyu (an age-based society from central Kenya) that in addition to the spirits of the father and mother and the clan spirits, there are age-group spirits. The key argument here is that these spirits will play a different role in the society, and the motive of lineage continuation for fertility will be less important.

Table 11: Ancestor worship, fertility and age-based social organization

| | Number of children | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Ancestral beliefs | 0.741** | 0.328 | 0.861** | 0.720** | 0.895*** | 0.538* |
| | (0.354) | (0.248) | (0.389) | (0.330) | (0.306) | (0.308) |
| Ancestral beliefs x Age-based | -0.113 | -0.243 | -0.341 | -0.674* | -0.792** | -0.505 |
| | (0.404) | (0.283) | (0.455) | (0.379) | (0.370) | (0.355) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | No | Yes | No | Yes | No | Yes |
| Mean Y | 1.654 | 1.667 | 2.379 | 2.378 | 2.963 | 2.964 |
| R-squared | 0.0146 | 0.565 | 0.0120 | 0.462 | 0.0105 | 0.326 |
| N | 1198 | 1177 | 775 | 767 | 669 | 662 |

NOTE. Data: PEW research forum 2008-2009 Survey (Kenya). The sample is restricted to women over the age of 25 in columns 3 and 4, and to women with at least one children in columns 5 and 6. The outcome variable is the total number of children. *Age-based* is an indicator equal to one if the respondent belongs to an aged-based society. The explanatory variable is an indicator equal to one if the respondent answers "yes" to the question "Do you ever participate in traditional African ceremonies or perform special acts to honor or celebrate your ancestors?". Controls include age, age$^2$, sex, urban/rural place of residence, religion, education, a dummy that equals one if the respondent is married, a dummy variable that equals one if the respondent finds himself/herself in a good economic situation, and a dummy equal to one if the respondent did not have money at some point during the last year to buy food for his/her family. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

## 6.4 Heterogeneity

Finally, I test for heterogeneous effects along different socioeconomic dimensions. Indeed, identifying when and where the influence of ancestor worship is stronger may help us to better understand the dynamic effects of cultural factors such as ancestor worship. In this regard, there is an important debate about the influence of structural change and European colonization on the persistence of traditional institutions and practices, especially those related to the supernatural world. Table 12 shows the results of re-estimating equation 3 but interacting the measure of ancestor worship with several covariates.

Table 12: Ancestor worship and fertility in sub-Saharan Africa

| | Number of children | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Ancestor Worship | 0.184*** | 0.228*** | 0.154*** | 0.204*** | 0.220*** | 0.191*** | 0.198*** |
| | (0.0292) | (0.0369) | (0.0494) | (0.0503) | (0.0333) | (0.0421) | (0.0309) |
| Ancestor Worship x Urban | | -0.110** | | | | | |
| | | (0.0561) | | | | | |
| Ancestor Worship x Secondary | | | 0.0632 | | | | |
| | | | (0.0613) | | | | |
| Ancestor worship x Post secondary | | | -0.00534 | | | | |
| | | | (0.0779) | | | | |
| Ancestor Worship x Christian | | | | -0.0341 | | | |
| | | | | (0.0601) | | | |
| Ancestor Worship x Muslim | | | | | -0.108* | | |
| | | | | | (0.0637) | | |
| Ancestor Worship x Good econ sit | | | | | | -0.0155 | |
| | | | | | | (0.0553) | |
| Ancestor Worship x $> 40$ | | | | | | | 0.0412 |
| | | | | | | | (0.0752) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Mean Y | 2.083 | 2.083 | 2.083 | 2.083 | 2.083 | 2.083 | 2.083 |
| R-squared | 0.480 | 0.481 | 0.482 | 0.480 | 0.480 | 0.480 | 0.423 |
| N | 22295 | 22295 | 22295 | 22295 | 22295 | 22295 | 22295 |

NOTE. Data: PEW research forum 2008-2009 Survey. The outcome variable is the total number of children. The explanatory variable is an indicator equal to one if the respondent answers "yes" to the question "Do you ever participate in traditional African ceremonies or perform special acts to honor or celebrate your ancestors?". In column 3, the reference category is having primary or less than primary education. Controls include age, age$^2$, sex, whether the individual lives in a urban or rural area, religion, education, marital status, a dummy variable that equals one if the respondent finds himself/herself in a good economic situation, and a dummy equal to one if the respondent did not have money at some point during the last year to buy food for his/her family. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Several interesting results emerge. First, the influence of ancestor worship does not diminish when the respondent is Christian. In fact, this result reinforces the well-known fact that modern religions in Africa have been flexible in accommodating traditional practices, such as some magical rituals and miracles, and this ability to adapt to pre-existing belief systems may help explain the success of some emerging movements, such as Pentecostalism (Platteau, 2009; Auriol et al., 2020).[69] However, it is also recognized that other traditional or religious elements (i.e., polygamy, sacrifice, or witchcraft) were prohibited (Platteau, 2009). Regarding ancestor worship, opposing views coexist. On the one hand, Platteau (2009) or Anderson (1993) include ancestor worship among the prohibitions made by Christian and Islamic doctrines. While I find no evidence of a weaker effect of ancestor worship when the respondent is Christian, I do find a weaker influence of ancestor worship in fertility when the respondent is Muslim. These findings are consistent with some authors such as Caldwell and Caldwell (1990) or Olupona (2014), who emphasize that Christian missionaries focused on replacing African high gods with their own god, while ancestor spirits were considered as a cultural rather than religious issue.

Another factor that may have contributed to the prevalence of traditional supernatural beliefs in the African context is low economic development and, in particular, low levels of urbanization and

[69] For example, "the descent of the Holy Spirit in the Pentecostal doctrine is described as a trance, and the believers continue to think that witchcraft is powerful but are persuaded that they are now protected by a superior, divine power (Platteau (2009), p.679)".

population density, as these may play a role in undermining cultural traits, kinship ties, and the clan-based structure of societies. I find that living in an urban area reduces the influence of ancestor worship, and in fact urban residence emerges as the most important factor affecting the magnitude of the ancestor worship effect, rather than education, age, or subjective economic situation.[70] However, the influence of ancestor worship does not disappear completely, as we saw in section 4.2 for the case of urban DRC in the 1970s. There are conflicting views in the literature about the impact of urbanization on traditional practices. For example, Hunter (1961) argues that urbanization contributes to the decline of ancestor worship by eroding traditional practices and clan structures. On the contrary, Theron (1996) and Coertze (2004) state that African traditional religions and worldviews still have a strong influence on people's lives despite urbanization. In a more recent paper, Bae (2007) asserts that in the South African context, the importance of ancestor worship has not diminished in urban areas. In fact, beliefs in ancestors play a role in maintaining local identities in the face of colonization, westernization, and urbanization. This hypothesis is consistent with the economic theory of cultural persistence among minority groups advanced by Bisin and Verdier (2000), in which the sense of identity is an important component of the individual's utility, so that brides and grooms prefer to be matched with a person of the same culture because this gives them a better chance of transmitting their culture to their children. Finally, in the specific context of the Democratic Republic of the Congo and with a specific mention of ancestor worship, Romaniuk (2011), p.15, asserts that "ethnicity still plays a role in interpersonal networks of socialization and in the wheeling and dealing of political patronage, but many of the customs associated with ethnicity tend to disappear [...]. Ancestral memory, which has traditionally supported high fertility in African societies, is waning as people are increasingly cut off from their ancestral lands," and Shapiro (2010), p. 14, argues for contemporary Kinshasa that "ethnicity, once the most important factor associated with differential fertility, has become largely irrelevant to fertility. Here, I provide evidence that urbanization may contribute to the decline in fertility rates by reducing the importance of kinship and the centrality of extended families and clans, in addition to its effects through increased education, better access to services such as healthcare or contraceptives, or better infrastructure (de la Croix and Gobbi, 2017).

Finally, it is interesting to examine whether the influence of ancestor worship varies with the average fertility level of the society. Cultural factors and beliefs related to fertility may become binding once fertility is reduced. For example, the absence of son preference in the data for sub-Saharan Africa, despite the emphasis in the anthropological and ethnographic literature on the advantage of having sons over daughters, may be explained by the high average fertility levels in the region

[70] Particularly interesting is the null effect of education on the importance of ancestor worship. In fact, if ancestor worship contributes to the stalls in fertility observed in many sub-Saharan African countries, these results suggest that education alone may have a limited impact on the reduction of fertility. These results are compatible with recent papers suggesting that slow education progress is not among the predominant factors in explaining fertility stalls in SSA (Schoumaker and Sánchez-Páez, 2024).

(Rossi and Rouanet, 2015; Baland et al., 2023).[71] Indeed, if parents want one, two, or three sons, this goal is easily achieved when average fertility rates are above five, without the need to resort to the stopping rule. However, as fertility declines, son preference may emerge in the data because parents will have difficulty achieving their desired number of sons at a lower fertility level. Similarly, the motive to continue the family line may become more important as household size is reduced due to higher population density, lower mortality rates, and general economic development. In Appendix P, Table Q1, I split the sample into countries with a total fertility rate above 4.5 and countries with a total fertility rate below 4.5. I show that when we compare the coefficient of ancestor worship to the mean of the dependent variable, the influence of ancestor worship is twice as large in countries where fertility is lower and declining, suggesting that ancestor worship may act as an obstacle to further reductions in fertility rates.

# 7 Conclusion

Understanding the drivers of (high) fertility is important, as high fertility rates combined with reductions in infant mortality lead to high child dependency ratios, are detrimental for maternal and child health, and are associated with low educational attainment and poor living standards (Stover and Ross, 2010; African Union, 2007).

This paper revisits the literature that stressed the importance of deep-seated cultural norms, rooted in traditional beliefs, in explaining resistance to fertility decline in sub-Saharan Africa (Lesthaeghe, 1989; Caldwell and Caldwell, 1987; Caldwell et al., 1992). In particular, I examine the role played by the belief in the influence of ancestors, one of the (historically) most prominent belief systems, both globally and within sub-Saharan Africa. I document and test the hypothesis that ancestor worship, which stresses the importance of ancestry and descent, and therefore attaches a central role to the succession of generations, contributes to sustain high fertility in the region. The emphasis on descent meant that high fertility was morally correct, associating it with joy, right living and ancestral approval, while barrenness and few children was evil, often associated with ancestral disapproval and misfortune.

I find a positive association between beliefs in ancestors in the specific contexts of contemporary Benin and post-independence Congo, within sub-Saharan Africa, and at the global level in pre-industrial societies. This relationship holds across migrants who live in the same city and were born in the same place, but differ in the practice of ancestor worship. I rule out religiosity, unobserved human capital, child labor, the possibility to externalize the costs of bearing children in clan-based

[71] Baland et al. (2023) find little evidence for the presence of a stopping rule favoring boys in most countries of sub-Saharan Africa (see Figure 8 in the paper). However, we can distinguish two types of countries. First, in sub-Saharan African countries with very high fertility rates (e.g., Cameroon, DRC, Nigeria, Mali, or Liberia), boys on average have more younger siblings than girls, indicating the prevalence of instrumental births favoring girls. In contrast, it is interesting to note that in countries with lower fertility rates that have undergone a fertility transition (e.g., Kenya, Burundi, Eswatini, or Rwanda), girls have, on average, more younger siblings than boys, indicating the prevalence of instrumental births favoring boys.

societies, or alternative magical-religious beliefs as confounding factors explaining these results. Finally, I study how ancestor worship interacts with other salient features of the social organization. I show that the influence of ancestral beliefs on fertility depends on the nature of the kinship system. I find that the positive effect of ancestral beliefs on fertility is driven by patrilineal societies, where the father and children belong to the same lineage, and thus having children is a way to continue the family line. On the contrary, the father and children belong to different lineages in matrilineal societies, and thus the motive to continue the family line with one's own offspring is absent for men. Still, I am able to find that there exists a negative relationship between women's fertility and their number of sisters in matrilineal societies, suggesting some room for women's decision-making.

Overall, these findings reinforce Casterline (2017)'s conclusion, notably that the hypothesis that an important basis for resistance to fertility decline is cultural and social has not been refuted yet, partly because beliefs and social norms have proven to be difficult to shift even in experimental settings (Dupas et al., 2024). However, I provide suggestive evidence that both the process of urbanization (that contributes to erode ethnic traits and the clan-based structure of societies) and the emergence of endogenous African religions (such as Evangelical churches in souther Benin) contribute to the reduction of the importance of traditional beliefs and therefore to the potential future decline of fertility levels. An important avenue for future research is to understand which factors (e.g., son preference or ethnic traits) increase or decrease in importance as fertility declines, or to understand what are the social and economic consequences of those institutions (i.e., evangelical churches) that challenge the most ancestral beliefs of some African communities.

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# Appendix A (Extract of) The Breath of the Ancestors
**(Birago Diop, 1960)**

## A.1 English

Listen more often
to things than to beings
the voice of the fire
the water that speaks
the voice of the wind
the bush that weeps
this is the ancestors breathing

The breath of the ancestors
who are not gone
who are not underground
who are not dead
those who have passed are not gone
they are in a woman's breast
in a child's wailing song
in the coals that won't rest

## A.1 Original

Écoute plus souvent
les choses que les êtres
La voix du feu s'étend
entends la voix de l'eau
Écoute dans le vent
le buisson en sanglot
C'est le souffle des ancêtres

Le souffle des ancêtres morts
qui ne sont pas partis
Qui ne sont pas sous terre
qui ne sont pas morts
Ceux qui sont morts ne sont jamais partis
Ils sont dans le sein de la femme
Ils sont dans l'enfant qui vagit
Et dans le tison qui s'enflamme

# Appendix B Correlates of beliefs in ancestors in contemporary Benin

I examine the correlates of believing in the influence of ancestors by plotting the standardized beta coefficients of the following bivariate regression:

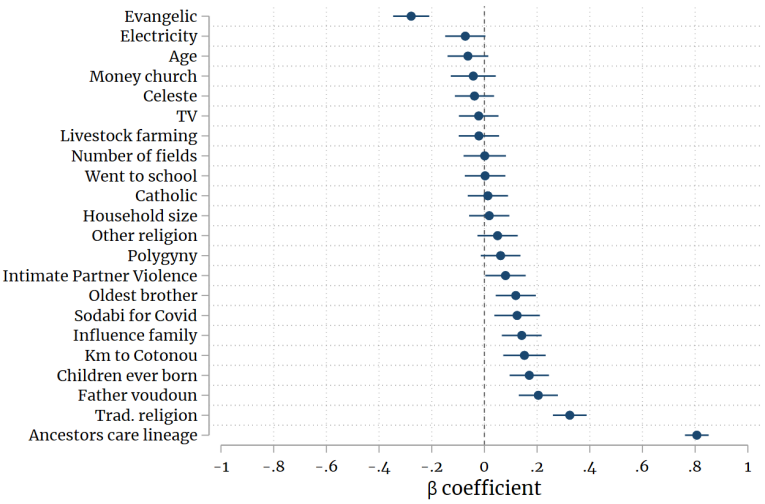
$$Y_i = \alpha + \beta_1 \text{AncestralBeliefs}_i + \epsilon_i \tag{8}$$

Where $Y_i$ is each time a different outcome variable (a row in Figure C1) and Ancestral Beliefs is an indicator variable that equals one if the respondent answers *yes* to the question *Do you believe that the spirits of your ancestors have an influence on the events of your life?*.

Believing in the influence of ancestors is positively associated with practising a traditional religion as your main religion (mostly Vodoun), having a father (or mother) that practice(d) Vodoun, number of children, having received pressure from the extended family to have children, drinking sodabi (traditional local alcoholic drink) to fight against COVID, distance to Cotonou (economic capital of Benin) or being the oldest brother. As expected, there is a very strong correlation between believing in the influence of ancestors on people's lives and believing that ancestors care about the survival of the extended family and the continuation of the family line, as they are the two main characteristics of this belief system. There is no statistically significant association between traditional beliefs in ancestors and variables such as education, age, being Catholic, having a TV, number of fields used for agriculture, amount donated to the church or having livestock. Interestingly, I find a negative and strong correlation with being evangelic. This is in line with previous accounts highlighting that the endogenous nature of African churches (in opposition to the imported missionary churches – as reflected in the null correlation with Catholicism –) has allowed them to challenge certain important aspects of the traditional belief system. As Caldwell and Caldwell (1987) note:

> The fact that they (African or endogenous churches, such as most evangelical churches in the context of Benin) are very much a grass-roots phenomenon and do not share the apprehension of African cultural manifestations that has often marked the missionary churches has tended to hide their greater willingness to challenge those aspects of the traditional belief system that they consider unacceptable (Caldwell and Caldwell (1987), p.428)".

Figure C1: Correlates of beliefs in ancestors




*Note*: The figure plots the standardized beta coefficient of regressing beliefs in the influence of ancestors on several explanatory variables. The unit of observation is an individual from the 2024 survey among pineapple producers in southern Benin. Lines around point estimates represent 95% confidence intervals.

# Appendix C Matching procedure: Vansina and DRC DHS

Figure D1: Ethnic groups in Vansina (1966) and DHS clusters

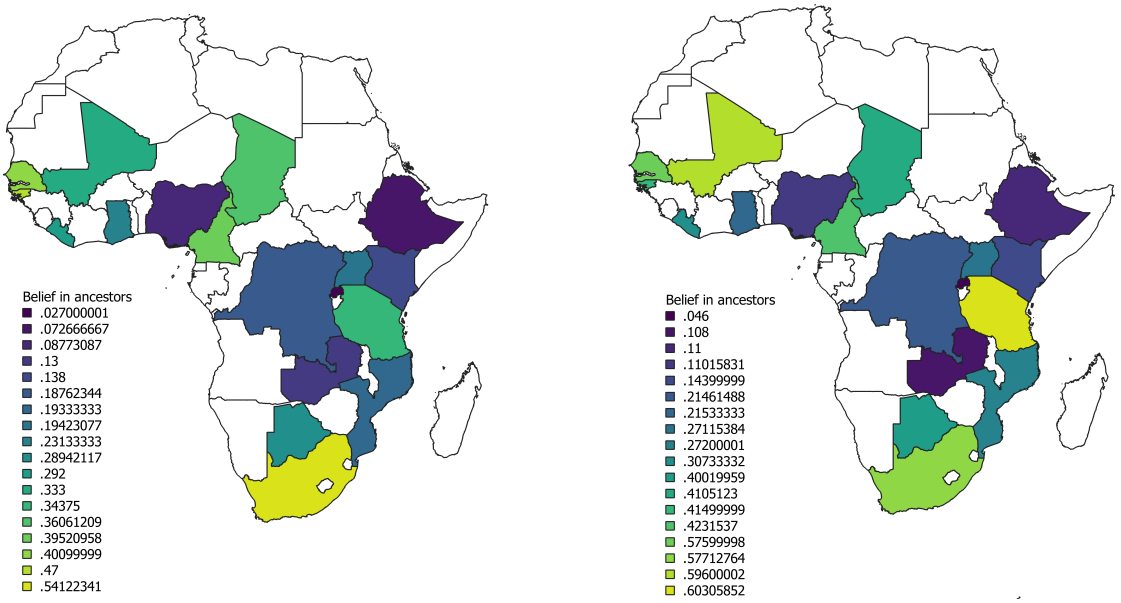

(a) Digitized version of Vansina (1966)

(b) Ancestor worship and DHS clusters

*Notes*: Panel D1a displays ethnic group boundaries for the DRC digitized from Vansina (1966). Panel D1b assigns to each DHS cluster the value taken by the variable ancestor worship in the ethnic homeland where the DHS cluster is located.

# Appendix D PEW Variables

Figure E1: Share of respondent believing in Ancestors




(a) Rituals to ancestors

(b) Believe in sacrifices to ancestors

*Notes*: The figure displays the share of individuals in each country of the PEW sample believing in ancestors. Panel E1a shows the geographic distribution of the share of respondents that answered "yes" to the question "*Do you ever participate in traditional African ceremonies or perform special acts to honor or celebrate your ancestors?*". Panel E1b shows the geographic distribution of the share of respondents that answered "yes" to the question "*Do you believe that sacrificing to spirits or ancestors can protect you from bad things happening?*".

# Appendix E Variable definitions

## E.1 Ethnicity-level variables

### E.1.1 Folklore:

**Number of motifs:** Total number of motifs recorded in each Berezkin's group. Data comes from Michalopoulos and Xue (2021).

**Number of publishers:** Total number of publishers of the sources in the group's oral tradition. Data comes from Michalopoulos and Xue (2021).

**Earliest year of publication:** Earliest year of publication in the group's oral tradition. Data comes from Michalopoulos and Xue (2021).

**Motifs related to "supernatural":** Share of motifs tagged by supernatural related terms in the oral tradition of an ethnic group. Data comes from Michalopoulos and Xue (2021).

### E.1.2 Ethnographic Atlas:

**Domestic organization around extended families:** is based on varible V8 of the Ethnographic Atlas (domestic organization). It is constructed as a dummy variable that is zero if domestic organization is "Independent polyandrous families", "Polygynous: unusual co-wives pattern", "Polygynous: usual co-wives pattern", "Minimal (stem) extended families", "Small extended families", and "Large extended families". It equals one if domestic organization is "Independent nuclear family, monogamous" or "Independent nuclear family, occasional polygyny". This measure is based on Enke (2019).

**Segmented communities and localized clans:** is based on variable V15 of the Ethnographic Atlas (community marriage organization). It is constructed as a dummy variable that is zero if community organization is "Demes, not segregated into clan barrios", "Agamous communities", "Exogamous communities, not clans". It takes on a value of one if community organization is "Segmented communities without local exogamy", "Segmented communities, localized clans, local exogamy", or "Clan communities, or clan barrios". This measure is based on Enke (2019).

**Patrilineal:** is based on variable V43 of the Ethnographic Atlas (descent: major type). It is a dummy variable that takes the value one if a group's major mode of descent is patrilineal as opposed to any other mode of descent.

**Political complexity:** is based on variable V33 of the Ethnographic Atlas (jurisdictional hierarchy beyond local communities). This is a categorical variable ranging from no levels beyond local community to four levels beyond local community. I use it as it appears in the Ethnographic Atlas (ranging from 0 to 4).

**Monogamy:** is based on variable V9 of the Ethnographic Atlas (marital composition: monogamy and polygamy). It is constructed as a dummy variable that takes on a value of one if an ethnic group's

dominant form of marital composition is monogamous.

**Pastoralism:** is based on variables V4 (animal husbandry) and V40 (predominant type of animal husbandry) of the Ethnographic Atlas. To construct this variable, I follow Le Rossignol and Lowes (2022). From variable v4, I create a dummy variable that equals one if the predominant type of animal raised is a herding animal such as cattle, sheep, or camelids. Then, pastoralism is measured by multiplying this new dummy variable by variable V40.

**Historical use of the plough:** is based on variable V39 of the Ethnographic Atlas (animals and plow cultivation). I construct an indicator variable for traditional plough agriculture that equals one if the plough was present (whether aboriginal or not) and zero otherwise. This measure is similar to Alesina et al. (2013).

**Historical economic development:** is based on variable V30 of the Ethnographic Atlas (settlement patterns). I use this variable as in Alesina et al. (2013). Each ethnic group is categorized into one of the following categories describing their pattern of settlement: "nomadic or fully migratory", "semi-nomadic", "semi-sedentary", "compact but temporary settlements", "neighborhoods of dispersed family homes", "separated hamlets forming a single community", "compact and relatively permanent", "complex settlements". The variable takes on the values of 1 to 8, with 1 indicating fully nomadic groups and 8 groups with complex settlement.

**Practice of intensive agriculture:** is based on variable V28 of the Ethnographic Atlas (intensity of agriculture). I follow Alesina et al. (2013) and construct an indicator that equals one if the society belongs to the categories "intensive agriculture" or "intensive irrigated agriculture", and zero otherwise.

#### E.1.3 Geographic variables:

**Tropical climate:** is taken from Alesina et al. (2013). It is computed as the proportion of land within a 200 kilometer radius of an ethnic group's centroid that is classified as being either tropical or subtropical. The classification of thermal climates comes from the GAEZ 2002 database.

**Precipitation:** is taken from Fenske (2013). It is average annual precipitation (mm). The data comes from the International Institute for Applied Systems Analysis.

**Ruggedness:** is taken from Nunn and Puga (2012). It is constructed as the average across points on a grid 1 kilometer apart within a country of an index of terrain ruggedness. For details about how the index is constructed, see Nunn and Puga (2012).

**Land quality:** is taken from Fenske (2013). It is measured as a non-additive combination of climate constraints, soil constraints and terrain slope constraints, coming from the Food and Agriculture Organization's Global Agro-Ecological Zones (FAO-GAEZ) project.

**Agricultural suitability:** is taken from Alesina et al. (2013). Using information on global geoclimatic conditions for crop cultivation from the FAO's Global Agro-Ecological Zones (GAEZ) v3.0 database, they calculate the fraction of this land that is suitable for the cultivation of barley, wheat,

rye, sorghum, foxtail millet, or pearl millet. They use this measure to construct the average suitability of the land (within 200 kilometers of the centroid of each ethnic group) historically inhabited by a location's ancestors.

# Appendix F West Zaire Surveys (1975-77)

These surveys were part of a large research project led by the Université Catholique de Louvain in collaboration with the Congolese Official Institute of Research and Statistics. The surveys were conducted between 1975 and 1977 and aimed at collecting basic demographic information for the Democratic Republic of the Congo, due to the paucity of this type of data. These surveys are the outcome of two parallel studies (see Figure G1 for the sampled territories):

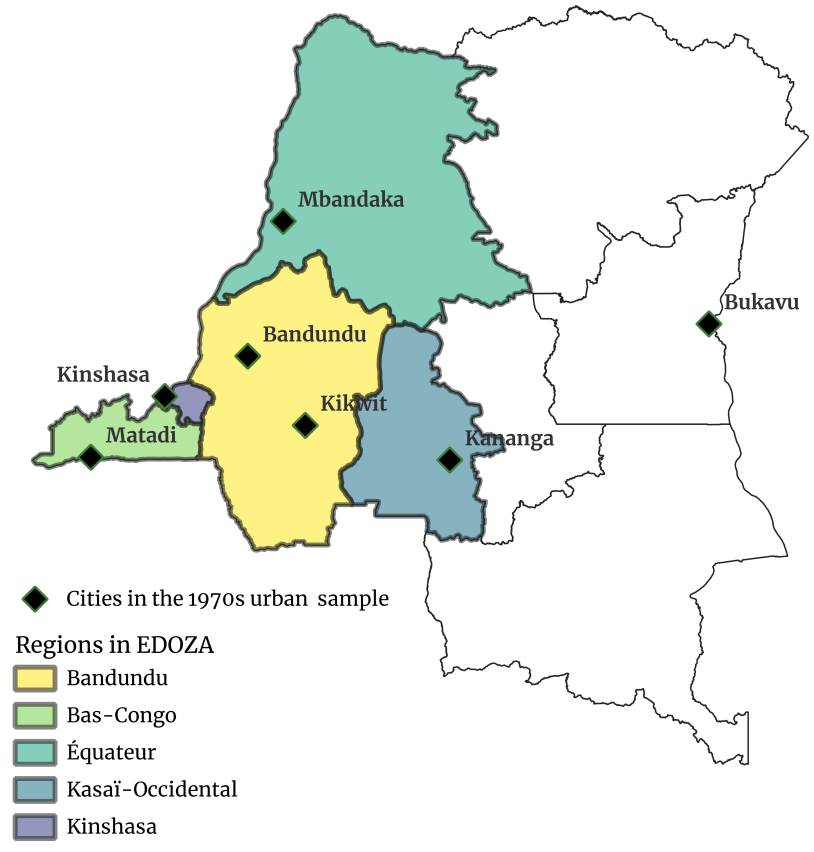
**Urban Demographic and Budgetary Survey.**—A demographic and budgetary survey were conducted in the six largest cities of western Zaire: Kinshasa, Matadi, Bandundu, Kikwit, Mbandaka and Kananga. This survey was led by Joseph Houyoux, professr at the Sociology department of the Université Catholique de Louvain, in Belgium. On the one hand, the demographic survey contains individual-level information on about 250,000 individuals in 43,000 households. After a census conducted in each of these cities to count and identify all households, 1/10 of the total number of households was randomly selected to be included in the sample. Demographic information was collected on age, sex, ethnicity, place of birth, and migration status, as well as socioeconomic characteristics such as years of education and occupation. Moreover, for each woman over the age of 13, births calendars are also recorded, including the month and year of each birth, the sex of the children, and the dates of death, if applicable. On the other hand, the budgetary survey contains information on household expenditures and transactions for 1/50 of the households identified in each city (two daily passages during one month).

**Enquête Démographique de l'Ouest du Zaïre (EDOZA).**—A demographic survey conducted in the rest of urban areas (excluding the large cities included in the previous survey) and in rural areas of four western regions: Bas-Congo, Bandundu, Kasai Occidental and Equateur (only in the Equateur and Tshuapa districts). This survey was led by the Demography deparment of the Université Catholique de Louvain. The original survey includes around 210.000 individuals in about 45.000 households. However, contrary to the Urban Demographic survey where I have the full sample, I have been able to locate 50.000 individuals in 11.000 households so far. To the extent of my knowledge, the rest of the EDOZA sample is lost.

One potential concern relates to the quality of these surveys. Although these surveys were conducted during Mobutu's dictatorship, both the design and implementation of the survey and data collection were managed jointly by a team of demographers based at the Congolese Institute for Research and Statistics and the Université Catholique de Louvain in Belgium. Data cleaning and statistical programming were carried out in Belgium. These data are considered high quality by demographers who rely on them to study demographic dynamics in the Congo in well-published academic papers (Tabutin, 1982; Shapiro, 1996; Shapiro and Tambashe, 2001; Schneidman, 1990). Finally, these surveys used the same methodology to construct variables (i.e., birth calendars) as current benchmark surveys, such as the Demographic and Health Surveys. Although the data from these

surveys have been used by demographers, it has only been used in an aggregated way to study fertility and mortality levels and trends across regions and time. Recently, some papers in economics have used the microdata of the Urban Demographic survey (Guirkinger and Villar, 2022; Alvarez-Aragon et al., 2023). To the best of my knowledge, no paper has yet exploited the microdata from EDOZA.

Figure G1: Cities included in the urban survey and regions included in EDOZA




*Note*: Own elaboration using QGIS.

# Appendix G Ancestral beliefs and fertility in southern Benin

## G.1 Poisson model

Table H1: Beliefs in ancestors and fertility in contemporary Benin

| | Number of children ever born | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Ancestral beliefs | 0.244*** | 0.219*** | 0.196*** | 0.198*** | 0.171*** | 0.153*** |
| | (0.0450) | (0.0413) | (0.0415) | (0.0474) | (0.0428) | (0.0437) |
| Baseline controls | No | Yes | Yes | No | Yes | Yes |
| Extended controls | No | No | Yes | No | No | Yes |
| Religion FE | No | No | No | Yes | Yes | Yes |
| Mean Y | 7.905 | 7.923 | 7.923 | 7.914 | 7.923 | 7.923 |
| N | 832 | 820 | 820 | 827 | 820 | 820 |

NOTE. Data: First-hand data collected in southern Benin. The table reports Pseudo-Poisson Maximum Likelihood (PPML) estimators. The outcome variable is the total number of children ever born. "Ancestral beliefs" is a dummy variable that equals one if the respondent answers *yes* to the question *Do you believe that the spirits of your ancestors influence the events of your life?*. Baseline controls include age, whether the household has electricity and education. Extended controls include the number of agricultural fields, whether the household owns a TV, whether the household has been part of a program to encourage the production of pineapple, and whether the respondent has received pressure from the extended family to have children. Religion fixed effects includes five categories: Vodoun, Roman Catholic, Evangelic, Celeste and other. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

## G.2 Alternative explanatory variables

Table H2: Beliefs in ancestors and fertility in contemporary Benin

| | Number of children ever born | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Ancestral beliefs | 2.032*** | 1.737*** | 1.563*** | 1.690*** | 1.339*** | 1.212*** |
| | (0.354) | (0.323) | (0.310) | (0.378) | (0.340) | (0.332) |
| Baseline controls | No | Yes | Yes | No | Yes | Yes |
| Extended controls | No | No | Yes | No | No | Yes |
| Religion FE | No | No | No | Yes | Yes | Yes |
| Mean Y | 7.905 | 7.923 | 7.923 | 7.914 | 7.923 | 7.923 |
| N | 832 | 820 | 820 | 827 | 820 | 820 |

NOTE. Data: First-hand data collected in southern Benin. The table reports OLS estimates. The outcome variable is the total number of children ever born. "Ancestral beliefs" is a dummy variable that equals one if the respondent answers *yes* to the question *Do you think that your ancestors' spirits care about your extended family and the continuation of the family line?*. Baseline controls include age, whether the household has electricity and education. Extended controls include the number of agricultural fields, whether the household owns a TV, whether the household has been part of a program to encourage the production of pineapple, and whether the respondent has received pressure from the extended family to have children. Religion fixed effects includes five categories: Vodoun, Roman Catholic, Evangelic, Celeste and other. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table H3: Beliefs in ancestors and fertility in contemporary Benin

| | Number of children ever born | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Ancestral beliefs | 1.950*** | 1.676*** | 1.540*** | 1.605*** | 1.290*** | 1.201*** |
| | (0.349) | (0.318) | (0.305) | (0.369) | (0.333) | (0.324) |
| Baseline controls | No | Yes | Yes | No | Yes | Yes |
| Extended controls | No | No | Yes | No | No | Yes |
| Religion FE | No | No | No | Yes | Yes | Yes |
| Mean Y | 7.905 | 7.923 | 7.923 | 7.914 | 7.923 | 7.923 |
| N | 832 | 820 | 820 | 827 | 820 | 820 |

NOTE. Data: First-hand data collected in southern Benin. The table reports OLS estimates. The outcome variable is the total number of children ever born. "Ancestral beliefs" is a dummy variable that equals one if the respondent answers *yes* to the question *Do you believe that the spirits of your ancestors influence the events of your life?* or to the question *Do you think that your ancestors' spirits care about your extended family and the continuation of the family line?*. Baseline controls include age, whether the household has electricity and education. Extended controls include the number of agricultural fields, whether the household owns a TV, whether the household has been part of a program to encourage the production of pineapple, and whether the respondent has received pressure from the extended family to have children. Religion fixed effects includes five categories: Vodoun, Roman Catholic, Evangelic, Celeste and other. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

## G.3 Effects on women and complementarity between spouses

Table H4: Beliefs in ancestors and fertility in contemporary Benin

| | Number of children ever born | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Ancestral beliefs | 0.570*** | 0.459*** | 0.387*** | 0.644*** | 0.536*** | 0.473*** |
| | (0.155) | (0.140) | (0.141) | (0.163) | (0.146) | (0.146) |
| Baseline controls | No | Yes | Yes | No | Yes | Yes |
| Extended controls | No | No | Yes | No | No | Yes |
| Religion FE | No | No | No | Yes | Yes | Yes |
| Mean Y | 5.345 | 5.333 | 5.327 | 5.345 | 5.333 | 5.327 |
| N | 943 | 937 | 932 | 943 | 937 | 932 |

NOTE. Data: First-hand data collected in southern Benin. The sample is restricted to women. The table reports OLS estimates. The outcome variable is the total number of children ever born. "Ancestral beliefs" is a dummy variable that equals one if the respondent answers *yes* to the question *Do you believe that the spirits of your ancestors influence the events of your life?*. Baseline controls include age, whether the household has electricity and education. Extended controls include the number of agricultural fields, whether the household owns a TV, whether the household has been part of a program to encourage the production of pineapple, and whether the respondent has received pressure from the extended family to have children. Religion fixed effects includes five categories: Vodoun, Roman Catholic, Evangelic, Celeste and other. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table H5: Beliefs in ancestors and fertility in contemporary Benin

| | Number of children ever born | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Ancestral beliefs | 2.680*** | 2.335*** | 2.068*** | 2.259*** | 1.860*** | 1.657*** |
| | (0.510) | (0.470) | (0.462) | (0.529) | (0.484) | (0.477) |
| Baseline controls | No | Yes | Yes | No | Yes | Yes |
| Extended controls | No | No | Yes | No | No | Yes |
| Religion FE | No | No | No | Yes | Yes | Yes |
| Mean Y | 7.905 | 7.923 | 7.923 | 7.914 | 7.923 | 7.923 |
| N | 832 | 820 | 820 | 827 | 820 | 820 |

NOTE. Data: First-hand data collected in southern Benin. The table reports OLS estimates. The outcome variable is the total number of children ever born. "Ancestral beliefs" is a dummy variable that equals one if both the husband and the wife answer *yes* to the question *Do you believe that the spirits of your ancestors influence the events of your life?*. Baseline controls include age, whether the household has electricity and education. Extended controls include the number of agricultural fields, whether the household owns a TV, whether the household has been part of a program to encourage the production of pineapple, and whether the respondent has received pressure from the extended family to have children. Religion fixed effects includes five categories: Vodoun, Roman Catholic, Evangelic, Celeste and other. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

## G.4 Specification curves: robustness to additional controls

In this section I show that the results are robust to the inclusion of alternative control variables and their different combinations. In addition to the baseline and extended controls (age, education, access to electricity, TV ownership, quantity of agricultural land, pressure from the extended family to have children and whether the respondent is participating in a program to increase pineapple production), I include:

*Polygyny*: Since I am focusing on men's ever-born children, polygyny is an important factor to consider. In fact, about 60% of men who report having 10 or more children are polygynous. I have not included this in the main specification because it may be a "bad control" (Angrist and Pischke, 2009). For example, Goody (1973) notes that one can gain security in the afterlife (i.e., continuity of the family line) directly by having children or indirectly by adding wives. Similarly, Kenyatta (1965) mentions in the context of the Gikuyu people of central Kenya that:

> "If a man dies without a male child his family group comes to an end. This is one thing that the Gikuyu fear dreadfully, and it can be said to be one of the factors behind the polygamous system of marriage. There is no doubt that perpetuation of family or kinship group is the main principal of every Gikuyu marriage. For the extinction of a kinship groups means cutting off the ancestral spirits from visiting the earth, because there is no one left to communicate with them (Kenyatta (1965), p.13)".

*Father practices Vodoun*: To proxy for parental preferences for children and aspects related to the traditional practices of the family, I include a dummy variable that equals one if the father's main religion is Vodoun. This variable is highly correlated to the respondent's religion: when the respondent declares Vodoun as his main religion, his father practices Vodoun in the 85% of cases.

*Household size*: This variable takes into account the structure of the household. Households with more members can more easily externalize the costs of having children, and more members may be the result of stronger preferences towards children in previous generations.

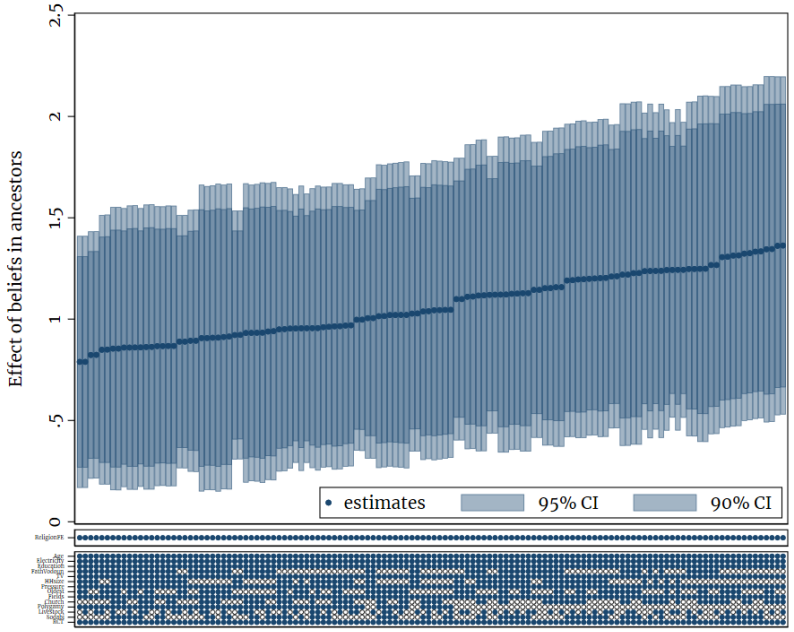
*Money to church to get protection against COVID*: I try to account for strong religiosity (beyond the inclusion of religion fixed effects) by looking at whether the respondent has donated some money to his church to get protected against COVID (average is 14%).

*Drinking sodabi to get protection against COVID*: I proxy for the strength of other traditional practices (not related to beliefs in supernatural powers) by measuring the subjective effectiveness of traditional medicine. I include an indicator that equals one if the respondent drunk a traditional alcoholic drink (sodabi) to get protection against COVID.

*Livestock ownership*: As an additional measure of wealth, I include a dummy variable that takes the value one if the respondent owns livestock.

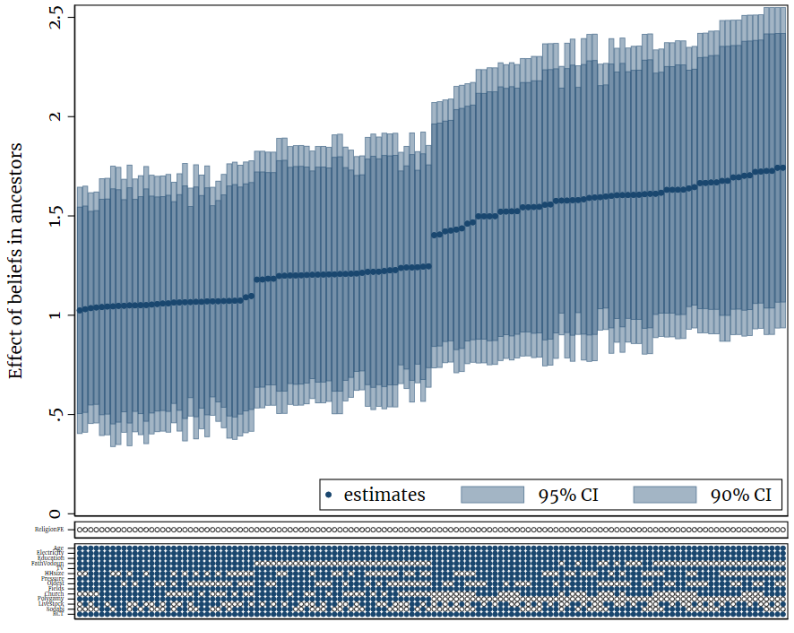
*Oldest brother*: Finally, since siblings may compete for limited resources in their household and first-born children are often prioritized in accessing resources, or in their marriage prospects, I include an indicator that takes value one if the respondent is the oldest sibling (among those from the same mother).

## Figure H1: Specification curve: additional controls and religion fixed effects




*Note*: The figure shows the specification curves for the effect of beliefs in the influence of ancestors. Each dot is a coefficient from Eq. 1 with a different set of control variables. The vertical bars, from darkest to lightest, denote the 95% and 90% confidence intervals. All specifications include religion fixed effects. *HHsize* is the total number of people living in the household. *Father-Vodoun* equals one if the (main) religion of the respondent's father is Vodoun and zero otherwise. *Oldest* takes the value one if the respondent is the oldest brother and zero otherwise. *Church* equals one if the respondent donated to his church to get protected from COVID. *Polygamy* equals one if the respondent is in a polygamous union and zero otherwise. *Livestock* is an indicator that takes the value one if the respondent owns livestock. *Sodabi* takes the value one if the respondent drank sodabi (a traditional alcoholic drink) to get protected against COVID.

## Figure H2: Specification curve: additional controls

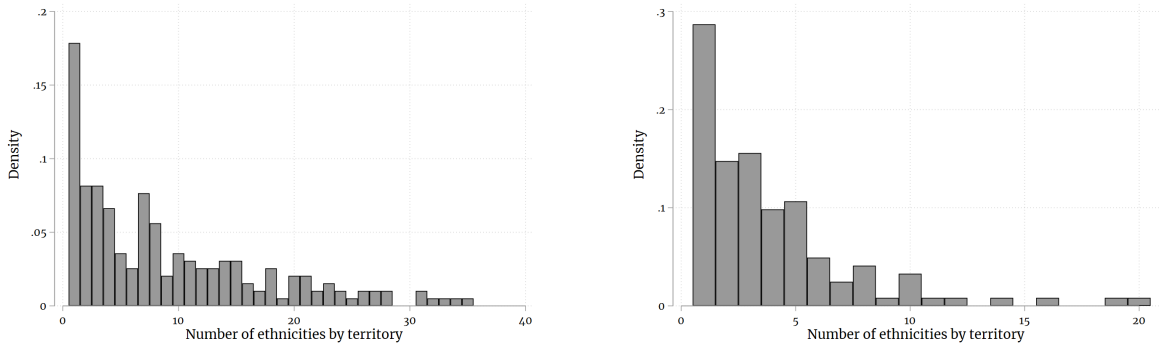



*Note*: The figure shows the specification curves for the effect of beliefs in the influence of ancestors. Each dot is a coefficient from Eq. 1 with a different set of control variables. The vertical bars, from darkest to lightest, denote the 95% and 90% confidence intervals. Religion fixed effects are not included. *HHsize* is the total number of people living in the household. *FatherVodoun* equals one if the (main) religion of the respondent's father is Vodoun and zero otherwise. *Oldest* takes the value one if the respondent is the oldest brother and zero otherwise. *Church* equals one if the respondent donated to his church to get protected from COVID. *Polygamy* equals one if the respondent is in a polygamous union and zero otherwise. *Livestock* is an indicator that takes the value one if the respondent owns livestock. *Sodabi* takes the value one if the respondent drank sodabi (a traditional alcoholic drink) to get protected against COVID.

# Appendix H Ethnicities by territory

A potential concern with the specification that includes fixed effects for territory of birth and city of residence in the urban sample is that there could be almost no variation in the number of people of different ethnicities born in the same territory, and thus the estimates could be driven by very few observations. First, it is important to note that territories are large administrative units.[72] Second, migration on the eve of and immediately after independence was very important in the DRC, and therefore the number of second generation migrants from different territories (and possibly with a different ethnicity) was potentially very high. In fact, about 90% of the sample was born in a rural area and migrated during the last years of the colonial era or after independence. Third, the classification of ethnicities (or, as defined in Vansina (1966), tribes) that I use in this paper is granular: I have about 220 different ethnicities in the urban sample, and the maps of ethnic boundaries drawn by Vansina (1966) generally depict small polygons that can lie within a single territory (see Figure D1a). Figure I1, panel I1a, shows the distribution of the number of ethnicities by territory of birth: it looks at the ethnicity of each person born in a given territory and counts the number of different ethnicities (it does not look at the number of ancestral ethnic boundaries that lie within a territory). However, there may be many ethnicities because only 1 or 2 people born in the territory are of the same ethnicity. Panel I1b shows the distribution of the number of ethnicities by territory of birth, considering only ethnicities with at least five people.

Figure I1: Variation in the number of ethnicities by territory of birth




(a) Full sample (b) Only ethnicities with $n > 5$

*Notes*: Panel I1a, shows the distribution of the number of ethnicities by territory of birth: it looks at the ethnicity of each person born in a given territory and counts the number of different ethnicities. Panel I1b shows the distribution of the number of ethnicities by territory of birth, considering only ethnicities with at least five people.

[72] Territories in the 1970s surveys do not correspond exactly to territories today: while I have about 200 territories (including cities) in my sample, there are 145 territories and 35 large cities today.

# Appendix I Congo: Age-specific fertility rates

Using birth calendars, I reconstruct the total number of births women had at ages 35, 40, and 45. The results are reported in Table J1. While fertility is more likely to be completed at older ages, the sample size becomes smaller because there are fewer women in the older age categories. I find a positive effect of ancestor worship on age-specific fertility, ranging from an average effect of 18% of the full sample mean at age 35 to 21% at age 40 and 26% at age 45. Here, I observe an stronger effect on the rural sample (again, note that I include city of residence FE when using the urban sample and region FE when I use the EDOZA sample, which can explain – at least partially – the stronger effect on the rural sample. I find that ancestor worship increases the number of births at age 30 by 27% in the EDOZA sample and by 15% in the urban sample. At age 40, the effect moves up to 31% of the EDOZA sample mean and to 18% in the urban sample. Finally, at age 45, ancestor worship is associated with an increase of 36% of the sample mean in the EDOZA survey and of 23% in the urban sample.

Table J1: Ancestor worship and age-specific fertility in the DRC

| | Births at 35 | | | Births at 40 | | | BIrths at 45 | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Ancestor worship | 0.772*** | 1.138*** | 0.695*** | 0.992*** | 1.363*** | 0.905*** | 1.200*** | 1.586*** | 1.117*** |
| | (0.172) | (0.345) | (0.165) | (0.229) | (0.398) | (0.250) | (0.242) | (0.398) | (0.259) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| City x Territory FE | No | No | No | Yes | No | No | No | Yes | Yes |
| All | Yes | No | No | Yes | No | No | Yes | No | No |
| Edoza | No | Yes | No | No | Yes | No | No | Yes | No |
| Urban | No | No | Yes | No | No | Yes | No | No | Yes |
| Mean Y | 4.568 | 4.243 | 4.746 | 4.862 | 4.580 | 5.055 | 4.710 | 4.489 | 4.890 |
| R-squared | 0.243 | 0.254 | 0.272 | 0.242 | 0.265 | 0.266 | 0.212 | 0.252 | 0.226 |
| N | 18997 | 6730 | 12267 | 13447 | 5466 | 7981 | 9678 | 4337 | 5341 |

NOTE. Data: Demographic Survey of 1970s and EDOZA. The table reports OLS estimates. The outcome variables are the total number of births a women had before age 35 (columns 1, 2 and 3), 40 (columns 4, 5 and 6) and 45 (columns 7, 8 and 9). "Ancestor worship" is a dummy variable that equals one if the ethnic group $e$ practice ancestor worship. Controls include age, whether the place of birth was urban or rural, whether the respondent has primary education, dummy equal to one if migrant, dummy equal to one if the father's respondent is alive, dummy equal to one if the respondent is working, dummy equal to one if the respondent is a farmer (only available in the urban sample), number of household members, and year of installation in the current city. City/region fixed effects include city of residence in the case of the urban sample and region of residence in the case of EDOZA. Standard errors clustered at the Vansina's ethnic group-level in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

# Appendix J Congo: Poisson model

Table K1: Ancestor worship and fertility in the DRC

| | Number of children ever born | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Full sample | | EDOZA | | Urban sample | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Ancestor worship | 0.179*** | 0.187*** | 0.157** | 0.219*** | 0.212*** | 0.186*** | 0.1000*** | 0.0838*** |
| | (0.0378) | (0.0432) | (0.0683) | (0.0740) | (0.0287) | (0.0362) | (0.0246) | (0.0268) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| City x Territory FE | No | No | No | No | No | No | Yes | Yes |
| Mean Y | 2.883 | 5.322 | 3.546 | 4.866 | 2.703 | 5.542 | 2.702 | 5.538 |
| N | 60064 | 23195 | 12825 | 7552 | 47239 | 15643 | 47014 | 15489 |

NOTE. Data: Demographic Survey of 1970s and EDOZA. Columns 1 and 2 combine both the Urban Demographic survey and EDOZA. Columns 3 and 4 use only the EDOZA sample. Columns 5-8 use only the urban sample. In columns 2, 4, 6 and 8, the sample is restricted to women older than 30 years old. The table reports Pseudo-Poisson Maximum Likelihood (PPML) estimators. The outcome variable is the total number of children ever born. "Ancestor worship" is a dummy variable that equals one if the ethnic group $e$ practice ancestor worship. Controls include age, whether the place of birth was urban or rural, whether the respondent has primary education, dummy equal to one if migrant, dummy equal to one if the father's respondent is alive, dummy equal to one if the respondent is working, dummy equal to one if the respondent is a farmer (only available in the urban sample), number of household members, and year of installation in the current city. City/region fixed effects include city of residence in the case of the urban sample and region of residence in the case of EDOZA. Standard errors clustered at the Vansina's ethnic group-level in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

# Appendix K Unobserved human capital

Table L1: Ancestor worship and unobserved human capital

| | Wage (1) | Log(1+Wage) (2) | Wage (3) |
|---|---|---|---|
| Ancestor Worship | -0.107 | 0.236 | -949.7 |
| | (0.208) | (0.305) | (1315.8) |
| Years of education | 0.161*** | 0.297*** | 628.8*** |
| | (0.0144) | (0.0353) | (92.69) |
| City FE | Yes | Yes | Yes |
| Territory of birth FE | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes |
| Mean Y | 4047.8 | 5.411 | 4045.2 |
| R-squared | | 0.234 | 0.191 |
| N | 15708 | 15718 | 15718 |

NOTE. Data: Budgetary Survey of the 1970s and Vansina(1966). Column 1 reports Pseudo-Poisson Maximul Likelihood estimates, and the dependent variable is the total wage. Column 2 reports OLS estimates, and the dependent variable has been transformed to Log(1+wage). Finally, column 3 reports OLS estimates using total wage as dependent variable. Ancestor worship is a dummy variable that equals one if the ethnic group $e$ of individual $i$ traditionally practices ancestor worship. Controls include age, age squared, total number of household members, gender, whether respondents were born in urban/rural area, education, dummy equal to one if migrant, year of installation in the current city, dummy equal to one if the father's respondent is alive, and dummy equal to one if the respondent is a farmer. Standard errors () are clustered at the ethnic group level. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

# Appendix L Congo: Exposure to missionary presence

I construct a measure of exposure to all Christian missions opened in the DRC between 1885 and 1948 for all individuals born before 1948 using the West Zaire Demographic surveys and data on missions from Guirkinger and Villar (2022) and Alvarez-Aragon et al. (2023). In the historical individual-level data, information on the territory of birth of each individual is available, so we can construct the exposure to missionary presence of each territory in each year and assign this measure to each respondent according to their year of birth. To do this, I follow Guirkinger and Villar (2022) and Alvarez-Aragon et al. (2023) and construct a continuous measure of proximity at the territory level that controls for mission density. Specifically, I generate 1000 random points within each territory and compute the distance from each random point to its closest mission before averaging over these distances. This process is repeated for each territory, each year between 1885 and 1948, and three types of missions: Catholic, Catholic with nuns, and Protestant. When showing my results, I report negative (log) distances to have an easier interpretation.

As we can observe in Table M1, the coefficients barely move when I control for exposure to missionary presence. The magnitude of the effects remain high. Ancestor worship is associated with an increase of 17% in the number of births at age 35 (using the full sample), of 20% age age 40, and of 25% at age 45. Moreover, I am able to replicate the main findings in Guirkinger and Villar (2022). Exposure at birth to Catholic missions with nuns is associated with higher fertility rates, while exposure to Protestant missionaries generally reduces fertility.

## Table M1: Ancestor worship and age-specific fertility in the DRC

| | Births at 35 | | | Births at 40 | | | BIrths at 45 | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Ancestor worship | 0.736*** | 1.007*** | 0.637*** | 0.949*** | 1.206*** | 0.840*** | 1.148*** | 1.431*** | 0.995*** |
| | (0.166) | (0.352) | (0.159) | (0.215) | (0.404) | (0.233) | (0.237) | (0.392) | (0.231) |
| Exp to Catholics | -0.222 | -0.197 | -0.0278 | -0.186 | -0.169 | -0.0389 | -0.0708 | -0.204 | 0.209 |
| | (0.177) | (0.333) | (0.115) | (0.217) | (0.407) | (0.139) | (0.198) | (0.376) | (0.136) |
| Exp to Cath nuns | 0.352*** | 0.572*** | 0.339** | 0.415*** | 0.669*** | 0.456*** | 0.380** | 0.547** | 0.467*** |
| | (0.109) | (0.201) | (0.135) | (0.123) | (0.194) | (0.147) | (0.146) | (0.205) | (0.135) |
| Exp to Protestants | -0.00487 | 0.196 | -0.150** | -0.0640 | 0.141 | -0.224** | -0.0667 | 0.242 | -0.364*** |
| | (0.126) | (0.283) | (0.0659) | (0.163) | (0.363) | (0.105) | (0.213) | (0.426) | (0.117) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| City x Territory FE | No | No | No | Yes | No | No | No | Yes | Yes |
| All | Yes | No | No | Yes | No | No | Yes | No | No |
| Edoza | No | Yes | No | No | Yes | No | No | Yes | No |
| Urban | No | No | Yes | No | No | Yes | No | No | Yes |
| Mean Y | 4.575 | 4.244 | 4.758 | 4.871 | 4.581 | 5.071 | 4.723 | 4.488 | 4.915 |
| R-squared | 0.244 | 0.261 | 0.271 | 0.244 | 0.273 | 0.265 | 0.216 | 0.259 | 0.228 |
| N | 18852 | 6698 | 12154 | 13328 | 5435 | 7893 | 9579 | 4306 | 5273 |

NOTE. Data: Demographic Survey of 1970s and EDOZA. The table reports OLS estimates. The outcome variables are the total number of births a women had before age 35 (columns 1, 2 and 3), 40 (columns 4, 5 and 6) and 45 (columns 7, 8 and 9). "Ancestor worship" is a dummy variable that equals one if the ethnic group $e$ practice ancestor worship. Details on how exposure to missions is constructed can be found in L. Controls include age, whether the place of birth was urban or rural, whether the respondent has primary education, dummy equal to one if migrant, dummy equal to one if the father's respondent is alive, dummy equal to one if the respondent is working, dummy equal to one if the respondent is a farmer (only available in the urban sample), number of household members, and year of installation in the current city. City/region fixed effects include city of residence in the case of the urban sample and region of residence in the case of EDOZA. Standard errors clustered at the Vansina's ethnic group-level in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

# Appendix M Ancestral beliefs and contemporary fertility: robustness

Table N1: Ancestor worship and fertility in sub-Saharan Africa

| | Number of children | | | | P($\geq$ 5 children) | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Sacrifices Ancestors | 0.332*** | 0.167*** | 0.149*** | 0.102*** | 0.0265*** | 0.0117*** | 0.00875** | 0.00563 |
| | (0.0370) | (0.0294) | (0.0294) | (0.0286) | (0.00478) | (0.00442) | (0.00438) | (0.00446) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Ext Controls 1 | No | No | Yes | Yes | No | No | Yes | Yes |
| Ext Controls 2 | No | No | No | Yes | No | No | No | Yes |
| Mean Y | 2.101 | 2.095 | 2.095 | 2.103 | 0.0978 | 0.0974 | 0.0974 | 0.0973 |
| R-squared | 0.0606 | 0.418 | 0.425 | 0.481 | 0.0426 | 0.174 | 0.180 | 0.188 |
| N | 22243 | 22115 | 22115 | 21361 | 22243 | 22115 | 22115 | 21361 |

NOTE. Data: PEW research forum 2008-2009 Survey. The outcome variables are defined as follows: in columns (1)-(4), it is the total number of children, and in columns (5)-(8) it is the probability of having at least 5 children. The explanatory variable is an indicator equal to one if respondent answers "yes" to the following question: "do you believe that sacrifices to spirits or ancestors can protect you from bad things happening?". Basic controls include age, age$^2$ and sex. Extended controls 1 also include whether the individual lives in a urban or rural area and whether he/she is christian/muslim or from other religion. Finally, extended controls 2 also include a dummy variable that equals one if the respondent has completed primary education, a dummy that equals one if the respondent is married, a dummy variable that equals one if the respondent finds himself/herself in a good economic situation, and a dummy equal to one if the respondent did not have money at some point during the last year to buy food for his/her family. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table N2: Ancestor worship and fertility in sub-Saharan Africa

| | Number of children | | | | P($\geq$ 5 children) | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Reincarnation | 0.118*** | 0.0503* | 0.0775*** | 0.0632** | 0.00971** | 0.00325 | 0.00649* | 0.00577 |
| | (0.0334) | (0.0263) | (0.0262) | (0.0253) | (0.00426) | (0.00395) | (0.00395) | (0.00400) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Extended Controls 1 | No | No | Yes | Yes | No | No | Yes | Yes |
| Extended Controls 2 | No | No | No | Yes | No | No | No | Yes |
| Mean Y | 2.087 | 2.081 | 2.081 | 2.087 | 0.0966 | 0.0961 | 0.0961 | 0.0959 |
| R-squared | 0.0560 | 0.418 | 0.425 | 0.482 | 0.0390 | 0.173 | 0.178 | 0.187 |
| N | 21134 | 21010 | 21010 | 20328 | 21134 | 21010 | 21010 | 20328 |

NOTE. Data: PEW research forum 2008-2009 Survey. The outcome variables are defined as follows: in columns (1)-(4), it is the total number of children, and in columns (5)-(8) it is the probability of having at least 5 children. The explanatory variable is an indicator equal to one if respondent answers "yes" to the following question: "Which, if any, of the following do you believe in? Reincarnation.". Basic controls include age, age$^2$ and sex. Extended controls 1 also include whether the individual lives in a urban or rural area and whether he/she is christian/muslim or from other religion. Finally, extended controls 2 also include a dummy variable that equals one if the respondent has completed primary education, a dummy that equals one if the respondent is married, a dummy variable that equals one if the respondent finds himself/herself in a good economic situation, and a dummy equal to one if the respondent did not have money at some point during the last year to buy food for his/her family. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

## Table N3: Ancestor worship and fertility in sub-Saharan Africa

| | Number of children | | | | P($\geq$ 5 children) | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Ancestral beliefs | 0.520*** | 0.211*** | 0.200*** | 0.143*** | 0.0369*** | 0.0119** | 0.0103** | 0.00713 |
| | (0.0407) | (0.0324) | (0.0324) | (0.0315) | (0.00534) | (0.00493) | (0.00489) | (0.00497) |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Basic Controls | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Extended Controls 1 | No | No | Yes | Yes | No | No | Yes | Yes |
| Extended Controls 2 | No | No | No | Yes | No | No | No | Yes |
| Mean Y | 2.100 | 2.095 | 2.095 | 2.104 | 0.0997 | 0.0993 | 0.0993 | 0.0993 |
| R-squared | 0.0982 | 0.442 | 0.445 | 0.501 | 0.0684 | 0.201 | 0.204 | 0.212 |
| N | 21980 | 21845 | 21845 | 21068 | 21980 | 21845 | 21845 | 21068 |

NOTE. Data: PEW research forum 2008-2009 Survey. The outcome variables are defined as follows: in columns (1)-(4), it is the total number of children, and in columns (5)-(8) it is the probability of having at least 5 children. The explanatory variable is an indicator equal to one if the respondent answers "yes" to the question "Do you ever participate in traditional African ceremonies or perform special acts to honor or celebrate your ancestors?". Basic controls include age, age$^2$ and sex. Extended controls 1 also include whether the individual lives in a urban or rural area and whether he/she is christian/muslim or from other religion. Finally, extended controls 2 also include a dummy variable that equals one if the respondent has completed primary education, a dummy that equals one if the respondent is married, a dummy variable that equals one if the respondent finds himself/herself in a good economic situation, and a dummy equal to one if the respondent did not have money at some point during the last year to buy food for his/her family. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

## Table N4: Ancestor worship and fertility in sub-Saharan Africa

| | Number of children | | | | P($\geq$ 5 children) | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Ancestral beliefs | 0.517*** | 0.243*** | 0.230*** | 0.162*** | 0.0369*** | 0.0146*** | 0.0133*** | 0.00918* |
| | (0.0595) | (0.0379) | (0.0367) | (0.0366) | (0.00697) | (0.00531) | (0.00503) | (0.00515) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Extended Controls 1 | No | No | Yes | Yes | No | No | Yes | Yes |
| Extended Controls 2 | No | No | No | Yes | No | No | No | Yes |
| Mean Y | 2.100 | 2.095 | 2.095 | 2.104 | 0.0997 | 0.0993 | 0.0993 | 0.0993 |
| R-squared | 0.0648 | 0.419 | 0.425 | 0.484 | 0.0421 | 0.178 | 0.183 | 0.192 |
| N | 21980 | 21845 | 21845 | 21068 | 21980 | 21845 | 21845 | 21068 |

NOTE. Data: PEW research forum 2008-2009 Survey. The outcome variables are defined as follows: in columns (1)-(4), it is the total number of children, and in columns (5)-(8) it is the probability of having at least 5 children. The explanatory variable is an indicator equal to one if the respondent answers "yes" to the question "Do you ever participate in traditional African ceremonies or perform special acts to honor or celebrate your ancestors?". Basic controls include age, age$^2$ and sex. Extended controls 1 also include whether the individual lives in a urban or rural area and whether he/she is christian/muslim or from other religion. Finally, extended controls 2 also include a dummy variable that equals one if the respondent has completed primary education, a dummy that equals one if the respondent is married, a dummy variable that equals one if the respondent finds himself/herself in a good economic situation, and a dummy equal to one if the respondent did not have money at some point during the last year to buy food for his/her family. Standard errors clustered at the region level in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

## Table N5: Ancestor worship, fertility, and religiosity

| | Number of children | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Ancestral beliefs | 0.184*** | 0.183*** | 0.184*** |
| | (0.0292) | (0.0291) | (0.0292) |
| High religious attendance | | 0.138*** | 0.136*** |
| | | (0.0459) | (0.0461) |
| Religion is important | | | 0.0254 |
| | | | (0.0343) |
| Country FE | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes |
| Mean Y | 2.083 | 2.083 | 2.083 |
| R-squared | 0.480 | 0.481 | 0.481 |
| N | 22295 | 22295 | 22295 |

NOTE. Data: PEW research forum 2008-2009 Survey. The outcome variables is the total number of children ever born. The explanatory variable is an indicator equal to one if the respondent answers "a great deal" or "some" to the question "How much would you say you know about ancestral, tribal, animist, or other traditional African religions?". *Attendance is a dummy variable that equals one if the respondent attends more than once a week religious events. Importance* is a dummy variable that equals one if the respondent declares than religion is "very important" in his/her life. Controls include age, age$^2$, gender, whether the individual lives in a urban or rural area, whether he/she is christian/muslim or from other religion, a dummy variable that equals one if the respondent has completed primary education, a dummy that equals one if the respondent is married, a dummy variable that equals one if the respondent finds himself/herself in a good economic situation, and a dummy equal to one if the respondent did not have money at some point during the last year to buy food for his/her family. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

## Table N6: Ancestor worship, fertility and other supernatural beliefs

| | Number of children | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Ancestral beliefs | 0.395*** | 0.495*** | 0.370*** | 0.476*** | 0.479*** | 0.143*** | 0.175*** | 0.157*** | 0.163*** | 0.186*** |
| | (0.0411) | (0.0381) | (0.0431) | (0.0392) | (0.0392) | (0.0318) | (0.0294) | (0.0332) | (0.0301) | (0.0300) |
| Religious healers | 0.261*** | | | | | 0.0766*** | | | | |
| | (0.0356) | | | | | (0.0273) | | | | |
| Experienced miracle | | 0.131*** | | | | | 0.0580** | | | |
| | | (0.0315) | | | | | (0.0243) | | | |
| Initiation ritual | | | 0.282*** | | | | | 0.0380 | | |
| | | | (0.0422) | | | | | (0.0322) | | |
| Witchcraft | | | | 0.0880** | | | | | 0.0162 | |
| | | | | (0.0347) | | | | | (0.0265) | |
| Traditional religion | | | | | 0.221*** | | | | | 0.0447 |
| | | | | | (0.0358) | | | | | (0.0277) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes |
| Mean Y | 2.097 | 2.088 | 2.091 | 2.090 | 2.078 | 2.099 | 2.092 | 2.094 | 2.093 | 2.078 |
| R-squared | 0.0673 | 0.0638 | 0.0660 | 0.0641 | 0.0669 | 0.481 | 0.482 | 0.481 | 0.483 | 0.486 |
| N | 22157 | 22654 | 22698 | 21974 | 21396 | 21324 | 21761 | 21808 | 21129 | 20587 |

NOTE. Data: PEW research forum 2008-2009 Survey. "Religious healers" equals one if the respondent's family has ever used traditional religious healers when someone is sick. "Experienced miracle" equals one if the respondent has experienced/witnessed a divine healing of an illness or injury. "Initiation ritual" equals one if the respondent has ever participated in an initiation ritual for friends, relatives or neighbors. "Witchcraft" equals one if the respondent declares that he/she believes in witchcraft. "Traditional religion" is a variable that equals one if the respondent answers "*some*" or "*a great deal*" to the question "*How much would you say you know about ancestral, tribal, animist, or other traditional African religions?*. Controls include age, age$^2$, sex, whether the individual lives in a urban or rural area, whether he/she is christian/muslim or from other religion, a dummy variable that equals one if the respondent has completed primary education, a dummy that equals one if the respondent is married, a dummy variable that equals one if the respondent finds himself/herself in a good economic situation, and a dummy equal to one if the respondent did not have money at some point during the last year to buy food for his/her family. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

# Appendix N Ancestral beliefs and fertility in folklore: robustness

Table O1: Motifs related to *birth* and to *ancestor worship*

| | Share of motifs related to *birth* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | SSA Sample | | | | Global Sample | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Ancestral beliefs | 0.0273*** | 0.0276*** | 0.0235*** | 0.0231*** | 0.0272*** | 0.0261*** | 0.0262*** | 0.0256*** |
| | (0.00134) | (0.00423) | (0.00517) | (0.00493) | (0.00137) | (0.00191) | (0.00261) | (0.00296) |
| SSA Sample | Yes | Yes | Yes | Yes | No | No | No | No |
| Folklore controls | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Ethnographic controls | No | No | Yes | Yes | No | No | Yes | Yes |
| Geographic controls | No | No | No | Yes | No | No | No | Yes |
| Mean Y | 4.177 | 4.177 | 3.895 | 3.908 | 4.086 | 4.086 | 3.877 | 3.848 |
| N | 407 | 407 | 307 | 306 | 1245 | 1245 | 951 | 862 |

NOTE. Data: Ethnographic Atlas and Folklore. In columns (1)-(4), the sample is restricted to SSA. The table reports Pseudo-Poisson Maximum Likelihood (PPML) estimators. The outcome variable is the share of motifs related to "birth" in the oral tradition of an ethnic group. "Ancestor worship" is the share of motifs related to "ancestor worship" in an ethnic group's oral tradition. Folklore controls include the total number of motifs in an ethnic group's oral tradition, the number of publishers of the sources in the group's oral tradition, and the earliest year of publication in the group's oral tradition. Ethnographic controls include whether the domestic organization is around independent nuclear families, whether people are part of localized clans that live as segmented communities, whether the ethnic group is patrilineal, political complexity, whether monogamy is dominant, whether the group practices pastoralism, use of historical plough, historical economic development, practice of intensive agriculture, and the share of motifs in an ethnic group related to "supernatural". Geographic controls include tropical climate, precipitations, ruggedness, land quality (population weighted), and agricultural suitability. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table O2: Motifs related to *fertility* and to *ancestor*

| | Share of motifs related to *fertility* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | SSA Sample | | | | Global Sample | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Ancestral beliefs | 0.148*** | 0.153* | 0.217*** | 0.225*** | 0.126*** | 0.112*** | 0.0995*** | 0.104*** |
| | (0.00650) | (0.0841) | (0.0673) | (0.0651) | (0.00466) | (0.00621) | (0.00691) | (0.00754) |
| SSA Sample | Yes | Yes | Yes | Yes | No | No | No | No |
| Folklore controls | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Ethnographic controls | No | No | Yes | Yes | No | No | Yes | Yes |
| Geographic controls | No | No | No | Yes | No | No | No | Yes |
| Mean Y | 0.674 | 0.674 | 0.562 | 0.564 | 0.729 | 0.729 | 0.687 | 0.660 |
| N | 407 | 407 | 304 | 303 | 1245 | 1245 | 951 | 862 |

NOTE. Data: Ethnographic Atlas and Folklore. In columns (1)-(4), the sample is restricted to SSA. The table reports Pseudo-Poisson Maximum Likelihood (PPML) estimators. The outcome variable is the share of motifs related to "fertility" in the oral tradition of an ethnic group. "Ancestor worship" is the share of motifs related to "ancestors" in an ethnic group's oral tradition. Folklore controls include the total number of motifs in an ethnic group's oral tradition, the number of publishers of the sources in the group's oral tradition, and the earliest year of publication in the group's oral tradition. Ethnographic controls include whether the domestic organization is around independent nuclear families, whether people are part of localized clans that live as segmented communities, whether the ethnic group is patrilineal, political complexity, whether monogamy is dominant, whether the group practices pastoralism, use of historical plough, historical economic development, practice of intensive agriculture, and the share of motifs in an ethnic group related to "supernatural". Geographic controls include tropical climate, precipitations, ruggedness, land quality (population weighted), and agricultural suitability. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

## Table 03: Motifs related to *fertility* and to *ancestor worship*

| | Share of motifs related to *fertility* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | SSA Sample | | | | Global Sample | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Ancestral beliefs | 0.0745*** | 0.0746*** | 0.145*** | 0.148*** | 0.0701*** | 0.0635*** | 0.0571*** | 0.0592*** |
| | (0.00305) | (0.0239) | (0.0454) | (0.0471) | (0.00229) | (0.00291) | (0.00366) | (0.00405) |
| SSA Sample | Yes | Yes | Yes | Yes | No | No | No | No |
| Folklore controls | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Ethnographic controls | No | No | Yes | Yes | No | No | Yes | Yes |
| Geographic controls | No | No | No | Yes | No | No | No | Yes |
| Mean Y | 0.674 | 0.674 | 0.562 | 0.564 | 0.729 | 0.729 | 0.687 | 0.660 |
| N | 407 | 407 | 304 | 303 | 1245 | 1245 | 951 | 862 |

NOTE. Data: Ethnographic Atlas and Folklore. In columns (1)-(4), the sample is restricted to SSA. The table reports Pseudo-Poisson Maximum Likelihood (PPML) estimators. The outcome variable is the share of motifs related to "fertility" in the oral tradition of an ethnic group. "Ancestor worship" is the share of motifs related to "ancestor worship" in an ethnic group's oral tradition. Folklore controls include the total number of motifs in an ethnic group's oral tradition, the number of publishers of the sources in the group's oral tradition, and the earliest year of publication in the group's oral tradition. Ethnographic controls include whether the domestic organization is around independent nuclear families, whether people are part of localized clans that live as segmented communities, whether the ethnic group is patrilineal, political complexity, whether monogamy is dominant, whether the group practices pastoralism, use of historical plough, historical economic development, practice of intensive agriculture, and the share of motifs in an ethnic group related to "supernatural". Geographic controls include tropical climate, precipitations, ruggedness, land quality (population weighted), and agricultural suitability. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

## Table 04: Ancestor worship and fertility in Folklore

| | Share of motifs related to *birth* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | SSA Sample | | | | Global Sample | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Ancestral beliefs | 0.619*** | 0.609*** | 0.541*** | 0.535*** | 0.472*** | 0.461*** | 0.421*** | 0.432*** |
| | (0.128) | (0.133) | (0.155) | (0.155) | (0.116) | (0.117) | (0.141) | (0.146) |
| SSA Sample | Yes | Yes | Yes | Yes | No | No | No | No |
| Folklore controls | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Ethnographic controls | No | No | Yes | Yes | No | No | Yes | Yes |
| Geographic controls | No | No | No | Yes | No | No | No | Yes |
| Mean Y | 4.177 | 4.177 | 3.895 | 3.908 | 4.086 | 4.086 | 3.877 | 3.848 |
| N | 407 | 407 | 307 | 306 | 1245 | 1245 | 951 | 862 |

NOTE. Data: Ethnographic Atlas and Folklore. In columns (1)-(4), the sample is restricted to SSA. The table reports OLS estimates. The outcome variable is the share of motifs related to "birth" in the oral tradition of an ethnic group. "Ancestor worship" is the share of motifs related to "ancestors" in an ethnic group's oral tradition. Folklore controls include the total number of motifs in an ethnic group's oral tradition, the number of publishers of the sources in the group's oral tradition, and the earliest year of publication in the group's oral tradition. Ethnographic controls include whether the domestic organization is around independent nuclear families, whether people are part of localized clans that live as segmented communities, whether the ethnic group is patrilineal, political complexity, whether monogamy is dominant, whether the group practices pastoralism, use of historical plough, historical economic development, practice of intensive agriculture, and the share of motifs in an ethnic group related to "supernatural". Geographic controls include tropical climate, precipitations, ruggedness, land quality (population weighted), and agricultural suitability. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

# Appendix O Descent structure, ancestor worship, and fertility

Table P1: Ancestor worship and fertility preferences in the DRC

| | Ideal Nb of Sons | | | | | |
|---|---|---|---|---|---|---|
| | All | | Ancestor Worship = 1 | | Ancestor Worship = 0 | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Patrilineal | 0.260*** | 0.528*** | 0.311** | 0.555*** | -0.00435 | 0.227 |
| | (0.0932) | (0.114) | (0.127) | (0.147) | (0.183) | (0.278) |
| Female | | -0.744*** | | -0.752*** | | -0.977*** |
| | | (0.0527) | | (0.0549) | | (0.246) |
| Patrilineal x Female | | -0.397*** | | -0.362*** | | -0.333 |
| | | (0.0742) | | (0.0833) | | (0.271) |
| Province FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Mean Y | 2.931 | 2.931 | 2.917 | 2.917 | 3.114 | 3.114 |
| R-squared | 0.131 | 0.133 | 0.135 | 0.136 | 0.131 | 0.132 |
| N | 36146 | 36146 | 29322 | 29322 | 4367 | 4367 |

NOTE. Data: Demographic and Health Surveys of DRC (2007 and 2013-2014). The table reports OLS estimates. The outcome variable is the ideal number of sons. The sample is restricted to ethnic groups with ancestor worship in columns (3) and (4) and to ethnic groups without ancestor worship in columns (5) and (6). "Patrilineal" is a dummy variable that equals one if the ethnic group $e$, defined as in Vansina (1966), has patrilineal descent. Controls include age, age squared, gender, a dummy variable that equals one if the respondent is catholic, single years of education, whether the DHS cluster is urban, whether the respondent works, whether the respondent works in agriculture and a dummy variable that equals one if the respondent is in the top 40% of the wealth distribution. Standard errors clustered at the DHS cluster-level in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table P2: Ancestor worship and fertility preferences in the DRC

| | Ideal Nb of Daughters | | | | | |
|---|---|---|---|---|---|---|
| | All | | Ancestor Worship = 1 | | Ancestor Worship = 0 | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Patrilineal | 0.0983 | 0.300*** | 0.149 | 0.342*** | -0.0365 | 0.0816 |
| | (0.0760) | (0.0892) | (0.101) | (0.114) | (0.211) | (0.244) |
| Female | | 0.0492 | | 0.0416 | | -0.128 |
| | | (0.0428) | | (0.0445) | | (0.161) |
| Patrilineal x Female | | -0.298*** | | -0.288*** | | -0.170 |
| | | (0.0599) | | (0.0666) | | (0.186) |
| Province FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Mean Y | 2.624 | 2.624 | 2.609 | 2.609 | 2.799 | 2.799 |
| R-squared | 0.0831 | 0.0843 | 0.0870 | 0.0881 | 0.0589 | 0.0591 |
| N | 36177 | 36177 | 29346 | 29346 | 4374 | 4374 |

NOTE. Data: Demographic and Health Surveys of DRC (2007 and 2013-2014). The table reports OLS estimates. The outcome variable is the ideal number of daughters. The sample is restricted to ethnic groups with ancestor worship in columns (3) and (4) and to ethnic groups without ancestor worship in columns (5) and (6). "Patrilineal" is a dummy variable that equals one if the ethnic group $e$ has patrilineal descent. Controls include age, age squared, gender, a dummy variable that equals one if the respondent is catholic, single years of education, whether the DHS cluster is urban, whether the respondent works, whether the respondent works in agriculture and a dummy variable that equals one if the respondent is in the top 40% of the wealth distribution. Standard errors clustered at the DHS cluster-level in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

# Appendix P Heterogeneous effects: low vs high fertility countries

Table Q1: Ancestor worship and fertility in sub-Saharan Africa

| | Number of children | | |
|---|---|---|---|
| | Full sample | Low fertility | High fertility |
| Ancestor Worship | 0.184*** | 0.147*** | 0.227*** |
| | (0.0292) | (0.0357) | (0.0465) |
| Mean Y | 2.083 | 2.282 | 1.628 |
| % of Mean Y | 8.812 | 6.432 | 13.92 |
| Country FE | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes |
| R-squared | 0.480 | 0.497 | 0.426 |
| N | 22295 | 15521 | 6774 |

NOTE. Data: PEW research forum 2008-2009 Survey. The outcome variable is the total number of children. Column (1) includes the full sample. Column (2) includes only those countries with less than 4.5 births per woman in 2010 according to the World Bank: Botswana, Djibouti, Ghana, Kenya, Rwanda and South Africa. Column (3) only includes those countries with more than 4.5 births per woman in 2010 according to the World Bank: Cameroon, Chad, the DRC, Ethiopia, Guinea-Bissau, Liberia, Mali, Mozambique, Nigeria, Senegal, Tanzania, Uganda and Zambia. The explanatory variable is an indicator equal to one if the respondent answers "yes" to the question "Do you ever participate in traditional African ceremonies or perform special acts to honor or celebrate your ancestors?". Controls include age, age$^2$, sex, whether the individual lives in a urban or rural area, religion, education, marital status, a dummy variable that equals one if the respondent finds himself/herself in a good economic situation, and a dummy equal to one if the respondent did not have money at some point during the last year to buy food for his/her family. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

# Appendix Q Conceptual Framework: Woman as decision-maker

From the woman's point of view, the optimization problem is slightly different. Specifically, the total number of children belonging to the woman's lineage is defined differently than the total number of children belonging to the man's lineage. This is because women in patrilineal societies become part of the husband's lineage upon marriage. On the contrary, men in matrilineal societies do not join their wives' lineage upon marriage. Now, the total number of children in a woman's lineage is:

$$N = \begin{cases} n_i + \sum_{j \neq i} n_j & \text{if patrilineal, j indexes husband's brothers} \\ n_i + \sum_{k \neq i} n_k & \text{if matrilineal, k indexes own sisters} \end{cases}$$

As we can see, nothing changes in the patrilineal case, and the motive to continue the family line is the same for both the husband and the wife. In the matrilineal case, however, a woman's lineage is now extended through her own children as well as through her sisters' children. We will now look at the matrilineal case to see the differences with respect to the husband's situation.

## Q.1 Matrilineal case

Then, the maximization problem in the matrilineal case becomes:

$$\begin{aligned} \max_{c_i, n_i} \quad & U_{\mathrm{i}} = u\left(c_i\right) + b\left(n_i\right) + \beta \ell(n_i + \textstyle\sum_{k \neq i} n_k) \\ \text{s.t.} \quad & c_i + n_i \leq y_i \end{aligned}$$

From the first order conditions follow that:

$$u'(c_i) = b'(n_i) + \beta \ell'(n_i + \sum_{j \neq i} n_k)$$

And, as before, the study of the interaction between $n_i$ and $n_k$ gives us:

$$\frac{dr_i\left(n_k\right)}{dn_k} = -\frac{\frac{\partial F}{\partial n_k}}{\frac{\partial F}{\partial r_i(n_k)}} = -\frac{\frac{\partial^2 U_i(c_i, n_i, ni + \sum n_k)}{\partial ni \partial n_k}}{\frac{\partial^2 U_i(c_i, n_i, ni + \sum n_k)}{\partial n_i^2}} < 0$$

If the woman takes part in the decision-making process regarding the number of children, which is possibly more likely to happen in matrilineal societies (Lowes, 2022), there is a negative relationship between own fertility and the number of children of the woman's sisters.

# Appendix R Backgroup on kinship systems

Two persons are kin when one is descended from the other. Kinship results from the recognition of a *social* relationship between parents and children.[73] A system of kinship and marriage can be looked at as an arrangement which enables persons to live together and co-operate with one another in an orderly social life. Kinship systems determine the set of people to whom an individual is considered related and their social obligations to this group (Radcliffe-Brown and Forde, 1950).

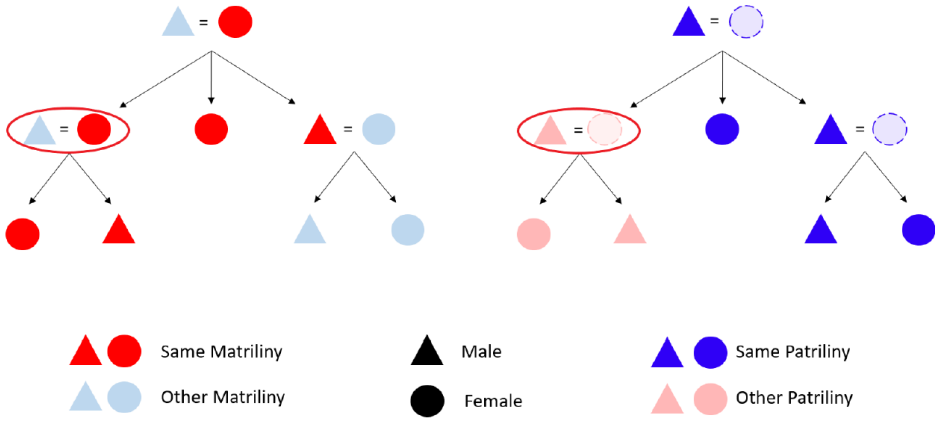
A kinship system that is reckoned by each individual with reference to ascendance and descendance, without distinction between male and female lines, is called a *cognatic system*. Persons are cognatic kin or cognates when they are descended from a common ancestor or ancestress counting descent through males and females (Lorimer, 1954). In a cognatic system, the emphasis in kinship relations rests on the nuclear family. In this type of kinship, kin, as defined by dencendance through both the paternal and maternal sides, is not a cohesive kinship group. It includes individuals on maternal and paternal sides, at each ascending and descending juncture, who may not be related to one another [74]

On the other hand, descent groups in which one belongs exclusively to one's father's or mother's line are called *unilieal systems*. In unilineal dencent groups, one's descent is traced either exclusively through male ancestors (patrilineal descent groups), or exclusively through female ancestors (matrilineal descent groups). These groups form a cohesive and continuing kinship structure. In fact, the unity of the sibling group is preserved (especially as regards those who by virtue of their sex are part of a continuing lineage). A group of brothers, or a group of sisters, acquire hereditary rights and transmit them to their descendants of the same sex. There is, however, an important difference between patrilineal and matrilineal descent systems that matters for the analysis in this paper, known as asymmetric marital allegiances (Berggreen and Gokmen, 2023). In patrilineal societies, the children belong to the father's lineage, and a patrilineal daughter who marries becomes part of her husband's lineage. Then, both spouses and children are part of the same kin group in patrilineal societies. In matrilineal societies, children belong exclusively to the mother's kin group, and a patrilineal son who marries maintains his birth lineage (in fact, inheritance often passes from the maternal uncle to his sisters' children). Figure Q1 summarizes these differences:

[73] The stress of the word social is key to distinguish kinship from consanguinity (physical relationship). In fact, an illigitimate child has a physical father but may not have a social father (he does not belong to the same kin group as his biological father). Similarly, an adopted child may be part of the same kin group as his adoptive parents while they are not consanguineous.

[74] As Lorimer (1954) notes: "I may feel myself to be related to the children and grandchildren of my paternal grandfather's brothers and sisters, and to those of my paternal grandmother, my maternal grandfather, and my maternal grandmother; but these four sets of relatives have no necessary relationship to one another".

Figure Q1: Matrilineal and patrilineal kinship systems, from Berggreen and Gokmen (2023)




*Source*: Berggreen and Gokmen (2023). The figure shows the kinship structure of both patrilineal and matrilineal societies. The sign = symbolizes marriage, while the bracket over the triangle/circle indicates siblingship.

# Appendix S DRC DHS: Additional child

Table S1: Ancestor worship and fertility preferences in the DRC

| | Wants another child | | | |
|---|---|---|---|---|
| | All | | Ancestor Worship = 1 | Ancestor Worship = 0 |
| | (1) | (2) | (3) | (4) |
| Patrilineal | 0.0652*** | 0.0401*** | 0.0705*** | -0.0229 |
| | (0.0170) | (0.0153) | (0.0161) | (0.0587) |
| Patrilineal x Female | -0.0585*** | -0.0262** | -0.0233* | -0.0271 |
| | (0.0134) | (0.0122) | (0.0134) | (0.0426) |
| Province FE | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes |
| Mean Y | 0.755 | 0.756 | 0.761 | 0.750 |
| R-squared | 0.0124 | 0.223 | 0.229 | 0.186 |
| N | 32120 | 31665 | 25576 | 3992 |

NOTE. Data: Demographic and Health Surveys of DRC (2007 and 2013-2014). The table reports OLS estimates. The outcome variable is a dummy variable that equals one if the respondent wants an additional child. The sample is restricted to ethnic groups with ancestor worship in column (3) and to ethnic groups without ancestor worship in column (4). "Patrilineal" is a dummy variable that equals one if the ethnic group $e$ has patrilineal descent. Controls include age, age squared, gender, a dummy variable that equals one if the respondent is catholic, single years of education, whether the DHS cluster is urban, whether the respondent works, whether the respondent works in agriculture and a dummy variable that equals one if the respondent is in the top 40% of the wealth distribution. Standard errors clustered at the DHS cluster-level in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.