Legacy of Colonial Education: Unveiling Persistence Mechanisms in the D.R. Congo

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December 20, 2023

DeFiPP Working Paper 2023-05

DeFiPP
Development Finance & Public Policies
defipp.unamur.be

UNIVERSITÉ DE NAMUR

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Abstract

The mechanisms that contribute to the enduring effects of colonial investments in education on human capital today are not well understood. This paper addresses this gap by examining the case of colonial Congo and the Democratic Republic of Congo. We first document the enduring effects of colonial education and then analyze both demand-side channels and supply-side mechanisms. Using detailed contemporary and historical microdata, our results show that exposure to colonial Catholic and Protestant missionary education led to different demand-side mechanisms (intergenerational transmission and educational mobility triggered by missions). However, the quantitative importance of these channels seems limited in this context. On the supply side, we examine the dynamics of school location after independence. Our results suggest that the persistence of educational outcomes is primarily due to the concentration of contemporary schools around historical missions. This agglomeration effect appears to be driven by competition among religious schools of different denominations (and possibly by structural change in the vicinity of Catholic missions). As a result, girls living farther from historical missions have to travel greater distances to reach schools, which affects their enrollment more than that of boys.

JEL Classification : I25, N37, F54

Keywords: Education, gender, intergenerational transmission, school competition, religious competition, Christian missions, persistence, Democratic Republic of the Congo.

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1 Introduction

A growing body of literature highlights the enduring effects of colonial policies on contemporary development outcomes in sub-Saharan Africa and Asia. For example, early investments in education in the form of missionary schools have been shown to have lasting effects, particularly on women's educational attainment (Nunn, 2014; Cagé and Rueda, 2016; Caicedo, 2019a; Becker and zu Selhausen, 2023; Montgomery, 2017; Calvi et al., 2020). Yet, the mechanisms driving these lasting effects (and the roots of gender and religious differences) are not well understood, in part due to a paucity of colonial and post-independence data (Michalopoulos and Papaioannou, 2020). Most papers insist on intergenerational transmission mechanisms (often measured long after the colonial period), and we know remarkably little about the dynamics of school openings and their historical roots. However, quantifying the contribution of these different channels to the persistence of educational inequalities is crucial for proposing effective policies to address them.

This paper takes a step towards filling this gap by investigating the long-term impact of colonial investments in human capital on education in the Democratic Republic of the Congo (DRC), where Catholic and Protestant colonial missionary schools became the foundation of the modern education system (as in many African countries, see Meier zu Selhausen, 2019). Using microdata from a sample of more than 270,000 individuals surveyed between 1975 and 1977 in the DRC as well as detailed information on contemporaneous schools, we carefully examine the mechanisms driving these effects, cautiously distinguishing between demand-side and supply-side effects.

On the demand side, we isolate a "pure demand channel" in the intergenerational transmission of education by drawing on a large and representative sample of urban migrants educated during the colonial era. These migrants differ in their exposure to colonial education, but their children face similar supply conditions in the cities, allowing us to properly identify the role of parental education (or exposure to colonial schools) in children's education. We find that parental education - and exposure to specific missionary schools - have a modest impact on children's education.

On the supply side, we use information on the location of the universe of schools operating in the DRC in the 2020s to highlight a remarkable agglomeration of contemporaneous schools in the vicinity of historical missions. Holding time invariant characteristics of grid cells constant, one additional historical Catholic (or Protestant) mission in a given location (grid cell) is associated with 1 (0.4) primary schools per 1000 inhabitants today. The same holds true for secondary schools: a Catholic (Protestant) mission in the grid cell is associated with 0.6 (0.2) additional secondary school per 1000 inhabitants. These effects are large: having had a Catholic mission is associated with an increase of 79% of the mean number of primary schools per 1000 inhabitants. This agglomeration appears largely driven by the competition between schools of different religious denominations:

new Catholic schools are more likely to open where Protestant schools recently opened and vice-versa. This religious competition through schools has been largely ignored in the existing literature (while likely operating in many contexts). The implied agglomeration means that distance to schools is larger further away from historical missions, which depresses girls' school attendance (more than boys).

Beyond the strong legacy of colonial schools, our research highlights important gender and religious differences in persistence patterns. Consistent with the literature (Nunn, 2014; Montgomery, 2017; Calvi et al., 2020), we find a strong correlation between Protestant mission posts and contemporaneous educational attainment of women (but not men). More surprisingly, we also find a persistent effect of historical Catholic posts (as Becker and zu Selhausen, 2023 and Baten et al., 2021 in cross-country studies), again only on women's educational outcomes. While missions of different religions have similar long-term effects, we find that, during the colonial period, only Catholic missions had a strong impact on the educational attainment of the first generation of exposed individuals. However, the next generation quickly catches up: parents exposed to Protestant missions (whether educated or not) are shown to have a stronger demand for their children's education than those exposed to Catholic missions, and, for all, educational mobility was very high. On the supply side, the agglomeration of schools around historical missions is strong for both types of missions, although the effect of Catholic missions is larger. This concentration has gendered consequences, as girls' education is more sensitive to distance to school.

We contribute to several strands of literature. First, we contribute to a growing literature on the long-term effects of colonial investments, especially those related to Christian missions and human capital (see, for example, Cagé and Rueda 2016, 2020; Caicedo 2019a; Calvi et al. 2020; Nunn 2014 and the extensive reviews by Becker 2022 and Okoye 2022). Several authors have found a pronounced impact of Protestant missions, especially on women's education in Prussia (Becker and Woessmann, 2008), India (Calvi et al., 2020), and Africa (Nunn, 2014). Our main contribution to the existing literature is to carefully elicit the mechanisms of persistence with the help of both colonial and post-colonial data, spanning from the beginning of the 20th century to present-time. This enables us, in line with Wantchekon et al. (2015), to estimate the effect of exposure to Christian missions on the first generations of individuals directly exposed to them. In addition, by exploiting the *timing of opening of posts* in the spirit of a difference-in-difference estimation, we rely on less demanding assumptions than the existing literature and thereby address the critic raised by Jedwab et al. (2022), namely that the endogeneity in mission placement leads to systematically overestimating the importance of missions for long-term outcomes.[1]

We also contribute to the literature on intergenerational transmission, educational mobility and

[1]By building an original and comprehensive data set of missions we also address their critic of altas based sources that disproportionately report a selection of the best missions.

their determinants (for recent reviews see Black and Devereux 2011, Solon 2018). Despite evidence from developed countries, little is known about the correlates of educational mobility and its gender differences in Africa. A recent paper by Alesina et al. (2021) finds that colonial investments in railroads and Christian missions are among the strongest correlates of educational mobility in Africa. Our research extends the existing literature by distinguishing between demand and supply factors.[2]

Finally, we contribute to the literature on school and religious competition. As far as school competition is concerned, to the best of our knowledge, there has been no investigation of its effect on agglomeration. Moreover, most of the evidence on the effects of school competition comes from developed countries (an important exception is Bau (2022), who develops a model of horizontal competition and shows how competition can hurt low-income students and reduce overall learning outcomes in the context of Pakistan). With respect to religious competition, historians have analyzed how missions used schools to attract new converts (Markowitz, 1970). In a recent paper, Gallego and Woodberry (2010) argue that this phenomenon helps explain the better quality of schools in British Africa (where Protestant and Catholic missionaries competed more than in French Africa). To the best of our knowledge, we are the first to provide a quantitative analysis of the dynamics of the opening of schools of different religious networks and the agglomeration it leads to.

The remainder of this paper is organized as follows. Section 2 provides historical background on educational policies in the DRC. Section 3 presents the data and measures. Section 4 provides evidence on the long-lasting impacts of colonial investments in the DRC. Section 5 presents a conceptual discussion on the potential transmission mechanisms. Section 6 tests the demand-side mechanisms at work in our empirical framework, while Section 7 tests those on the supply side. Section 8 concludes the paper.

2 Historical Background

2.1 Colonial Schooling

In the Congo, both Catholic and Protestant missions invested heavily in mass education and played a crucial role in the development of the educational system. By 1960, at independence, 97% of all students were attending missionary schools (Yates, 1976).[3] Although the primary intention of missionaries was to convert Africans to Christianity, they saw the provision of formal education as the most

[2]Most papers on the long-term effects of Christian missions on human capital outcomes focus on supply-side determinants (Frankema, 2012; Fernández, 2022).

[3]In fact, the Belgian Congo had the highest number of Western missionaries in Tropical Africa, reaching almost 4.000 in the eve of the World War II, as compared to about 3.500 in the entire region of East Africa during the interwar years (Frankema, 2013; Bergeron, 2020).

effective way to do so (Meier zu Selhausen, 2019).[4] The colonial state, as in most African colonies, encouraged mission investment in education, through the provision of direct subsidies or indirect benefits (infrastructure, land concessions...) to missions that ran schools. Yet in the Congo, Catholic missions benefited from preferential treatment by the colonial authorities. Unlike Protestant missions (mostly from Britain, the U.S. or Sweden), they were typically "national missions" and were perceived as more loyal to Belgium and easier to work with (or control) (Markowitz, 1970).[5] Beginning in 1925, the Belgian state subsidized Catholic missions to provide education, giving them an important advantage over Protestant schools (Protestant missions would not receive a subsidy until 1948). According to Boyle (1995), by the end of the 1950s, about 11% of the total number of students were enrolled in Protestant schools, while about 85% were enrolled in the Catholic network.

The type of education offered by the two types of missions was different, for girls in particular. Catholic missions followed an official program set by the government (to qualify for subsidies), while Protestant missions were free to design their own programs. In Catholic missions, the principle of non-mixed schooling was a moral issue: girls should have a separate curriculum from boys, and only nuns could be responsible for their education (Masandi, 2004). Thus, opening classes for girls was only possible if nuns were present. The late arrival of nuns in the territory (around the mid-1920s) explains (in part) the delay in women's education in the colony (most Protestant posts had at least one female missionary at the opening of the post (Irvine, 1978)). The program focused on domestic skills such as cooking, child care, farming, and dressmaking. Depaepe and Kikumbi (2018) and Yates (1982), argue that the education provided by the Protestants was better in terms of quality, especially for girls who were in the same classes as boys: the curriculum was thus less focused on teaching practical, traditionally "female" skills. Protestant missionaries thereby promoted a different ideal of a Christian woman than the Catholics. In Appendix A, we illustrate the differences between Catholics and Protestants regarding their views on women education with historical quotes from the official education program (followed by the Catholics) and from a congress of Protestant missions.

At independence, approximately 98% of students were enrolled in primary schools, while secondary schools accounted for less than 2% of the total enrollment, and only a few dozen university students had graduated. Yet at independence, the Congo did very well compared to other colonies in terms of overall primary school enrollment: as much as 71% of the appropriate age group was enrolled in primary school, the highest rate in Africa. However this overall figure masks significant

[4]The focus on education and the reach of missionaries were global, leading to what some authors have called a "first global mass education wave" (Caicedo, 2019b).

[5]Some Protestant missionaries reported the atrocities committed by the system of forced labor and concessionary companies during the years of the Congo Free State under the authority of King Leopold II, and the king soon viewed Protestants as a threat to his project (Anet, 1939). The suspicion remained after Belgium "took over" the colony in 1908.

gender disparities with girls far less likely to attend school than boys (Masandi, 2004).[6]

2.2 Post-independence Schooling

After independence, the newly elected government committed very early on to expanding its education system and subsidized schools that met minimum standards. In addition, the differences in education between boys and girls were officially abolished in 1962 (André and Poncelet, 2013).

The 1960s saw a massive opening of new secondary schools, driven largely by the opening of these new "official" (state) schools. However, most schools were still run by Christian denominations, and especially by Catholic congregations (Lembagusala Kikumbi, 2018): in the early 1970s, 62% of primary school children were enrolled in Catholic schools, compared to 21% in Protestant and 14% in official schools.[7]

In the mid-1980s, Mobutu nationalized schools but quickly a deep crisis hit the education sector. Until then, the government budget for education represented almost 25% of total public spending. As part of the structural adjustment program (1982-1987) led by the international financial institutions, this share fell to 7% in the mid-1980s and reached its lowest point in the early 2000s (2-3%)(Frankema, 2013). In response to this crisis, the government authorized private providers to open schools in 1986 and agreements were signed with representatives of the country's four main religions (Catholicism, Protestantism, Islam and Kimbanguism) to delegate part of the management of the system in return for grants and subsidies. In the face of significant financial challenges, both private and public schools have sought parental contributions to cover a substantial portion of the schooling expenses, particularly teachers' salaries. These private contributions represent about two-thirds of the country's basic education costs (Briand and Nicolai, 2021).

Since the beginning of the 2000s (and with the end of the civil wars and economic turmoil), the situation regarding education has clearly improved, and today, DRC outperforms other income-comparable countries (such as Niger, Mali and Burkina Faso). Yet, in their detailed report on education in the country Gauthier et al. (2021) show that geographical inequality remains quite high and public planning and regulation by the State are lacking. In many places, only some religious networks, in particular the Catholic and Protestant churches, are present. These religious schools are said to rely on school openings as a tool of evangelization to draw in more converts. In addition, evidence in Briand and Nicolai (2021) suggests that faith-based organizations use a significant pro-

[6] Gender disparities are also striking in higher education. Lauro (2020) notes that there was no woman at the university and only one among the 800 general high school graduates at Independence.

[7] In secondary education, the state played a more active role: one third of students attended an official school, while 42% (resp. 17%) attended a Catholic (resp. Protestant) school in 1973 (MacGaffey, 1982). It is worth noting that even in the official secondary schools, the teachers were mostly from (Belgian) Catholic orders (Sheline et al., 1984).

portion of the households' school fees to finance their church activities.

3 Data and Variables

3.1 Data

Contemporary data.–To study persistence in education and its mechanisms, we rely on contemporary demographic information.

DHS: We use the two available rounds of the Demographic and Health Surveys (2007-2013), a nationally representative survey that provides detailed information on education, literacy, occupation, and religion. In total, we have information on about 40,000 individuals living in 785 clusters. We are able to combine this dataset with the historical colonial schools data detailed below.

Contemporaneous schools: We retrieved data on the universe of primary and secondary schools in the DRC in 2020. This dataset is provided by the Ministry of Education and includes school-level information such as exact GPS location, number of students and teachers, or school management regime. The education system in the DRC consists of two types of schools: publicly funded and private. Public schools are divided into official schools and schools under contract with the state. Official schools are run by the state and are secular, while schools under contract are run by the four religious organisations that have signed an agreement with the state (Catholics, Protestants, Kimbanguists, and Muslims). While they are also managed, in the vast majority, by faith-based organisations, private schools do not receive any state subsidies (new evangelical churches typically operate private schools). In our data, there are approximately 60,000 primary schools, of which nearly 20% are Catholic (public), 37% are Protestant (public), 17% are official schools, 12% are managed by other religious groups (public), and 14% are private (unfortunately this data do not provide information on whether these private schools are denominational or not). As for secondary education, there are 35,000 secondary schools, of which 15% are Catholic (public), 35% are Protestant (public), 18% are official schools, 15% are administered by other religious groups (public), and 17% are private.

Historical data.–We construct our main historical dataset by combining surveys containing information on individuals born during the colonial era with data on Christian missions.

Demographic Survey from the 1970s: These data provide original individual-level information on 270,000 individuals in 46,000 households surveyed between 1975 and 1977 in seven major cities in the DRC: Kinshasa, Matadi, Bandundu, Kikwit, Mbandaka, Kananga, and Bukavu (1/10 of the total

number of households identified in each of these cities are surveyed). Demographic information was collected on age, sex, ethnicity, marital status, place of birth, and migration status, as well as socioeconomic characteristics such as years of education and occupation. Among respondents born before independence, 80% are migrants, and 85% of them migrated to the cities after independence (or shortly before) and were therefore educated in their place of birth. In fact, migration prior to the last year of the colonial era was highly controlled and restricted. Importantly, this survey includes information on the position of individuals within the household, which allows us to link parents and children and to study educational mobility. We retrieved this data from digital archives at the University of Louvain-La-Neuve 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).[8]

Household Budget Survey of the 1970s: Using the same methodology as the demographic survey of the 1970s, a household budget survey was conducted in parallel, in which 1/50 of the identified households were interviewed. This survey contains information on expenditures and economic transactions made by the household during the month of the interview, including information on education expenditures, which will allow us to explore additional questions related to the demand for education.

Demographic Survey from the 1950s: Since the 1970s demographic survey was conducted in only 7 major cities of the DRC, we complement this information with data from another demographic survey conducted in the 1950s. However, data from this survey have been published in the form of aggregates at the territory level and by age category (5-9, 10-14, 15-19, 20-24, 25-29, 30-34, 35-44, 45-54 and +55).[9] The survey covered about 11% of the total population and its sampling strategy was designed to be representative of both rural and urban areas. It includes information on the number of children enrolled in primary and secondary schools, the number of people who can read and write, and the number of people with no education. We digitized this data from the published booklets that we found in various libraries in Belgium. Since the information provided by the 1950s Demographic Survey is aggregated at the *Territory x Age-cohort* level, we mostly rely on the 1970s Demographic Survey in our main specifications, and use the 1950s data for descriptive purposes and robustness analyses.

Missionary activities: We construct a database with comprehensive information on Christian mission posts opened in the DRC between 1885 and 1948. The data on Catholic missions come from

[8] One potential concern may relate to the quality of these surveys. The 1970s surveys were conducted during Mobutu's dictatorship, but 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.

[9] The territory is the second administrative unit in the Democratic Republic of the Congo, smaller than the province. There were 138 territories at the time of the survey.

information digitized from comprehensive yearbooks and maps published in 1924, 1935 and 1949 (Corman, 1924, 1935; Van Wing, 1949). As for the location and date of opening of Protestant missions, we obtain them from maps published in 1905, 1921, 1930, 1944, 1953, and 1960, and from a 1978 handbook (Irvine, 1978). The recorded Protestant missions cover the period 1879-1960, while the recorded Catholic missions cover the period 1885-1948. To make the results more comparable, we focus on the period 1885-1948. The final sample of missions includes a total of 697 missions for the DRC, of which 300 are Protestant and 397 are Catholic. Figure 1 shows the geographic location of Catholic and Protestant missions in the DRC in 1948. Importantly, we know the date of arrival of Catholic nuns (if any)[10]. On the other hand, Protestant missions almost always counted with the presence of female missionaries.[11] We will exploit this information when looking at the gendered impact of exposure to missionary presence, since the presence of nuns within the Catholic school system was a necessary condition for girls' education.[12]

For the DRC, these data on missions are far more complete than most of the existing data on missions used in the literature, enabling us to address one of the critic raised by Jedwab et al. (2022), namely that mission atlases exacerbate endogeneity in mission location by reflecting only the best missions (Appendix B shows a comparison of our dataset with the missions reported for Congo in Cagé and Rueda (2020) and Nunn (2010), who use information provided by Streit (1929) (Catholic missions), Beach (1903) (Protestant missions), and Roome (1924)).[13]

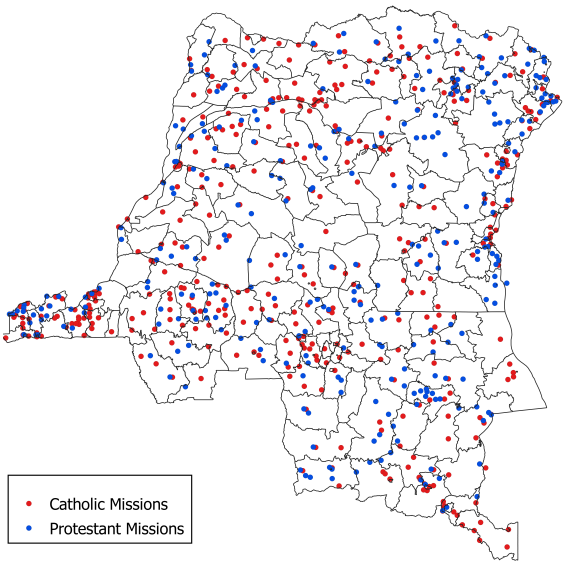
[10] Catholic nuns mostly arrived to already existing missions run by male missionaries. Indeed, the date of arrival of Catholic nuns is the same as the date of creation of the mission post in only 6% of the cases

[11] According to Irvine (1978), about 90% of Protestant posts hosted at least one female missionary.

[12] This is true until 1960. After independence, girls were also educated in missions without Catholic nuns.

[13] The comparison shown in Appendix B refers to the final dataset used in both papers. Even if we restrict our data to missions opened before the year they use (1903 for Protestant missions and 1929 for Catholic in the case of Cagé and Rueda, and 1924 in the case of Nunn), we have 62 Protestant missions and 199 Catholic, while Cagé and Rueda have 26 Protestant and 69 Catholic. If we compare the number of missions in 1924, when the Roome map was published, we have 166 Protestant missions and 156 Catholic, compared to 120 Protestant and 93 Catholic in the Roome map.

Figure 1: Location of Christian Missions in 1948



Note: The map shows the exact location of Catholic and Protestant missions in the DRC in 1948, along with territory level boundaries. The digitization has been done by the authors.

Determinants of missions' location: Since missionaries were likely to locate in better areas, it is crucial to consider the geographic and historical characteristics that influence this decision. Building on Jedwab et al. (2022), our control variables include: altitude, slope, rainfall, length of growing season, distance to the coast, distance to a colonial road, distance to a colonial railroad, distance to a navigable river, population density in 1900, and cropland area in 1900 as estimated in the HYDE 3. 1 database (Klein Goldewijk et al., 2011), malaria index from Cagé and Rueda (2016), tsetse suitability index from Alsan (2015) and number of slaves exported in the Indian and Atlantic trades (normalized by ethnic homeland area) from Nunn and Wantchekon (2011). We construct these historical and geographical controls at DHS cluster level and the 1970s territory level.

3.2 Measure of exposure to missions

Since missionaries provided virtually all education during the colonial period, and since all missions operated schools during our study period, we use exposure to missionary presence as a measure of exposure to colonial investment in education. However, our construction of exposure variables differs across data sets, as they provide different levels of precision regarding the location of the individual place of birth / location (in the DHS we know the GPS coordinates of the sampling cluster, while in the demographic survey we have information on the territories of birth). With DHS data, we measure exposure to former missionary presence as the logarithm of the distance from the DHS

cluster to the nearest mission post, multiplied by (-1).[14] For the historical analysis we construct an average exposure to missionary presence for each territory and each year and assign this measure to each respondent according to their year of birth.[15] To do this, we follow Calvi and Mantovanelli (2018) and construct a continuous measure of proximity at the territory level that controls for mission density. Specifically, we generate 1000 random points within each territory and compute the distance from each random point to its closest mission before averaging over these distances. A major advantage of this method is that it takes into account missions in neighboring territories when calculating the exposure of a given territory. We repeat this process for each territory, each year between 1885 and 1948, and three types of missions: Catholic, Catholic with nuns, and Protestant. Finally, based on these distances we construct a measure of proximity by multiplying the logarithm of the distance by -1. Table C1 in Appendix C provides descriptive statistics for these exposure measure.

4 Long-lasting impacts of colonial investments in education

In this section we explore the long lasting impacts of colonial schools on educational outcomes today in the DRC using DHS data, focusing on two dimensions of heterogeneity : gender, and the religious affiliation of these schools at independence.

4.1 Education outcome today and missionary schools in the past

In line with the existing literature, we estimate a linear regression model of contemporary outcomes on the exposure of the individual's cluster in the DHS survey and the nearest Christian mission, controlling for historical and geographic characteristics. Let i denote individuals, c denote DHS clusters, and p denote provinces.[16] Our regression equation is:

$$y_{icp} = \beta_0 + \beta_C M_c^C + \theta_C M_c^C F_i + \beta_P M_c^P + \theta_P M_c^P F_i + \lambda F_i + \gamma W_i + \mathbf{\Phi} X_c + \alpha_p + \sigma_r + \varepsilon_{icp} \quad (1)$$

where $y_{i,c,p}$ is the educational outcome of interest. M_c^C (M_c^P) measures the exposure of cluster c to Catholic (Protestant) missions and it is expressed as the negative (log) distance of cluster c to

[14] We use distances in logarithms to remove the high skewness in the distribution of distances and because we expect the influence of mission to be fundamentally nonlinear, with individuals located close to missions being disproportionately affected by the presence of the mission. We provide robustness estimates with alternative measures of exposure.

[15] We choose exposure at birth primarily because it allows us to include individuals in our sample who were born up to 1948. For example, if we instead compute exposure at age 6, we can only include individuals born before 1942, since our last mission opening occurs in 1948.

[16] Provinces are administrative units one level higher than territories.

the nearest Catholic (Protestant) mission in 1948. α_p denotes province fixed effects, which are included in all regressions and capture time-invariant province-level characteristics, such as colonial policies or unobserved heterogeneity, that may be correlated with average education and missionary activity. Finally, σ_r represents the DHS survey round (2007 or 2013). The vector $W_i^{'}$ contains individual-level control variables such as age, age squared, and gender. Finally, we also include the vector $X_c^{'}$, which contains geographic and historical controls computed at the DHS cluster level. Their selection is based on the main determinants of mission location listed by Jedwab et al. (2022) (see Section 3.1 for details about these variables).[17] Since our main variables of interest are defined at the DHS cluster level, we cluster the standard errors at this level.

The results are reported in Table 1. We find that, today, *(i)* proximity to Christian colonial school matters for women but not for men and *(ii)* Catholic and Protestant colonial schools have similar effects (we cannot reject the null hypothesis that $\beta_C + \theta_C = \beta_P + \theta_P$). In terms of magnitude, halving the distance to a former Catholic or Protestant school is associated for women with 0.2 additional years of schooling (a 4% increase when compared to the female sample mean), a 4 pp increase in literacy (a 8% increase) and in the likelihood to attend post-primary school (a 8% increase).[18] These effects contribute to reducing gender inequality in education. For instance, halving the distance to a Catholic or Protestant mission reduces the gender gap in literacy by 15%. Yet, exposure to colonial schools has no effect on women's likelihood of finishing secondary education. For men, in contrast, it is only in this dimension (finishing secondary school) that we find an effect of proximity to Catholic schools: halving the distance to a Catholic school increases the probability to finish secondary school of 1 pp (or 9% increase).

Our results on contemporaneous education confirm the overall findings in the literature regarding the persistent effects of missionary presence on education today: women living in places close to colonial schools are on average more educated than women living in more distant locations. However, we also find a persistent effect of both historical Protestant and Catholic posts, which is consistent with the results in Baten et al. (2021) or Becker and zu Selhausen (2023), where no differences in outcomes are found between these two religions.[19]

In Appendix D we provide further discussion and analyses in order to rule out a spurious correlation between mission location and education outcomes today. More specifically, we first discuss the potential endogeneity of historical post location. We then investigate whether missions left lasting impact on the main dimension they targeted: religion. Finally, we perform a series of robustness

[17] One standard control used in the literature (which mainly includes multi-country analyses) is distance to the capital city. However, we do not include it here, since in the DRC context, distance to the coast is highly correlated with distance to the capital city, Kinshasa ($\rho = 0.95$).

[18] The final effect of having distances is obtained by multiplying the coefficient reported in the table by $ln(2)$, since $[-ln(d)] - [-ln(\frac{d}{2})] = ln(2)$.

[19] In contrast, Nunn (2014) finds a significant effect only for Protestant missions.

checks.

Table 1: Education in 2000 and exposure to former missionary presence

	(1) Years of education	(2) Literacy	(3) Post primary	(4) Secondary or more
Exposure to Catholics	0.0720	-0.0118	-0.00398	0.0197**
	(0.119)	(0.0108)	(0.0117)	(0.00928)
Exp to Catholics x Female	0.273***	0.0576***	0.0475***	-0.0127*
	(0.0712)	(0.0102)	(0.0103)	(0.00649)
Exposure to Protestants	-0.00320	-0.0143	-0.0107	-0.000604
	(0.121)	(0.0119)	(0.0136)	(0.00923)
Exp to Protestants x Female	0.348***	0.0564***	0.0525***	0.0110
	(0.0689)	(0.00946)	(0.0106)	(0.00722)
FEs	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Mean Y	6.933	0.637	0.566	0.165
Mean Y female	5.678	0.505	0.435	0.102
R-squared	0.304	0.202	0.232	0.165
N	34654	34654	34654	34654

NOTE. Data: Pooled 2007 and 2013 waves of the DHS. The sample is restricted to people living in DHS clusters located 50km or closer to a mission. The table reports OLS estimates. We use $-log(distance)$ to measure exposure. Outcome variables are defined as follows: single years of education in column (1), ability to read a whole sentence in column (2), probability of having post-primary education in column (3) (it includes incomplete secondary education) and probability of having secondary or higher education in column (4). Standard errors () are clustered at DHS cluster level. Geographical, historical and individual controls included (see Section 4 for details). *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Does persistence fade over time? The DHS samples include generation of adults educated in the first decades after independence as well as adults born in the early 1990s, allowing to explore whether the persistence effects highlighted above are fading over time. Persistence is all the more intriguing and preoccupying that it is not gradually disappearing.

Table P1 in Appendix P reveals that the correlation between exposure to missions and education is remarkably stable over time. In fact, we find no heterogeneous effect of exposure to missionary presence by decade of birth.[20] These results are in line with Becker and zu Selhausen (2023) who find no evidence of diminishing effects of exposure to Protestant and Catholic missions on women's education over time. In contrast, Ben Salah et al. (2022) find that the effect of exposure to colonial public education on literacy declines over time, due to the expansion of public education and compulsory schooling.

4.2 The effect of early missionary schooling on education during colonial times

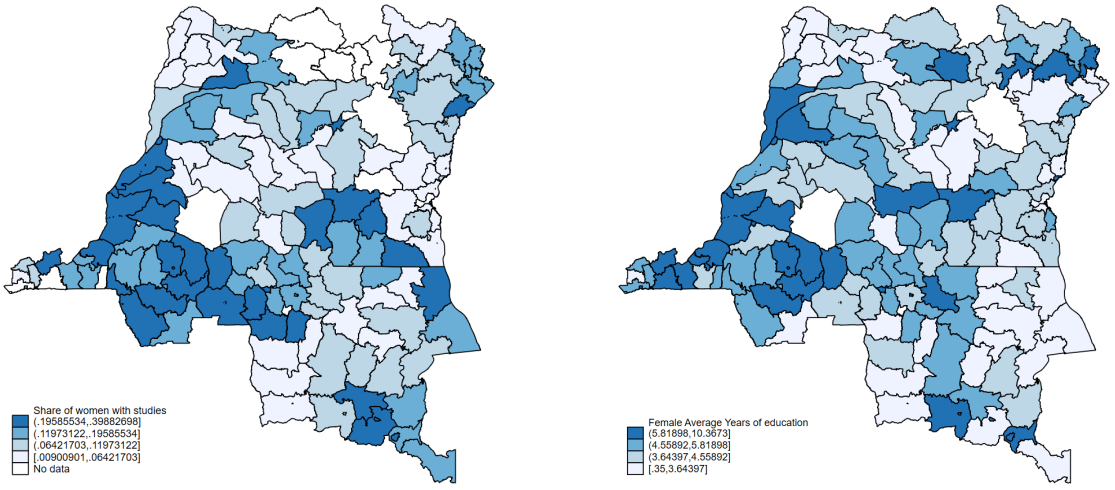
We now take up the question of whether missionary investments in *education* triggered higher average education levels closer to mission posts (that may have persisted). This is an important first step towards understanding the mechanisms of persistence. Yet, while this is often an (implicit)

[20] Using the DHS personal recode files (PR), we even observe persistent effects for children aged 12 to 17. However, we do not find an effect on children aged 6 to 11, suggesting that persistence today is driven by access to secondary schooling.

claim, it is rarely formally tested. A first descriptive look is provided by Figure 2 which compares average education outcomes by territories in colonial and contemporaneous times. A darker territory in the left panel indicates a higher average share of women with any education in the 1950s, while in the right panel it indicates a higher average years education for women in the 2000s. The maps suggest that initial inequalities in educational attainment are strongly persistent over time.

To explore systematically the relationship between the opening of mission schools and colonial education we rely on microdata on education for individuals directly exposed to mission (using the individual-level data from the 1970s urban demographic survey) and combine it with information on the timing of opening of new missionary post during the colonial era.

Figure 2: Female education, 1950s vs 2000s



(a) Share of women 15-19 with studies in 1950s

(b) Women's average years of education in 2000s

Notes: Panel 2a shows the geographic distribution of female education using the Demographic Survey of the 1950s. We use those women aged 15 to 19 at the time of the survey, since variation in education is high and primary education has already been completed. The share of women with studies is defined as (1-share of women without studies). For some territories (28/131), the share of women without studies was not available, but there was information on the number of women able to read or write. In those cases, the share of women without studies is computed as the difference between the total number of women and the number of women able to read or write. Panel 2b shows the geographic distribution of female education using data from the 2007 and 2013 DHS rounds. All women included. It shows, for each territory, the average years of female education.

4.2.1 Empirical strategy and results

Our general strategy is to exploit time variation in exposure to mission in the spirit of a difference-in-difference, including cohort and territory fixed effects. This identification strategy helps to overcome a major weakness of the existing literature on the impact of missions (or other colonial investments): any time-invariant characteristics (e.g., related to geography or the environment) correlated with mission placement are absorbed by the territory-fixed effects and cannot bias our estimates. As before, we distinguish between Catholic and Protestant missions and we add a variable to

capture the effect of exposure to Catholic missions with nuns. This is because the opening of schools for girls within the Catholic system was conditional on the presence of at least one nun.[21] [22]

Let i index individuals, t index territory of birth (since most of the sample consists of urban migrants), a index year of birth and m the type of mission ($m = 1$ denotes Catholic missions, $m = 2$ denotes Catholic missions with at least one nun and $m = 3$ refers to Protestant missions). Using these notations, Equation 1 describes our preferred empirical specification:

$$y_{i,t,a} = \beta_0 + \sum_{m=1}^{3} \beta_m D_{t,a,m} + \sum_{m=1}^{3} \alpha_m F_i D_{t,a,m} + X_i^{'}\Phi + \theta_t + \sigma_{coh} + \varepsilon_{i,a} \tag{2}$$

where $y_{i,t,a}$ is an educational outcome. $D_{t,a,1}$, $D_{t,a,2}$ and $D_{t,a,3}$ are our variables of interest and measure the average exposure of territory t in year a as described in Section 3.2. The coefficient associated to $D_{t,a,2}$ (exposure to Catholic missions with nuns) captures the effect of posts with at least one Catholic nun, conditional on the exposure to general Catholic missions and Protestant missions. The variable F_i is an indicator $= 1$ if individual i is female, and its interaction with our measures of missionary presence captures the differential impact of missions by gender. X_i denotes a vector of individual-level control variables, which includes the F_i gender indicator, year of installation in the current city and whether the respondent was born in a rural or urban area. Finally, θ_t and σ_{coh} denote territory of birth and age-cohort fixed effects respectively. Since our treatment variables are defined at the territory of birth level, we cluster the standard errors at this level.[23]The inclusion of territory fixed effects allows for a within-territory analysis. Therefore, the coefficients of interest are identified by time variations in the exposure to missions in a given territory.

Table 2 displays the results. Two main findings stand out. First, the effect of exposure to missionary presence is only detectable for Catholic missions. In terms of magnitude, Column (4) shows that halving the distance to a Catholic mission increases years of education by 0.5 (11% of the sample mean) or, in Column 6, the probability of completing primary education by 6 percentage points (13% of the sample mean). The effect of Protestant missions is not only statistically insignificant but also small in size. The contrast between Catholic and Protestant is in line with historical accounts: as mentioned in Section 2 the majority of pupils were in Catholic schools in the 1950s. Yet, given that

[21]In the previous analysis, based on DHS data, we did not include exposure to Catholic missions with nuns. This is because here we only observe missions at one point in time (1948) and by that time a large proportion of Catholic posts counted with at least one nun, leading to potential multicollinearity ($\rho = 0.70$). In addition, many more Catholic posts began to include nuns after 1948, so that the distinction likely became less relevant after 1948. Nevertheless, when we distinguish between exposure to Catholic missions with nuns and Catholic missions without nuns, our results are left unchanged.

[22]When using the 1970s survey, we focus on individuals born between 1930 and 1948, since the data include few migrants born earlier (and heterogeneity in education is small for them).

[23]Note, however, that clustering at this level may be highly conservative for two reasons (Abadie et al., 2023). First, we observe all clusters in the population and second, treatment assignment is imperfectly correlated within clusters. Still, since conventional robust standard errors may be underestimated, we prefer being overly cautious and report cluster standard errors.

proximity to former Protestant missions has today the same effect as proximity to Catholic ones, it suggests that the mechanisms behind persistence may differ across denominations.

Second, we confirm that the presence of nuns in Catholic missions was important for female education: halving the distance to a Catholic mission with at least one nun in is associated with a 8 percentage points increase in the probability of having any schooling (column 5). This latter result represents a large impact when compared to the mean of the variable for the female sample (16%). These results are especially striking given that our exposure measurement is an average exposure within a given territory. As such, it tends to attenuate the true effect of mission exposure and provides lower bound estimates. These results are consistent with the historical record on the functioning of the Catholic school system, where the presence of nuns was a necessary condition for opening schools for girls, and suggests that ignoring this distinction in similar contexts may be masking important heterogeneity.

Table 2: Education in colonial times and missionary presence

	(1) Years educ	(2) Any educ	(3) Primary or more	(4) Years educ	(5) Any educ	(6) Primary or more
Catholic missions	0.587***	0.0344	0.0546**	0.759***	0.0907*	0.0831***
	(0.209)	(0.0278)	(0.0251)	(0.248)	(0.0460)	(0.0318)
Catholic missions x female	0.0415	-0.0158	-0.00337	-0.416	-0.146	-0.0699
	(0.255)	(0.0379)	(0.0312)	(0.393)	(0.0909)	(0.0540)
Protestant missions	-0.0690	0.0364	0.0161	-0.0963	0.0302	0.0129
	(0.275)	(0.0299)	(0.0315)	(0.280)	(0.0301)	(0.0318)
Protestant missions x female	-0.159	0.0185	-0.0100	-0.115	0.0310	-0.00367
	(0.240)	(0.0285)	(0.0310)	(0.245)	(0.0287)	(0.0320)
Catholic with nuns				0.0405	-0.0290	-0.0139
				(0.228)	(0.0303)	(0.0278)
Catholic with nuns x female				0.423	0.121*	0.0615
				(0.320)	(0.0635)	(0.0399)
FEs	Yes	Yes	Yes	Yes	Yes	Yes
Territory FE	Yes	Yes	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	4.995	0.734	0.435	4.995	0.734	0.435
R-squared	0.442	0.292	0.338	0.442	0.293	0.338
N	41655	41655	41655	41655	41655	41655

NOTE. Data: Demographic Survey of the 1970s. The sample is restricted to people born after 1930. The table reports OLS estimates. Exposure to missionary presence is measured as $-log(distance)$. Outcome variables are defined as follows: single years of education in columns (1) and (4), a binary variable that equals one if the respondent has at least one year of education in columns (2) and (5) and the probability of completing primary education (>5 years of education) in columns (3) and (6). Standard errors () are clustered at the territory of birth level. Fixed-effects include city of residence, territory of birth, 5yr age cohorts and whether the individual was born in an urban area. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

4.2.2 Threats to identification

Selective migration.- One potential concern may be related to the nature of the 1970s survey. Indeed, this survey includes information on people living in seven major cities, most of whom are migrants from rural areas. Therefore, selection into migration and its potential heterogeneity by Catholic/Protestant exposure may bias our estimates. First, the returns to education may differ between Protestant and Catholic schooling. Second, the presence of mission posts may have created

economic opportunities even for people who did not attend Christian schools, affecting their likelihood of migrating.

To examine this question, we use data from a demographic survey conducted in the 1950s, at a time when migratory flows were strictly controlled. This survey covered about 11% of the total population of the country and its sampling strategy was designed to be representative of both rural and urban areas. Available data is aggregated at the territory and age-category level (more details in Appendix F). In order to rule out that selective migration is driving the results on the individual sample from the 1970s, we compare patterns between the two databases. If the effects of mission exposure are similar, then we can assume that the 1970s sample does not indicate any particular differential selection of migrants along the mission exposure dimension. Table F1 in Appendix F shows the results. Overall, it confirms our main findings.

Finally, we go one step further and explicitly examine whether selection into migration is differentially affected by exposure to Catholics versus exposure to Protestants. To do so, we compute the share of educated people by territory of birth and age cohort using the representative 1950s sample and compare it to the share of educated people in the same age cohort and territory of birth in the 1970s urban sample.[24] Appendix H shows the results. First, we observe that there is generalized positive selection into migration. The share of educated people in the 1970s sample is higher than the share of educated people in the 1950s sample (comparing the same territories and age cohorts). However, we show in table H1 that the magnitude of selection into migration does not depend on the type of exposure. Therefore, these results suggest that migration patterns were not significantly different between people exposed to Catholic missionaries compared to people exposed to Protestant missionaries, and therefore it is not very likely that our results are explained by selective migration into education.

Endogenous opening of missions.—Our identifying assumption is that in the absence of new mission posts, education trends would have been similar across places where these posts opened and where they did not. Given that missionaries were the sole providers of education during colonial times, this assumption is quite plausible. Yet, a potential concern in our setting is related to the endogenous timing of new post openings: we might be worried that the intensity of educational investments varied with different (time varying) returns to education (and that these returns were heterogeneous along our key dimensions of analysis: gender and religious denominations). For instance, if, in contrast with Protestant schools, Catholic schools opened strategically in places where other colonial investments were made (e.g increased employment opportunities), our coefficients would not capture the causal effect of mission opening on education but rather the differential religious strategies deployed.

[24] We focus on people older than 15, since they should have started school by that age. We assume that the territory of birth is the same as the territory of residence in the 1950s sample, since migration was very limited during the early colonial period.

A first remark is that time-invariant factors that would affect these returns are absorbed by the territory fixed effects. We conduct two other analyses that suggest that an endogenous timing in school openings in unlikely to drive our results. First in Table G1 in Appendix G, we check decade by decade that the characteristics of territories where Catholic vs Protestant missions settled are not systematically different.[25] Second, we add time variant controls that capture differences in the economic dynamism of different places across time. To do so, we collected information at the district level from yearly reports on the administration of the colony presented to the Belgium parliament. Specifically, we include data on the size of the white Belgian and white non-Belgium population, the size of the indigenous population and the amount of per-capita tax levied from the indigenous population. This information covers the entire period of analysis (1930-1948).[26] We show in Appendix I that adding time-varying covariates to control for confounding factors barely changes our results.

5 Mechanisms of persistence: a conceptual discussion

Why do the initial location of colonial schools still influence education outcomes more than 80 years after their openings? Why do we observe today a positive effect only on women's years of education? Why do we observe a similar effect for Protestant and Catholic missions in the long run, while the effect for Catholics was significantly stronger during the colonial period? To answer these questions we now turn to transmission mechanisms, distinguishing between two broad categories: supply factors and demand factors.

5.1 Demand factors

Demand for education may be persistently higher closer to former missions if educated parents have a higher demand for the education of their children than uneducated parents but also if missions influence parental demand for education, *regardless of parental education*. This latter mechanism would result in higher educational mobility closer to former missions, whereby uneducated parents are more likely to invest in the education of their children when they were exposed to missions (Alesina et al., 2021). Such effects have been highlighted by Wantchekon et al. (2015) who, with detailed data from Benin, show that uneducated parents are more likely to invest in their children's education when they grew up in a village that hosted a colonial school. The former mech-

[25] For readability purposes, we chose to show only three decades.

[26] The reports are not always complete: for some dimensions, we could not recover the information for some years (taxes in 1948 and white Belgian and non-Belgian population between 1939-1944 and between 1945-1948). When this is the case, we use the last available year.

anism (whereby educated parents have a higher demand for education), termed the intergenerational *transmission* of education has been the focus of a large literature in sociology and economics and may be driven by several factors.[27] First there may be an intergenerational correlation in ability or other family characteristics (values, parenting skills, information...). Second parents education may affect (perceived) returns from schooling. Finally, in the presence of liquidity constraints, uneducated parents may be poorer and therefore under-invest in their children's education.

An important confounding factor in trying to isolate these demand channels relates to supply: parents and children education levels may be correlated simply because they are more likely to grow up in the same environment (with the same access to schools) than random individuals. This supply channel is central in the recent investigation of Alesina et al. (2021) of intergenerational mobility in sub-Saharan Africa, where they compare integenerational transmission across siblings who grew up in different places. They conclude that "regional exposure" has a considerable influence on intergenerational correlation levels (or mobility).[28] Our historical data provides a ideal setting to isolate pure demand factors from this regional exposure effect. Indeed it consists of a representative sample of second-generation urban migrants in the 1970s who share the same supply environment but whose parents, educated in missions, have different levels of education (and exposure to missions). This allows us, in the spirit of Alesina et al. (2011) earlier work on the persistence of gender roles, to compare education outcomes of children who share the same access to school but have parents differently exposed to missions in their childhood (and differently educated).

5.2 Supply factors

Turning to persistence in the supply of education, it is often hard to establish whether new schools locate preferentially in areas where first schools opened because it is rare to have systematic information on the universe of schools. Leveraging such data for the entire DRC, we investigate how contemporaneous schools' location relates to colonial mission position and we shed light on the mechanisms behind this strong correlation.

Several mechanisms may explain that places where first schools located continue to attract more investments in education over time. First, mission placement was not random: missions may have located in more favorable environments (better connected to markets, better naturally endowed etc...) where returns to education were higher. If these places continue to enjoy higher returns, they may continue to attract more schools for the same reason. We will carefully control for location

[27] Seminal papers include Becker (1964) and Coleman (1968). For a recent review, see Bjorklund and Salvanes (2011).

[28] The classification of this "regional exposure" effect on the supply side is debatable to the extent that it captures not only school supply but local returns to education. Yet it is distinct from a "pure" demand channel, whereby educated parents would have a higher demand for education, holding the environment (school supply, local returns...) constant.

of missions to absorb this selection effect. Second, places that attracted colonial investments in education may continue to attract more public funding, due to the lasting nature of school buildings. This mechanism is highlighted by Huillery (2009) in the context of French Africa. In the DRC where public subsidies are dismal we do not expect an important contribution of this channel.

Third, competition across schools may lead to agglomeration of schools in places where they first appear. This is all the more likely in the context of developing countries where there is easy entry in the school sector, state subsidies are limited and schools are often linked to a religion. In this context, schools may tend to act as profit maximizers and concentrate in specific places, as suggested by many models of competition with a spatial dimension. Furthermore, if schools are managed by churches who compete for converts, they may strategically react to the opening of schools by other religious denominations: they may open a school nearby to prevent too large a success of their competitor. To investigate agglomeration effects and competition across schools, we exploit information on existing schools' religious denomination and dynamics of opening. We anticipate stronger competition between schools of different denominations than between schools of the same denomination. This possibility is often mentioned, yet it has rarely been formally tested. An important exception is Gallego and Woodberry (2010), who show that the quality of education offered by missionaries was higher when they faced stronger competitive pressure.[29] While this competition may be positive for overall school quality, it may also lead to strong spatial inequalities.

Finally, higher supply in places where schools opened first may be the result of faster structural transformation in these places (Rocha et al., 2017 or Caicedo, 2019b). Structural transformation may then contribute to raising the returns to education and both supply and demand, leading again to agglomeration effects. To test for this channel, we examine whether the type of occupation differ closer to missions (using DHS data) and whether economic development, proxied by night light luminosity is different.

6 Persistence in the demand for education: empirical investigation

The demographic survey from the 1970s enables us to isolate demand channels and assess whether educated parents (or those who grew up near missions) make different decisions about their children's education, holding supply constant (and absorbing the "regional exposure effect"). To this

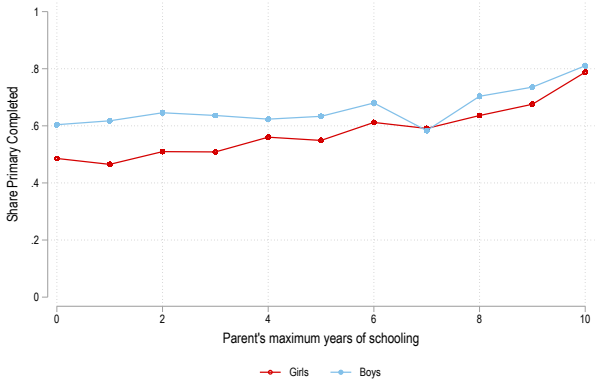
[29] More specifically they find that the important differences in educational attainment between Catholic and non-Catholic states in Africa today are largely explained by market pressure. Because in Catholic states, the Catholic church was favoured and Protestants restricted, Catholic schools invested less in school quality than their counterpart in non-Catholic states which feared competition by Protestants. In non-Catholic states, there was no regulation favouring a specific denomination and both had to invest in school quality to attract converts.

end, we leverage the heterogeneity of migrant parents' exposure to missions in their childhood: sampled children face the same school supply in the cities (we can include neighborhood fixed effects), but their parents grew up in different environments and (therefore) have different levels of education (exposure to missions). Specifically, we estimate the extent to which parents' education during the colonial period matters for children's education, and whether exposure to Christian missionaries had an effect on the education of the children of exposed individuals.[30]

6.1 Intergenerational transmission of education

We begin by estimating the raw correlation between parents' and children's education. Figure 3 plots the share of children with completed primary education as a function of the maximum year of education of their parents. There is a positive relationship, and the slope is steeper for girls than for boys: while 60% (50%) of boys (girls) whose parents have no education manage to complete primary education, this percentage rises to 80% when the maximum year of parental education is 10. This suggests that there is positive intergenerational correlation, yet the graph also reveals a remarkable degree of upward educational mobility immediately after independence: a majority of urban children (boys and girls) of uneducated parents finish primary school.

Figure 3: Correlation between parents' and children education



Note: Data: Demographic Survey of the 1970s. The figure shows the share of children aged 14-19 with primary school completed (6 years of education) given the maximum year of education of their parents.

[30] We follow Card et al. (2022) or Alesina et al. (2021) and focus on children aged 14-19 because they should have already completed primary school and cohabitation rates are very high (0.6% of people aged 14-19 in our sample are heads of household, while about 6% are spouses of the head of household).

Table 3: Intergenerational correlation in education in the 1970s

	(1) Years educ	(2) Primary or more	(3) Post-primary	(4) Years educ	(5) Primary or more	(6) Post-primary
Father's y.o.e	0.0998***	0.0175***	0.0165***	0.0778***	0.0155***	0.0157***
	(0.0110)	(0.00161)	(0.00131)	(0.00590)	(0.00131)	(0.00165)
Mother's y.o.e	0.0452***	0.00928***	0.00917***	0.0327***	0.00654***	0.00677***
	(0.0103)	(0.00214)	(0.00188)	(0.0115)	(0.00185)	(0.00242)
Father's y.o.e x F				0.0457**	0.00422	0.00179
				(0.0210)	(0.00300)	(0.00285)
Mother's y.o.e x F				0.0268***	0.00580***	0.00506**
				(0.00738)	(0.00181)	(0.00206)
FEs	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	6.080	0.636	0.439	6.080	0.636	0.439
R-squared	0.354	0.261	0.298	0.356	0.262	0.298
N	22458	22458	22458	22458	22458	22458

NOTE. Data: Demographic Survey conducted during the 1970s. The sample is restricted to children aged 14-19 during the time of the survey. In the explanatory variables, "*y.o.e*" account for "Years of education" to shorten their names. The table reports OLS estimates. Outcome variables are defined as follows: single years of education in columns (1) and (2), a binary variable that equals one if the respondent has at least one year of education in columns (2) and (5) and the probability of completing primary education (>5 years of education) in columns (3) and (6). Standard errors () are clustered at the territory of birth level. Fixed-effects include city of residence, territory of birth, age and the zone of residence of the individual within the city. Controls also include age of parents. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

The positive, but very modest, correlation between children and parents education is confirmed in a regression framework. Table 3 presents the results of regressing children's education on their parents' education, controlling for an extensive set of demographic and geographic characteristics. Overall, the relationship between parents' and children's education is strongly significant but small in size: an additional year of father's (mother's) education is associated with 0.1 (0.05) years of education for a child (column 1). These coefficients are small compared to estimates in the literature, even accounting for the fact that we absorb the "regional exposure effect" of parents. For instance, Hertz et al. (2008) report coefficients from simple regressions of children number of years of education on parents years of education for 42 countries and find coefficients of 0.80 for their African sample.[31]

Our estimates suggest that the relationship between parents and children education is slightly stronger for girls, suggesting that parental education is a stronger determinant of girls' education than of boys'.[32] Why this larger intergenerational correlation for girls? Above we highlighted three factors repeatedly mentioned in the literature to explain intergenerational correlation: liquidity constraints, transmission in ability or other family characteristics and different returns to education for children of educated parents. Are uneducated parents liquidity constrained and giving priority to boys who experience higher returns to education? As we have information on parental occupation we can (imperfectly) control for liquidity constraints. These results are shown in Ap-

[31]Other regional averages are: 0.79 for Latin America, 0.47 for Eastern European countries and 0.54 for West-European countries and North America.

[32]This is consistent with recent findings for other developing countries, both in Africa or in Asia (Emran and Sun, 2015; Emran and Shilpi, 2015; Azomahou and Yitbarek, 2016; Torche, 2019).

pendix J. It is striking that our coefficient on parental education barely move when we include this control, pointing to a limited role of liquidity constraints.[33]

Could family backgrounds (values) and returns to education be different when parents are educated, and different across gender? Several elements suggest that the answer is positive. Colonial education conveyed specific gender values that may have directly influenced parents' demand for education. Furthermore labour market returns were higher for men (educated women had very few skilled labour opportunities until the very end of the colonial period), while women likely experienced marriage market returns to education. If marriage market returns depend more on parental background than labour market returns (for example because family network is more important in marriage market than labour market), intergenerational correlation in education may be stronger for daughters than for sons.[34]

6.2 Missions and education mobility

The high degree of educational mobility shown above may itself be influenced by exposure to missions (maybe missions changes the demand for education of both educated and uneducated individuals). As detailed above, Alesina et al. (2021) show that upward mobility in Africa is higher in areas exposed to missions. With our urban migrant sample, we can formally test for this positive effect of missions on educational mobility, again absorbing the "regional exposure effect" of parents.

We exploit the same source of variation as in equation 2, replacing parental education by parental exposure to mission. Thus, our coefficients are again identified by time variations in parental exposure to missions in a given territory, holding constant the supply of education in the city. In addition, with the same estimation strategy, we explore the role of exposure to mission on education *expenditure*, taking advantage of an expenditure survey including 1/50 of the total number of households identified in the same seven cities of the 1970s Demographic Survey.

[33] Parental occupation qualifies as a "bad control" because it is itself influenced by parental education. Yet the fact that the coefficient on education is unaffected by the inclusion of this variable suggests that it is not "mediating" the direct impact of parents' education on children education.

[34] Regarding the intergenerational correlation in family characteristics, Wantchekon et al. (2015) argues that ability is likely to have only a very modest influence on individuals differences in colonial education, as selection into missionary schools could hardly be based on ability.

Table 4: Parents' exposure to missions and children's education

	(1) Years educ	(2) ≥ Primary	(3) Post-primary	(4) Years educ	(5) ≥ Primary	(6) Post-primary
Father's exposure to Cath	-0.0264	-0.0143	0.00179	0.0167	-0.0135	0.00228
	(0.116)	(0.0228)	(0.0196)	(0.158)	(0.0270)	(0.0225)
Father's exposure to Nuns	-0.118*	-0.0201	-0.0115	-0.133*	-0.00924	-0.00795
	(0.0643)	(0.0142)	(0.0119)	(0.0753)	(0.0164)	(0.0133)
Father's exposure to Prot	0.277***	0.0433**	0.0397**	0.193*	0.0281	0.0336*
	(0.102)	(0.0207)	(0.0185)	(0.116)	(0.0223)	(0.0198)
Exposure to Cath x Female				-0.0910	-0.00246	-0.00133
				(0.152)	(0.0196)	(0.0180)
Exposure to Nuns x Female				0.0232	-0.0229	-0.00764
				(0.0797)	(0.0154)	(0.0145)
Exposure to Prot x Female				0.179	0.0324**	0.0130
				(0.111)	(0.0136)	(0.0131)
FEs	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	6.066	0.632	0.437	6.066	0.632	0.437
R-squared	0.284	0.201	0.253	0.285	0.202	0.253
N	20443	20443	20443	20443	20443	20443

NOTE. Data: Demographic Survey of the 1970s. The sample is restricted to children aged 14-19 at the time of the survey. The table reports OLS estimates. Father's exposure to missions is described Section 3.2. Outcome variables are defined as follows: single years of education in columns (1) and (4), the probability of completing primary education (>5 years of education) in columns (2) and (5), and the probability of having post-primary education (>6 years of education) in columns (3) and (6). Standard errors () are clustered at father's territory of birth level. Fixed-effects include city of residence and father's territory of birth. Controls include sex, year of installation in the current city, age and age of parents. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table 4 shows the results and reveals that parents' exposure to Protestant missions directly increases their demand for education, in particular for their daughter. In contrast, exposure to Catholic missions has no significant impact on its own. In terms of magnitude, these effects are modest. Halving the distance (at birth) of the father to a protestant mission increases children's years of education by 3%, or the probability to complete primary education by 3pp (5%). The same conclusion is obtained from the analysis of education expenditure (Table 5): exposure to Protestant, but not Catholic missions increases education expenditure.

Table 5: Exposure to missions and education expenditures

	(1) Education exp.	(2) Ln(1+Educ Exp.)	(3) Exp. per capita	(4) Clothes exp.
Exposure to Catholic	-0.0382	-0.211	-54.95	0.00542
	(0.0399)	(0.162)	(98.16)	(0.0403)
Exposure to Nuns	-0.0140	-0.0508	75.52	0.00148
	(0.0205)	(0.104)	(75.75)	(0.0213)
Exposure to Protestant	0.0665**	0.278*	60.68	0.00627
	(0.0307)	(0.146)	(87.33)	(0.0265)
FEs	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Mean Y	0.348	1.511	1311.9	0.264
R-squared	0.162	0.179	0.183	0.160
N	4731	4731	4731	4731

NOTE. Data: Budgetary Survey of the 1970s. The table reports OLS estimates. (Log) Exposure to missions is described in Section 3.2. Outcome variables are defined as follows: dummy variable that equals one if the household spends in education in column (1), 1 + the logarithm of total expenditure in education in column (2) , total expenditure per capita in column (3), and whether the household spends in clothes for children in column (4). Standard errors () are clustered at the territory of birth level. Fixed-effects include city of residence, territory of birth, and 5-year age cohorts. Controls include total number of household members, sex of household head, whether respondents were born in urban/rural area, and total expenditure. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

These results come somewhat as a surprise, since we showed above that *Catholic but not Protestant* missions had a sizeable effect on the *education of the first generation*. Taken together, these findings suggest that parental exposure to Catholic missions has an effect on children education *only to the extent that parents themselves are educated* (so that the results is far less strong in reduced form when we directly estimate the effects of missions on the education of the next generation). In contrast, exposure to Protestant missions appears to directly increase parents' demand for education, suggesting that exposure to Protestant missions is associated with more investment in education, even for uneducated parents (exposure to Protestant missions has a stronger impact on mobility). In Appendix K we explore this conjecture and confirm that Protestant missions have a stronger effect on mobility than Catholic missions.

Why this stronger effect of Protestant missions (than Catholic) on the education of the next generation? Why does it affect more girls' education? A large literature in social sciences establishes that Protestantism, at least historically, conveys a strong attachment to education. The idea is that each individual, whether female or male, should be able to read the bible (*sola scriptura*). Becker and Woessmann (2008, 2009, 2010) show that Protestantism triggered strong increased demand for literacy in Prussia in the early 19th century (before the industrial revolution). It is difficult to establish whether Protestant missionaries in the Congo insisted more on literacy than Catholic missionaries. It is clear however that Protestant were more educated than Catholic missionaries, female missionary in particular (Irvine, 1978). Furthermore, as discussed above, Protestant missions had a more gender-equal approach to schooling (Yates, 1982).

All in all, our exploration of demand channels indicates that the influence of parental education

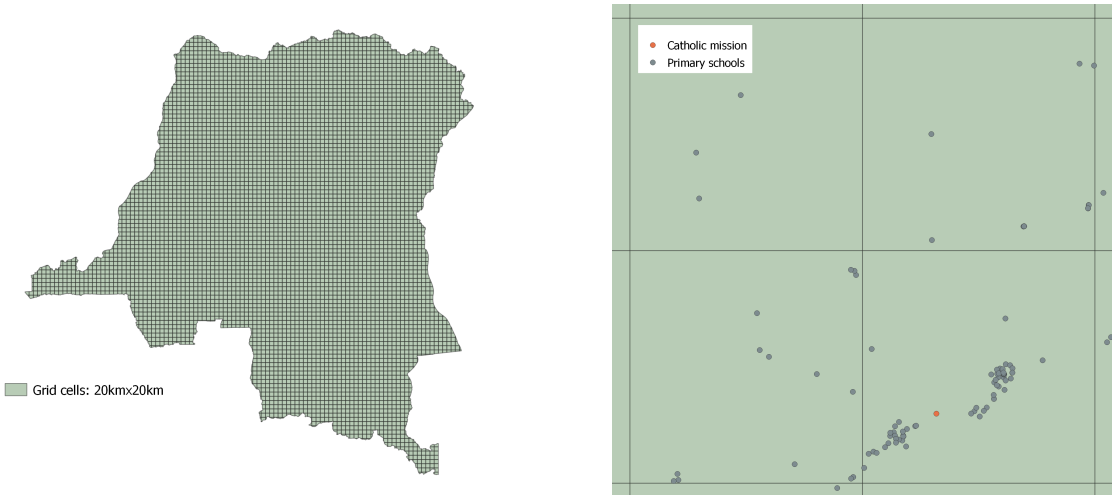
and exposure to mission on educational outcomes are modest in urban post-independence Congo. Parents, whether educated or not, massively invested in the education of their children who, in their majority, completed primary school. Yet, interesting contrasts across gender and religion emerge, with a positive correlation between children education and parental exposure to Protestantism and more intergenerational persistence for daughters.

7 Persistence in the supply of education: empirical investigation

7.1 Location of schools in the vicinity of historical missions

We first examine whether the supply of contemporary schools is correlated with the location of colonial mission posts. To this end, we use data on the universe of primary and secondary schools and their characteristics provided by the Ministry of Education. We examine the spatial correlation between the presence of contemporary schools and the presence of historical mission posts. To do this, we divide the DRC into small grid cells of 20 km x 20 km, as shown in Figure 4. We then calculate the total number of schools and missions per grid cell. As very few grid cells have more than one mission, we rely on a binary indicator for the presence of a mission. For this analysis, the unit of observation is a cell. In each specification, we include sector fixed effects (*collectivité*), which are smaller administrative units than territories, in order to absorb time invariant location specific controls.

Figure 4: Historical missions and contemporary schools in the DRC



(a) 20x20km cells

(b) Example

The results are reported in Table 6. We find a strong and significant effect of past missionary presence on the number of primary and secondary schools a given cell has today. When a historical Catholic (Protestant) mission was present in the grid cell, there is today one (0.4) additional primary school per 1000 inhabitants today (Column 2). The same holds true for secondary schools: a Catholic (Protestant) mission in the grid cell is associated with 0.6 (0.2) additional secondary school per 1000 inhabitants. These effects are large: having hosted a Catholic mission in the past is associated with an increase of 79% of the mean number of primary schools per 1000 inhabitants (1.3). These results hold when we control for population density at the cell-level, either historical (estimated population density in 1900) or contemporary (more details are provided in Appendix L).[35] Interestingly the share of girls in these secondary schools is also larger closer to former missions (we come back to this point below).[36]

Table 6: Historical Missionary Presence and Contemporary Schools

	(1) Schools	(2) Schools/1000	(3) % Girls	(4) % Female Teachers
Panel A: Primary Education				
Catholic mission	24.43***	1.002***	0.000857	0.000120
	(3.189)	(0.204)	(0.00216)	(0.000351)
Protestant mission	11.48***	0.390**	0.00241	0.000130
	(4.141)	(0.161)	(0.00267)	(0.000504)
Mean Y	16.16	1.271	0.48	0.51
Collectivité FE	Yes	Yes	Yes	Yes
R-squared	0.368	0.344	0.190	0.704
N	3597	3448	3597	3597
Panel B: Secondary Education				
Catholic mission	16.71***	0.594***	0.0198***	0.0280***
	(2.312)	(0.151)	(0.00450)	(0.00392)
Protestant mission	7.777**	0.237**	0.00995**	0.00618
	(3.121)	(0.119)	(0.00467)	(0.00469)
Mean Y	10.70	0.805	0.37	0.10
Collectivité FE	Yes	Yes	Yes	Yes
R-squared	0.368	0.316	0.518	0.553
N	2996	2862	2968	2996

NOTE. Data: Universe of primary and secondary schools in the DRC in 2020, from Ministry of education. The table reports OLS estimates. The unit of observation is a 20kmx20km grid cell. Only grid cells with at least one mission or one school are included. Outcome variables are defined as follows: total number of schools in column (1), schools per 1000 population in 2015 in columns (2) and (6), average share of girls in school by grid cell in column (2), and average share of female teachers in school by grid cell in column (3). Sector fixed-effects (collectivités) included in all specifications. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Why did new schools open near former missions (and schools)? The discussion above (Section 5) suggests three mechanisms: 1) missions were located in areas where demand/returns to education would be higher; 2) missions triggered structural change leading to demand/returns to education; 3) schools compete and therefore agglomerate. Mission placement is unlikely to fully explain the

[35] Furthermore, the results do not change when we use number of missions per 1000 inhabitants as explanatory variables.

[36] Furthermore the proportion of female teachers in secondary schools is higher near Catholic missions, which may increase female education per se, as female teachers act as role models (Burde and Linden, 2013; Adukia, 2017).

results: carefully controlling for endogeneity in mission location (with geographic fixed effects or state of the art controls) does not affect the significance of the coefficients.[37] In what follows, we first examine school competition and its role in school agglomeration. We then turn to examining the structural transformation argument, looking at the correlation between the structure of occupations and proximity to historical missions.

7.2 Competition across religions

To investigate whether agglomeration is exacerbated by competitive forces, we examine whether the opening of a secondary school of a given denomination triggers - or deters - the opening of a school of the same or another denomination in the same place (grid-cell).[38]

More specifically, we estimate the following regression, where $S_{i,t,r}$ takes value 1 if a school of denomination r opened at time t in grid-cell i - with $r = c$ corresponding to Catholic and $r = p$ to Protestant school. Finally λ_t and σ_i are year and grid-cell fixed effects, respectively. We show the results using different lags for the opening of a school in the past (during the previous three or five years). Note that a lag of our dependent variable is included in the construction of one of our explanatory variables. However, as T is large in our context (the median grid-cell has $T = 40$), dynamic panel bias becomes insignificant and the standard within-groups estimator is appropriate (Roodman, 2009; Blundell and Bond, 2023).[39].

$$S_{i,t,r} = \beta_0 + \sum_{i=1}^{3/5} \beta_c S_{i,t-i,c} + \sum_{i=1}^{3/5} \beta_p S_{i,t-i,p} + \lambda_t + \sigma_i + \varepsilon_{i,t,r} \tag{3}$$

If schools compete with each other, we would expect competition to be stronger across religious denominations than within. Under this assumption, we could detect competition by observing that the opening of a Catholic (Protestant) school is more likely after the recent opening of a Protestant (Catholic) school than of a Catholic (Protestant) school. If school openings are unrelated to religious competition, we would not expect any difference between β_c and β_p. Note that we may still observe positive coefficients, due to competition in general or local growth.

[37] This issue is more problematic when mission data are limited to the oldest missions or when mission data come from atlases, (Jedwab et al., 2017), which is not our case (we have information on the universe of missions operating in 1948 from several yearbooks and colonial maps).

[38] We focus on secondary schools, since we do not have information on the opening date of primary schools. An important assumption is that secondary school closure is not introducing problematic sample selection concerns: we know the date of opening of all schools operating in 2020, we thus have no information on schools that would have opened and closed before 2020.

[39] Moreover, the number of instruments would be far too large if we implemented the kind of estimators proposed by Arellano and Bond (1991). For example, if we include three yearly lags of our dependent variable, we would have about 3000 instruments. We would still reach 150 instruments if we limit ourselves to a single lag. In any case, our main conclusions remain valid if we implement the estimator proposed by Arellano and Bond (1991) (see Appendix M)

Table 7 shows the results. Both types of religious schools respond very differently to the opening of a school of the other denomination than to the opening of a school of the same denomination. Column 1 shows that the opening of a Catholic school in the same area in the last 3 years reduces the probability of a new Catholic school opening by about 2 percentage points. In contrast, the opening of a Protestant school in the last 3 years increases the probability of a new Catholic school opening by 1.4 percentage points, which is an increase of 28% from the mean. Protestant schools also respond to the opening of a Catholic school: the opening of a Catholic school in the last three years increases the likelihood of a Protestant school opening by 2.6 percentage points (or 23% of the mean) (column 2).

We can extend the analysis to other types of schools. To the extent that Catholic (Protestant) schools are in competition with other types of schools, e.g. because they wish to attract pupils from other schools for conversion or financial reasons, we would again expect different reactions to the opening of a Catholic (Protestant) school than to the opening of any other type of school. Table Q in the appendix reports the results of estimating the regression 3, controlling for the opening of schools of different types in the recent past, including public secular schools, private schools - probably from new evangelical churches - and "other schools" which is a residual category of faith schools grouping Kimbanguistes, Muslims and Adventists among others (see Section 3.1 for a description of school types). It confirms the competition between the two main denominations (Catholic and Protestant) and shows that both denominations react as strongly to the opening of private (including new evangelical) or other faith schools as to the opening of a school of the other main denomination. However, they react less strongly to the opening of a secular public school (suggesting that religious competition, over and above financial considerations, is likely to be an important driver of faith-based school openings).

In short, religious competition appears to lead to a concentration of schools in areas close to historic missions. While this possibility has been raised in the literature, it has never been formally tested.[40] Historians insist on the importance of religious competition in colonial Africa and argue that it helps to understand the geography of mission settlements. In the case of the Congo, both Catholic and Protestant authorities carefully monitored each other's progress and tried to prevent the other religion from "conquering" large areas by opening posts relatively close to each other. Recent reports on education in the DRC indicate that today, as in colonial times, schools remain a vector of proselytization for the churches, so that church competition can lead to school competition (Gauthier et al., 2021).

[40] Interestingly, in their investigation of the impacts of colonial public education on labour and marriage market outcomes in Cameroon, André and Dupraz (2023) note that Christian schools tend to locate where other Christian schools were already operating. While they do not distinguish between Protestant and Catholic schools, this finding could be the result of competition across schools.

Table 7: Competition between religious affiliations

	(1) P(Catholic)	(2) P(Protestant)	(3) P(Catholic)	(4) P(Protestant)
Catholic between t and t-3	-0.0151***	0.0263***		
	(0.00344)	(0.00479)		
Protestant between t and t-3	0.0143***	0.00862**		
	(0.00286)	(0.00433)		
Catholic between t and t-5			-0.0188***	0.0219***
			(0.00317)	(0.00437)
Protestant between t and t-5			0.0107***	-0.00215
			(0.00278)	(0.00398)
Time FEs	Yes	Yes	Yes	Yes
Grid-cell FEs	Yes	Yes	Yes	Yes
Mean Y	0.0514	0.113	0.0534	0.118
R-squared	0.104	0.189	0.107	0.191
N	65752	65752	60968	60968

NOTE. The dependent variable is a dummy that equals one if a new school of type x opens in cell c at year. The independent variables are dummies that equal one if a new school of the opposite type opened in cell c in year t-1, t-2 or t-3, or in cell c in year t-1, t-2, t-3, t-4 or t-5, respectively. Standard errors () clustered at the 20x20km grid cell level. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Robustness check One of the main drawbacks of our secondary school universe dataset is that it includes schools opened in 2022 (and thus ignores schools that would have closed before that date). Since an important determinant of school closure in the DRC is conflict, we conduct a robustness test where we restrict attention to grid cells with low exposure to conflict. To do this, we use data on the total number of conflicts that occurred between 1997 and 2022 from the Armed Conflict Location and Event Data Project (ACLED).[41] Appendix N confirms that the results presented in sections 7.1 and 7.2 are robust to this sample restriction (Tables N1 and N2, respectively).

7.3 Structural transformation and returns to education

Finally, a natural explanation for the concentration of schools closer to historic missions relates to structural change and returns to education. If the initial educational advantage allowed mission-exposed areas to take advantage of economic opportunities (development of manufacturing or service sectors), then these areas may have enjoyed higher levels of returns to education and economic development, leading to a more dynamic supply of education and generating educational persistence.[42] To explore this possibility, we provide suggestive evidence based on contemporaneous occupational patterns in the DHS data. The DHS survey provides simple information about labour market participation and the broad sector of occupation, it is however not well suited for an in-

[41] Conflicts include events such as fighting, explosions or remote violence, protests, riots, strategic developments, and violence against civilians.

[42] Occupational specialization is the main factor of transmission generating economic and educational persistence in Rocha et al. (2017); Caicedo (2019b)

depth analysis of educational return as it does not include details about occupation or information about income. We also construct a variable that captures the intensity of night lights in the area around each DHS cluster, which is usually considered a proxy for economic development, both in terms of levels and changes.

In practice, we estimate the same model as for educational outcomes (equation 1). Table 8 shows the results and suggests that halving the distance to former Catholic or Protestant missions reduces the propensity to work by a modest 1-2 percentage points when considering all individuals over 20. Conditional on working, the sector of occupation is slightly different closer to Catholic missions: halving the distance reduces the probability of working in agriculture by four percentage points in favor of services (+2 pp) and manufacturing (+1.2 pp). In contrast, we see no clear pattern of occupation closer to historic Protestant missions. Moreover, we find no effect on nighttime luminosity, which is surprising if we expect places closer to historical mission to be more dynamic economically but is in line with the results for Ghana of Jedwab et al. (2022). In short, the occupational structure points to some signs of structural transformation near historical Catholic posts but not Protestant, suggesting that these differences in occupational specialization (and the associated structural transformation) are very unlikely to account for persistence, at least for Protestant missions.[43]

Table 8: Exposure to missions and occupational specialization

	(1) Work	(2) Work	(3) Agriculture	(4) Services	(5) Manufacture	(6) Log(nightlights)
Exp to Cath	-0.0181**	-0.0150**	-0.0563***	0.0193***	0.0121***	0.0260
	(0.00850)	(0.00761)	(0.0137)	(0.00660)	(0.00357)	(0.0257)
Exp to Prot	-0.0243***	-0.0196**	-0.00832	-0.00314	-0.00779**	0.0299
	(0.00817)	(0.00774)	(0.0139)	(0.00776)	(0.00340)	(0.0261)
FEs	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	0.719	0.821	0.393	0.178	0.0781	0.652
R-squared	0.220	0.101	0.290	0.100	0.102	0.823
N	34208	25221	34208	34208	34208	675

NOTE. Data: Pooled 2007 and 2013 waves of the DHS. The sample is restricted to people living in DHS clusters located 50km or closer to a mission. The sample in column 2 is restricted to people over 20. The unit of observation in column 7 is the DHS cluster. The table reports OLS estimates. We use $-log(distance)$ to measure exposure. Outcome variables are defined as follows: "Employed" is a dummy variable equal to one if the respondent works (column 1) or if the respondent works and is older than 20 years old (column 2). Dummy equal to one if the respondents works in agriculture (column 3), services (column 4), or manufactures (column 5). The outcome in column 6 is a dummy variable that equals one if the respondent belongs to the top 40% of the wealth distribution. Column 7 reports the log(1+nightlights), where nighslights are defined as the average nighttime luminosity of the area within the 2 km (urban) or 10 km (rural) buffer surrounding the DHS survey cluster location (removing outliers such as flares from petroleum extraction and other short-duration lights. The background data was also shifted to 0 to account for moonlight). Standard errors () are clustered at DHS cluster level. Geographical, historical and individual controls included. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

[43] In Table O1 in Appendix O, we examine gender heterogeneity and find that the negative effect on propensity to work is confined to the female sub-sample. This may appear surprising, given the persistent impacts of missions on female education. We may speculate that parts of female returns to education are related to marriage market outcome yet a careful analysis of returns to education is out of the scope of this paper.

7.4 Distance to school and education

The analysis of school location reveals strong spatial inequalities that are correlated with the location of missions in the past. In other words, closer to former missions, children grow up closer to both primary and secondary schools. Inequality in distance to school typically translates into inequality in education in poor country contexts. It is well documented that distance to school is a strong determinant of enrollment, especially for girls (King and Hill, 1993; Burde and Linden, 2013; World Bank, 2021), so persistence in school location may be a critical element in understanding spatial inequality in female educational outcomes.

Table 6 shows that the proportion of girls in secondary schools is strongly associated with the presence of historical missions. Such an association is not found for primary schools, where girls make up 48% of students. Data from the 2013 National Survey on the Situation of Out-of-School Children and Adolescents in the DRC (OOSC) confirm the strong correlation between distance to schools and enrollment rates. This survey is representative of children aged 6-17.[44] It includes detailed information on education and on the distance between the respondent's residence and the nearest primary and secondary school for approximately 20,000 children.

Table 9 shows how the probability of children being out-of-school depends on indicators of distance to schools. For primary schools, the effect of distance is strong and similar for boys and girls: if the school is 5-10 km away, children are 14 percentage points less likely to attend than if it is less than 1 km away (40pp for distances above 10 km). For secondary school attendance, the results are very different by gender: the probability of never attending secondary school is already 5 percentage points higher for girls living 3-5 km from a secondary school than for those living less than 1 km, an effect of almost 80% of the mean.[45] It may appear surprising that effects are marked only for secondary schooling, recalling that the persistent effects of missions was particularly marked for primary schooling outcomes among adult women in the 2007 and 2013 waves of the DHS. Yet the progress in primary school attendance have been very substantial over the last decades, so that heterogeneity in schooling outcomes among adolescents in 2013 concerns mostly secondary schooling.

The combination of agglomeration forces (in part driven by competition across religious denominations) and the influence of distance to school in schooling outcomes are important drivers of geographical and gender inequalities in educational outcomes in the DRC and of the persistence of the effects of colonial missions.

[44] The survey was managed by the Ministry of Primary, Secondary and Vocational Education of the DRC and implemented by the Higher Institute of Population Sciences of the University of Ouagadougou.

[45] Note that the mean of the dependent variable is significantly higher in columns 1-3 than in columns 4-6. This is because 25% of the children in our sample start primary school later, when they are older than six years old.

Table 9: Distance to School and Enrollment rates

	Dependent variable: Out-of-school child					
	Primary			Secondary		
	All (1)	Boys (2)	Girls (3)	All (4)	Boys (5)	Girls (6)
Primary school 1-2km	0.0277**	0.0242*	0.0309*			
	(0.0130)	(0.0147)	(0.0176)			
Primary school 3-5km	0.0759***	0.0767***	0.0721***			
	(0.0195)	(0.0257)	(0.0261)			
Primary school 5-10km	0.136***	0.173***	0.0963***			
	(0.0265)	(0.0358)	(0.0357)			
Primary school >10km	0.398***	0.361***	0.432***			
	(0.0928)	(0.111)	(0.0762)			
Secondary school 1-2km				0.00103	-0.00377	0.00529
				(0.00661)	(0.00713)	(0.00948)
Secondary school 3-5km				0.0221*	-0.00367	0.0495**
				(0.0116)	(0.0109)	(0.0200)
Secondary school 5-10km				0.0204*	0.00208	0.0394**
				(0.0117)	(0.0116)	(0.0192)
Secondary school >10km				0.138***	0.0700***	0.214***
				(0.0346)	(0.0263)	(0.0488)
Mean Y	0.208	0.199	0.217	0.0473	0.0321	0.0629
R-squared	0.187	0.188	0.188	0.0592	0.0358	0.0803
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
N	12086	6170	5916	9030	4577	4453

NOTE. Data: Out-of-School Children and Adolescents Survey. The sample in Columns (1)-(3) is restricted to children in primary school age (6-11) while it is restricted to children in secondary school age (12-17) in Columns (4)-(6). The outcome variable is a dummy variable that equals one if the respondent is out-of-school at the time of the survey. Standard errors () are clustered at the "grappe" level. Province fixed-effects are always included. Controls include age, whether the respondent lives in a rural/urban area and sex.

8 Conclusion

Our paper proposes a new mechanism to explain the long-term consequences of historical missions on women education in the DRC. Contemporaneous schools - which are overwhelmingly linked either to a Catholic or a Protestant church - seem to compete, whereby the opening of a school of a given religion appears to trigger the subsequent opening of a school of the other religion (but not of the same). This competition appears the most likely channel for the agglomeration of schools in the vicinity of historical missions. This agglomeration has gendered consequences, with girls' education being more sensitive to distance to school, and thus more likely to be influenced by the distance to historical missions.

An interesting avenue for further research would be to examine the gendered returns to education from the colonial period until today. Historians insist on the lack of economic opportunities for women during the colonial era and the low labour market returns to education (Lauro, 2020; Lembagusala Kikumbi, 2018). Yet we find that the demand for girls' education, right after independence, was very large. This raises the question of the nature of returns to women education: are there labour market return for some? What about the marriage market returns? Do these returns change over time? What is the legacy of the colonial labour market structure? This latter question is even more relevant that our analysis of DHS data suggests that women participation to the labour market is *lower* closer to historical mission, although their levels of education are higher.

Regarding the supply of education, recently, the Congolese government has increased its efforts to provide free education and has launched an important program to build non-denominational public schools. In this context, our paper raises the question of the impact of these public investments on schools run by religious organizations, particularly in terms of complementarity and substitutability: Will these schools reduce inequalities in access to education by opening in areas where private actors are not active? Should we expect new competition between new public schools and religious schools? More generally, in many countries, private actors play a very important (and growing) role in the delivery of education. While a large literature has examined the consequences of this competition for the cost and quality of education, to the best of our knowledge, there is no analysis of the spatial consequence and the possible agglomeration of schools in specific areas. This a promising area for future research. Another gap in the literature concerns the possibility that religions compete for new converts through schools. This is likely relevant in other contexts and may have important consequences for the type of education provided by these actors.

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Appendix A Catholic and Protestant Educational Programs

The strong conservative view existing in the Catholic system regarding girls' education is well summarized in the following paragraph, which is an excerpt of the official (governmental) program of 1952 to be followed by subsidized schools in Congo.

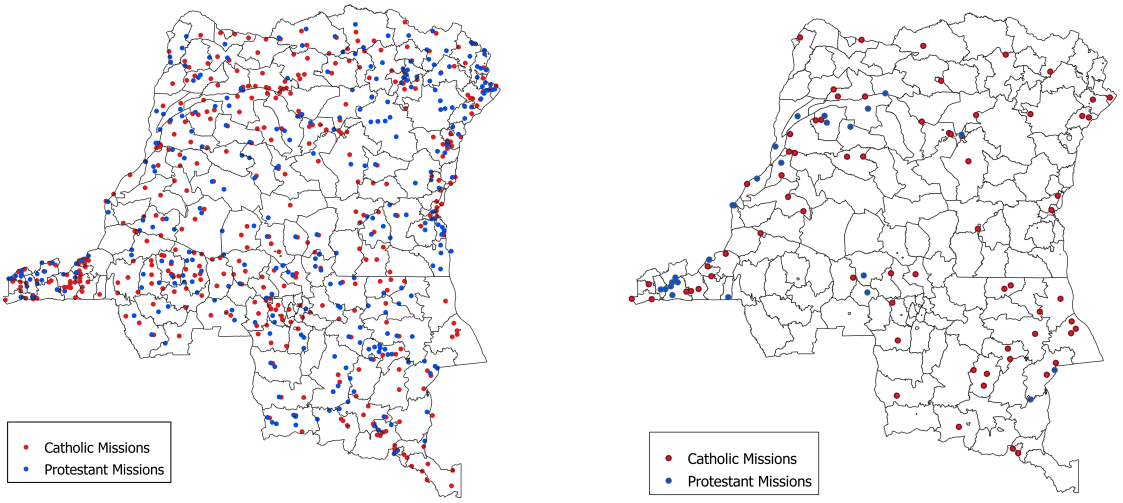
> "The ideal would be to be able to pursue the moral and intellectual uplift of boys and girls at the same pace. Unfortunately, this ideal cannot be realized due to a variety of unfavorable circumstances: [...] lower intellectual receptivity of girls compared to boys [...] It is necessary to design a girls' education program that trains good wives and good mothers and that does not neglect practical branches such as gardening, cooking, washing, ironing, sewing, child care, hygiene, and housekeeping.(Service de l'Enseignement (1952), p.18)".

The difference with the Protestant viewpoint is striking as illustrated by the following excerpt of the minutes of the Congo Missionary Conference of 1924 (this conference gathered annually Protestant missions active in the Congo):

> "In this land, where the woman's social position is so much lower than that of the man's we believe that a mixed school is a powerful factor in lifting the woman to be man's equal. The girls being in the same class as boys have in the daily competition an opportunity of showing an equal aptitude for learning as the boys. Thus we expect the old idea of woman's inferiority to man will be done away with.(Congo Missionary Conference (1924), p.33)".

Appendix B Data Comparison

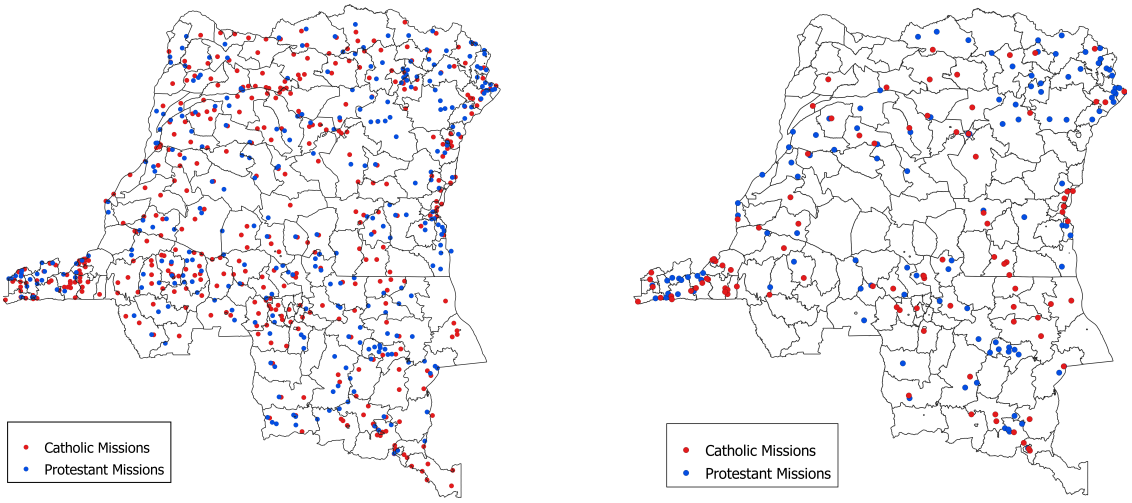
Figure B1: Data comparison with Cagé and Rueda (2020)



(a) Our data

(b) Cagé and Rueda (2020)

Figure B2: Data comparison with Nunn (2010)



(a) Our data

(b) Nunn (2010)

Appendix C Measures of exposure to missions

Table C1: Exposure to missionary presence in 1900,1948 and DHS

	N	Mean	St. deviation	Max	Min
Exposure to Catholics in 1900	148	-230.14	145.61	-592.28	-4.52
Exposure to Catholics in 1948	148	-37.81	19.76	-114.50	-2.98
Exposure to Catholics in DHS	785	-21.64	20.83	-126.20	-0.37
Exposure to Nuns in 1900	148	-306.26	187.33	-790.68	-4.52
Exposure to Nuns in 1948	148	-54.43	31.47	-158.61	-2.98
Exposure to Nuns in DHS	785	-35.40	35.88	-189.21	-0.37
Exposure to Protestants in 1900	148	-142.64	87.24	-362.27	-6.43
Exposure to Protestants in 1948	148	-45.61	23.83	-161.64	-6.43
Exposure to Protestants in DHS	785	-32.16	28.33	-191.05	-0.33

Notes: Exposure to mission of type X in 1900 and in 1948 is our measure of average exposure computed at the territory level. It is computed as the average (negative) distance in kilometres between 1000 random points generated within the territory in the corresponding year and the nearest mission of type X. With the DHS data, exposure is measured as the (negative) distance in kilometres from each DHS cluster to the closest mission in 1948. N corresponds to the number of clusters in the DHS, while it corresponds to the number of territories for our historical distances.

Appendix D Long-term Effects: Threats to identification and Robustness Checks

In this Appendix we provide further discussion and analyses in order to rule out a spurious correlation between mission location and education outcomes today. First we discuss the potential endogeneity of historical post location. Second we investigate whether missions left lasting impact on the main dimension they targeted: religion. Finally we perform a series of robustness checks.

Endogenous location of historical posts.–Our main specification includes an extensive state-of-art set of historical and geographic controls, which the literature have identified as important determinants of mission location (Jedwab et al., 2022). Nevertheless, we cannot rule out the presence of unobserved confounding factors. To reduce this concern, we follow the strategy introduced by Cagé and Rueda (2016) and restrict the analysis to those individuals living in DHS clusters with at least one mission within a 50 km radius. The idea behind this restriction is that areas located far from mission posts most likely present substantial differences from those closer to posts, not only in terms of geographical attributes but also institutional or cultural factors. In order to enable comparisons between similar areas on these dimensions, we remove these remote areas from the sample.[46] [47]

Finally, an important concern is that our treatment (exposure to missions) mainly captures differential degrees of urbanization. Indeed, most colonial posts in the DRC (but not all), became cities or towns after independence. In that case, our treatment would be a proxy for distance to the city, and our empirical strategy would consists in a comparison between more and less urbanized areas. To account for this, we have always included population density in 1900 as a proxy for current urbanization (the correlation between our measure of population density in 1900 and an index of urbanization in 2000 is 0.81).[48] We do not directly control for current urbanization in our main specifications as it can be understood as a *bad control* in the sense of Angrist and Pischke (2009). Table D1 shows the re-estimation of Equation 1 including urbanization in 2000 as a control and shows that our results barely move. Even if this variable can be considered as a *bad control*, the fact

[46] The main threshold chosen here to define proximity is 50 km. Cagé and Rueda (2016) use 100km as their threshold, but their respondents' cities are on average 140km away from the nearest mission, while in our case, due to the higher availability of data, it is 22km for Catholics and 32km for Protestants. The choice of this threshold does not affect our results. Virtually the same results are obtained by choosing different thresholds (i.e. 30km, 40km or no threshold).

[47] In the same line, linear regression may be biased if the true relationship is not linear and the overlap in the support of X is small or if the (expected) gains of our treatment vary in X, which may be a concern given the number of continuous covariates that we include in our specification. Appendix E shows that our results remain robust after imposing common support and estimating an interacted linear regression.

[48] We acknowledge that these historical measures of population density have strong limitations (Guinnane, 2023). However, in our case, historical population density strongly correlates with current population density, which is derived from remote sensing image collections (e.g. Landsat imagery). Moreover, our results are not sensitive to the inclusion of historical population density.

that our results change little when we control for current urbanization suggests that it is not the main driver of the correlation (Table D1).

Table D1: Exposure to missions, education and urbanization

	(1) Years of education	(2) Literacy	(3) Post primary	(4) Secondary or more
Exposure to Catholic	0.00298	-0.0184*	-0.0110	0.0157**
	(0.103)	(0.0104)	(0.0118)	(0.00787)
Exp to Cath x Female	0.262***	0.0566***	0.0463***	-0.0134**
	(0.0730)	(0.0104)	(0.0106)	(0.00642)
Exposure to Protestant	-0.0341	-0.0172	-0.0139	-0.00240
	(0.110)	(0.0112)	(0.0131)	(0.00839)
Exp to Prot x Female	0.348***	0.0563***	0.0524***	0.0110
	(0.0699)	(0.00967)	(0.0108)	(0.00713)
Urbanization	4.828***	0.459***	0.491***	0.280***
	(0.471)	(0.0402)	(0.0437)	(0.0362)
FEs	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Mean Y	6.933	0.637	0.566	0.165
R-squared	0.334	0.223	0.255	0.179
N	34654	34654	34654	34654

NOTE. Data: Pooled 2007 and 2013 waves of the DHS. The sample is restricted to people living in DHS clusters located 50km or closer to a mission. The table reports OLS estimates. We use $-log(distance)$ to measure exposure. "Urbanization" is an index ranging from 0.00 (extremely rural) to 1.00 (extremely urban) for the area within the 2 km (urban) or 10 km (rural) buffer surrounding the DHS survey cluster location. Outcome variables are defined as follows: single years of education in column (1), ability to read a whole sentence in column (2), probability of having post-primary education in column (3) (it includes incomplete secondary education) and probability of having secondary or higher education in column (4). Standard errors () are clustered at DHS cluster level. Geographical, historical and individual controls included. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Mission location and religion. – Conversion was the primary goal of missionary and historians accounts suggest that providing education was often seen as a strategy to attract new converts. If missionary activities are to have left long-lasting traces, we expect them first on the religious dimension. To investigate whether this is the case, we replace education with religion in the estimated model (Equation 1). Results presented in Table D2 confirm that missions triggered changes that have persisted until today: proximity to historical Catholic missions increases the probability of being Catholic, while proximity to historical Protestant missions increases the probability of being Protestant.

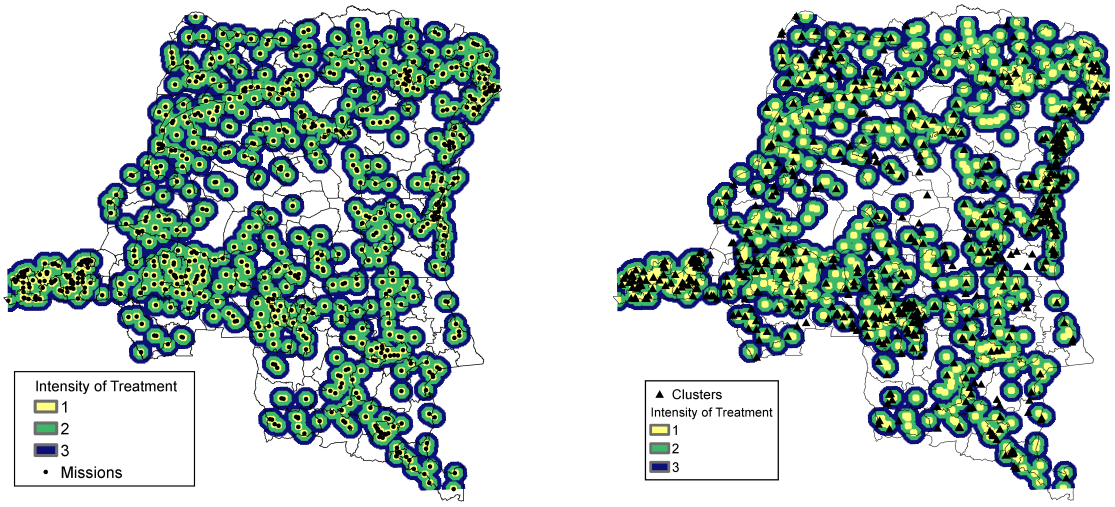
Table D2: Historical missionary presence and religion today

	(1) Religion today: Catholic	(2) Religion today: Protestant
Exposure to Catholic	0.0395***	-0.0172
	(0.0108)	(0.0107)
Exposure to Protestant	0.00913	0.0270**
	(0.0134)	(0.0134)
FEs	Yes	Yes
Controls	Yes	Yes
Mean Y	0.293	0.267
R-squared	0.0877	0.0957
N	34654	34654

NOTE. Data: Pooled 2007 and 2013 waves of the DHS. The sample is restricted to people living in DHS clusters located 50km or closer to a mission. We use $-log(distance)$ to measure exposure. The table reports OLS estimates. Outcome variables are dummies that equal one if the respondent reports that he/she is Catholic or Protestant, respectively. Standard errors () are clustered at DHS cluster level. Geographical, historical and individual controls included. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Alternative measure of exposure to Christian missions – First, we consider an alternative measure of exposure to past missionary presence. Instead of measuring exposure as the negative (logarithmic) distance from each DHS cluster to the nearest mission, which in the context of the DHS data introduces classical measurement error due to random cluster displacements, we measure exposure using different sets of Euclidean distance buffers. Therefore, we classify each DHS cluster into three categories: highly exposed (0-16 km away from a mission), moderately exposed (16-33 km away), and weakly exposed (33-50 km away) (Figure D1). As in our main specification, we find in Table D3 that women in highly exposed clusters are more educated today. Second, if missions are located in better areas and educated people sort themselves into more favorable areas, migration would be a concern.

Figure D1: Intensity of Treatment



(a) Missions and area of influence

(b) DHS clusters and missions' intensity

Notes: Figure D1a shows the different intensity buffers. Number "1" corresponds to the area within a 16km radius from a mission, while "2" represents the area between 16km-33km and "3" represents the area between 33km-50km away from a mission. On the other hand, Figure D1b shows the correspondence between DHS clusters and the intensity measures. If a DHS cluster is 20km away from its closest mission, then it is treated with "medium" intensity. Only the closest mission is considered when assigning exposure.

Table D3: Degree of exposure to missions and education

	(1) Years of education	(2) Literacy	(3) Post primary	(4) Secondary or more
HIT	0.128	-0.0206	-0.0125	0.0112
	(0.288)	(0.0273)	(0.0321)	(0.0206)
HIT x Female	0.502**	0.106***	0.0987***	-0.00624
	(0.206)	(0.0280)	(0.0249)	(0.0184)
LIT	0.355	0.0555	0.0456	-0.0319
	(0.311)	(0.0364)	(0.0382)	(0.0223)
LIT x Female	-0.561*	-0.0930**	-0.0654*	0.0201
	(0.294)	(0.0383)	(0.0335)	(0.0239)
FEs	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Mean Y	6.933	0.637	0.566	0.165
R-squared	0.301	0.197	0.229	0.165
N	34654	34654	34654	34654

NOTE. Data: Pooled 2007 and 2013 waves of the DHS. The sample is restricted to people living in DHS clusters located 50km or closer to a mission. The table reports OLS estimates. Exposure measures at described in Section D. Outcome variables are defined as follows: single years of education in column (1), ability to read a whole sentence in column (2), probability of having post-primary education in column (3) (it includes incomplete secondary education) and probability of having secondary or higher education in column (4). Standard errors () are clustered at DHS cluster level. Geographical, historical and individual controls included. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Migration.–Migration could also be considered as a potential confounder. In fact, people could be sorting themselves into missionary locations nowadays, since these areas could present better geographical, economic or cultural characteristics. Table D4 shows that our results are not driven by

migration by focusing only on people who never migrated from their place of residence. Although point estimates are not always significant here, this is likely due to low power due to smaller sample size. Indeed, by focusing on non-migrants, we have to restrict the sample to those people surveyed in the 2007 DHS round since the 2013 round does not have information on the number of years that respondents spent in their place of residence. Therefore, our sample size is reduced from 34.000 to 7.000. Still, the size and direction of coefficients are very similar.

Table D4: Exposure to missions and education of non-migrants

	(1) Years of education	(2) Literacy	(3) Post primary	(4) Secondary or more
Exposure to Catholic	0.143	-0.0168	0.00753	0.0227**
	(0.180)	(0.0169)	(0.0193)	(0.0108)
Exp to Cath x Female	0.237	0.0721***	0.0405*	-0.0204**
	(0.145)	(0.0220)	(0.0233)	(0.00996)
Exposure to Protestant	0.0747	-0.0125	-0.00896	0.00302
	(0.177)	(0.0167)	(0.0186)	(0.0126)
Exp to Prot x Female	0.232*	0.0475**	0.0459**	-0.00769
	(0.134)	(0.0194)	(0.0208)	(0.0102)
FEs	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Mean Y	6.324	0.603	0.521	0.123
R-squared	0.390	0.281	0.317	0.167
N	7567	7567	7567	7567

NOTE. Data: 2007 wave of the DHS. The sample is restricted to people surveyed in the 2007 DHS round who has never migrated, and lived in a DHS cluster located 50km or closer to a mission at the time of the survey. The table reports OLS estimates. We use $-log(distance)$ to measure exposure. Outcome variables are defined as follows: single years of education in column (1), ability to read a whole sentence in column (2), probability of having post-primary education in column (3) (it includes incomplete secondary education) and probability of having secondary or higher education in column (4). Standard errors () are clustered at DHS cluster level. Geographical, historical and individual controls included. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Spatial autocorrelation. – A final concern is related to the existence of spatial autocorrelation, which could reduce our estimated standard errors. To address this issue, we always include geographical fixed effects, latitude and longitude as controls, and several variables measuring distances (as suggested by Voth, 2020). Moreover, we show in Table D5 that the statistical significance of our results is unaffected when adjusting for spatial autocorrelation using Conley standard errors(Conley, 1999).[49]

[49]These results are consistent to the election of different thresholds such as 25km or 50km (not shown).

Table D5: Education in 2000 and missions, 100km Conley standard errors

	(1) Years of education	(2) Literacy	(3) Post primary	(4) Secondary or more
Exposure to Catholic	0.0720	-0.0118	-0.00398	0.0197**
	(0.119)	(0.0108)	(0.0117)	(0.00928)
	[0.137]	[0.010]	[0.013]	[0.009]
Exp to Cath x Female	0.273***	0.0576***	0.0475***	-0.0127*
	(0.0712)	(0.0102)	(0.0103)	(0.00649)
	[0.077]	[0.008]	[0.010]	[0.007]
Exposure to Protestant	-0.00320	-0.0143	-0.0107	-0.000604
	(0.121)	(0.0119)	(0.0136)	(0.00923)
	[0.127]	[0.013]	[0.015]	[0.006]
Exp to Prot x Female	0.348***	0.0564***	0.0525***	0.0110
	(0.0689)	(0.00946)	(0.0106)	(0.00722)
	[0.055]	[0.011]	[0.012]	[0.008]
FEs	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Mean Y	6.933	0.637	0.566	0.165
R-squared	0.304	0.202	0.232	0.165
N	34654	34654	34654	34654

NOTE. Data: Pooled 2007 and 2013 waves of the DHS. The sample is restricted to people living in DHS clusters located 50km or closer to a mission. The table reports OLS estimates. We use $-log(distance)$ to measure exposure. Outcome variables are defined as follows: single years of education in column (1), ability to read a whole sentence in column (2), probability of having post-primary education in column (3) (it includes incomplete secondary education) and probability of having secondary or higher education in column (4). Standard errors are either clustered at DHS cluster level () or account for spatial autocorrelation (100km Conley standard errors) []. Geographical, historical and individual controls included (see Section 4 for details). *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

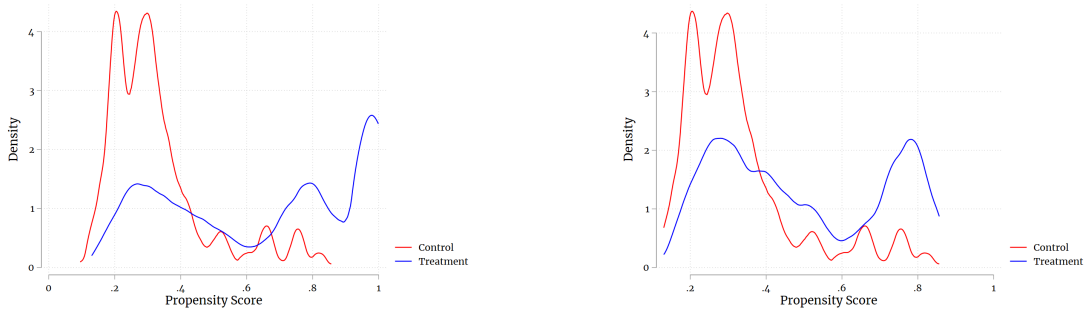
All these analyses confirm that our results are very robust and point to a causal effect of mission on education outcomes today. The question we now turn to is whether these effects are triggered by missionary investments in *education* specifically. This is an important first step towards understanding the mechanisms of persistence. Yet, while this is often an (implicit) claim in papers on persistence, it is rarely formally tested.

Appendix E Common Support

Linear regression is biased if the true relationship is non-linear. However, this bias is small if there is sufficient overlap in the supports of X ($P(d_i = 1 \mid X_i) < 1$ and $0 < P(d_i = 1 \mid X_i)$). Since we include an extensive set of continuous covariates[50], it may be useful to check whether there is a problem of common support. In this section, we first verify that our results hold after imposing common support, and second we estimate an interacted regression model.

To identify common support, we first transform our continuous covariates and treatment variable (distance to the closest Christian mission) into dummy variables and then remove observations that are off support for the estimation of the average treatment effect[51], i.e., treated observations for which the propensity score was higher (smaller) than the maximum (minimum) propensity score of the control observations or control observations for which the propensity score was smaller (larger) than the minimum (maximum) propensity score of the treatment observations. Figure E1 shows the distribution of the propensity score before (Figure E1a) and after (Figure E1b) removing observations off support. Similarly, Table E1 shows the results of our main specification (without distinguishing between Catholic and Protestant missions), before imposing common support (columns 1-4) and after imposing common support (columns 5-8). Coefficients are somewhat smaller, but remain positive and statistically significant.

Figure E1: Overlapping support



(a) Before imposing common support

(b) After imposing common support

Notes: Panel E1a shows the distribution of the propensity score for both the treatment (individuals living 10km or closer to a mission) and the control (individuals living more than 10km away from a mission) groups. Panel E1b shows the distribution of the propensity score for both the treatment and the control groups after removing observations off support – treated observations for which the propensity score was higher (smaller) than the maximum (minimum) propensity score of the control observations or control observations for which the propensity score was smaller (larger) than the minimum (maximum) propensity score of the treatment observations.

[50] Refer to the section in which controls are defined.

[51] We consider an individual as treated if he/she lives 10km or closer to a Christian mission.

Table E1: Exposure to missions and common support

	No common support				Common support			
	(1) Years educ	(2) Literacy	(3) >primary	(4) ≥Secondary	(5) Years educ	(6) Literacy	(7) >primary	(8) ≥Secondary
≤ 10km	-0.00735	-0.0437**	-0.0283	0.0278	0.168	-0.00880	0.00626	0.0262
	(0.237)	(0.0212)	(0.0245)	(0.0173)	(0.241)	(0.0213)	(0.0249)	(0.0176)
≤ 10km x F	0.732***	0.141***	0.126***	-0.0170	0.441**	0.0822***	0.0693***	-0.00888
	(0.151)	(0.0202)	(0.0194)	(0.0135)	(0.173)	(0.0223)	(0.0225)	(0.0145)
FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	6.933	0.637	0.566	0.165	6.216	0.577	0.497	0.116
R-squared	0.288	0.192	0.221	0.136	0.208	0.151	0.170	0.0743
N	34654	34654	34654	34654	28631	28631	28631	28631

NOTE. Data: Pooled 2007 and 2013 waves of the DHS. In columns 1-4, the sample is restricted to people living in DHS clusters located 50km or closer to a mission, while in columns 5-8 we also exclude all observations off support. The table reports OLS estimates. Outcome variables are defined as follows: single years of education in columns (1) and (5), ability to read a whole sentence in columns (2) and (6), probability of having post-primary education in columns (3) and (7) (it includes incomplete secondary education) and probability of having secondary or higher education in columns (4) and (8). Standard errors () are clustered at DHS cluster level. Geographical, historical and individual controls included. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Finally, we estimate the following equation on the full sample after imposing common support:

$$y_i = \beta_0 + \delta_1 d_i + \left(X_i - \bar{X}_i\right)\pi + \left(X_i - \bar{X}_i\right) d_i \gamma + \varepsilon_i$$

where $\left(X_i - \bar{X}_i\right)$ are our control variables in deviation from their mean and $\hat{\delta} = \widehat{ATE}$. Table E2, columns 1-4, shows that our results barely change.

Table E2: Interacted Linear Regression after Common Support

	Female sample				Male sample			
	(1) Years educ	(2) Literacy	(3) >primary	(4) ≥Secondary	(5) Years educ	(6) Literacy	(7) >primary	(8) ≥Secondary
≤ 10km	0.686***	0.0765***	0.0787***	0.0197**	0.255	0.00105	0.0191	0.0271*
	(0.214)	(0.0238)	(0.0237)	(0.00992)	(0.224)	(0.0197)	(0.0229)	(0.0164)
FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	5.406	0.488	0.410	0.0771	7.913	0.763	0.680	0.198
R-squared	0.188	0.133	0.151	0.0542	0.127	0.0573	0.102	0.0720
N	19438	19438	19438	19438	9193	9193	9193	9193

NOTE. Data: Pooled 2007 and 2013 waves of the DHS. The sample is restricted to people living in DHS clusters located 50km or closer to a mission, and all observations off support are removed. Columns 1-4 focus on female individuals, while columns 5-8 focus on male individuals. The table reports OLS estimates. Outcome variables are defined as follows: single years of education in columns (1) and (5), ability to read a whole sentence in columns (2) and (6), probability of having post-primary education in columns (3) and (7) (it includes incomplete secondary education) and probability of having secondary or higher education in columns (4) and (8). Standard errors () are clustered at DHS cluster level. Geographical, historical and individual controls included. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Appendix F Short-term Effects in the 1950s

In this section, we rely on the demographic survey that was carried out in the 1950s (see Section 3 for details).

When using the 1950s demographic survey to estimate equation 2, we need to modify our specification slightly. First, instead of using the territory of birth, as in the 1970s survey, to match individuals to our measures of exposure to missionary presence, we use the territory of residence, since the data are aggregated by territory of residence. In addition, since the data are also aggregated by age cohort, we compute the average of age-specific exposure measures (i.e., for the age group 5-9, we first compute the exposure at birth of those aged 5, 6, 7, 8, and 9, and then take the average).

Let t index territory of residence, a index age-group and d index districts.[52] Then, we run the following regression equation for men, women and both sex separately:

$$y_{t,a} = \alpha + D_{t,a}^{'}\beta + X_{t}^{'}\Phi + \theta_d + \sigma_a + \varepsilon_{t,a} \tag{4}$$

Where $y_{t,a}$ is the educational outcome of age group a in territory t. Instead of looking at individual years of education or whether individual i has at least one year of education, the survey provides information on the share of people with (completed) primary and secondary education, the share of people who can read and write, or the share of people who have not studied. Since the variation is higher now, we also include people born before 1930. The vector $D_{t,a}$ contains the (negative) logarithm of our distance measures (averages of age-specific distances) described in section 3.2, but only for Catholics and Protestants due to the high correlation between distance to Catholic missions and distance to Catholic missions with nuns in this dataset ($\rho = 0.94$).[53] Finally, θ_d and σ_a are district and age group fixed effects.

Since we use district fixed effects (θ_d)[54], we need to account for potential endogeneity in the location of missions within the territories of a given district. To do so, we introduce the vector X_t, which contains geographic and historical controls computed at the territory level. Their choice is based on the main determinants of mission location listed by Jedwab et al. (2022) and include: distance to Catholic and Protestant missions in 1885, area, altitude, ruggedness, latitude, longitude and their product, distance to the nearest colonial route, population density and arable land in 1900, a malaria index, a tsetse susceptibility index, number of slaves exported in the Indian and Atlantic trade, dis-

[52] Districts are one level higher administrative units than territories.

[53] This high correlation may introduce a problem of (almost) perfect multicollinearity due to the fact that our exposure measure is now an average of age-specific exposures, which reduces the variation in our explanatory variables.

[54] Including territory fixed effects leaves us with very little variation. When using data from the 1950s, we move our geographic fixed effects up one level.

tance to the nearest navigable river, and distance to the coast. [55] Standard errors are clustered at the territory of residence level.

Table F1: Education in 1950s and exposure to missionary presence

	(1) Share Primary	(2) Share Secondary	(3) Share read/write	(4) Share Studies
Panel A: Both sex				
Exposure to Catholic	0.0213***	0.00445**	0.0335***	0.0268***
	(0.00729)	(0.00171)	(0.00860)	(0.00810)
Exposure to Protestant	-0.00481	-0.00249	-0.00878	-0.00529
	(0.00996)	(0.00189)	(0.0103)	(0.0108)
Panel B: Men				
Exposure to Catholic	0.0195**	0.00743**	0.0336**	0.0334***
	(0.00919)	(0.00302)	(0.0132)	(0.0103)
Exposure to Protestant	0.0120	-0.00446	0.00932	0.00137
	(0.0120)	(0.00323)	(0.0141)	(0.0136)
Panel C: Women				
Exposure to Catholic	0.0159**	0.0000411	0.0159*	0.0237***
	(0.00738)	(0.000561)	(0.00880)	(0.00736)
Exposure to Protestant	-0.00783	-0.00138**	-0.00805	-0.00711
	(0.00945)	(0.000666)	(0.00915)	(0.00997)
FEs	Yes	Yes	Yes	Yes
Mean Y both	0.215	0.0107	0.160	0.779
Mean Y men	0.368	0.0222	0.300	0.624
Mean Y women	0.0834	0.00228	0.0517	0.919
Controls	Yes	Yes	Yes	Yes
R-squared (both)	0.844	0.582	0.775	0.841
N (both)	1082	836	825	1064

NOTE. Data: Demographic Survey of the 1950s. The unit of observation is a "*Territory x Age-Cohort*". In column (2), the sample is restricted to cohorts older than 15 years old. The table reports OLS estimates. Exposure to missionary presence is measured as $-log(distance)$. Outcome variables are defined as follows: share of people in a given cohort and territory who attended primary (column 1) or secondary (column 2) school, share of people in a given cohort and territory able to read or write (column 3), and share of people with studies in a given cohort and territory (column 4). Standard errors () are clustered at the territory level. Total population, geographical and historical controls included. Cohort and district fixed-effects included in all specifications. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table F1 presents the results. Proximity to Catholic mission increases education for both men and women, while Protestant missions has no detectable effect. Unfortunately, here we are not able to identify the differential effect by gender of Catholic missions with nuns, so we only report the average effect of exposure to general Catholic missions. In terms of magnitude, halving the distance to a Catholic mission increases the share of people with primary school completed by almost 7%, or the share of people able to read and write by about 15%.

[55] We do not include distance to the capital because it is highly correlated with distance to the coast (($\rho = 0.95$).

Appendix G Short-term Effects: Determinants of Missions

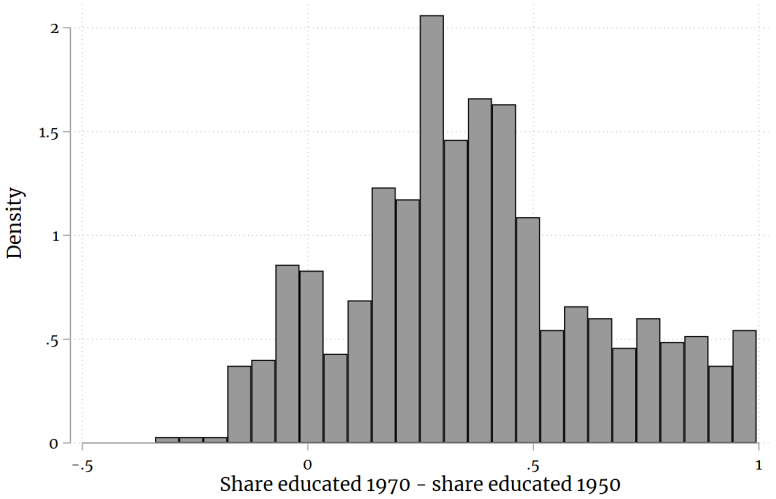
Table G1: Differences between Catholic and Protestant posts, by opening decade

	1900-1910			1920-1930			1940-1948		
	Catholic	Protestant	p-value(1-2)	Catholic	Protestant	p-value(1-2)	Catholic	Protestant	p-value(1-2)
	(1)	(2)		(1)	(2)		(1)	(2)	
Longitude	21.963	23.228	0.396	23.132	24.449	0.123	22.561	23.498	0.284
Latitude	-2.599	-1.689	0.482	-3.923	-3.622	0.743	-2.810	-2.776	0.963
Elevation	568.664	664.965	0.393	726.201	735.825	0.899	685.208	719.918	0.659
Ruggedness Index	5.227	4.719	0.754	4.694	5.450	0.422	6.056	5.333	0.515
Malaria Suitability Index	14.588	12.528	0.240	11.790	12.239	0.719	14.236	12.739	0.147
Distance to navigable river (km)	58.271	90.860	0.210	140.256	98.444	0.077	82.527	112.076	0.128
Distance to coast (km)	1194.633	1275.922	0.650	1331.350	1264.488	0.489	1243.386	1509.821	0.010
Distance to Kinshasa (km)	868.453	926.350	0.716	1011.975	941.810	0.438	918.114	1166.291	0.005
Disantance to colonial routes (km-	79.256	108.589	0.189	99.683	107.704	0.581	101.217	91.132	0.524
Distance to colonial railroad (km)	655.757	511.468	0.213	560.390	644.113	0.163	574.660	694.486	0.022
Population density in 1900	18.146	74.364	0.088	10.300	13.945	0.499	14.790	8.341	0.186
Area suitable for agriculture in 1900	5.352	5.578	0.886	4.125	2.739	0.044	3.975	3.024	0.107
TseTse Fly Suitability Index	0.735	0.515	0.340	0.339	0.535	0.217	0.586	0.663	0.554
Exposure to the Atlantic Slave Trade	344,711.844	6,007.636	0.317	149,143.385	86,064.467	0.624	80,851.923	2,497.541	0.207
N	45	11		78	45		52	74	

Note: This table shows the differences in means between Catholic and Protestant posts along selected variables, depending on the decade in which the posts were opened. A description of the variables and their sources can be found in Section 3.1

Appendix H Short-term Effects: Selection into migration

Figure H1: Degree of Selection into Migration



NOTE.: Data: Demographic Survey of 1950s and Demographic Survey of 1970s. The graph displays the distribution of the difference between the share of educated people in age-cohort a and territory t in the 1970s sample and the share of educated people in age-cohort a and territory t in the 1950s sample. For example, if this difference is 0.2, it means that the share of educated people in age-cohort a and territory t in the 1970s sample is 20 percentage points larger than the share of educated people in the 1950s sample from that same territory and age-cohort.

Table H1: Selection into migration and exposure to missionary presence

	Degree of Selection into Migration		
	(1)	(2)	(3)
Exposure to Catholic	0.00499	0.00621	-0.00215
	(0.0426)	(0.0422)	(0.0447)
Exposure to Protestant	0.0523**	0.0213	0.0399
	(0.0260)	(0.0268)	(0.0305)
Exposure to Catholic Nuns	0.0197	0.0220	0.0176
	(0.0308)	(0.0351)	(0.0355)
Cohort FE	No	Yes	Yes
District FE	No	No	Yes
Territory-level Controls	Yes	Yes	Yes
Mean Y	0.373	0.373	0.373
R-squared	0.147	0.215	0.249
N	645	645	645
p-value Cath=Prot	0.4083	0.7848	0.4968
p-value Cath=Nuns	0.8337	0.8271	0.7882
p-value Nuns=Prot	0.4159	0.9869	0.6169

NOTE. Data: Demographic Survey of the 1950s and Demographic Survey of the 1970s. The unit of observation is a "*Territory x Age-Cohort*". The table reports OLS estimates. Exposure to missionary presence is measured as the $-log(distance)$. It is measured as the average of age-specific exposure measures (at birth) of people from age-cohort a born in territory t. The outcome variable is the difference between the share of educated people in cohort a and territory t in the 1970s sample and the share of educated people in cohort a and territory t in the 1950s sample. Territory-level controls are described in Section F. Standard errors () are clustered at the territory level. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Appendix I Short-term Effects: Time-varying controls

Table I1: Education in 1970s and exposure to missionary presence

	(1) Years educ	(2) Any educ	(3) Primary of more	(4) Years educ	(5) Any educ	(6) Primary of more
Catholic missions	0.520***	0.0296	0.0500**	0.700***	0.0862*	0.0804***
	(0.197)	(0.0277)	(0.0228)	(0.241)	(0.0467)	(0.0301)
Catholic missions x female	0.0361	-0.0162	-0.00384	-0.419	-0.147	-0.0698
	(0.255)	(0.0379)	(0.0312)	(0.391)	(0.0908)	(0.0537)
Protestant missions	-0.124	0.0310	0.00935	-0.147	0.0250	0.00658
	(0.294)	(0.0294)	(0.0329)	(0.297)	(0.0296)	(0.0332)
Protestant missions x female	-0.154	0.0188	-0.00959	-0.110	0.0313	-0.00333
	(0.240)	(0.0286)	(0.0310)	(0.245)	(0.0288)	(0.0321)
Catholic with nuns				-0.0176	-0.0314	-0.0259
				(0.232)	(0.0321)	(0.0285)
Catholic with nuns x female				0.420	0.121*	0.0609
				(0.319)	(0.0634)	(0.0396)
FEs	Yes	Yes	Yes	Yes	Yes	Yes
Territory FE	Yes	Yes	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Time-Varying Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	4.995	0.734	0.435	4.995	0.734	0.435
R-squared	0.443	0.293	0.339	0.444	0.294	0.339
N	41655	41655	41655	41655	41655	41655

NOTE. Data: Demographic Survey of the 1970s. The sample is restricted to people born after 1930. The table reports OLS estimates. Exposure to missionary presence is measured as $-log(distance)$. Outcome variables are defined as follows: single years of education in columns (1) and (2), a binary variable that equals one if the respondent has at least one year of education in columns (2) and (5) and the probability of completing primary education (>5 years of education) in columns (3) and (6). Standard errors () are clustered at the territory of birth level. All regressions include time-varying district-level information on the size of the white Belgian and white non-Belgium population, the size of the indigenous population and the amount of per capita tax levied from the indigenous population. Fixed-effects include city of residence, territory of birth, 5yr age cohorts and whether the individual was born in an urban area. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Appendix J Intergenerational correlation and father's occupation

Table J1: Intergenerational correlation in education in the 1970s

	(1)	(2)	(3)	(4)	(5)	(6)
	Years educ	Primary or more	Post-primary	Years educ	Primary or more	Post-primary
Father's y.o.e	0.0976***	0.0169***	0.0163***	0.0754***	0.0149***	0.0154***
	(0.0105)	(0.00149)	(0.00120)	(0.00553)	(0.00128)	(0.00167)
Mother's y.o.e	0.0452***	0.00924***	0.00911***	0.0325***	0.00646***	0.00662***
	(0.0103)	(0.00215)	(0.00188)	(0.0115)	(0.00189)	(0.00244)
Father's y.o.e x F				0.0459**	0.00425	0.00177
				(0.0210)	(0.00304)	(0.00286)
Mother's y.o.e x F				0.0271***	0.00589***	0.00523**
				(0.00746)	(0.00179)	(0.00207)
FEs	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	6.080	0.636	0.439	6.080	0.636	0.439
R-squared	0.355	0.262	0.299	0.357	0.263	0.299
N	22458	22458	22458	22458	22458	22458

NOTE. Data: Demographic Survey conducted during the 1970s. The sample is restricted to children aged 14-19 during the time of the survey. In the explanatory variables, "*y.o.e*" account for "Years of education" to shorten their names. The table reports OLS estimates. Outcome variables are defined as follows: single years of education in columns (1) and (2), a binary variable that equals one if the respondent has at least one year of education in columns (2) and (5) and the probability of completing primary education (>5 years of education) in columns (3) and (6). Standard errors () are clustered at the territory of birth level. Fixed-effects include city of residence, territory of birth, age, zone of residence of the individual within the city, and father's sector of activity. These sectors are 10: 1) Agriculture, silviculture, hunting and fishing; 2) Extractive industries; 3) Agricultural processing industries; 4) Other processing industries and rubber; 5) Building and civil engineering; 6) Electricity, gaz, water and health services; 7) Financial institutions, insurance, real state; 8) Transport, warehouses and communications; 9) Services; 10) Trade. Controls also include age of parents. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Appendix K Missions and the demand for education of uneducated parents.

We examine whether the demand for education of uneducated parents is different when they grew up closer to a Protestant mission. Formally we estimate the following equation, for both sons and daughters separately:

$$y_{iatz} = \alpha + ParEduc_i^{'}\beta + ParExp_i^{'}\gamma + ParExp_i * ParEduc_i^{'}\pi + X_i^{'}\Phi + \theta_t + \sigma_a + \tau_z + \varepsilon_{iatz} \quad (5)$$

Where y_{iatz} is the educational outcome of child i of age a born in territory t and living in the zone z within her city of residence. $ParEduc$ is a vector containing two binary variables indicating whether the mother and the father have at least one year of education. Finally, $ParExp$ captures whether the father was born in a territory highly exposed to Catholic or to Protestant missions.[56] In our main specification, high exposure to Catholic (Protestant) mission is defined as a binary variable that equals one if the father was born in a territory where the distance to Catholic (Protestant) mission is above the median.[57] X_i is a vector of individual level controls (gender, year of installation in the current city of residence and the age of parents). θ_t, σ_a and τ_z are territory of birth, age and neighborhood (within the city) fixed effects, respectively.

The main coefficient of interest is that on exposure, γ indicating whether uneducated parents who were (highly) exposed to missions take different education decisions (for them $ParEduc = 0$ and thus $ParEduc * ParExp = 0$). Table K1 reports the results and confirms that uneducated parents' exposure to Protestant missions is associated with higher investment in the education of their children, even if, again sizes are modest. Children of uneducated parents have 0.55 more years of education (9.5% of the sample mean) when parents' exposure to Protestant missions is above the median.[58] Exposure to Catholic missions has no significant effect. Furthermore the effect of exposure to Protestant missions is stronger for daughters than for sons.

[56] Results are similar (although of smaller size) if we use the exposure of the mother instead of the father. We prefer using father's exposure to missions because most mothers are uneducated.

[57] Below, we show that these results are robust to alternative thresholds (i.e., top 40% or top 30% of the distribution) or to a continuous measure of exposure.

[58] Interestingly the coefficient on the interaction is of a similar magnitude and an opposite sign, suggesting that educated and uneducated parents had similar demand for education, when highly exposed to Protestant missions.

Table K1: Exposure to mission and children's education: heterogeneity between educated and uneducated fathers

	Daughters			Sons		
	Years educ	$\geq$ Primary	Post-primary	Years educ	$\geq$ Primary	Post-primary
	(1)	(2)	(3)	(4)	(5)	(6)
Father educated	0.833***	0.110***	0.0703***	0.479***	0.0843***	0.0678***
	(0.125)	(0.0272)	(0.0195)	(0.0938)	(0.0188)	(0.0182)
Mother educated	0.420***	0.0797***	0.0674***	0.208***	0.0437***	0.0403***
	(0.0466)	(0.0102)	(0.0100)	(0.0362)	(0.00881)	(0.00937)
High Exposure to Cath	0.0135	-0.0153	-0.0210	-0.229	-0.0537	-0.0250
	(0.203)	(0.0293)	(0.0237)	(0.159)	(0.0330)	(0.0245)
High Exposure to Prot	0.547***	0.0701**	0.0654***	0.369**	0.0788***	0.0441*
	(0.179)	(0.0301)	(0.0195)	(0.150)	(0.0302)	(0.0259)
HEC x Father Educ	0.0866	0.0152	0.0542**	0.219	0.0593*	0.0220
	(0.223)	(0.0338)	(0.0233)	(0.159)	(0.0328)	(0.0249)
HEP x Father Educ	-0.455**	-0.0465	-0.0517**	-0.288*	-0.0784**	-0.0294
	(0.190)	(0.0309)	(0.0200)	(0.150)	(0.0342)	(0.0276)
FEs	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	5.769	0.590	0.391	6.347	0.673	0.480
R-squared	0.350	0.263	0.282	0.371	0.267	0.311
N	9853	9853	9853	10562	10562	10562

NOTE. Data: Demographic Survey of the 1970s. The sample is restricted to daughters aged 14-19 at the time of the survey in columns (1)-(3) and to sons aged 14-19 in columns (4)-(6). The table reports OLS estimates. High exposure to mission of type X is a dummy variable that equals one if father's exposure to mission of type x is in the top 50% of the distribution. Outcome variables are defined as follows: single years of education in column (1), the probability of completing primary education (>5 years of education) in column (2), and the probability of having post-primary education (>6 years of education) in column (3). Standard errors () are clustered at the father's territory of birth level. Fixed-effects include territory of birth, age and zone of residence. Controls include sex, year of installation in the current city and age of parents. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

These results are robust to alternative specifications. First, Table K2 shows the same specification but uses instead mother's exposure to missionary presence. Second, Tables K3 and K4 measure high exposure to missions by using alternative thresholds: high exposure is a dummy variable that takes value one if the father was born in a territory belonging to the top 40% or to the top 30% of the distribution of exposure to missionary presence, respectively. Finally, Table K5 measures exposure to missionary presence by using the logarithmic distance, as reported in Section 4.2.

Table K2: Exposure to mission and children's education: heterogeneity between educated and uneducated mothers

	Daughters			Sons		
	Years educ	$\geq$ Primary	Post-primary	Years educ	$\geq$ Primary	Post-primary
	(1)	(2)	(3)	(4)	(5)	(6)
Father educated	0.651***	0.0925***	0.0696***	0.454***	0.0771***	0.0652***
	(0.103)	(0.0161)	(0.0137)	(0.0621)	(0.0142)	(0.0132)
Mother educated	0.522***	0.0935***	0.0929***	0.271***	0.0511***	0.0455***
	(0.0637)	(0.0132)	(0.0166)	(0.0502)	(0.0132)	(0.0125)
High Exposure to Cath	0.103	-0.00292	0.0274*	0.0251	0.00170	0.00425
	(0.0830)	(0.0156)	(0.0155)	(0.0656)	(0.0132)	(0.0159)
High Exposure to Prot	0.190***	0.0318**	0.0158	0.182**	0.0202	0.0286*
	(0.0685)	(0.0142)	(0.0147)	(0.0740)	(0.0167)	(0.0173)
HEC x Father Educ	-0.140	-0.0324*	-0.0484**	-0.0353	-0.00762	0.00377
	(0.101)	(0.0182)	(0.0231)	(0.0840)	(0.0229)	(0.0221)
HEP x Father Educ	-0.0541	0.0151	0.0152	-0.102	-0.00665	-0.0158
	(0.0895)	(0.0198)	(0.0189)	(0.102)	(0.0266)	(0.0251)
FEs	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	5.770	0.590	0.393	6.358	0.676	0.481
R-squared	0.348	0.262	0.284	0.368	0.265	0.311
N	9561	9561	9561	10138	10138	10138

NOTE. Data: Demographic Survey of the 1970s. The sample is restricted to daughters aged 14-19 at the time of the survey in columns (1)-(3) and to sons aged 14-19 in columns (4)-(6). The table reports OLS estimates. High exposure to mission of type X is a dummy variable that equals one if mother's exposure to mission of type x is in the top 50% of the distribution. Outcome variables are defined as follows: single years of education in column (1), the probability of completing primary education (>5 years of education) in column (2), and the probability of having post-primary education (>6 years of education) in column (3). Standard errors () are clustered at the mother's territory of birth level. Fixed-effects include territory of birth, age and zone of residence. Controls include sex, year of installation in the current city and age of parents. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table K3: Exposure to mission and children's education: heterogeneity between educated and uneducated fathers

	Daughters			Sons		
	Years educ	$\geq$ Primary	Post-primary	Years educ	$\geq$ Primary	Post-primary
	(1)	(2)	(3)	(4)	(5)	(6)
Father educated	0.801***	0.108***	0.0680***	0.468***	0.0783***	0.0622***
	(0.116)	(0.0251)	(0.0187)	(0.0921)	(0.0191)	(0.0182)
Mother educated	0.419***	0.0794***	0.0672***	0.208***	0.0441***	0.0405***
	(0.0467)	(0.0102)	(0.00997)	(0.0360)	(0.00878)	(0.00933)
High Exposure to Cath	0.0142	-0.0157	-0.0199	-0.228	-0.0506	-0.0250
	(0.204)	(0.0307)	(0.0247)	(0.145)	(0.0308)	(0.0227)
High Exposure to Prot	0.551***	0.0737**	0.0613***	0.360**	0.0843***	0.0354
	(0.140)	(0.0290)	(0.0209)	(0.146)	(0.0288)	(0.0294)
HEC x Father Educ	0.0854	0.0197	0.0485**	0.238	0.0650**	0.0273
	(0.221)	(0.0336)	(0.0239)	(0.147)	(0.0316)	(0.0244)
HEP x Father Educ	-0.461***	-0.0568*	-0.0458**	-0.318**	-0.0812**	-0.0238
	(0.154)	(0.0295)	(0.0222)	(0.137)	(0.0330)	(0.0290)
FEs	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	5.769	0.590	0.391	6.347	0.673	0.480
R-squared	0.350	0.263	0.282	0.371	0.267	0.311
N	9853	9853	9853	10562	10562	10562

NOTE. Data: Demographic Survey of the 1970s. The sample is restricted to daughters aged 14-19 at the time of the survey in columns (1)-(3) and to sons aged 14-19 in columns (4)-(6). The table reports OLS estimates. High exposure to mission of type X is a dummy variable that equals one if father's exposure to mission of type x is in the top 40% of the distribution. Outcome variables are defined as follows: single years of education in column (1), the probability of completing primary education (>5 years of education) in column (2), and the probability of having post-primary education (>6 years of education) in column (3). Standard errors () are clustered at the father's territory of birth level. Fixed-effects include territory of birth, age and zone of residence. Controls include sex, year of installation in the current city and age of parents. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table K4: Exposure to mission and children's education: heterogeneity between educated and uneducated fathers

	Daughters			Sons		
	Years educ	≥ Primary	Post-primary	Years educ	≥ Primary	Post-primary
	(1)	(2)	(3)	(4)	(5)	(6)
Father educated	0.784***	0.110***	0.0737***	0.482***	0.0834***	0.0653***
	(0.105)	(0.0217)	(0.0180)	(0.0818)	(0.0180)	(0.0162)
Mother educated	0.415***	0.0791***	0.0666***	0.206***	0.0436***	0.0401***
	(0.0468)	(0.0102)	(0.00986)	(0.0361)	(0.00869)	(0.00930)
High Exposure to Cath	-0.293	-0.0315	-0.0246	-0.166	-0.0241	-0.0214
	(0.321)	(0.0459)	(0.0356)	(0.128)	(0.0271)	(0.0287)
High Exposure to Prot	0.838***	0.0982***	0.0642**	0.270**	0.0580**	0.0326
	(0.189)	(0.0279)	(0.0250)	(0.116)	(0.0239)	(0.0276)
HEC x Father Educ	0.402	0.0393	0.0506	0.180	0.0431	0.0308
	(0.339)	(0.0481)	(0.0353)	(0.141)	(0.0306)	(0.0323)
HEP x Father Educ	-0.768***	-0.0860***	-0.0528**	-0.251**	-0.0613**	-0.0276
	(0.203)	(0.0286)	(0.0253)	(0.111)	(0.0267)	(0.0305)
FEs	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	5.769	0.590	0.391	6.347	0.673	0.480
R-squared	0.351	0.263	0.282	0.371	0.267	0.311
N	9853	9853	9853	10562	10562	10562

NOTE. Data: Demographic Survey of the 1970s. The sample is restricted to daughters aged 14-19 at the time of the survey in columns (1)-(3) and to sons aged 14-19 in columns (4)-(6). The table reports OLS estimates. High exposure to mission of type X is a dummy variable that equals one if father's exposure to mission of type x is in the top 30% of the distribution. Outcome variables are defined as follows: single years of education in column (1), the probability of completing primary education (>5 years of education) in column (2), and the probability of having post-primary education (>6 years of education) in column (3). Standard errors () are clustered at the father's territory of birth level. Fixed-effects include territory of birth, age and zone of residence. Controls include sex, year of installation in the current city and age of parents. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table K5: Exposure to mission and children's education: heterogeneity between educated and uneducated fathers

	Daughters			Sons		
	Years educ	≥ Primary	Post-primary	Years educ	≥ Primary	Post-primary
	(1)	(2)	(3)	(4)	(5)	(6)
Father educated	-0.0483	-0.00134	0.102*	0.253	0.0378	0.0377
	(0.494)	(0.0749)	(0.0608)	(0.369)	(0.0823)	(0.0929)
Mother educated	0.416***	0.0793***	0.0667***	0.208***	0.0437***	0.0402***
	(0.0463)	(0.0101)	(0.00992)	(0.0359)	(0.00874)	(0.00929)
Father's Exposure to Cath	-0.196	-0.0343*	-0.0194	-0.0983	-0.0237	-0.00740
	(0.159)	(0.0190)	(0.0176)	(0.103)	(0.0171)	(0.0182)
Father's Exposure to Prot	0.507***	0.0734***	0.0505***	0.200*	0.0436***	0.0236
	(0.129)	(0.0193)	(0.0164)	(0.107)	(0.0165)	(0.0225)
Exp to Cath x Educ	0.295	0.0364	0.0488***	0.112	0.0352*	0.0116
	(0.191)	(0.0224)	(0.0181)	(0.0956)	(0.0182)	(0.0190)
Exp to Prot x Educ	-0.456***	-0.0584***	-0.0365**	-0.154	-0.0423**	-0.0176
	(0.145)	(0.0198)	(0.0163)	(0.102)	(0.0178)	(0.0228)
FEs	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean Y	5.769	0.590	0.391	6.347	0.673	0.480
R-squared	0.351	0.263	0.283	0.371	0.267	0.311
N	9853	9853	9853	10562	10562	10562

NOTE. Data: Demographic Survey of the 1970s. The sample is restricted to daughters aged 14-19 at the time of the survey in columns (1)-(3) and to sons aged 14-19 in columns (4)-(6). The table reports OLS estimates. Exposure to missionary presence is measured as $-log(distance)$. Outcome variables are defined as follows: single years of education in column (1), the probability of completing primary education (>5 years of education) in column (2), and the probability of having post-primary education (>6 years of education) in column (3). Standard errors () are clustered at the father's territory of birth level. Fixed-effects include territory of birth, age and zone of residence. Controls include sex, year of installation in the current city and age of parents. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Appendix L Missions and contemporary schools: robustness

The strong positive correlation between historical mission schools and contemporary schools is not surprising if the missions were located in urban areas. While this may be true, it is less likely that urbanization explains all of our results. Here we show that the strong positive correlation between historical and contemporary schools holds when we control for population density, estimated in either 1900 or 2000. Historical population density data comes from the HYDE 3.1 Database, which provides estimates of population density at a spatial resolution of about $85km^2$ at the equator. On the other hand, population density in 2000 comes from The Gridded Population of the World (GPW) collection (fourth version), which has an output resolution of about $1km^2$ at the equator. Tables L1 and L2 show the results after controlling for both historical and contemporary population density.

Table L1: Former missionary presence and supply of primary education

	(1) Schools	(2) S/1000	(3) % Girls	(4) % Fem Teac.	(5) Schools	(6) S/1000	(7) % Girls	(8) % Fem Teach.
Cath	22.92***	0.949***	0.000800	0.0000649	18.20***	1.029***	0.000952	0.000136
	(3.151)	(0.210)	(0.00216)	(0.000354)	(2.822)	(0.205)	(0.00222)	(0.000362)
Prot	11.46***	0.406**	0.00239	0.000128	12.06***	0.389**	0.00281	0.000189
	(4.010)	(0.162)	(0.00268)	(0.000506)	(3.411)	(0.161)	(0.00272)	(0.000512)
Mean Y	16.15	1.267	0.477	0.513	16.27	1.271	0.477	0.513
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Collect FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pop den 1900	Yes	Yes	Yes	Yes	No	No	No	No
Pop den 2000	No	No	No	No	Yes	Yes	Yes	Yes
R-squared	0.391	0.349	0.190	0.287	0.514	0.345	0.192	0.287
N	3595	3446	3595	3595	3454	3448	3454	3454

NOTE. Data: Universe of primary and secondary schools in the DRC in 2020, from Ministry of education. The table reports OLS estimates. The unit of observation is a 20kmx20km grid cell. Only grid cells with at least one mission or one school are included. Historical and contemporary population density variables are described in Appendix L. Outcome variables are defined as follows: total number of schools in columns (1) and (5), number of schools per 1000 inhabitants in columns (2) and (6), average share of girls in school by grid cell in columns (3) and (7), and average share of female teachers in school by grid cell in columns (4) and (8). Sector fixed-effects (collectivités) included in all specifications. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table L2: Former missionary presence and supply of secondary education

	(1) Schools	(2) S/1000	(3) % Girls	(4) % Fem Teach.	(5) Schools	(6) S/1000	(7) % Girls	(8) % Fem Teach.
Cath	15.88***	0.560***	0.0196***	0.0281***	12.56***	0.608***	0.0183***	0.0265***
	(2.300)	(0.156)	(0.00451)	(0.00393)	(2.052)	(0.151)	(0.00458)	(0.00397)
Prot	7.805**	0.253**	0.0100**	0.00623	8.273***	0.236**	0.0101**	0.00613
	(3.048)	(0.119)	(0.00468)	(0.00470)	(2.621)	(0.119)	(0.00472)	(0.00475)
Mean Y	10.69	0.802	0.374	0.0980	10.81	0.805	0.372	0.0963
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Collect FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pop den 1900	Yes	Yes	Yes	Yes	No	No	No	No
Pop den 2000	No	No	No	No	Yes	Yes	Yes	Yes
R-squared	0.325	0.322	0.518	0.553	0.443	0.317	0.518	0.554
N	2994	2860	2966	2994	2865	2862	2837	2865

NOTE. Data: Universe of primary and secondary schools in the DRC in 2020, from Ministry of education. The sample is restricted to secondary schools. The table reports OLS estimates. The unit of observation is a 20kmx20km grid cell. Only grid cells with at least one mission or one school are included. Historical and contemporary population density variables are described in Appendix L. Outcome variables are defined as follows: total number of schools in columns (1) and (5), number of schools per 1000 inhabitants in columns (2) and (6), average share of girls in school by grid cell in columns (3) and (7), and average share of female teachers in school by grid cell in columns (4) and (8). Sector fixed-effects (collectivités) included in all specifications. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Appendix M Competition between schools and religious affiliations

When the lagged dependent variable is included as a regressor, OLS estimates are inconsistent since they are correlated with the error term. Moreover, when T is small, the introduction of individual fixed effects does not solve the problem (Nickell, 1981). Here, we show that our results (two-way fixed effects model with large T) do not change when we implement the estimator developed by Arellano and Bond (1991), which is designed to avoid the problem raised by the inclusion of lagged dependent variables. To this end, we estimate the following first difference model:

$$\Delta y_{it} = \gamma_1 \Delta y_{i,t-1} + \gamma_2 \Delta y_{i,t-2} + \gamma_3 \Delta y_{i,t-3} + \beta_0 \Delta x_{i,t} + \beta_1 \Delta x_{i,t-1} + \beta_2 \Delta x_{i,t-2} + \beta_3 \Delta x_{i,t-3} + \Delta u_{i,t}$$

Where y_{it} is the opening of a school of type x in year t, and x_{it} is the opening of a school of the opposite type in year t. Because of practical reasons, we now separate the different lags in the right hand side of the equation. Table M1 shows evidence of strong substitution effects between schools of the same religion, but strong agglomeration effects between schools of different religion, suggesting competition between religious affiliations.

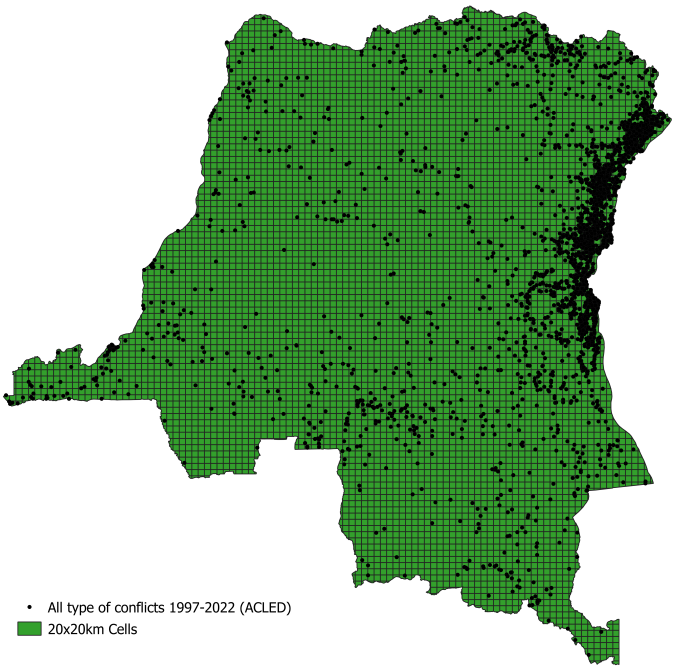
Table M1: Competition between religious affiliations

	(1) P(Catholic)	(2) P(Protestant)	(3) P(Catholic)	(4) P(Protestant)
Catholic		0.0799***		0.107***
		(0.0278)		(0.0383)
Lag 1 Catholic	-0.155***	0.0135*	-0.245***	0.0206**
	(0.0210)	(0.00691)	(0.0281)	(0.00887)
Lag 2 Catholic	-0.00582	-0.00149	-0.00766	0.00190
	(0.00481)	(0.00646)	(0.00520)	(0.00765)
Lag 3 Catholic	-0.0167***	0.000860	-0.0199***	0.00299
	(0.00404)	(0.00546)	(0.00430)	(0.00626)
Protestant	0.0723***		0.0594**	
	(0.0180)		(0.0235)	
Lag 1 Protestant	0.00745*	-0.167***	0.0147**	-0.236***
	(0.00450)	(0.0248)	(0.00586)	(0.0328)
Lag 2 Protestant	0.00187	-0.000116	0.00612	0.00356
	(0.00412)	(0.00553)	(0.00498)	(0.00669)
Lag 3 Protestant	0.00188	-0.0134***	0.00438	-0.0109**
	(0.00348)	(0.00464)	(0.00398)	(0.00523)
Time FEs	Yes	Yes	Yes	Yes
Mean Y	0.0524	0.116	0.0524	0.116
N	63378	63378	63378	63378

NOTE. The dependent variable is a dummy that equals one if a new school of type x opens in cell c at year t. The independent variables are dummies that equal one if a new school opens in year t (Catholic or Protestant), in year $t-1$ (lag 1), $t-2$ (lag 2), or $t-3$ (lag 3). Standard errors () clustered at the 20x20km grid cell level. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Appendix N Post-colonial schools and conflict

Figure N1: Distribution of conflict events in the DRC, 1997-2022



NOTE.: Data comes from The Armed Conflict Location Event Data Project (ACLED). The figure shows the distribution of all type of conflicts in the DRC between 1997-2022. Events include battles, explosions/remote violence, protests, riots, strategic developments, and violence against civilians.

Table N1: Historical Missionary Presence and Contemporary Schools

	Primary education				Secondary education			
	(1) Schools	(2) Schools/1000	(3) % Girls	(4) % Female Teachers	(5) Schools	(6) Schools/1000	(7) %Girls	(8) % Female Teachers
Nb Cat Missions	16.78***	0.840***	0.000228	0.000135	11.21***	0.474***	0.0147***	0.0266***
	(2.424)	(0.202)	(0.00199)	(0.000332)	(1.824)	(0.146)	(0.00417)	(0.00377)
Nb Prot Missions	4.340*	0.404***	0.00206	-0.0000545	2.451	0.254**	0.00874*	0.00335
	(2.278)	(0.153)	(0.00275)	(0.000515)	(1.657)	(0.117)	(0.00465)	(0.00467)
Mean Y	14.57	1.267	0.477	0.513	9.620	0.803	0.373	0.0978
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Collectivite FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.333	0.345	0.190	0.286	0.291	0.317	0.513	0.552
N	3537	3388	3537	3537	2940	2806	2912	2940

NOTE. Data: Universe of primary and secondary schools in the DRC in 2020, from Ministry of education. The sample is restricted to grid-cells with less than 100 conflicts between 1997 and 2022. The table reports OLS estimates. The unit of observation is a 20kmx20km grid cell. Only grid cells with at least one mission or one school are included. Outcome variables are defined as follows: total number of schools in column (1), schools per 1000 population in 2015 in columns (2) and (6), average share of girls in school by grid cell in column (2), and average share of female teachers in school by grid cell in column (3). Sector fixed-effects (collectivités) included in all specifications. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Table N2: Competition between religious affiliations

	(1) P(Catholic)	(2) P(Protestant)	(3) P(Catholic)	(4) P(Protestant)
Catholic between t and t-3	-0.0192***	0.0235***		
	(0.00344)	(0.00489)		
Protestant between t and t-3	0.0118***	0.00555		
	(0.00283)	(0.00435)		
Catholic between t and t-5			-0.0217***	0.0196***
			(0.00319)	(0.00450)
Protestant between t and t-5			0.00936***	-0.00446
			(0.00280)	(0.00405)
Time FEs	Yes	Yes	Yes	Yes
Grid-cell FEs	Yes	Yes	Yes	Yes
Mean Y	0.0472	0.109	0.0491	0.114
R-squared	0.0851	0.181	0.0876	0.183
N	62979	62979	58305	58305

NOTE. The dependent variable is a dummy that equals one if a new school of type x opens in cell c at year. The sample is restricted to grid-cells with less than 100 conflicts between 1997 and 2022. The independent variables are dummies that equal one if a new school of the opposite type opened in cell c in year t-1, t-2 or t-3, or in cell c in year t-1, t-2, t-3, t-4 or t-5, respectively. Standard errors () clustered at the 20x20km grid cell level. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Appendix O Exposure to missions and occupational specialization by gender

Table O1: Exposure to missions and occupational specialization

	(1) Work	(2) Work	(3) Agriculture	(4) Services	(5) Manufacture
Exposure to Cath	0.0114	0.0100	-0.0406***	-0.0146***	0.0447***
	(0.00884)	(0.00811)	(0.0142)	(0.00553)	(0.00882)
Exposure to Cath x Female	-0.0442***	-0.0378***	-0.0235	0.0509***	-0.0488***
	(0.0102)	(0.0104)	(0.0152)	(0.00818)	(0.0102)
Exposure to Prot	-0.00358	-0.00415	0.00848	-0.0134**	0.00137
	(0.00891)	(0.00825)	(0.0145)	(0.00642)	(0.00785)
Exposure to Prot x Female	-0.0303***	-0.0227**	-0.0246**	0.0149*	-0.0133
	(0.00915)	(0.00904)	(0.0121)	(0.00856)	(0.00849)
FEs	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Mean Y	0.719	0.821	0.393	0.178	0.0781
R-squared	0.223	0.105	0.292	0.105	0.110
N	34208	25221	34208	34208	34208

NOTE. Data: Pooled 2007 and 2013 waves of the DHS. The sample is restricted to people living in DHS clusters located 50km or closer to a mission. The sample in column 2 is restricted to people over 20. The unit of observation in column 7 is the DHS cluster. The table reports OLS estimates. We use $-log(distance)$ to measure exposure. Outcome variables are defined as follows: "Employed" is a dummy variable equal to one if the respondent works (column 1) or if the respondent works and is older than 20 years old (column 2). Dummy equal to one if the respondents works in agriculture (column 3), services (column 4), or manufactures (column 5). Standard errors () are clustered at DHS cluster level. Geographical, historical and individual controls included. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Appendix P Long term effects by birth decade

Table P1: Education in 2000 and missions, by birth decade

	Years of education			
	(1)	(2)	(3)	(4)
Exposure to Missions	0.315**	0.468***		
	(0.142)	(0.159)		
Exp to Mission x (1980-1989)	0.102	-0.00476		
	(0.115)	(0.141)		
Exp to Mission x (1970-1979)	0.0186	-0.108		
	(0.130)	(0.151)		
Exp to Mission x (1950-1970))	0.120	0.0270		
	(0.160)	(0.173)		
Exposure to Catholic			0.271*	0.320**
			(0.139)	(0.157)
Exp to Cath x (1980-1989)			0.00921	-0.0124
			(0.113)	(0.132)
Exp to Cath x (1970-1979)			-0.0464	-0.0756
			(0.138)	(0.154)
Exp to Cath x (1950-1970)			-0.000437	0.0693
			(0.148)	(0.171)
Exposure to Protestant			0.144	0.259*
			(0.141)	(0.147)
Exp to Prot x (1980-1989)			0.155	0.136
			(0.107)	(0.120)
Exp to Prot x (1970-1979)			0.166	0.0873
			(0.130)	(0.141)
Exp to Prot x (1950-1970)			0.194	0.0212
			(0.135)	(0.159)
FEs	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Mean Y	7.005	6.101	7.005	6.101
R-squared	0.337	0.317	0.338	0.319
N	25561	17266	25561	17266

NOTE. Data: Pooled 2007 and 2013 waves of the DHS. Columns 2 and 4 restrict the sample to women. The sample is restricted to people living in DHS clusters located 50km or closer to a mission. The sample is restricted to respondents over the age of 20. The table reports OLS estimates. We use $-log(distance)$ to measure exposure. The outcome variable is single years of education. Standard errors are either clustered at DHS cluster level (). Geographical, historical and individual controls included (see Section 4 for details). *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.

Appendix Q Competition across different school types

Table Q1: Competition between school types

	(1) P(Catholic)	(2) P(Protestant)	(3) P(Catholic)	(4) P(Protestant)
Public Catholic between t and t-3	-0.0185***	0.0232***		
	(0.00363)	(0.00491)		
Public Protestant between t and t-3	0.0120***	0.000199		
	(0.00286)	(0.00422)		
Private between t and t-3	0.0231***	0.0244**		
	(0.00832)	(0.0109)		
Secular Public between t and t-3	0.00562	0.0164***		
	(0.00349)	(0.00495)		
Other between t and t-3	0.0106***	0.0317***		
	(0.00378)	(0.00584)		
Public Catholic between t and t-5			-0.0207***	0.0198***
			(0.00338)	(0.00461)
Public Protestant between t and t-5			0.00852***	-0.0100**
			(0.00283)	(0.00397)
Private between t and t-5			0.0188**	0.0188*
			(0.00775)	(0.0103)
Secular Public between t and t-5			0.00123	0.0103**
			(0.00317)	(0.00459)
Other between t and t-5			0.00918**	0.0291***
			(0.00375)	(0.00540)
Time FEs	Yes	Yes	Yes	Yes
Grid-cell FEs	Yes	Yes	Yes	Yes
Mean Y	0.0521	0.119	0.0543	0.125
R-squared	0.107	0.191	0.110	0.193
N	61849	61849	57079	57079

NOTE. The dependent variable is a dummy that equals one if a new school of type x opens in cell c at year. The independent variables are dummies that equal one if a new school of the same or different type opened in cell c in year t-1, t-2 or t-3, or in cell c in year t-1, t-2, t-3, t-4 or t-5, respectively. The category "Other" includes: "Église de réveil du Congo", "École conventionnée Islamique", "École conventionnée Kimbanguiste", "École conventionnée Salutiste", "École conventionnée Adventiste", and "École conventionnée de la Fraternité". Standard errors () clustered at the 20x20km grid cell level. Robust standard errors in parenthesis. *** for $p < 0.01$, ** for $p < 0.05$, * for $p < 0.1$.