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The Legacy of the Catholic Missionary Sisters: Effects on Women's Human Capital in the Democratic Republic of the Congo*

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Abstract:

This paper examines the long-term impact of Catholic missionary nuns on women's human capital in the Democratic Republic of Congo. By using newly digitized historical data on Christian missions, recent demographic surveys, and administrative data on schools and healthcare facilities, we analyze the lasting effects of the missionaries' presence, focusing on gender-specific outcomes. While both Catholic and Protestant missions influenced educational attainment, the presence of Catholic nuns significantly enhanced these effects, especially for girls. Proximity to Catholic missions is also associated with better health outcomes. Beyond education and health, exposure to missions with nuns delays marriage, reduces polygamy, and increases women's decision-making power within households. However, the negative effects on female labor force participation likely reflect the enduring influence of the "Christian household" model promoted during the colonial period. Overall, Catholic missionary nuns played a decisive role in shaping women's outcomes, with effects that remain visible more than a century later.

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1. Introduction

The history of education in the Democratic Republic of Congo (DRC) is closely linked to the work of religious missions, which played a central role in shaping the school system during the colonial era (1908-1960). In 1960, on the eve of independence, approximately 97% of pupils were enrolled in missionary schools (Yates, 1976). Catholic missions, supported by the Belgian colonial authorities, largely dominated the educational sector, accounting for nearly 85% of pupils, compared to just 11% for Protestant missions (Boyle, 1995). Catholic schools followed the official curriculum defined by the government, *which was a requirement* for receiving public subsidies.[1] The main objective was not to provide advanced education to the Congolese, but rather to train them for subordinate jobs deemed useful for the colonial project.

Girls' education, considered secondary by the colonial authorities, was entrusted to Catholic nuns (notably, among Catholics, the Sisters of Our Lady, the Sisters of Charity and the Sisters of Saint Joseph). Girls received a more limited education than boys, consisting of the basic literacy and numeracy, catechism and domestic work (sewing, small-scale farming, housework and childcare) and tailored to what was considered their future role in society (Depaepe and Lemba- gusala Kikumbi, 2018; Masandi, 2004). The underlying objective was to promote the image of the "progressive Christian household" among the local population and to train "good Christian wives" for the Congolese elite, women able to run a home and raise children in the faith (Dunkerley , 2009; Masandi, 2004).

> *It is unnecessary to emphasise the importance of educating indigenous women in a civil action plan implemented by schools. (…) (Due to) the generally lower intellectual receptivity of girls compared to boys (…), we cannot consider developing girls' education at the same pace, on such a widespread basis, or with such a comprehensive programme as for boys. It is therefore important to give girls' education an essentially educational character, with a practical orientation, among other things. However, the indigenous female population must receive more than a minimum of general education if we want to (…) introduce the concepts of civilisation in a lasting way into indigenous society (Belgian Congo: Education Department, 1948, p.21).*

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[1] At the end of the colonial period, Protestant missions were also eligible for subsidies on condition that they followed the official curriculum.

In the context of Rwanda, Buscaglia and Randell (2012) highlight, regarding social homes, the transformation of the female role caused by colonial power:

> *[…] An educational welfare program which supported female promotion for an* élite *group of women in urban areas with the objective of making them suitable partners for the chosen* évolués *and under male control. This completely reversed the gender power relations existing in rural areas where women were important agricultural workers. In the new replicated urban nuclear families, men were seen as the producers and women as the re-producers needing social control. Far from being emancipated, women became domesticated in their roles, which mimicked the roles of expatriate wives and mothers.*

The influence of nuns on women and girls was characterised by ambivalence, oscillating between the reproduction of patriarchal and conservative norms and the opening of new possibilities for emancipation. As part of their educational and evangelising mission[2], their work was traditionally guided by a conservative and patriarchal view that assigned domestic and maternal roles to girls. However, their influence also had, a somewhat emancipatory nature. Not only did the sisters undoubtedly influence women's and girls' preferences regarding education, promoting the intergenerational transmission of human capital, but they also likely had a direct impact on the dynamics of the marriage market. Since the stated goal of girls' education was to create so-called "progressive" Christian households, the criteria for selecting spouses changed, and traditional family structures (polygamy, ethnic endogamy) were altered. Moreover, the ways in which couples organise themselves and negotiate power within their relationships have been completely transformed. Furthermore, the very identity of the sisters may have served as *a role model* for young girls exposed to their influence. Many of these sisters had chosen exile and colonial adventure as a way to achieve personal emancipation, conveying to their students an image of women enjoying a certain degree of independence (McBride, 2021).[3] Indeed, many of these nuns came from rural and working-class backgrounds in the Flemish region of Belgium. Their missionary commitment helped them escape the social and economic constraints of their poor and very conservative backgrounds (Yates, 1982). Besides their focus on education, the missions played a key role in social work and primary health care. In this context, the sisters, as nurses, were responsible for providing care, especially to mothers and children. Some

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[2] Evangelisation remained the preserve of priests within the Catholic Church. Nuns played only a subordinate role, but they had a monopoly on direct contact with women and girls.

[3] Qualitative interviews we conducted with Belgian Catholic sisters also corroborate this idea.

students received more advanced training in nursing and midwifery (Likaka , 2006; Masandi, 2004). The sisters' work in the health sector was therefore able to influence health-related investment behaviour, particularly in maternal and child health.

This article aims to analyse and measure the lasting effects of the presence of missionary sisters on the education and health of women compared to men in the DRC. Education in missions (of all types) was mainly aimed at boys, while girls' education relied on the presence of female teachers (missionary sisters) according to the doctrine of that time. Contrary to most of the existing literature, this article does not focus solely on the overall impact of missions (Catholic or Protestant), but distinguishes between those missions where Catholic sisters were active, with their monopoly on female education and their critical role in caring for the sick and young children.[4] Protestant societies, which were also very active in the colony, were more financially and ideologically independent from the Belgian state: most of them were British, Swedish or American. They also provided education and healthcare for girls and women, but the content of their programs and the staff responsible for implementing them differed significantly from those of the Catholic missions. Not only were the women (and men) from more educated backgrounds, but Protestant schools were also relatively progressive, offering the same curriculum to boys and girls in mixed classes. The educational content was also perceived as more demanding by observers at the time (Wiebe, 1961). Although fewer in number than the Catholic missions, the Protestant missions offer a relevant counterfactual for this analysis: the *Reports on the Administration of the Belgian Congo* reveal that Protestant female missionaries were much more numerous than their male counterparts.

This analysis was made possible by digitising several historical sources. For Catholic and Protestant missions, we rely o n official yearbooks and compilations by historians, providing detailed information such as the exact dates when posts were opened, the name of the congregation or society responsible for each post, and, in the case of Catholic posts, the possible presence of nuns (Braekman, 1961; Corman, 1924, 1935; Irvine, 1978; Van Wing, 1949). Examination of these sources also confirms the almost systematic presence of Protestant women missionaries at the opening of posts: at least one woman was involved in the establishment of 88% of the posts surveyed (Irvine, 1978). Regarding education and

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[4] To our knowledge, only one article in economics analyses the long-term effects of women missionaries. Calvi et al. (2020) present interesting findings on the persistent effects of Protestant missionaries: the presence of a post where Protestant missionaries were active during the colonial period is associated with higher levels of education and literacy in India, for both men and women.

health indicators, we mainly rely on nationally representative *Demographic and Health Surveys* (DHS), with the most recent two waves collected in 2007 and 2013. We also draw on the 2020 secondary school yearbook and data on existing health facilities in fourteen provinces, published by the DRC Ministry of Education and GRID3 COD-Health Facilities v4.0, respectively. This comprehensive yearbook provides the exact geographical location of each school, its year of opening, the number of students by gender, and the gender of teaching staff recorded in 2020. Detailed descriptions of the various data sources are provided in the appendix.

2. The long-term effects of Christian sisters

2.1. *Empirical strategy*

The following estimates are based on two approaches. The first relies on DHS data and compares individuals living close (less than 10 km) to a colonial mission, with or without the presence of nuns, to more distant populations (between 10 and 50 km).[5] Estimates based on secondary school or health center yearbooks and reports are spatially created by partitioning the territory into 20 km x 20 km cells, with each cell representing one observation. Our analysis in this case involves comparing the characteristics of these cells with one another. Given that missionaries were likely to settle in better areas, we always include a wide range of control variables (geographical and historical) in our empirical analysis to take into account the endogenous location of missionary activities. The control variables used in each estimate are listed below each table.

2.2. *Empirical models*

Throughout the paper, we estimate two main models. Using the DHS data (Tables 1, 3 and 5), our main specification is as follows:

$$y_{icp} = \beta_0 + \beta_{Cath} M_c^{Cath} + \beta_{Prot} M_c^{Prot} + \gamma W_i' + \Phi X_c' + \sigma_p + \varepsilon_{icp}$$

where i represents an individual, c the DHS cluster (village or urban neighbourhood) and p the province. M_c^{Cath} and M_c^{Prot} are binary variables equal to 1 if there is a Catholic or Protestant mission within 10 km of the place of residence of individual i. According to the specification, we distinguish within Catholic missions those in which sisters were present, M_c^{Nuns}, and those in which they were not, M_c^{WoNuns}. W_i' includes individual-level control

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[5] Populations located more than 50 km from a mission are excluded from this comparison because, being more remote, they undoubtedly have different structural characteristics.

variables such as age, age squared and gender. Finally, the vector X′c includes geographical and historical controls calculated at the DHS cluster level. Their selection is based on the main determinants of mission location listed by Jedwab et al. (2022): length of the agricultural season, area of cultivated land and population density in 1900, annual precipitation in 2000, distance from the border, coast, pre-colonial exploration routes, colonial railways and rivers, as well as the prevalence index for malaria and sleeping sickness, longitude, latitude and average slope of the clusters. σ_p refers to the fixed effects of the province, which are included in all regressions and control for time-invariant characteristics at the provincial level. Since our main variables of interest are defined at the DHS cluster level, we cluster standard errors at that level.

When analysing school census data (Tables 2 and 4), we estimate a similar model, with the observation unit being a 20 km x 20 km cell:

$$y_{gp} = \beta_0 + \beta_C M_g^{Cath} + \beta_P M_g^{Prot} + \Phi X_g' + \sigma_p + \varepsilon_{gp}$$

where g represents a cell.

2.3. Girls′ education

Our main focus is on the long-term impact of religious missions on current female enrollment in the DRC, as measured by DHS data. We look at two aspects: the number of years of schooling and whether education continues beyond primary school (as a binary variable). Table 1 compares girls and boys based on their proximity to a Protestant or Catholic mission, with or without the presence of nuns. Regarding schooling, girls seem to benefit from the presence of a Catholic or Protestant mission, with an average effect of about 0.6 additional years compared to boys (for an average of 6.9 years) or compared to girls living in more remote areas (column 1). Column 2 shows that this effect is mainly due to the presence of nuns in Catholic missions (+0.78 years), an effect that clearly exceeds that observed for Protestant missions (+0.45 years). Columns 3 and 4 of the table confirm these results regarding access to post-primary education: they indicate a 20-percentage point gap between girls and boys in mission areas, which is significant given the average post-primary enrolment rate (64%). However, when comparing girls living near Catholic missions with those in more remote areas, the effect of missions on secondary enrollment is similar, regardless of whether nuns are specifically present. Overall, the effects of Protestant missions are generally smaller.

However, we find no significant effect on the men's education. This is likely due to two

factors. First, men are on average more educated than women (76% of men in our sample completed primary education, compared to 50% of women), and there is therefore less room for improvement[6]. Second, girls' enrolment is more sensitive to distance from school than boys'. Consequently, although boys attend school even if it is relatively far away, the opening of a school close to their place of residence is particularly important for girls (Álvarez-Aragón et al., 2025).

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[6] In this regard, if we examine instead the probability of having completed secondary education or higher, the effect on men becomes apparent. These results are available on request.

Table 1: Education

	No. of years of schooling		Post-primary = 1	
	(1)	(2)	(3)	(4)
Catholic mission in ≤ 10 km	0.0333		-0.0384	
	(0.252)		(0.0248)	
Female	-2.888***	-2.900***	-0.304***	-0.304***
	(0.108)	(0.104)	(0.0135)	(0.0130)
Catholic Mission in ≤ 10 km x Female	0.600***		0.127***	
	(0.161)		(0.0204)	
Protestant mission in ≤ 10 km	-0.171	-0.0775	-0.0422*	-0.0284
	(0.247)	(0.249)	(0.0242)	(0.0241)
Protestant mission in ≤ 10 km x Female	0.582***	0.452**	0.0838***	0.0687***
	(0.170)	(0.183)	(0.0217)	(0.0229)
Catholic mission with nuns in ≤ 10 km		-0.108		-0.0598**
		(0.290)		(0.0268)
Catholic mission with nuns in ≤ 10 km x Female		0.777***		0.140***
		(0.170)		(0.0208)
Catholic mission without nuns in ≤ 10 km		0.0928		-0.0130
		(0.285)		(0.0280)
Catholic mission without nuns in ≤ 10 km x Female		0.302		0.0819***
		(0.188)		(0.0215)
Mean of Y	6.929	6.929	0.639	0.639
R-squared	0.300	0.301	0.207	0.207
Province fixed effects	X	X	X	X
Geographical controls	X	X	X	X
N	34,505	34,505	34,561	34,561
Nuns x Female = No nuns x Female (p-value)		0.0317		0.0386
Nuns x Woman = Protestant x Woman (p-value)		0.289		0.0711

NOTE. Data: 2007 and 2013 DHS for the DRC. The sample includes women aged 15 to 49 and men aged 15 to 59. The sample is restricted to individuals living in DHS clusters located 50 km or less from a mission. The dependent variables are defined as follows: number of years of schooling (columns 1 and 2) and an indicator variable taking the value 1 if the individual has completed post-primary education (columns 3 and 4). The explanatory variables are binary variables taking the value 1 if there is at least one mission of a given type within a 10 km radius of the respondent's place of residence. Control variables always include age, age squared and fixed effects of the DHS wave. Geographical controls include length of growing season, area of cultivated land in 1900, annual rainfall in 2000, distance from the national border, distance from the coast, malaria index, distance from pre-colonial exploration routes, distance from colonial railways, distance from rivers, slope, population density in 1900, tsetse fly breeding suitability index, and cluster longitude and latitude. Robust standard errors pooled at the DHS cluster level are shown in parentheses.

Table 2, based on spatial observations compiled from the secondary school yearbook, supports the findings in Table 1. It shows that Catholic missions have a significant impact on the presence of girls among pupils, on the proportion of girls enrolled in school in the population, and on the proportion of women in the teaching profession (columns (1), (3) and (5)).[7] Once again, these effects significantly increase when a congregation of nuns was involved in the mission. For example, the historical presence of nuns is associated with a 7-percentage point increase in the share of girls enrolled in the population, more than triple the average (2.9%). In the absence of nuns in the mission, this effect is reduced by more than half.

These results are consistent with existing literature, which highlights the significant role played by Christian missions in enhancing women's human capital (Nunn, 2014). However, our analysis refines this finding by highlighting the importance of the type of mission: it is not just the mission itself, but specifically the presence of female missionaries whose actions targeted women that had a lasting impact on girls' education.

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[7] The presence of women in the teaching staff is even greater than in Protestant schools, whereas initially Protestant missions had a higher proportion of female staff.

Table 2: Characteristics of schools

	Proportion of female pupils		Female pupils/total population		Proportion of female teachers	
	(1)	(2)	(3)	(4)	(5)	(6)
Catholic mission	0.119***		0.0557***		0.0509***	
	(0.0103)		(0.0102)		(0.00444)	
Protestant mission	0.0746***	0.0751***	0.0163**	0.0170**	0.0219***	0.0221***
	(0.0110)	(0.0110)	(0.00807)	(0.00807)	(0.00438)	(0.00440)
Catholic mission with nuns		0.127***		0.0702***		0.0554***
		(0.0129)		(0.0147)		(0.00576)
Catholic mission without nuns		0.0949***		0.0291***		0.0410***
		(0.0124)		(0.0103)		(0.00556)
Mean of Y	0.190	0.190	0.0295	0.0295	0.0522	0.0522
R-squared	0.234	0.234	0.0266	0.0270	0.317	0.317
Province fixed effects	X	X	X	X	X	X
Geographical controls	X	X	X	X	X	X
N	6149	6149	5954	5954	6149	6149
Nuns = Without nuns (p-value)		0.0483		0.0179		0.0652
Nuns = Protestant (p-value)		0.000657		0.000790		0.00000183

×Note. Data: All secondary schools in the DRC in 2020, from the Ministry of Education's statistical yearbook. The observation unit is a spatial cell measuring 20 km by 20 km. The treatment variables indicate, for each type considered, the presence of a historical mission in the cell. The dependent variables are defined as follows: (1) the share of girls among secondary school students observed (columns 1 and 2), (2) the share of girls in secondary school relative to the total population (columns 3 and 4), and (3) the share of female teachers among secondary school teachers observed (columns 5 and 6). Cell-level controls systematically include: presence of a navigable river, presence of a colonial railway, presence of a pre-colonial exploration road, population density in 1900, area of cultivated land in 1900, average altitude, ruggedness, and distance between the cell centroid and Kinshasa. Fixed province effects are included in all specifications. Robust standard errors are shown in parentheses.

2.4. Health indicators

Table 3 again uses DHS data, this time to examine the influence of religious missions on child health and maternity practices. The results indicate a specific impact of nuns, which is slightly less pronounced than that of education variables.[8]

Exposure to a Catholic mission, regardless of whether it hosted nuns, is linked to a significant reduction in infant mortality, approximately 15 to 20% (column 1). There has also been an increase in the likelihood of giving birth in hospitals or health centres, which has resulted in a decline in home births or births attended solely by a midwife. However, the presence of nuns seems to play a distinct role in certain aspects of pediatric and maternal care, as it is associated with higher infant vaccination rates and a greater likelihood of receiving prenatal care from a doctor.

However, no significant association is observed for protestant missions, regardless of the health indicators considered.

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[8] Guirkinger and Villar's (2022) analysis of fertility behaviour (based on DHS data) reveals that women tend to have fewer children in areas close to historic Protestant and Catholic missions with nuns.

Table 3: Health indicators

	Under-five mortality	Vaccinated	Place of delivery:			Prenatal care:		
			Hospital	Health centre	Home	Doctor	Nurse	Midwife
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Catholic mission with nuns in ≤ 10 km	-0.0144**	0.0351***	0.0608**	-0.0433	-0.0175	0.0458***	-0.0406*	-0.00430
	(0.00666)	(0.0135)	(0.0255)	(0.0275)	(0.0217)	(0.0148)	(0.0244)	(0.00404)
Catholic mission without nuns in ≤ 10 km	-0.0254***	0.0298	0.0486*	0.0628**	-0.111***	0.0263	0.0113	-0.0105***
	(0.00716)	(0.0191)	(0.0288)	(0.0302)	(0.0186)	(0.0172)	(0.0292)	(0.00397)
Protestant Mission in ≤ 10 km	-0.00361	-0.00400	0.0473	-0.0224	-0.0249	0.0186	0.0180	-0.00499
	(0.00695)	(0.0155)	(0.0296)	(0.0293)	(0.0183)	(0.0167)	(0.0280)	(0.00377)
Mean of Y	0.125	0.864	0.278	0.498	0.225	0.115	0.482	0.0151
R-squared	0.0177	0.0904	0.156	0.0716	0.194	0.197	0.0829	0.00815
Fixed effects for provinces	X	X	X	X	X	X	X	X
Geographical controls	X	X	X	X	X	X	X	X
N	60,982	16,137	21,868	21,868	21,868	13,447	13,447	13,447
Nuns = Without nuns (p-value)	0.221	0.820	0.734	0.004	0.00014	0.334	0.145	0.210
Nuns = Protestant (p-value)	0.301	0.083	0.742	0.618	0.800	0.191	0.131	0.893

NOTE. 2007 and 2013 DHS surveys for the DRC. The observation unit is the child. The sample is restricted to DHS clusters located within 50 km of a mission. The dependent variable in column 1 is an indicator equal to 1 if the child died before the age of 5. The variable in column 2 is equal to 1 if the child was vaccinated. Columns 3, 4, and 5 indicate whether the place of birth was a hospital, a health centre, or the home, respectively. Columns 6, 7, and 8 indicate whether the mother received prenatal care from a doctor, nurse or midwife. The treatment variables are indicators equal to 1 if there is at least one mission of a given type within a 10 km radius of the respondent's place of residence. Control variables always include the age and sex of the child, the age and age squared of the mother, and fixed effects of the EDS survey wave. Geographic controls include the length of the growing season, the area of cultivated land in 1900, annual rainfall in 2000, distance to the national border, distance to the coast, malaria index, distance to pre-colonial exploration roads, distance to colonial railways, distance to the river, slope, population density in 1900, tsetse fly breeding suitability index, and cluster longitude and latitude. Robust standard errors grouped at the EDS cluster level in parentheses.

2.5. Education and health infrastructures

Looking at the estimates above, an important question arises: why and how does the presence of nuns in missions founded in the early 20th century continue to influence the well-being of populations today? One possible explanation is that nuns, by taking charge of girls' education and promoting new behaviours or female role models (in the context of the time), helped to establish a stronger demand for education and healthcare, which has been passed down through the generations.

Furthermore, these missions were among the first educational institutions in the country and had infrastructure that often remained in place. After independence, the Congolese government undertook to modernise and expand access to education by subsidizing schools, without questioning the role of Christian congregations. In the early 1970s, approximately 62% of primary school pupils attended Catholic schools and 21% attended Protestant schools (MacGaffey, 1982). The 1980s marked a turning point with the failed nationalisation of the education system, followed by a structural crisis, which led the state to gradually hand over the management of schools to the main religious denominations (Catholicism, Protestantism, Islam and Kimbanguism). Since the 2000s, access to education has improved, but significant regional disparities remain, exacerbated by inadequate public planning. Similar to the colonial era, religious actors continue to use the opening of schools as a leverage for evangelisation, while relying on school fees paid by households to support their religious activities (Briand and Nicolai, 2021; Gauthier et al., 2021).

In what follows, we therefore propose to analyse the historical effect of missions on current school and health infrastructure, emphasising the role played by Christian sisters. Again, we use territorial data. Columns (1), (3), (5) and (6) refer to all observations, while columns (2), (4) and (7) refer to a sample reduced to cells with a small number of schools (fewer than 14) in order to minimise the potential impact of large urban centres.

As shown in Table 4 below, the correlation between education and health infrastructure remains largely positive, regardless of the type of mission (Catholic or Protestant).

Catholic missions without nuns and Protestant missions have a comparable and largely positive effect, but the presence of nuns significantly reinforces this effect. For example, the presence of Catholic nuns more than doubles the impact of missions on the number of schools or health centres per capita: +0.222 and +0.545 compared to the overall average for the population (0.201 and 0.401). As indicated in the last column, these effects are likely not the result of increased urbanisation, as measured by nightlight intensity.[9]

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[9] Data on nightlight intensity is provided by the Earth Observation Group, the Payne Institute for Public Policy, and the Colorado School of Mines. The data is generated by the Defense Meteorological Programme Operational Linear Scan (DMSP-OLS) by detecting visible and near-infrared light. We use information for the year 2010.

Table 4: Health and education infrastructure provision

	Number of schools		Number of schools per 1,000 inhabitants		Number of health centres	Number of centres per 1,000 inhabitants	Nightlight intensity (logarithm)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Catholic mission with nuns	20.27***	2.281***	0.618***	0.222***	15.96***	0.545***	0.0110
	(5.664)	(0.342)	(0.120)	(0.0550)	(3.323)	(0.140)	(0.0218)
Catholic mission without nuns	7,824	2,033***	0.385***	0.118***	6,464***	0.283***	-0.0101
	(5.180)	(0.405)	(0.114)	(0.0456)	(2.242)	(0.103)	(0.00837)
Protestant Mission	8.280**	1.369***	0.252***	0.156***	5,934***	0.324***	-0.00742
	(3.883)	(0.271)	(0.0859)	(0.0431)	(1.854)	(0.114)	(0.00692)
Mean of Y	5.798	2.026	0.376	0.201	5.904	0.401	0.00696
R-squared	0.316	0.234	0.0665	0.0855	0.238	0.111	0.318
Province fixed effects	X	X	X	X	X	X	X
Geographical controls	X	X	X	X	X	X	X
N	6,149	5,512	5,914	5,296	3,173	2,964	5,512
Nuns = Without -nuns (p-value)	0.0756	0.628	0.150	0.145	0.0153	0.136	0.363
Nuns= Protestant (p-value)	0.00176	0.0330	0.0103	0.356	0.00960	0.199	0.427

NOTE. The observation unit is a 20 km by 20 km cell. Columns (2), (4) and (7) restrict the sample to cells with fewer than 14 secondary schools (i.e. the bottom 10% of the distribution). Columns (5) and (6) are limited to cells with fewer than 300 health centres (i.e. excluding the last percentile). The dependent variables are defined as follows: the total number of secondary schools in columns (1) and (2), the number of secondary schools per 1,000 inhabitants in columns (3) and (4), the total number of hospitals in column (5), and the number of hospitals per 1,000 inhabitants in column (6). All specifications include cell-level controls: presence of a navigable river, presence of a colonial railway, presence of a pre-colonial exploration road, population density in 1900, cultivated area in 1900, average altitude, terrain roughness, and distance between the cell centroid and Kinshasa. Fixed province effects are systematically included. Robust standard errors are shown in parentheses.

2.6. Measures of female emancipation

Finally, we examine the historical impact of nuns on specific measures of women's emancipation, as measured by the DHS surveys. These effects may result both from the direct influence of nuns, through the historical emulation of girls and women in contact with them, and from their role in promoting girls' education, as discussed above. Our estimates in Table 5 present a mixed picture. While the presence of nuns reduces the prevalence of polygamy (among the entire surveyed population), increases the age at first marriage (measured among married women), and boots decision-making power within households, it also significantly reduces female participation in the labour force (by 7 percentage points, for a dependent variable mean of 82%).[10] It is also interesting to note that the historical effects of nuns are relatively similar to those of Protestant missions, which had a more emancipatory tradition than Catholic doctrine at the time. This latter effect could be related to the norm of "Christian marriage" promoted by the missions at the time, but also to other phenomena, such as the

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[10] Of course, it is probably unfair to equate monogamy with a process of emancipation in the context of Sub-Saharan Africa (see, for example, Guirkinger et al. 2021; Baraka Kusinza and Guirkinger 2024; Rossi 2018). In particular, this practice may also reflect simple conformity to the norm defined by the Church, far from a real process of emancipation.

socio-economic environment, which we cannot properly account for in our estimates. Indeed, when we examine the p-value of the test for the equality of coefficients associated with Protestant and Catholic missions with nuns, we cannot reject the null hypothesis in any column that they are statistically different from each other.

Table 5: Results on the labour and marriage markets

	Respondent is polygamous (1)	Age at first marriage (2)	Decision-making index (3)	Respondent is employed (4)
Catholic mission with nuns in ≤ 10 km away	-0.0307**	0.408***	0.0521**	0.0125
	(0.0143)	(0.134)	(0.0254)	(0.0181)
Catholic mission without nuns in ≤ 10 km	-0.0142	-0.0316	-0.0159	0.0166
	(0.0185)	(0.138)	(0.0326)	(0.0171)
Protestant mission in ≤ 10 km	-0.0237*	0.445***	0.0543	-0.00615
	(0.0136)	(0.139)	(0.0367)	(0.0163)
Catholic mission with nuns in ≤ 10 km x Female				-0.0700***
				(0.0214)
Catholic mission without nuns in ≤ 10 km x Female				-0.0326
				(0.0249)
Protestant mission in ≤ 10 km x Female				-0.0466**
				(0.0209)
Mean of Y	0.200	18.19	1.724	0.821
R-squared	0.0523	0.105	0.105	0.104
Province fixed effects	X	X	X	X
Geographical controls	X	X	X	X
N	20,575	17,494	18,144	25,136
Nuns = Without nuns (p-value)	0.418	0	0.075	
Nuns = Protestant (p-value)	0.740	0.858	0.962	
Female x Nuns = Female x Without -nuns (p-value)				0.246
Female x Nuns= Female x Protestant (p-value)				0.502

NOTE. Data: 2007 and 2013 DHS for the DRC. The sample is restricted to DHS clusters located within 50 km of a mission. The sample includes men and women in columns 1 and 4, and only women in columns 2 and 3. The sample is limited to men and women who are married in column 1, and women who have ever been married in column 2. The sample is limited to people aged over 20 in column 4. The dependent variables are: a dummy variable equal to one if the respondent is in a polygamous union in column 1, age at first marriage in column 2, and an index in column 3 which is the average of all non-missing responses to four variables concerning the person who makes the final decision on healthcare, major household purchases, visits to family, and how income is spent. These variables are reduced to 1-3 categorical variables where one corresponds to the partner/other person who decides, two to the respondent and partner who decide, and three to the respondent who decides alone. Column 4 is a dummy variable that is one if the respondent is working at the time of the survey. The explanatory variables are dummy variables equal to one if there is at least one mission of a given type within a 10 km radius of the respondent's place of residence. Controls include age, age squared, and fixed effects of the DHS survey cycle. Location controls include length of the growing season, area of land cultivated in 1900, annual rainfall in 2000, distance to the national border, distance to the coast, malaria index, distance to pre-colonial exploration roads, distance to colonial railways, distance to the river, slope, population density in 1900, tsetse fly breeding suitability index, and cluster longitude and latitude. Robust standard errors grouped at the DHS cluster level in parentheses.

3. Conclusions

Catholic female missionaries have had significant and lasting effects in their spheres of intervention. These effects differ significantly from those linked to Protestant or Catholic missions where they were absent. They are particularly marked in the current education of girls (whose enrolment rate is twice as high) and infant mortality, which has fallen by 10%. While the initial aim was to train good Christian wives for the emerging Congolese elite, after independence, girls' educational attainment gradually aligned with that of boys. School and health infrastructure appear to play a key role in transmitting the influence of the missions.

Since colonial times, the female model promoted by Catholic nuns has been ambiguous. While they were responsible for conveying the Catholic family doctrine of the time, the nuns, who were unmarried and had chosen to live far from their families, could also promote a more emancipated and autonomous female model, outside traditional patriarchal structures. This more diffuse influence, combined with the opportunities offered by education, is perhaps reflected in greater decision-making power within households, but also in the rejection of polygamy and lower fertility levels (Guirkinger and Villar, 2024).

4. Appendix

4.1 Missionary activities

Our data on Christian missions includes all missions established in the DRC between 1885 and 1948[11]. Information on Catholic missions comes from comprehensive yearbooks and maps published in 1924, 1935 and 1949, which have been digitised (Corman, 1924, 1935; Van Wing, 1949). Data on the location and date of opening of Protestant missions were extracted from maps published in 1905, 1921, 1930, 1944, 1953 and 1960, as well as a yearbook published in 1978 (Irvine, 1978). The Protestant missions surveyed cover the period 1879–1960, while the Catholic missions cover the period 1885–1948. To enable comparisons, we focus on the period 1885–1948. The final sample includes 697 missions across the DRC, of which 300 are Protestant and 397 are Catholic. It should be noted that we also have the dates of arrival of Catholic nuns where this information is available.

4.2 DHS surveys

We use all available DHS surveys from the DRC (2007–2013). These are representative national surveys providing detailed information on education, health, marital trajectories, household decision-making, and labour market participation. Thanks to the collection of mothers' birth histories, detailed health indicators are also available for a sub-sample of children, allowing us to conduct analyses at the individual level. In total, the sample covers approximately 40,000 individuals in 785 clusters.

As the geographical coordinates (latitude and longitude) of the clusters are available, it is possible to cross-reference these data with the historical data on colonial schools presented above.

4.3 Infrastructures

Secondary schools. We use a comprehensive census of secondary schools operating in the DRC in 2020. This dataset, compiled by the Ministry of Education, includes school-level information: exact GPS coordinates, number of students and teachers, opening date, and management regime (public or private). The sample includes approximately 35,000 secondary schools, of which 15% are Catholic (public), 35% Protestant (public), 18% official

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[11] These data were used in Guirkinger and Villar (2022) and Alvarez-Aragon et al. (2025). See these works for more details on the spatial distribution of mission posts and for comparisons with other data sources on mission posts.

(state), 15% run by other religious groups (public), and 17% private.

Hospitals and health centres. Data on health infrastructure come from the GRID3 COD – Health Facilities v4.0 database (Center for Integrated Earth System Information, CIESIN). They include information on the type of health facility (e.g. hospital, health centre, etc.), name or GPS coordinates. The data covers fourteen provinces of the DRC: Haut-Katanga, Haut-Lomami, Ituri, Kasaï, Kasaï-Central, Kasaï-Oriental, Kinshasa, Kwilu, Lomami, Maniema, Mongala, Sankuru, Tanganyika and Tshopo.

Out of the 6,183 spatial cells, 3,209 contain at least one piece of information on health infrastructure. Of these, 63% have at least one health facility and 10% have at least one hospital.

4.4 Geographic and historical controls

As missionaries were able to choose the most favourable regions for setting up, it is crucial to examine the geographical and historical characteristics that may have influenced their location to assess their long-term impact. Based on Jedwab et al. (2022), we include a set of control variables: altitude, slope, precipitation, length of growing season, distances to the coast, to a colonial road, to a colonial railway and to a navigable river, population density in 1900, cultivated area in 1900 (from the HYDE 3.1 database (Goldewijk et al., 2011)), malaria index from Cagé and Rueda (2016), tsetse fly proliferation index from Alsan (2015), and number of slaves exported in the Atlantic and Indian slave trades, normalised by ethnic origin (Nunn and Wantchekon, 2011). These control variables are constructed at the level of DHS clusters and geographical cells.

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