Pro-birth policies, missions and fertility : historical evidence from Congo*

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Abstract

Did colonial powers shape fertility patterns in their colonies? We investigate this question in the context of the Belgian Congo. Starting in the late 1920s, several colonial powers in Africa feared depopulation of their colonies and designed pro-birth policies. The Belgian state heavily relied on Catholic nuns to implement these policies in the Congo. Using a demographic survey conducted in the 1970s in six major cities, we recovered the individual birth calendars of 30,000 women born between 1900 and 1948, under colonial rule. In addition we digitized high-quality territory level information on fertility by cohort in the 1950s. We rely on unique historical and archival material to reconstruct temporal and geographic heterogeneity in exposure to missionary presence and the type of activities performed at the station level. We find a positive effect of Catholic nuns on fertility. In contrast, Catholic male missionaries have no detectable impact on fertility and Protestant missionary have a strong and negative impact. In terms of mechanisms, we argue that progress in general health are unlikely to explain, *alone*, the rise in fertility. Another likely channel for the impact of Catholic nuns was the promotion of an ideal of domesticity where women are confined to their role of mother and wife. Our results show that the colonial administration had a direct impact on the fertility behavior of colonized women, and thus potentially on the dynamics of the country's demographic transition.

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1 Introduction

Today, fertility levels remain remarkably high in many sub-Saharan African countries, including the Democratic Republic of Congo (DRC) where women give birth to more than six children on average. More worryingly, levels of fertility and of desired fertility are not decreasing as theories of demographic transitions would predict (Bongaarts and Casterline, 2013; Caldwell et al., 1992; Lee, 2003). In fact fertility has even been slightly increasing in the DRC in the recent past, despite sizeable decrease in infant mortality (Shapiro et al., 2017). While reasons behind African peculiar fertility patterns are still debated, a partial explanation may be that, compared to other regions of the globe, modern family planning programs have been implemented much later (De Silva and Tenreyro, 2017, 2020).

Yet family policies have a long history in Africa and the question of how to change fertility patterns in the region was the subject of heated debates in the 1920s already. However, the policy makers' main objective then was the exact opposite of modern family planing programs: colonial powers feared depopulation and aimed at increasing fertility in their colonies. Several states carefully designed pro-birth policies and heavily invested in their implementation from the 1930s onward. Surprisingly, these policies - and their potential long-term consequences - have received very little attention in the social science literature.[1]

In this paper, we seek to investigate the impacts of pro-birth policies in colonial Congo during and directly after the colonial period. To implement these policies, the Belgian colonial state heavily relied on Catholic missionaries, and Catholic nuns in particular (Catholic male missionaries could not be involved in girls' education or women health interventions). In practice, the state subsidized Catholic missions to implement health and education programs targeted at women with the double objective of raising fertility and decreasing child mortality. Protestant missionaries, who were also very active in the colony, were more independent (financially and ideologically) from the Belgian state. Motivated by work from history arguing, on the one hand that female missionaries had a deep transformative influence on girls "close to the mission", and, on the other hand

[1] In fact there are few studies in general on the economics of historical changes in fertility (Guinnane, 2011). Few historians have analysed these policies stressing that their quantitative impacts remain largely unknown (Cornet, 2014; Hunt, 1988; Likaka, 2006).

that Catholic nuns effectively implemented health and education programs designed by the State, we hypothesize that women exposed to Catholic nuns (but not those exposed exclusively to male missionaries) increased their fertility. We are more agnostic about the impact of Protestant missionaries. They also provided education and health care to girls and women, but the content of their programs and the personnel administrating them were sensibly different from those of the Catholics.

To measure fertility behaviors, we recovered individual birth calendar for a sample of 30000 women surveyed in the 1970s and representative of the population of six major cities of the newly independent country (at that time about 20% of the population was urban (**?**)). More than 90% of sampled women were born in a rural area and migrated during the last years of the colonial era or after independence. The survey is of exceptional quality and provides unique individual level information for a time period at which reliable demographic information is sorely lacking. In addition, we digitized data from the 1950s on fertility by cohort for 148 territories[2] (this data is representative of 95% of the colony's population), and very detailed information on the universe of Catholic and Protestant missions from the 19th century to 1948. In particular we know when each post opened, the type of personnel present (in terms of gender and religion in particular) and the work missionaries they were involved in. This data provides a source of temporal and geographical heterogeneity in pro-birth program intensity: in a given place in a given year, state-subsidized girls education and women health interventions were implemented if Catholic female missionaries were sufficiently close by. We use this heterogeneity in the spirit of a difference-in-difference strategy: we exploit the arrival of new missions of different types (Catholic, Catholic with nuns, Protestants) at different dates in the 148 territories of the country and compare cohorts by their degree of exposures to the missions. For women surveyed in the 1970s, we consider their territory of birth to define their exposure. For women surveyed in 1950s, we use their territory of residence (they are very likely to have grown up there, given the migration restrictions in place until the late 1950s).

We find that Catholic missions stimulated fertility when they hosted Catholic nuns. A

[2]The territory (*territoire* in French) is the lowest level of administrative division in the Belgian Congo.

decrease of 100 km in the distance to such mission increases the number of children by about 0.55 at age 35 to 45. The effect of Catholic nuns is particularly strong when they operated housekeeping schools (*écoles ménagères* in French). In stark contrast, Protestant missions have a strong negative and robust impact on fertility: women exposed have their first child later, have larger birth intervals and fewer children (a decrease in 100 km in the distance to a Protestant mission decreases the number of children at 35-45 by about 0.75). The results are robust to the inclusion of a variety of geographic pre-colonial and individual controls. To verify that mission location (or more precisely the endogenous timing of mission openings) is not driving the results, we (somehow) check that the parallel trend assumptions hold using the eldest cohort of the 1950s data (and find no significant fertility trends prior to the opening of new missionary posts whether we consider posts of Catholic male missionaries, Catholic female missionaries or Protestant missionaries).[3] Selective urban migration does not seem to drive the results either: when we compare the same birth cohorts (from the same territory) in the representative sample of the 1950s and in the urban sample of migrant in the 1970s, we find that they had similar fertility levels in the 1950s.[4]

We conclude that, overall, the State was successful in its efforts to stimulate fertility by subsidizing health and education interventions by Catholic nuns. Investigating the mechanisms beyond this overall impact on fertility is complex. Yet the contrasted effects of Protestant and Catholic missions (and the effects of specific missionary works) suggests that improvements in general health alone are unlikely to account for the increase in fertility in the vicinity of nuns. Indeed Protestant missions health care was unlikely to be of lower quality for the period under study. We suggest that Catholic female missionaries were probably successful in changing behaviour and preference related to maternity. Education and evangelizing activities promoted the image of an ideal Christian wife entirely dedicated to the well-being of her children and husband and the embedding of the discourse in religious prescriptions possibly facilitated persuasion (Bassi and Rasul, 2017). Protestant missionaries may have instilled a different view on women's roles. While "Christian

[3]Protestant missions typically hosted both male and female missionaries.

[4]We can reconstruct the fertility in the 1950s of a woman surveyed in the 1970s using their birth calendar.

marriage" was an important institution for them, they also insisted on the importance of formal female education and the promotion of women as local Christian leaders. The contrasted impact of Protestant and Catholic missionaries on female outcomes resonates with the findings of several papers on the distinctive impact of Protestant missions on women education in Prussia (Becker and Woessmann, 2008), India (Calvi et al., 2020) or Africa (Nunn, 2014).

We contribute to several strands of the literature. First we contribute to a growing literature on the impacts of colonial policies and institutions on individual behaviours and attitudes (Acemoglu et al., 2001; Anderson, 2018; Banerjee and Iyer, 2005; Dell and Olken, 2020; Huillery, 2009; Lowes and Montero, 2020, 2021). Our specificity, with respect to this literature, is to measure impacts of exposure to colonial policies on individuals directly exposed to these policies.[5] Furthermore, by focusing on fertility, we investigate how colonization affected a core aspect of culture (Fernandez and Fogli, 2009). We thus also contribute to a literature investigating cultural persistence and change, by showing how colonial influences modified certain aspects of lives that are deeply culturally rooted. Finally, and more directly, we contribute to a growing literature on the impact of missions on development outcomes. This literature insists on long lasting effects (mostly on education and health) of missionary presence during the colonial period (see, for example,Cagé and Rueda, 2016, 2020; Valencia Caicedo, 2019; Calvi et al., 2020; Nunn, 2014 and the extensive reviews by Jedwab et al., 2018 and Becker et al., 2021). In line with this literature we find that missions modified the behavior of population exposed to missionary influence. We go a step further and decompose the influence by type of mission and missionary work (close to the paper of Calvi et al., 2020). In addition, our identification strategy is less demanding than that of the existing literature: we need not assume that - once geographical and historical controls are introduced - missions settled in "random" places. Because we combine time and geographic variations in exposure, we need to assume that the specific timing of (specific) post openings is uncorrelated with pre-existing fertility trends.

The rest of the paper is organized as follows. Section 2 provides background on pro-birth

[5]In that sense, we are close to the work of Meier zu Selhausen (2014); Meier zu Selhausen and Weisdorf (2016) on the impact of missions on women empowerment

policies and missions' expansion over the period of interest. Section 3 introduces the data and measures. Section 4 details our empirical strategies and presents the results. Section 5 discusses the mechanisms behind the results at the light of historical evidence and concludes.

2 Historical context

2.1 Fear of depopulation, pro-birth policies and the role of Catholic missions

For the future of the race and the prosperity of our colony, we must count on high childbirths. P.J. Bourgaux, Union Minière du Haut-Katanga, cited by Likaka (2006)

Between 1885 and 1930, the population of Congo was decreasing. The lack of reliable data makes it hard to estimate the extend of the decline but it was a major preoccupation for colonial authorities (Sanderson, 2000, 2020). The Belgian colony was not an exception and similar trends were observed in neighbouring countries. France and the United Kingdom shared Belgian concern about the demographic situation (Feierman, 1985).[6] Colonial authorities feared labour shortage: a colony would be worth little without workers. The general governor of the Congo summarized the problem in the following terms in 1924: *The exploitation of the resources we know about - and of those we guess exist - will require numerous hands. It will be delayed if the population does not grow as fast as our resource extraction, and many worry that natality is so low that a gradual decrease, slow but certain, of the population is inevitable.*[7] Low fertility rates became the main topic of the colonial demographic literature and several medical studies and expeditions were devoted to these questions (Hunt, 1988; Sanderson, 2010).

Both European occupation and indigenous practices were blamed for low natality. Colo-

[6] Reliable demographic information from the late 1950s confirm that, in some regions in particular, natality rates were very low and infertility rates were very high in the last decades of the 19th and the first decades of the 20th century (Romaniuk, 1967). It is now commonly accepted that sexually transmitted diseases played a major role in this "natality crisis" (Retel-Laurentin, 1974) and that, while the problem predated the Belgium colonization, the movements of population triggered by colonization aggravated the problem. Sterility sharply declined in the next several decades for reasons that remain debated. Anti-veneral diseases campaigns in the late colonial period may have contributed to lessen the problem (Romaniuk, 2011).

[7] This declaration is cited in Congrès Colonial National (1924)

nization was said to have accelerated the spread of diseases and lead to trauma, depression and an apathy that inhibited reproductive functions (Romaniuk, 1967). Indigenous practices held responsible for low birth rates included polygamy, traditional practices of abortion and abstinence during breastfeeding (Hunt, 1988).[8] There was a lot of attention to the latter element: as breastfeeding periods were long (two to three years according to the colonial literature), it lead to "excessive" birth-spacing. The historian Hunt (1988) cites the report to the Colonial National Congress of 1924 that makes the explicit link between breastfeeding and low fertility: *the present situation is certainly irrational. Sometimes women breast feed during three years. In the course of the approximate thirty years during which women are susceptible of becoming mothers, to place periods of three to four years during which they can have only a single child, while nature would certainly permit them to support more frequent pregnancies without harm.*

The government started to design policies to reduce infant mortality and promote birth rates in the 1920s. It subsidized health facilities and the development of programs that would teach African women the "art" of child rearing. In addition, the government introduced a tax on polygamy and subsidies for large (monogamous) families.[9] In order to reduce birth spacing, breastfeeding periods were to be reduced and artificial milk and alternative feeding practices were to be promoted (Hunt, 1988).

To implement these pro-birth policies the government seek the support of missionaries: female missionaries were put in charge of the new maternal and infant health programs and would help change sexual practices through moral advice and incentives (Likaka, 2006). An annual subvention was allocated to "national missions" if they respected a strict program and worked under the control of the hygiene services to which they would regularly report (Cornet, 2014, pp 155-56). These programs were ambitious and the regular maternal and infant consultations turned out to be successful at attracting women. It is estimated that at the end of the 1950s about a third of the colony's infant population (aged 0 to 2)

[8]The colonial literature explains abstinence during breastfeeding by superstition and reports that African believed that having sexual relations during this period would harm the child and bring bad luck to the family(Hunt, 1988).

[9]Polygamy was thought to depress birth rates for several reasons. By encouraging young women to marry old men, some young men may be without wives. In addition polygamy was seen as an obstacle to a "higher conception of marriage" that would be centered on reproduction (Congrès Colonial National, 1924).

attended a consultation program, and half of women giving birth would have attended prenatal consultations. During these consultations mother (or mother-to-be) would be instructed about appropriate infant care and in particular feeding practices.

Next to medical programs, girls education programs intended to raise morality standards, promote "Christian marriage" and teach appropriate home-keeping practices. Girls who attended schools were to become Christian wives and mothers, focused on their household. Programs were set by the government but virtually all education took place in missions (more on this in the next sub-section). When secondary schools opened for girls, they were almost exclusively dedicated to home-keeping. The *écoles ménagères* taught in particular infant care, hygiene, sewing and ironing. In addition, missions organized workshops for young wives and mothers (*Ateliers pour jeunes mères et épouses*) with similar curriculum. Missionaries perceived the success of the latter initiative to be less obvious than the education of young girls. Thus Hunt (1988) writes that the higher conception of marriage and the social duties incumbent on spouses *was not easily inculcated, however, usually requiring Christian education for both spouses, and was most likely about "girls raised among the nuns".* Another historian, Cornet (2014), reports that adult women were *less enthusiastic pupils when exposed to the mental revolutions proposed by occidental missionaries.*

2.2 Mission expansion, Protestant vs Catholic missionaries and the State

As illustrated by the implementation of pro-birth policies, missions played an important role as intermediaries between the State and the population. Belgium encouraged the expansions of missions, by granting them land concessions and providing subsidies for missionary school and health facilities. In addition to relying on the logistical support of missions for medical assistance, the State saw missionaries as agents of social control that would ensure local peace and educate workers (Markowitz, 1973).

Catholic and Protestant missions had distinct status and relations with the State. Catholic missions were typically "national" while Protestant missions were predominantly from Great-Britain, the United States or Sweden. While claiming to support religious freedom and the principles of international law, the State favoured "national" (Catholic) congregations over Protestant societies. Protestant missions regularly complained to national

authorities that they were receiving smaller land grants than the Catholics, and were excluded from receiving state subsidies. Indeed, until the end of WWII, education and medical subsidies were granted to "national" (Catholic) missions only. This discrimination was all the more resented that Protestant missions were active in medical services long before the Catholics and had started to run schools upon their very installation in the Congo (Markowitz, 1973). Over the colonial period Catholic missions thus receive stronger support from the State in the form of subsidies and land concessions, yet Protestant missions continued their expansion and held more posts than Catholic congregations until the mid 1930s (by 1948 Protestants societies had a total of 330 posts, thus 25% less than Catholics congregations who had 389).

Catholic and Protestant had very different view on their "mission". Catholics were reluctant at first to engage in medical relief work, fearing that healing the body would crowd-out important resources destined to saving the soul (Au, 2017). The development of medical activities in Catholic posts was stimulated by State subsidies and followed the arrival of nuns (despite their lack of formal qualification in this area).[10] In contrast, Protestant missions embraced medical work with great enthusiasm, and relied on highly qualified personnel: they had licensed medical doctors and hospital long before the Catholics (Au, 2017; Markowitz, 1973).[11] Protestant missions welcomed women from the start: female missionaries participated to the opening of more than 88% of Protestant posts. In contrast the presence of Catholic nuns only became substantial in the 1930s.

In the area of education, Protestants also got a head start, yet both Catholics and Protestants heavily invested (with the help of State subsidies for the Catholics) in mass education and competed against each other. Virtually all primary education took place in missionary schools. The primary goals of Catholic missionary schools was mass conversion and the focus was on "socialization" and moral training rather than on "education". Historians

[10]The government clearly saw the advantage of relying on missionaries. In Congrès Colonial National (1924) one reads: *Give [missions] the resources needed, they will, at much lower cost than the State or the Red Cross, embark on the medical crusade [...]. If, much alike Protestant foreign missions - who do not lack resources - Belgian religious missions could hire medical doctors, they could considerably increase their social action and bring to the natives from the bush an outstanding medical assistance.* (p. 132, own translation).

[11]Despite important efforts to recruit doctors for Catholic missions in the 1920s, by 1930 there were only 8 Catholic mission doctors, against 30 Protestant mission doctors (Au, 2017).

report that Protestant education was of higher quality and provided girls with opportunities for literacy before the Catholics partly because they implemented coeducation, instead of aiming for as much gender-specific education as possible (Depaepe and Lembagusala Kikumbi, 2018; Yates, 1982).[12] The development of girls' education in Catholic missions followed the arrival of nuns. Overall, investment in girls education has been substantially lower than investment in boys education over the colonial period. Only one in five pupil was a girl upon independence in 1960 (Yates, 1982).[13]

3 Data, samples and measures

How to measure fertility behaviors and missionary presence in the Belgian Congo during the colonial period? To do so, we rely on multiple original sources from historical documents and archival data. The fertility outcomes we use are derived from two main demographic surveys. In the case of the first survey (conducted in the mid-1950s throughout the whole country), we digitized published data aggregated at the territory (the smallest administrative unit) and the cohort level. For the second survey (conducted in the mid-1970s in six major cities), we were able to recover individual level records. To assess the extent to which individuals are exposed to the missionary presence, we rely on missionary directories and maps indicating the location of different mission stations. These three main data sets are further described in the following sub-sections.

[12]The report from the 7th congress of Protestant missionaries in the Congo held in 1918 in Luebo, Congo, provides an account of what has been accomplished in terms of education and underlines the importance of girls' education - and the difference with the Catholics in this regards: *Boys and girls have been gathered into village schools in large numbers. At almost every mission station boys have been taught, and on quite a large number girls also. And right where let it be said that it is most necessary to educate the girls of Congo as well as the boys [...] We are glad to record that much has been done in the training of women, and that the majority of our missionaries are awake to this great need. [...] What would have been the result of the Christian churches at home had neglected the education of women? We can have some idea of the result after viewing some of the Latin countries of Southern Europe and of South America dominated by a church that is afraid to educate its people, especially the women.*Congo Missionary Conference, 1918, p.69

[13]Yates (1982) writes that the Belgian Congo "had one of the highest Third Word enrolment rates for males and one of the lowest for females".

3.1 Demographic surveys and fertility measures

3.1.1 Demographic survey in urban Zaire in the 1970s: data recorded at the individual level

The micro-data we use to construct our main outcomes are derived from a unique demographic and household budget survey that was carried out between 1975 and 1977, in six major cities of DRC at that time : Kinshasa, Matadi, Bandundu, Kikwit, Mbandaka, Kananga and Bukavu.[14] For each of these cities, a census was conducted to count and identify all existing households in each city. From this census, one in twelve households was randomly selected so that a total of 270,000 individuals in 46,000 households were interviewed.[15] For each individual belonging to the selected households, enumerators carefully collected demographic information (age, gender, ethnic group, marital status, place of birth), socio-economic characteristics (level of education, employment status and occupation) and position in the household (relationship to the head of the household).

A major advantage of this survey is that each woman over 13 was surveyed about the birth schedule of all children she ever had, including the exact month and year of birth, the child's gender and, in case the child was no longer alive, the exact month and year of death. Thanks to this information, we can reconstruct indicators of women fertility levels at a given age (here we measure those levels at 25, 35, 40 and 45). In order to understand in more detail the channels that could explain variations in the total number of births, we are also interested in the age at first child, the birth intervals between children, childlessness (whether a women, at a given age, has never given birth) and infant mortality. Finally, for all members of the household, the territory of birth as well as the date of arrival in the city for migrant individuals were recorded: this information makes it possible not only to match each individual to the measures of missionary exposure ,but also to learn about the migratory pathways of individuals.

[14] The French designation for these surveys is *Enquêtes démographiques et budgétaires des villes à l'Ouest du Zaïre*. A digital version of these data was stored in the *Belgian Archives for Social Sciences* of this same university.

[15] The census and data collection took between one and six months depending on the city and its population size.

The use of this database is an essential asset for this project and more generally for the understanding the link between exposure to colonial presence and fertility choices. Indeed, there are very few databases of this quality that have rigorously collected information from individuals who lived under the colonial system with this level of coverage (Sanderson, 2010). Yet, a potential concern is that these surveys were conducted under the Mobutu dictatorship, in a context of hyperinflation and economic hardship, and thus the data may have been strategically manipulated by interviewers or respondents for political or economic purposes. While there are no documents that explicitly address this possible caveats, we are reassured by the following considerations. First, the design of the survey was developed by a team of recognized demographers of Louvain-la-Neuve University in Belgium and at the Congolese Official Institute of Research and Statistics. The implementation of the survey was jointly managed by these teams. The statistical programming, data cleaning, analysis and storage of the information were performed in Louvain-la-Neuve. Documents found in the archives show an impressive level of care taken in data collection and control of the quality levels.Second, these data have been used by prominent demographers specializing in African demography for a significant number of published works (see for instance : Shapiro (1996) and Tabutin (1982)), and they are cited as a reference for measuring infant mortality in the Democratic Republic of Congo during the colonial period (Sanderson, 2010). Finally, this survey uses the same birth calendar methodology to reconstruct measures of fertility and infant mortality as current benchmark surveys, such as the *Demographic and Health Surveys*. All in all, we believe that the quality of the data meets high social science standards.

3.1.2 Demographic surveys 1950s: fertility by age and *territory*

Our empirical estimates are also based on another key demographic survey in Congolese demography, conducted in 1955-1957. The results of this survey were published in official reports and, in particular, current fertility levels are available by 5- or 10-year age categories, at the territory level and for all the territories in the country. Age categories are : 15-19, 20-24, 25-29, 30-34, 35-44, 45-54, +55. Although this data set provides less precise information than than that of the 1970s, it has the advantage of being representative of the population of the whole country (the surveyed population is representative at the 10

% level). Moreover, it is considered the first scientific and high quality survey conducted in the Democratic Republic of Congo (Romaniuk, 1967). To obtain our database, we digitized the published survey results.[16]

3.2 Exposure to colonial presence : Missions, missionaries and missionary works

3.2.1 Sources for catholic missions

The main sources we have for the Catholic missions come from three official and exhaustive yearbooks published in 1924, 1935 and 1949 (Corman, 1924, 1935; Van Wing, 1949). These three yearbooks contain rich information as they indicate precisely the dates of opening of the missionary posts, the name of congregation managing the post, the current number of missionaries per post, and the presence of female missionaries (their number and their date of arrival). This information is completed by maps allowing to pinpoint the geographical location of each post. The yearbooks also indicate the type of activities being conducted by missionary personnel at each post at the time of their publication. While these types of activities are diverse, they remain closely related to the two main functions of missionary work: education and health. Table 2 presents four categories of activities dedicated to women and their children that are highlighted in this article: (i) the workrooms, in which women were paid to make handicrafts that the female missionaries then sold in Belgium; (ii) the housekeeping schools and marriage preparation workshops; (iii) the infrastructures and workshops related to maternal and child health: maternity wards, childcare classes, etc.; and finally, (iv) the dispensaries and general health infrastructures.

The information contained in these books thus allows us to place the various posts in time and space : Figure 1 shows this spatial distribution by yearbook. However, this information is partially censored since we do not observe the opening and closing of posts after 1949. Also, while some posts are sometimes transferred from one Catholic congregation to another (and this transfer sometimes means that the post is abandoned for a few years), very few posts closed permanently during the period from 1886 to 1949: only 6 posts out

[16] One report was never published, so that information is missing for 6 territories.

of the 389 posts identified with our data were permanently closed[17]. We can thus assume that when a Catholic post is open, it remains so throughout the period, and that the surrounding populations are therefore exposed to the missionary presence.

3.2.2 Sources for Protestant missions

The sources for the Protestant missions are less centralized than for the Catholic missions, since Protestant societies are less centralized themselves and they came from various countries and regions of the world, while the vast majority of the Catholic congregations were Belgian. To construct our indicators of Protestant missionary presence, we rely on two types of sources: six official maps indicating the presence of missionary posts published in 1905, 1921, 1930, 1944, 1953 and 1960; and a handbook compiled in 1978 (Irvine, 1978).[18] We found the maps in the archives of the African Museum in Namur, Belgium.

To recover the opening dates of the Protestant posts, we rely on the 1944 map which indicates the dates of opening of the posts. For the other cases, we apply two strategies : if the post is listed in the 1978 handbook, we retrieve its date of opening; if this is not the case, we randomly draw a date between the last map on which the post does not appear and the first map on which it is indicated.[19] This strategy allows us to reconstruct the opening dates of protestants posts for the period 1878-1960. However, as this information is censored for Catholic post from 1949 onward, we focus on the 1886-1949 period. Finally, based on the yearbook, only 17% of the posts closed permanently. As with the Catholic posts, we can therefore assume that once opened the posts are active (although the church that manages them may change during the period).

The sources we have for Protestant missions do not contain systematic information on missionary activities within posts. Yet, based on the 1978 handbook, we can easily hypothesize a generalized female presence in Protestant missions: at least one woman participated to the opening of 88% of the 330 posts listed. Also, it allows us to confirm that the Protestant religious personnel was different from that of the Catholic missions: a typical mission

[17] This, however, does not mean that other posts opened and closed permanently in between yearbook publications or before 1924.

[18] Unlike the Catholic missions, the 1978 yearbook is not official, but the author has scrupulously compiled the information she was able to obtain from the various church archives

[19] For example, if a post first appears in 1930, we draw a random date between 1930 and 1921.

was composed of a reverend and his wife, sometimes accompanied by educated unmarried women.

3.2.3 Measures of colonial exposure

As explained above, we have the dates of opening for each Catholic and Protestant post from 1886 to 1949, as well as the date of arrival of catholic nuns to a given post. We also know the exact geographic location of these posts, and thus the territory in which they are located. Figure 2 displays the dynamics of these openings : panel (a) illustrates the idea that the Protestant presence predates that of the Catholics, with the latter catching up with the Protestants – in terms of number of posts – only in the 1930s. Also, this figure shows that the arrival of Catholic sisters roughly from the mid-1920s: their presence intensifies up to the beginning of the Second World War. Table 1 quantifies the changes in average distance during the period. Another important element that this figure shows is that this missionary expansion is also geographical: as shown in panel (b), the number of territories with at least one post is increasing throughout the period, which implies that new posts are opening in territories that were not colonized until then. Thus, in 1949, almost all the territories have at least one Catholic post, 80% of the territories have at least one Protestant post, and 66% have at least one Catholic post with Catholic nuns.

We construct two types of measure of missionary presence at the territory level for any given year between 1886 and 1949. First, we use a binary variable equal to 1 if at least one Catholic (Catholics with nuns or Protestant) missionary post was active on date t in territory g. As the nuns are always under the supervision of a male congregation, the date of arrival of Catholic female missionary is always posterior or equal to that of the opening of the post. Second, we use a measure that accounts for the density of missionary posts at the territory level. We follow the methodology proposed by Calvi and Mantovanelli (2018): within each territory we generate 1000 randomly located points; for each of these points we compute the distance to the nearest Catholic post (respectively Protestant or Catholic post with nuns) in any given year (between 1900 and 1949); finally we compute the average of these distances at the territory level (in a given year). The advantage of this methodology is that it accounts for posts that are located in neighboring territories: if

a post is build outside but close to a territory boundary, it will influences exposure within the territory considered. This measure accurately represents the exposure of a randomly selected inhabitant of the territory if the density of population is homogeneous within the territory. As there is no information available about variation in population density within territories, we can hardly refine our measure. Note however that urbanization was very limited before 1950. In the rest of this paper we use two variations of this intensive margin measure: the linear average distance and the log of the average distance. We apply the same methodology to define exposure to specific Catholic missionary activities. Note however that the yearbooks only indicate whether these activities were in place at the time of publication and not the exact date of implementation of these activities. We thus assume that an activity starts the year the yearbook is published and stops the year before the next book is published if it is not mentioned in the next book.

In order to match these measures to the demographic survey data of the 1970s, we use the territory of birth, available for each individual. In the case of the 1950s survey, we use the territory of residence (since the aggregation at the territory level is based on the territory of residence). In order to define exposure measures for a given age category, we compute the (unweighted) arithmetic average of age-specific exposure measures.

A key question is: what age threshold should we use to define degree exposure? We choose to compute exposure at birth and at age 6. Using older thresholds is complicated because of the censuring in the variation in exposure from 1948 onward. Moreover, the historical literature provides arguments for the choice of an early threshold: as detailed in Section 2, missionaries targeted young children for education and conversion. Our preferred measure is exposure at six because it corresponds to the age of entry to primary school: any child below that age may be a future pupil (or friend of a pupil) of a missionary school.[20] The 6-year threshold also has the advantage to allow us to exploit more variation in exposure in the 1950s data. Indeed, if we consider exposure at birth, the important expansion in missions in the 1930s is hardly affecting the measured exposure for women in their fertile year at the time of the survey. In contrast, in the 1970s data, the six-year threshold implies

[20] An argument in favor of defining exposure at birth would be to allow children to potentially benefit from the infant consultations put in place by female missionaries. Note however that these consultations were typically not opened right after the opening of posts, as they required specific infrastructure.

that we can only include women born before 1942 (since the last year for which we have data on post openings is 1948).

4 Impact of missions on fertility behavior

In this section we investigate how the presence of missions changed women fertility behavior during and right after the colonial period. Missions may trigger changes in total fertility through distinct medical and social phenomena. Increased fertility may result from better general health or from adequate treatment against sterility (as mentioned earlier, sterility induced by STDs was prevalent in some regions). Changes in marital and parental behaviour may also trigger changes in fertility: earlier marriage, preference for larger families or reduction in breastfeeding period (and/or the accompanying sexual abstinence) could all contribute to increasing the number of children women bear. Finally, demand for children also depends on the costs of childbearing. Greater economic opportunities for women outside their households may decrease the demand for children, while economic incentives (gifts in maternity wards and infant consultations) work in the opposite direction. Missionary presence (and nuns' presence in particular) could have triggered changes through each of these separate channels.

To be in a position to evaluate the impact of missions on fertility but also to discuss the relevance of these various channels, we estimate the impact of missions on total fertility, first birth, birth spacing, child mortality and childlessness in Section 4.2. In Section 4.3, we then reproduce the analysis, distinguishing between activities that Catholic nuns engaged in. We start by introducing our empirical strategies in Section 4.1.

4.1 Empirical strategies

We seek evaluate the impact of growing up close to missions on women's fertility. To do so, we rely on a generalized difference-in-difference approach and we leverage both the intensity of the missionary exposure and the timing of such exposure.

4.1.1 Differences-in-differences using the 1970s individual records

For this data, our baseline specification is as follows :

$$Y_{i,t,g} = \alpha_0 + \alpha_1 \text{ ExpCatholics}_{i,t',g} + \alpha_2 \text{ ExpCatholic}_{i,t',g} \times \text{Nuns}_{i,t',g} + \alpha_3 \text{ ExpProtestants}_{i,t',g} + \alpha_4\, t + \alpha_5\, t^2 + X_g' \alpha_6 + u_g + \epsilon_{i,t} \quad (1)$$

where $Y_{i,t,g}$ is the fertility outcome for woman i, born in *territory* g in year t. $\text{ExpCatholics}_{i,t',g}$, $\text{ExpCatholic}_{i,t',g} \times \text{Nuns}_{i,t,g}$ and $\text{ExpProtestants}_{i,t,g}$ are the exposure measures as described in Section 3.2 : these are either the extensive measure (whether there is at least one missionary post in *territory* g at time t'), or the intensive margin variables (measures of *territory*-level average distance to missionary posts), and are measured either at birth (in which case $t = t'$) or at age 6 ($t' = t + 6$). In particular the coefficient associated to $\text{ExpCatholic}_{i,t,g} \times \text{Nuns}_{i,t,g}$ captures the differential effect of posts in which catholic nuns are active. The coefficients of interest,α_1, α_2 and α_3, have a different meaning depending on the exposure measures that is considered: at the extensive margin, a positive coefficient implies a positive link between missionary exposure and the outcome of interest. Conversely, when the measure of exposure is the distance to posts, a positive coefficient indicates a negative link between exposure to missions and the outcome of interest (distance being in some way the inverse of exposure). For example, if we consider the number of births at age 25, and we obtain a positive coefficient, then we interpret that the closer a territory is from the mission stations, the lower the number of children. The variables t and t^2 allow to account for quadratic year-of-birth time trends. The vector X_g includes controls such as the city of residence, and a dummy variable indicating whether the place of birth within the *territory* is in a rural area or not. Importantly for our identification strategy, we introduce u_g which is a *territory* of birth fixed effect : this last feature of the equation allows to conduct a *within territory* analysis. Thus, our coefficients of interest, α_1, α_2 and α_3 are identified by time variations of the exposure to the missions, in a given *territory*. Finally, as our exposure measures are constructed at the *territory*-level, the standard errors are clustered at this level.

Threats to identification The *within-territory* approach has two implications for our identification strategy. First, the main identifying assumption is that the settlement of

missionaries in a given location is not correlated with fertility trends in that same location. As time-invariant unobserved heterogeneity at the territory level is accounted for in this specification through the territory fixed-effect, the omitted variable bias can arise from time-variant confounders at the territory level : if, for example, missionaries settle in a given location when the territory's fertility rates start worsening (if sanitary conditions deteriorate for instance). This type of parallel trend hypothesis is tested for in Section 4.4, using fertility trends derived from the 1950s data. Second, this strategy is less demanding than what the typical estimation on the impact of missions requires since we do not need to assume that areas in which missionaries settled are comparable to areas where they did not settle. Indeed with respect to the intensive-margin exposure measure, all *territories* are considered as "treated", only the intensity of this treatment matter; and as for the extensive-margin approach (whether a *territory* has at least one missionary post), we are reassured by Figure 2 which shows that the vast majority of *territories* have been occupied by the end of the period. This entails that our within-*territories* effects are identified on a sub-sample of selected *territories*, that is virtually similar to the entire sample. Another threat of identification is selective migration. Indeed the 1970s sample is made of urban dwellers, born in a rural area and that migrated in the late 1950s. We need to provide evidence that the propensity to migrate (and the characteristics of these migrants) is not influenced by mission exposure. Ideally, we would need the information from the rural dwellers in 1970s. As this information is not available, we build a 1950s counter-factual population using the 1970s data : we attribute each woman to its *territory* of birth and age-category in the 1950s and construct her fertility at the date of the 1950s survey. We can then compare the results obtained for the impacts of missions on fertility with the representative sample of the 1950s data and with the 1970s counter-factual sample. If the results are similar, the missions impacts can hardly be driven by selective migration. We provide evidence for such test in Section 4.4.

4.1.2 Differences-in-differences using the 1950s territory-level records

This survey records fertility measures at the territory level but only at the time of the survey and for specific age categories c : as a result, we have fewer observations per *territory* than in the 1970s data and we need to construct an average exposure measure

for each age category. There is another reason why there is less variation in exposure in this data set: women fertile at the time of the survey were born before 1940 (and long before 1940 for many) and, as a result, post openings that occur towards the end of the period are not taken into account. As a result, we use continuous exposure variables only and we adapt Equation (1) by (i) substituting district fixed effects, u_d, which is the next highest administrative division after the *territory*,in place of *territory*, and (ii) using age category fixed-effect δ_c instead of year-of-birth trends..[21] Equation (2) is then weighted by the number of individuals in each territory $\times$ age-category.

$$Y_{i,c,g} = \alpha_0 + \alpha_1 \text{ ExpCatholics}_{i,c,g} + \alpha_2 \text{ ExpCatholic}_{i,c,g} \times \text{Nuns}_{i,c,g} + \alpha_3 \text{ ExpProtestants}_{i,c,g} + \alpha_4 \, \delta_c + X_g' \alpha_5 + \, u_d + \epsilon_{i,c} \quad (2)$$

Since we change the level of analysis from territory to district, we limit the omitted-variable bias by introducing in the vector X_g, a series of geographic and historical controls measured at the territory level that could be correlated to both the location choices of mission stations and fertility trends. The choice and construction of the controls builds upon Jedwab et al. (2018) who indicate the classical measures used in papers close to ours: the average distance to Catholic and to Protestant missions in 1886, *territory* area, a dummy equal to 1 if a pre-colonial explorer route crosses the *territory* (data from Nunn and Wantchekon (2011)), latitude, longitude and their product, average elevation and ruggedness, population density in 1900 and area suitable for agriculture in 1900 (Klein Goldewijk et al., 2010), the Alsan (2015) Tsetse Suitability Index, an historical malaria index from Kiszewski et al. (2004), exposure to slave trade (data from Nunn and Wantchekon (2011)), and a dummy variable indicating access to a navigable river (from the *Referentiel Geographique Commun*, an online repository for GIS maps for DRC).

Threats to identification In addition to the assumption of exogeneity of the mission installation timing, in this setting, we need to check that the location of installation within

[21] If we were to use territory fixed effect, we would loose several territories for which there is no variation in exposure across cohorts.

a district (thus between *territories*) is not endogenous to fertility patterns. As mentioned above, we control for a set of time-invariant controls measured at the *territory* level, which partially limits the endogeity bias. In addition, we compare the characteristics of territories that welcome new posts (of different types) by decades of installation (see Section 4.4). Another caveat in this analysis is that we assume that women were exposed in their *territory* of current residency. This may not be the case if women have migrated since their childhood to other territories. We believe that this a minor issue in our context because the administration strictly controlled inter-territories migration until the end of the colonial period (a passport and a reason for work or family reunification were required to migrate). Moreover, according to data from the 1970s, only 3% of adult women (over 15) in 1955 had experienced a first episode of migration before age 6.

4.2 Empirical results: The contrasted impacts of Catholic and Protestant missionaries on fertility, age at first birth and birth spacing

In this section we start by investigating the impact of growing up closer to a mission on women fertility. We then turn to the impact of missions on age at first birth, birth spacing, child mortality and childlessness. We distinguish between Catholic missions, Catholic missions with nuns and Protestant missions. Recalling that Catholic missions with nuns always hosted male missionaries, exposure to mission with male missionaries only is captured by "Catholic missions", while the impact of exposure to Catholic female missionaries is the sum of the effect of "Catholic missions" and "Catholic missions with nuns".

Table 3 provides the results of regressions for the total number of birth at different ages using the 1970s data. While at older ages, fertility is more likely to be complete, the relevant sample size is smaller as it includes only women who have reached the age considered. Exposure is defined at age six (Table A.1 in appendix provides the same estimation when exposure is defined at birth). Panel A, B and C present the results for different measures of exposure. In Panel A, exposure is a binary variable that takes value 1 if a mission of the type considered was present in the territory of birth. In Panel B, we use the average distance to the closest mission (using 1000 random locations in the territory).

The logarithm of this distance is used in Panel C.

The results reveal striking differences by type of missions. When women grew up closer to a Protestant mission they have less children at age 25, 35, 40 and 45. Reducing by 100 km the average distance to a Protestant mission in the territory of birth decreases the number of children by 0.35-0.4 at the various age considered. In contrast, when women grew up closer to Catholic missions with nuns they tend to have more children. Reducing by 100 km the average distance to a Catholic mission with nuns in their territory of birth decreases the number of children by about 0.7-0.8 at age 35-45 (Table 3, Panel B).[22] The overall effect of Catholic nuns on fertility is not always significantly different from zero, however it is markedly different from the effect of missions with only male missionaries, who have no impact of fertility.[23]

The sharp contrast between Catholic and Protestant missions is confirmed when we use the data from the 1950s demographic survey, representative of both urban and rural areas. As detailed in Section 4.1, this data allows to estimate an average impact of missionary presence on women at different stages of their fecund life, but it does not offer the same level of detailed information as the 1970s data and we cannot reconstruct fertility at different ages. Table 4 reports the results of linear regressions of women fertility (Table A.2 in appendix provides the same estimation when exposure is defined at birth). The first four columns use the complete sample of women (all women above 15) while the last four columns restrict attention to women above 35 (who are close to having completed their fertility). Exposure to missions is measured at 6 (columns 1, 2, 5, and 6) or at birth (columns 3, 4, 7 and 8). Women who grew up closer to Protestant missions have fewer children: an increase in 100 km in the distance translates in 0.3 fewer children on average for women above 15. Catholic missions have the opposite effect: an increase in 100 km in the distance to any Catholic mission decreases fertility by 0.5 (column 1). Catholic nuns do not appear to have an effect on fertility distinct from that of Catholic male missionaries (contrary to the estimation in the 1970s sample), except if we focus on older age cohorts (and use exposure at 6). While various elements may explain the contrasted impact of

[22] To obtain the effect of Catholic nun we sum the coefficient on Catholic and Catholic with nuns. The result of a test of significance of the sum is reported below the coefficients.

[23] In only one specification is the coefficient on Catholic missions significantly different from zero.

Catholic nuns in the 1970s and 1950s data, we will argue in Section 4.4 that the difference is largely driven by the loss of information implied by the aggregation at the territoire × age category level of the 1950s data.[24]

We now turn to the impact of missions on age at first birth and birth intervals. Table 5 reports the results. Women who grew up closer to a Protestant mission have modestly larger birth intervals, whether we include all birth (column 2) or focus instead on the first two births (column 3).[25] Results suggest that women who grew up 100 km closer to a Protestant mission have a birth interval between their first two children longer by 2.2 months. Taking all births into account, birth spacing is 1.2 month longer when the mother grew up 100 km closer to a protestant mission. Catholic missions in contrast do not seem to change birth spacing. Neither Protestant, nor Catholic missions have an effect at age at first birth.[26]

The impact of missions on child mortality is reported in Table 6. We find no significant impact of missions on child mortality. Here the effects are quite different if we use exposure at birth instead (Table A.4 in the appendix): child mortality then appears generally lower for children whose mother grew up closer to a Protestant mission and the effect is often large. Decreasing distance by 100 km reduces mortality by 30 per thousand for children of mother above 35 (Panel B, Table A.4), which represents a 35% decrease from the mean of 86 per thousand. The effect of Catholic missions without nuns works in the opposite direction (in the same proportion), although it is less often significantly different from zero. This detrimental effect of Catholic missions is dampen by the presence of nuns: when Catholic missions host nun, they have no significant impact on child mortality. We do not want to draw strong conclusions from these results on child mortality given their sensitivity to the definition of the exposure threshold.

The impact of missions on childlessness is reported in Table 7. Catholics do not have a significant impact on this dimension. In contrast, there is a higher propensity to remain

[24] The results are similar but slightly smaller in their magnitude if we use exposure at age 0 (Table A.1).

[25] Focusing on the first two births avoids giving larger weight to larger families who generate more observations.

[26] The results are slightly stronger if we use exposure at birth (Table A.3, Protestants appear to delay age at first marriage in particular.). The effect of Protestant missions on birth intervals is unchanged but the effect of Catholic missions is no longer significant.

childless when the distance to a Protestant mission decreases, especially at younger age (25 and 35). The effect is much smaller at age 40 and 45. The results are confirmed (and the effect of Protestant weaker) if we use exposure at birth instead (see Table A.5).

4.3 Empirical results: Unfolding the effects of Catholic nuns

In this section, we explore whether different types of missionary activities are associated with different fertility patterns. As explained above, this information is available for Catholic missions only. Furthermore the diversity in activities concern nuns only. Catholic missions without nuns focused exclusively on evangelizing and boys' education, as Catholic orders systematically turned to female missionaries for any health care or girls' education activity.

We construct the following broad categories of activities (grouping the most common activities): general health, women and child health, housekeeping school (*'ecole m'enag'ere* and workroom. The results are reported in Table 8. The excluded category is "general health" because almost all missions with nuns are active in this area. Two activities stand out with robust effects on fertility: hosting a housekeeping school appears to have a positive effect on the fertility of women who grow up close by (negative sign of the distance variables) while workrooms have a negative effect. Similar results obtain if we use exposure at birth (Table A.6) or the 1950s data instead (Tables available upon request).

4.4 Threats to identification: endogeneity of new post installation and selective migration

In this section we provide some evidence in favor of our identifying assumptions. As detailed in Section 4.1, these assumptions are slightly different in the two samples. With the 1970s sample, we face two threats: the endogenous timing of mission installation within a territory and the selection into urban migration. With the 1950s sample, we need to assume that not only the timing of installation but also the choice of a territory within a district is uncorrelated with fertility.

Endogenous timing of post installation Historical accounts of the deployment and Catholic and Protestant posts suggest that they had similar strategies regarding their occupation of the country (Markowitz, 1973) and we find no evidence that would give credit to the idea that Catholic nuns would settle precisely in areas where fertility would increase in near future while Protestant settled precisely where fertility would decrease.[27] To formally test for the parallel trend assumption, we investigate, with the 1950s data, whether places where (different types of) missions settled were on different fertility trends.[28] More specifically, we verify that the fertility of the two eldest cohorts in the 1950s (aged 45-55 and more than 55) does not correlated with the installation of missions when they were too old to be affected, using the same controls as in Equation (2). To measure the "future" installation of missions, we measure the decrease in the distance to a given type of mission in the territory of residence between 1943 and 1948 (the first last years for which we have precise data on post openings). Women above 45 at the time of the survey were at least 33 years old in 1943. We believe that the fertility of these women is very unlikely to be affected by the installation of nuns because most children were born before the mother reached that age (the demographic survey of the 1950s reveals gross fertility...) and because nuns targeted young women for most of their activities (see Section 2). Results are presented in Table 9. We also check that the difference in fertility across these two cohorts is correlated with "future" installation of missions, with district fixed effects and controls (Table 10).

Table 9 shows that neither future installation of Catholic and Catholic with nuns (columns 1 and 3) nor the future installation of Protestant (columns 2 and 4) are correlated with the fertility of women too old to be impacted (in this dimension) by the arrival of missionaries. This holds true whether we control for mission exposure in their infancy (columns 1 and 2) or not (column 3 and 4). Similarly, Table 10 indicates that no significant correlation

[27] Missions of a given religions first sought to be present in as many regions, districts, territories as possible. Once present in a given area, they organized their expansion with the same hope to cover as extensively the area as possible (Markowitz, 1973). While many congregations (societies) were active in the Congo, there was coordination between congregations for the Catholics and between societies for the Protestants (and a great deal of competition between religions not to leave large areas under the domination of one religion).

[28] We have to rely on the 1950s data for this analysis: women old enough to have almost complete their fertility in the last years for which we have variations (the late 1940s) are (likely) not alive any more in the 1970s.

between the decrease in the distance to missions when the women were at least 33 and the average change in fertility across the cohort of women aged more than 55 and the women between 45 and 55.

Endogenous choice of place within districts We now turn to the question of whether different type of missions settled in areas with specific characteristics. In particular, we worry that the Protestants settled in less favorable areas than the Catholics (which could be correlated with differential fertility trends). To confront this possibility, we compare the characteristics of the locations of new Catholic, Catholic with nuns and Protestant posts by decades, using the historical controls described in Section 4.1.2. While for some decades, some of the characteristics are significantly different across type of missions, we find no systematic differences that would lend support to the idea that Protestant settled in worse environment (Tables available upon request).

Selective urban migration Does selective migration account for the correlation between the fertility of urban women in the 1970s and missionary presence in their place of birth? The results with the 1950s sample are reassuring: we find similar impacts of the Catholic and the Protestant missionaries when we use a sample representative of the population. Yet the effect of Catholic nuns is a bit less clear and cannot rule out that the measure of fertility (at the time of the survey) hides some subtle patterns. In order to verify that the women surveyed in the 1970s in a city are similar to their rural counterparts, we build a counter-factual population of the territory in the 1950s using the 1970s data. Using the birth date of each women, we attribute each woman to her age-category in the 1950s and compute her fertility at the date of survey of her territory of birth in the 1950s. We reproduce the estimation of Equation (2) on this counter factual sample and compare the results obtained to the estimation on the 1950s data. Because we have not enough observations for all the territories, some are dropped from the analysis. We thus restrict attention to territories represented in the 1970s. The results are featured in Table 11. The coefficient estimates across the two samples are very similar. This suggests that the women surveyed in the 1970s had similar fertility behavior as the general population of their territories in the 1950s. This suggests that selective migration is unlikely to account

for the effect of missionaries in the 1970s data (and that the differences in results across the two sample are likely driven by cohort × territories aggregations).

5 Discussion: results interpretation at the light of historians' contributions

In a nutshell, the empirical results reveal that women have more children when they grew up closer to Catholic nuns and fewer children when they grew up closer to Protestants. This effect is not driven by a differential change in childlessness. Protestant missions also affect age at first birth and birth intervals (effects of Catholic nuns on these outcomes are less marked). Finally the impact of Catholic nuns is larger when they opened housekeeping schools and less pronounced when they offered economic opportunities to women in the form of workrooms.

We draw two main conclusions from our analysis. First, Catholic female missionaries appear to have successfully fulfill the State's expectation regarding their role in encouraging higher birth rates. Second, Protestant missionaries, largely independent from the State, have a diametrically opposite effect on fertility. Understanding the mechanisms behind these contrasted impacts is complex, yet combining our empirical results with historical evidence suggest partial answers that we develop here below.

A first important remark is that missions' activities directly targeted towards women seem of foremost importance for the observed change in fertility. Indeed Catholic missions who did not organize these activities (those without nuns) have no impact on women's fertility (recall that women's education, health and training programs were organized exclusively by female missionaries). The dichotomy between missions with and without female missionaries is irrelevant for the Protestants: Protestant missions hosted both male and female missionaries and engaged from the beginning in activities for women (and in fact welcomed girls together with boys in primary schools).

Now turning to the specific missionary works targeted at women, we can group them in four types, each with distinct expected impacts on fertility: conversion, health care, educa-

tion, training/employment. Conversion to Catholicism may change preferences regarding fertility since religious precepts define the roles of lay women as essentially wives and mothers, confined to their households, submissive to their husband and dedicated to their children. Turning to health care, because health status and fertility are positively correlated, missionary health interventions could contribute to higher fertility if it succeeds in improving the population's health through the administration and promotion of preventive and curative medicine. Also the promotion of infant nutrition away from breastfeeding may have contributed to lowering breastfeeding periods and decreasing birth spacing. In contrast, girls' education has *a priori* an ambiguous impact on fertility. On the one hand it may increase access to economic opportunities that may raise the cost of children (and decrease fertility), on the other hand, girls educated among the nuns likely absorb religious precepts regarding the roles of women. Turning to activities promoting training or generating employment opportunities, they are expected to decrease demand for children (by raising the opportunity cost of women's time). This suggests two main channels for the positive impact of Catholic nuns on fertility: a health channel (through improvement of general health or changes in infant care practices) and a promotion channel (insisting on women belonging to their households and bearing children). We discuss the relevance of these channels and then turn to the contrasted impact of Protestant missionaries.

Could general improvements in women health alone explain the positive of Catholic nuns on fertility (and the contrast with Protestants)? Several elements suggest that this is unlikely. First, historical evidence suggests that health interventions of Catholic missions were not of higher quality than those of the Protestants. Protestant missions had more qualified personnel, and started to run dispensaries and hospitals before the Catholics.[29] We cannot rule out however that the activities of the average Catholic mission was of wider scale, given the easier access to State subsidies.[30] Another element against a pure general

[29]Detailed archival work for several missionary societies and congregations in neighboring Rwanda - a country also under Belgian ruling where health program and missionary implementation followed the same dynamics as in the Congo - reveals that, in the interwar period, 52% of female Protestant missionaries were trained as nurses or medical doctors against 15% of Catholic female missionaries. No Catholic nun held a medical doctor degree (Cornet, 2014).

[30]It is very difficult to find comparable figures for medical actions of Protestant versus Catholic missions. In contrast to aggregate statistics produced episodically for Protestant missions, Catholic yearbooks do not report systematic information on medical consultations, number of treated individuals, the qualification of the personal, the number of hospital beds, etc...

health channel is the impact of Catholic mission on infant mortality: mothers who grew up closer to Catholic missions with nuns are *not* loosing fewer infants (which might be expected if they are themselves healthier). In the same line, we do not find that Catholic missions decrease childlessness (most probably caused by sexually transmitted diseases treated in hospital and dispensaries). Finally, when we distinguish between the type of activities Catholic nuns engaged in, we do not find any positive correlation between health facilities and fertility.

Could nuns have modified women's demand for children through the promotion of conservative gender roles? Education in Catholic mission schools was not intended to train women to become successful professionals.[31] Education programs established by the state and Catholic religious precepts converged in promoting the image of women entirely dedicated to their children and husband, and submissive to their husband.[32] The embedding of these prescriptions in religion and formal education contributed to increase their legitimacy in the eyes of the targeted population. The historian Likaka (2006) writes in this regard *Catholic missionaries created schools, which they transformed into vehicles of cultural change to influence sexual behaviors of younger generations. [...] From missions stations, the "pro-natal" discourse extended into local communities. In reality, this treaty had more far-reaching consequences in transforming sexual behavior and the ideologies of reproduction because missionaries' control over schooling than the polygyny-taxation.* Our empirical results suggest that housewives schools have the strongest impact on fertility. In other words, it is where missionaries invested the most in girls' education that fertility increased the most. This finding is consistent with an increase demand for children for women who were in contact with Catholic missionary education activities.

Both health and education interventions may also have modified infant care, in particular breastfeeding practices, thereby, indirectly, influencing fertility. As detailed in Section 2.1, colonial authorities believed that an important factor contributing to low natality was the

[31] It is not until the very end of the colonial period that some programs were designed to train female school teacher and nurses.

[32] As late as 1952, the State's official text defining school organization in the colony states the necessity 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 homekeeping*de l'enseignement (1952).

duration of breastfeeding periods. They were deemed excessive, especially given that it was accompanied by sexual abstinence. Mother and infant consultation programs were to promote appropriate diversification of infant's diet and a reduced reliance on mother's milk, with a hope to reduce birth spacing. Appropriate infant and child nutrition was also part of the girls' school program. It is difficult to assess how effective these attempts to change infant and child nutrition practices have been. However it seems that birth spacing has not been dramatically reduced: our empirical results show no significant impact of Catholic nuns on birth spacing (and an increase in birth spacing for women who grew up closer to Protestant missions).

Turning to differential impact of Protestants on fertility, the above discussion on the expected impacts of missionary works on fertility identifies two channels for an overall decrease in fertility: education and training (if it increases labour opportunities) and the development of missionary labour opportunities. The possibility also exists that Protestant missionaries promoted a slightly different ideal of a Christian woman. Historical evidence provides some support for all three mechanisms. First girls education may have been less focused on teaching practical women skills if only because primary schools were mixed and welcomed both boys and girls (Yates, 1982). Second, Protestants may have relied more intensively on indigenous labour to perform tasks that required some qualification such as medical care.[33] Also there is some evidence that Protestant missionaries promoted the idea that Christian women should be leader in their communities and contribute to actively spread the faith, thereby giving women roles outside of their households (Richards, 2017). Third, the general description of the ideal "Christian marriage" by Protestant missionaries may have be subtly different than that of the Catholics. Indeed there is much insistence on the marriage been centred on the couple and on love between husbands and wives (Congo Missionary Conference, 1918; Richards, 2017, pp 69-71). Also, Protestant female missionaries were themselves women who considered marriage or were married (and often had children). They were thereby lively examples of well educated women who could choose to get married (or not) and who could successfully combined a career

[33] Cornet (2014) argues that the Anglican Church Missionary Society based a lot of its medical work in Rwanda on African personnel, both male and female, and was the only group to put African employees in charge of dispensaries without being formally supervised by a European missionary.

and children. Finally, female missionary views on the roles of women were likely more progressive among the Protestant simply because many Protestant missionaries came from England and Sweden where women's relative status was in general higher than in Catholic Belgium. In fact in several missionary societies, leadership positions could be occupied by women as well as men. This was unthinkable in Catholic orders where religious women were always formally under the authority of religious men Cornet (2014).

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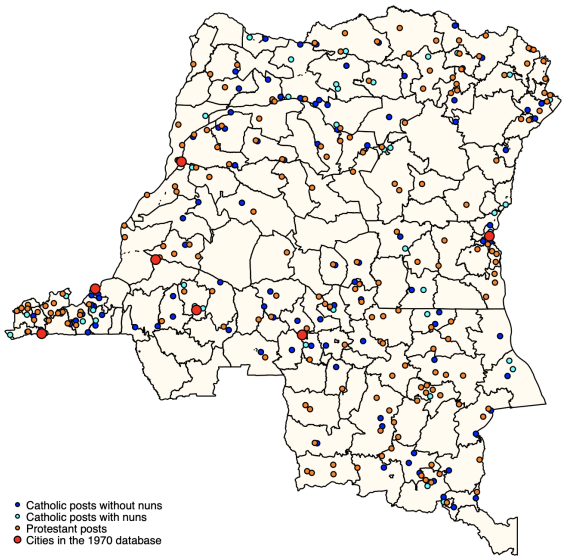
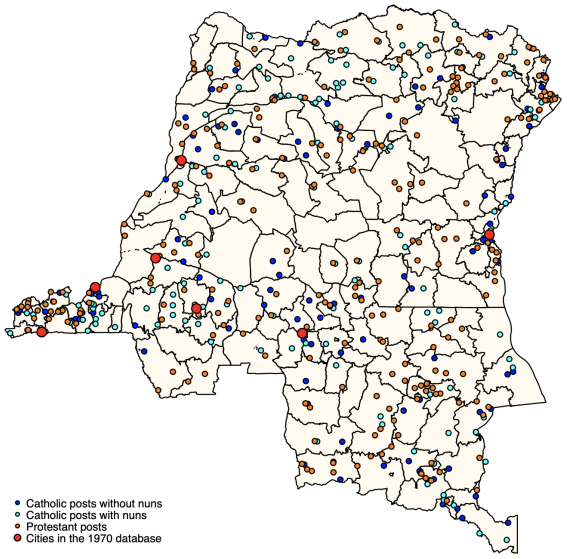
Figures

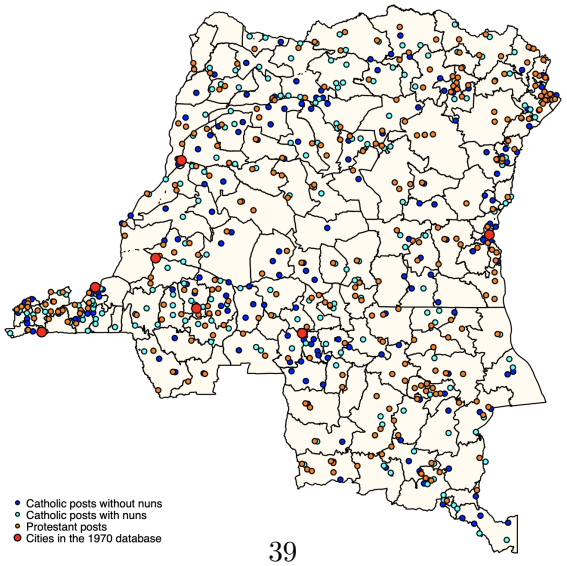
Figure 1: Spatial distribution of missionary posts



(a) Missionary posts in 1924



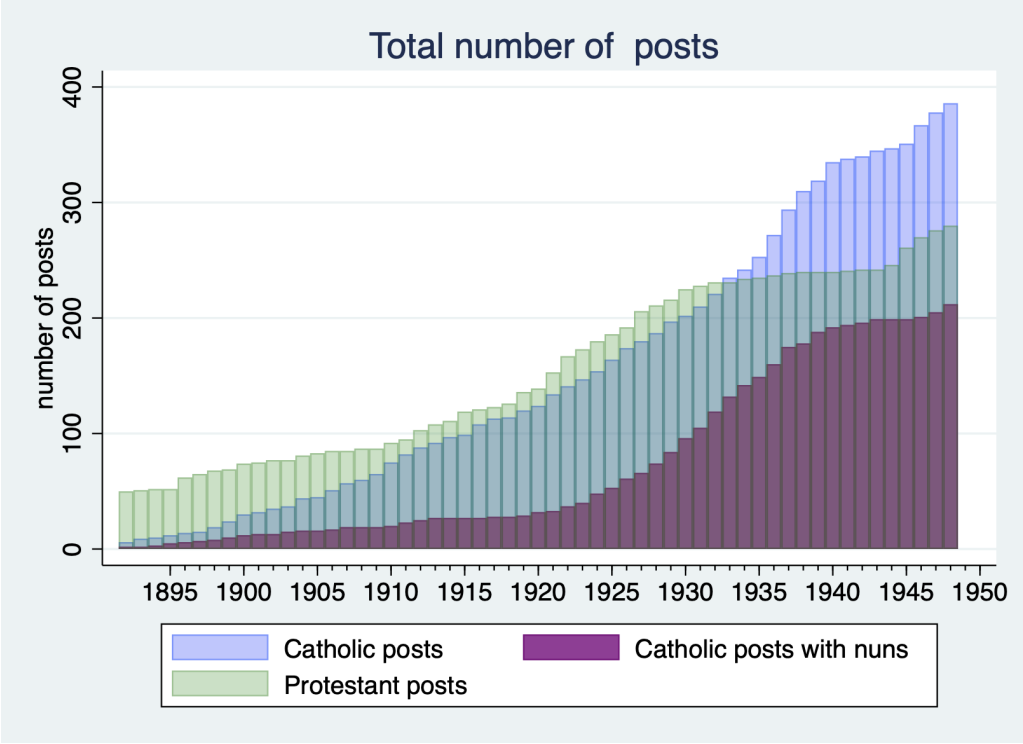
(b) Missionary posts in 1935



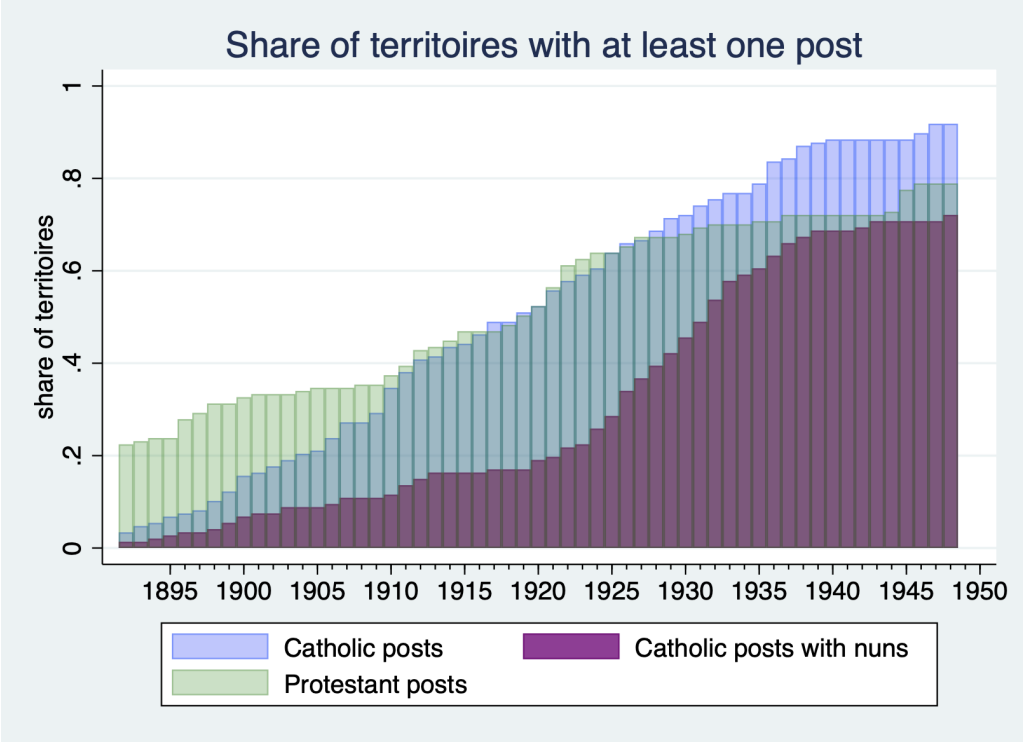
(c) Missionary posts in 1949

Data : Multiple historical and archival sources described in Section 3.2.

Figure 2: Opening of missionary posts, by religious affiliation



(a) Number of posts by year



(b) Share of territoires with at least one post

Data : Multiple historical and archival sources described in Section 3.2.

Tables

Table 1: Change in territory average distance to different type of posts between 1910 and 1948:

	(1)			
	mean	sd	min	max
ExpCatholics_1910	1.10	0.75	0.15	3.45
ExpCatholics_1948	0.37	0.18	0.03	1.01
ExpCatholicsxNuns_1910	1.87	1.09	0.15	4.71
ExpCatholicsxNuns_1948	0.55	0.31	0.03	1.59
ExpProtestants_1910	1.30	0.97	0.15	3.60
ExpProtestants_1948	0.45	0.19	0.13	1.29

The measures of exposure are average linear distance to the closest post of either type, using 1000 random location in the territoire. The unit is 100 km.

Table 2: Type of activities targeting women and their children in Catholic posts with nuns (proportion of total posts), by Catholic missions yearbooks:

	1924	1935	1949
Workrooms	0.21	0.19	0.34
Housekeeping schools and marriage preparation workshops	0.29	0.26	0.46
Women and children health: activities and infrastructures	0.19	0.67	0.91
General health : activities and infrastructures	0.62	0.84	0.94
N	48	150	217

Data from the Catholic Missions yearbooks (*Annuaires des Missions Catholiques au Congo Belge*) published in 1924, 1935 and 1949. For more detail information, see Section 3.2. The last row indicates the number of Catholic posts with female missionaries.

Table 3: Total number of birth at different ages
Missionary exposure measured at 6 years

	Age 25	Age 35	Age 40	Age 45
Panel A: Any post in district (0/1)				
	(1)	*(2)*	*(3)*	*(4)*
ExpCatholics	0.056	−0.067	−0.020	−0.051
	(0.121)	(0.186)	(0.200)	(0.243)
ExpCatholics × Nuns	−0.044	0.231*	0.210	0.505***
	(0.093)	(0.117)	(0.132)	(0.160)
ExpProtestants	−0.163	−0.342*	−0.469*	−0.487**
	(0.101)	(0.200)	(0.251)	(0.222)
Adjusted R2	0.10	0.13	0.13	0.12
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.943	0.497	0.453	0.117
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.136	0.364	0.218	0.252
pvalue(ExpCatholics = ExpProtestants)	0.367	0.138	0.098	0.020
Panel B: Linear distance				
ExpCatholics	−0.284**	−0.155	−0.153	−0.344
	(0.141)	(0.239)	(0.263)	(0.254)
ExpCatholics × Nuns	−0.015	−0.333**	−0.365***	−0.340**
	(0.097)	(0.160)	(0.135)	(0.131)
ExpProtestants	0.265**	0.781***	0.678***	0.677***
	(0.114)	(0.170)	(0.220)	(0.226)
Adjusted R2	0.10	0.13	0.13	0.12
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.046	0.053	0.071	0.016
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.014	0.001	0.005	0.002
pvalue(ExpCatholics = ExpProtestants)	0.007	0.004	0.026	0.006
Panel C: Log distance				
ExpCatholics	−0.107	−0.122	0.042	−0.180
	(0.133)	(0.205)	(0.198)	(0.266)
ExpCatholics × Nuns	−0.032	−0.327**	−0.344**	−0.444***
	(0.107)	(0.149)	(0.141)	(0.148)
ExpProtestants	0.286***	0.613***	0.478**	0.570***
	(0.089)	(0.138)	(0.195)	(0.169)
Controls	*Yes*	*Yes*	*Yes*	*Yes*
Territoire FE	*Yes*	*Yes*	*Yes*	*Yes*
N	17367	15749	9941	6354
Adjusted R2	0.10	0.13	0.13	0.12
Mean of dep. var.	2.82	5.40	5.96	5.98
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.362	0.060	0.194	0.019
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.028	0.000	0.024	0.001
pvalue(ExpCatholics = ExpProtestants)	0.031	0.007	0.137	0.019

Data: Demographic survey collected in the 1970s in six major cities in Zaire (see Section 3.1.1).
Sample: women aged 25 or older (column 1), 35 or older (column 2), 40 or older (column 3) and 45 or older (column 4). OLS regression.
Dep variables : number of birth a women had at age 25 (column 1), 35 (column 2), 40 (column 3) and 45 (column 4).
ExpCatholics, ExpCatholic × Nuns and ExpProtestants are the exposure measures as described in Section 3.2: these are either the extensive measure in Panel A (whether there is at least one missionary post in *territory* g), or the intensive margin variables (measures of *territory*-level average distance to missionary posts) in Panel B and Panel C for the log transformation of this measure. In Panel B, we divide the distance by 100 to ease the reading of coefficients. All exposure variables and are measured at age 6. Controls included: city of residence and a dummy variable indicating whether the place of birth of the mother is in a rural area.
Standard errors, in (), are clustered at the territory level.
* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Table 4: Mission exposure and cohort fertility in the representative sample of the 1950s
Exposure measured at 6

	(1)	(2)	(3)	(4)
	All (linear distance)	All (log distance)	>35 (linear distance)	>35 (log distance)
ExpCatholics	-0.451***	-0.306**	-0.172	-0.038
	(0.146)	(0.146)	(0.133)	(0.144)
ExpCatholics_x_Nuns	-0.051	0.064	-0.268**	-0.419**
	(0.108)	(0.120)	(0.125)	(0.200)
ExpProtestants	0.303**	0.299**	0.063	0.193
	(0.153)	(0.123)	(0.213)	(0.190)
_cons	-10.973	-11.535	-2.707	-2.840
	(9.314)	(9.666)	(13.787)	(13.574)
N	742	742	318	318

Standard errors in parentheses

One observation is one age category in a given territoire. Age categories are: 15-19, 20-24, 25-29, 30-34, 35-44, 45-54, +55.

When exposure is measured by linear distance, we divide the distance by 100 to ease the reading of coefficients.

Observations are weighted by the number of women they represent. Standard errors are clustered at the territoire level.

Controls include district and cohort fixed effects and the following control at the territoire level: distance to Catholic and Protestant missions in 1886, lattitude, longitute and their product, area, area suited for agriculture, mean elevation, standard deviation in elevation, population density in 18xx, tse-tse index, malaria index, the presence of railroad, navigable river and the intensity of the Atlantic slave trade.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Evidence on mechanisms driving effects of exposure to missionary presence : Age at first birth and birth spacing
Exposure measured at age 6

	Age at first birth	Birth intervals	
		All births	Btw. 1st and 2nd births
Panel A: Any post in district (0/1)			
	(1)	*(2)*	*(3)*
ExpCatholics	0.002	−0.016	−1.572
	(0.460)	(0.781)	(1.740)
ExpCatholics × Nuns	−0.311	−0.449	−0.380
	(0.333)	(0.528)	(1.242)
ExpProtestants	0.365	0.213	0.151
	(0.361)	(0.444)	(1.100)
Adjusted R2	0	0	0
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.63	0.59	0.33
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.55	0.81	0.39
pvalue(ExpCatholics = ExpProtestants)	0.365	0.485	0.363
Panel B: Linear distance			
ExpCatholics	−0.519	0.650	2.493
	(0.798)	(1.389)	(2.857)
ExpCatholics × Nuns	0.648	0.387	0.409
	(0.475)	(0.522)	(0.903)
ExpProtestants	−0.062	−1.240**	−2.213*
	(0.492)	(0.602)	(1.216)
Adjusted R2	0.08	0.01	0.01
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.854	0.384	0.274
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.847	0.066	0.068
pvalue(ExpCatholics = ExpProtestants)	0.656	0.164	0.109
Panel C: Log distance			
ExpCatholics	−0.193	−0.087	0.716
	(0.499)	(0.786)	(1.476)
ExpCatholics × Nuns	0.527	0.286	0.275
	(0.397)	(0.544)	(1.073)
ExpProtestants	−0.208	−0.933**	−1.868*
	(0.397)	(0.464)	(1.039)
Controls	*Yes*	*Yes*	*Yes*
Territoire FE	*Yes*	*Yes*	*Yes*
N	17402	80579	14610
Mean of dep.var	19.36	30.54	31.95
Adjusted R2	0.08	0.01	0.01
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.578	0.793	0.529
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.492	0.288	0.169
pvalue(ExpCatholics = ExpProtestants)	0.984	0.434	0.204

Data: Demographic survey collected in the 1970s in six major cities in Zaire (see Section 3.1.1).
Sample: women aged 25 or older. (column 1) and women aged 25 or older who gave birth at least twice (columns 2 and 3). OLS regression
Dep variables : age at first child (column 1), birth intervals in months for all birth the woman ever had (column 2), and restricted to the first and second births only (column 3).
ExpCatholics, ExpCatholic × Nuns and ExpProtestants are the exposure measures as described in Section 3.2 : these are either the extensive measure in Panel A (whether there is at least one missionary post in *territory g*), or the intensive margin variables (measures of *territory*-level average distance to missionary posts) in Panel B and Panel C for the log transformation of this measure. In Panel B, we divide the distance by 100 to ease the reading of coefficients. All exposure variables and are measured at age 6. Controls included: city of residence and a dummy variable indicating whether the place of birth of the mother is in a rural area. In column 2, we also include birth-order dummy variables.
Standard errors, in (), are clustered at the territory level.
* p ≤ 0.1, ** p ≤ 0.05, *** p ≤ 0.01.

Table 6: Infant mortality
Exposure measured at age 6

	Age 25	Age 35	Age 40	Age 45
	(1)	*(2)*	*(3)*	*(4)*
Panel : Any post in district (0/1)				
ExpCatholics	−4.538	−11.155	−16.778	−4.439
	(20.603)	(16.110)	(17.219)	(20.188)
ExpCatholics × Nuns	13.956	8.410	8.665	0.104
	(14.166)	(8.419)	(9.217)	(9.645)
ExpProtestants	15.889	8.716	15.049	13.667
	(10.497)	(7.459)	(16.156)	(16.885)
Adjusted R2	0.02	0.02	0.02	0.02
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.684	0.884	0.683	0.838
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.417	0.337	0.295	0.597
pvalue(ExpCatholics = ExpProtestants)	0.815	0.610	0.466	0.596
Panel B: Linear distance				
ExpCatholics	24.876	8.746	18.487	12.089
	(37.557)	(21.814)	(22.218)	(22.625)
ExpCatholics × Nuns	−0.217	4.128	3.244	5.217
	(14.396)	(12.097)	(10.404)	(10.423)
ExpProtestants	−27.746	−10.298	−1.545	−10.103
	(21.710)	(16.401)	(20.306)	(19.835)
Adjusted R2	0.02	0.02	0.02	0.02
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.503	0.575	0.354	0.454
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.278	0.497	0.536	0.453
pvalue(ExpCatholics = ExpProtestants)	0.253	0.551	0.578	0.528
Panel c: Log distance				
ExpCatholics	25.778	20.265	18.182	−0.234
	(21.668)	(15.909)	(17.228)	(19.287)
ExpCatholics × Nuns	−0.548	0.793	−0.553	3.722
	(13.861)	(9.379)	(9.142)	(10.247)
ExpProtestants	−20.401	−4.100	6.952	1.685
	(14.698)	(10.692)	(17.090)	(15.231)
Controls	*Yes*	*Yes*	*Yes*	*Yes*
Territoire FE	*Yes*	*Yes*	*Yes*	*Yes*
N	38928	73166	50471	32522
Mean of dep. var	84.66	85.90	94.49	104.06
Adjusted R2	0.02	0.02	0.02	0.02
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.247	0.223	0.355	0.874
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.143	0.256	0.706	0.946
pvalue(ExpCatholics = ExpProtestants)	0.105	0.270	0.689	0.939

Data: Demographic survey collected in the 1970s in six major cities in Zaire (see Section 3.1.1).
Sample: all births for women aged 25 or older (column 1), 35 or older (column 2), 40 or older (column 3) and 45 or older (column 4). OLS regression.
Dep variable : Dummy equal to 1 if the child died before age 1. This variable is multiplied by 1000 to ease the reading of the coefficients.
ExpCatholics, ExpCatholic × Nuns and ExpProtestants are the exposure measures as described in Section 3.2 : these are either the extensive measure in Panel A (whether there is at least one missionary post in *territory g*), or the intensive margin variables (measures of *territory*-level average distance to missionary posts) in Panel B and Panel C for the log transformation of this measure. In Panel B, we divide the distance by 100 to ease the reading of coefficients. All exposure variables and are measured at age 6. Controls included: city of residence and a dummy variable indicating whether the place of birth of the mother is in a rural area.
Standard errors, in (), are clustered at the territory level.
* p ≤ 0.1, ** p ≤ 0.05, *** p ≤ 0.01.

Table 7: Childlessness - exposure measured at age 6

	Age 25	Age 35	Age 40	Age 45
	(1)	*(2)*	*(3)*	*(4)*
Panel A: Any post in district (0/1)				
ExpCatholics	−0.044	−0.037	−0.021	−0.016
	(0.029)	(0.029)	(0.026)	(0.028)
ExpCatholics × Nuns	0.001	−0.013	−0.003	0.002
	(0.024)	(0.018)	(0.018)	(0.018)
ExpProtestants	0.068***	0.045**	0.032	0.044*
	(0.025)	(0.021)	(0.032)	(0.026)
Adjusted R2	0.09	0.07	0.06	0.07
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.302	0.193	0.496	0.686
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.007	0.036	0.284	0.169
pvalue(ExpCatholics = ExpProtestants)	0.037	0.043	0.331	0.257
Panel B: Linear distance				
ExpCatholics	0.032	0.000	0.005	0.030
	(0.048)	(0.051)	(0.046)	(0.047)
ExpCatholics × Nuns	0.023	0.041	0.030	0.011
	(0.029)	(0.026)	(0.021)	(0.017)
ExpProtestants	−0.059*	−0.063**	−0.035	−0.037
	(0.030)	(0.026)	(0.028)	(0.026)
Adjusted R2	0.09	0.07	0.06	0.07
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.239	0.340	0.362	0.322
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.086	0.060	0.159	0.103
pvalue(ExpCatholics = ExpProtestants)	0.140	0.272	0.427	0.157
Panel C: Log distance				
ExpCatholics	0.027	0.013	−0.008	0.015
	(0.031)	(0.031)	(0.031)	(0.034)
ExpCatholics × Nuns	0.019	0.019	0.015	−0.000
	(0.028)	(0.023)	(0.021)	(0.020)
ExpProtestants	−0.058**	−0.046**	−0.025	−0.036*
	(0.023)	(0.020)	(0.023)	(0.019)
Controls	*Yes*	*Yes*	*Yes*	*Yes*
Birth District FE	*No*	*Yes*	*Yes*	*Yes*
Adjusted R2	0.09	0.07	0.06	0.07
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.265	0.368	0.827	0.688
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.058	0.093	0.488	0.277
pvalue(ExpCatholics = ExpProtestants)	0.063	0.158	0.668	0.210

Data: Demographic survey collected in the 1970s in six major cities in Zaire (see Section 3.1.1).
Sample: women aged 25 or older (column 1), 35 or older (column 2), 40 or older (column 3) and 45 or older (column 4). OLS regression.
Dep variables : Dummy equal to 1 if the woman never gave birth before age 25 (column 1), 35 (column 2), 40 (column 3) and 45 (column 4).
ExpCatholics, ExpCatholic × Nuns and ExpProtestants are the exposure measures as described in Section 3.2 : these are either the extensive measure in Panel A (whether there is at least one missionary post in *territory g*), or the intensive margin variables (measures of *territory*-level average distance to missionary posts) in Panel B and Panel C for the log transformation of this measure. In Panel B, we divide the distance by 100 to ease the reading of coefficients. All exposure variables and are measured at age 6. Controls included: city of residence and a dummy variable indicating whether the place of birth of the mother is in a rural area.
Standard errors, in (), are clustered at the territory level.
* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Table 8: Fertility levels at different ages and missionary activities targeting women and their children
Exposure measured at age 6

	Age 25	Age 35	Age 40	Age 45
	(1)	*(2)*	*(3)*	*(4)*
Panel A: Linear distance				
ExpCatholics	−0.265*	−0.129	−0.131	−0.327
	(0.144)	(0.232)	(0.282)	(0.263)
ExpCatholics × Nuns	0.050	−0.183	−0.179	−0.123
	(0.097)	(0.157)	(0.131)	(0.131)
ExpCatholics × Nuns × Workrooms	0.001***	0.001**	0.001	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
ExpCatholics × Nuns × Housewife School and workshops	−0.001***	−0.002***	−0.002***	−0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
ExpCatholics × Nuns × Women health activities	−0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
ExpProtestants	0.209*	0.644***	0.475**	0.436*
	(0.124)	(0.170)	(0.231)	(0.230)
Adjusted R2	0.10	0.13	0.13	0.12
Panel B: Log distance				
ExpCatholics	−0.119	−0.115	0.054	−0.163
	(0.132)	(0.202)	(0.204)	(0.262)
ExpCatholics × Nuns	−0.011	−0.225	−0.215	−0.228
	(0.117)	(0.164)	(0.150)	(0.170)
ExpCatholics × Nuns × Workrooms	0.090***	0.062	0.078	0.038
	(0.033)	(0.047)	(0.062)	(0.073)
ExpCatholics × Nuns × Housewife School and workshops	−0.084*	−0.165**	−0.224***	−0.322***
	(0.051)	(0.072)	(0.074)	(0.095)
ExpCatholics × Nuns × Women health activities	0.001	−0.043	0.025	0.021
	(0.045)	(0.082)	(0.079)	(0.083)
ExpProtestants	0.240**	0.578***	0.372*	0.478***
	(0.104)	(0.163)	(0.196)	(0.174)
Controls	*Yes*	*Yes*	*Yes*	*Yes*
Territoire FE	*Yes*	*Yes*	*Yes*	*Yes*
N	17367	15749	9941	6354
Mean of dep. var	2.82	5.40	5.96	5.98
Adjusted R2	0.10	0.13	0.13	0.12

Data: Demographic survey collected in the 1970s in six major cities in Zaire (see Section 3.1.1).
Sample: women aged 25 or older (column 1), 35 or older (column 2), 40 or older (column 3) and 45 or older (column 4). OLS regression.
Dep variables : number of birth a women had at age 25 (column 1), 35 (column 2), 40 (column 3) and 45 (column 4).
ExpCatholics, ExpCatholic × Nuns and ExpProtestants are the exposure measures as described in Section 3.2 : these are either the linear *territory*-level average distance to missionary posts in Panel A and, or in Panel B the log transformation of this measure. ExpCatholic × Nuns is further interacted with three set of activities targeting women as defined in section 3.2. The omitted category is the "general health activities" categories. In Panel A, we divide the distance by 100 to ease the reading of coefficients. All exposure variables and are measured at age 6.
Controls included: city of residence and a dummy variable indicating whether the place of birth of the mother is in a rural area.
Standard errors, in (), are clustered at the territory level.
* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Table 9: Fertility of women aged 45+ and missions installation when they had (almost) completed their fertility:

	(1) birthperwoman	(2) birthperwoman	(3) birthperwoman	(4) birthperwoman
ExpCatholics	-0.357**	-0.310**		
	(0.157)	(0.148)		
ExpCatholics_x_Nuns	-0.171	-0.220*		
	(0.125)	(0.126)		
ExpProtestants	0.590***	0.601***		
	(0.204)	(0.212)		
reduction_dist_Catholics_43-48	-1.261		-2.104	
	(1.407)		(1.712)	
reduction_dist_CathoNuns_43-48	-0.966		-1.103	
	(0.906)		(1.012)	
reduction_dist_Protestants_43-48		0.240		0.268
		(0.918)		(1.086)
_cons	-6.571	-2.853	-3.095	1.405
	(13.909)	(13.925)	(15.894)	(16.516)
N	212	212	212	212

Standard errors in parentheses

The dependent variable is the average cohort fertility. Distances are in 100 km.

Women were at least 33 in 1943 (their fertility should not be much impacted by new posts opened btw 1943 and 1948).

Observations are weighted by the number of women they represent. Standard errors are clustered at the territoire level.

Controls include district and cohort fixed effects and the following control at the territoire level: distance to Catholic and Protestant missions in 1886, lattitude, longitute and their product, area, area suited for agriculture, mean elevation, standard deviation in elevation, population density in 18xx, tse-tse index, malaria index, the presence of railroad, navigable river and the intensity of the Atlantic slave trade.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Correlation btw difference in fertility across the two eldest cohorts and reduction in distance in the last 5-years for which we have mission data (with District fixed effects and controls):

	(1) Increase in fertility	(2) Increase in fertility	(3) Increase in fertility
reduction_dist_Catholics_43-48	2.860		2.930
	(1.900)		(1.908)
reduction_dist_CathoNuns_43-48	0.964		0.907
	(0.834)		(0.886)
reduction_dist_Protestants_43-48		-0.317	-0.256
		(0.761)	(0.815)
_cons	-15.605	-19.745	-15.907
	(11.049)	(12.494)	(11.073)
N	106	106	106

Standard errors in parentheses

The dependent variable is the difference in fertility between the cohort 45-55 and 55+. Distances are in 100 km.

Women were at least 33 in 1943 (their fertility should not be much impacted by new posts opened btw 1943 and 1948).

Observations are weighted by the number of women they represent. Standard errors are clustered at the territoire level.

Controls include district fixed effects and the following control at the territoire level: distance to Catholic and Protestant missions in 1886, lattitude, longitute and their product, area, area suited for agriculture, mean elevation, standard deviation in elevation, population density in 18xx, tse-tse index, malaria index, the presence of railroad, navigable river and the intensity of the Atlantic slave trade.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Comparison of results on the representative sample of 1950s and on the counter-factual sample of migrants observed in the 1970s:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	50s (at 6)	70s (at 6)	50s (at 6) - log	70s (at 6) - log	50s (at 0)	70s (at 0)	50s (at 0) - log	70s (at 0) - log
ExpCatholics	-0.414*	-0.178	-0.191	-0.092	-0.491***	-0.355	-0.199	-0.064
	(0.220)	(0.388)	(0.177)	(0.224)	(0.158)	(0.268)	(0.174)	(0.212)
ExpCatholics_x_Nuns	-0.127	-0.210	0.023	0.110	-0.022	-0.064	0.055	0.079
	(0.122)	(0.183)	(0.141)	(0.146)	(0.097)	(0.134)	(0.131)	(0.132)
ExpProtestants	0.525***	0.523**	0.392***	0.262	0.537***	0.556***	0.394***	0.311*
	(0.190)	(0.232)	(0.134)	(0.171)	(0.128)	(0.201)	(0.135)	(0.174)
_cons	-19.899**	-2.843	-21.170**	-3.796	-19.177**	-1.458	-20.948**	-4.213
	(8.503)	(5.224)	(9.317)	(5.449)	(8.326)	(5.261)	(9.274)	(5.344)
N	565	565	565	565	565	565	565	565

Standard errors in parentheses

Columns 1, 3, 5 and 7 use the 1950s data, for cohorts/territories represented in the 1970s data

Columns 2, 4, 6 and 8 use the reconstructed 1950s fertility of women surveyed in the 1970s.

One observation is one age category in a given territoire. Age categories are: 15-19, 20-24, 25-29, 30-34, 35-44, 45-54, +55.

Observations are weighted by the number of women they represent. Standard errors are clustered at the territoire level.

Controls include district fixed effects and the following control at the territoire level: distance to Catholic and Protestant missions in 1886, lattitude, longitute and their product, area, area suited for agriculture, mean elevation, standard deviation in elevation, population density in 18xx, tse-tse index, malaria index, the presence of railroad, navigable river and the intensity of the Atlantic slave trade.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6 Appendix

6.1 Tables

Table A.1: Total number of birth at different ages
Missionary exposure measured at birth

	Age 25	Age 35	Age 40	Age 45
Panel A: Any post in district (0/1)				
	(1)	*(2)*	*(3)*	*(4)*
ExpCatholics	−0.071	−0.046	0.035	0.030
	(0.087)	(0.163)	(0.173)	(0.176)
ExpCatholics × Nuns	0.170***	0.218**	0.155	0.369**
	(0.063)	(0.105)	(0.136)	(0.160)
ExpProtestants	−0.189**	−0.423***	−0.226	−0.174
	(0.074)	(0.141)	(0.162)	(0.163)
Adjusted R2	0.09	0.13	0.13	0.12
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.361	0.334	0.301	0.068
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.393	0.143	0.355	0.431
pvalue(ExpCatholics = ExpProtestants)	0.057	0.022	0.111	0.026
Panel B: Linear distance				
ExpCatholics	−0.127	0.093	−0.027	−0.007
	(0.114)	(0.173)	(0.205)	(0.201)
ExpCatholics × Nuns	−0.061	−0.234**	−0.222**	−0.255***
	(0.073)	(0.109)	(0.087)	(0.081)
ExpProtestants	0.373***	0.407***	0.349***	0.331***
	(0.101)	(0.137)	(0.117)	(0.124)
Adjusted R2	0.09	0.13	0.13	0.12
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.117	0.437	0.205	0.145
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.005	0.054	0.032	0.022
pvalue(ExpCatholics = ExpProtestants)	0.010	0.243	0.179	0.225
Panel C: Log distance				
ExpCatholics	−0.169*	0.084	0.018	−0.048
	(0.086)	(0.128)	(0.157)	(0.170)
ExpCatholics × Nuns	−0.172**	−0.266**	−0.232**	−0.377***
	(0.078)	(0.117)	(0.105)	(0.099)
ExpProtestants	0.382***	0.339***	0.255**	0.281**
	(0.084)	(0.123)	(0.108)	(0.110)
Controls	*Yes*	*Yes*	*Yes*	*Yes*
Territoire FE	*Yes*	*Yes*	*Yes*	*Yes*
N	27659	15752	9941	6354
Adjusted R2	0.09	0.13	0.13	0.12
Mean of dep. var.	2.82	5.40	5.96	5.98
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.004	0.289	0.205	0.009
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.000	0.031	0.046	0.001
pvalue(ExpCatholics = ExpProtestants)	0.000	0.202	0.283	0.143

Data: Demographic survey collected in the 1970s in six major cities in Zaire (see Section 3.1.1).
Sample: women aged 25 or older (column 1), 35 or older (column 2), 40 or older (column 3) and 45 or older (column 4). OLS regression.
Dep variables : number of birth a women had at age 25 (column 1), 35 (column 2), 40 (column 3) and 45 (column 4).
ExpCatholics, ExpCatholic × Nuns and ExpProtestants are the exposure measures as described in Section 3.2 : these are either the extensive measure in Panel A (whether there is at least one missionary post in *territory* g), or the intensive margin variables (measures of *territory*-level average distance to missionary posts) in Panel B and Panel C for the log transformation of this measure. In Panel B, we divide the distance by 100 to ease the reading of coefficients. All exposure variables and are measured at birth Controls included: city of residence and a dummy variable indicating whether the place of birth of the mother is in a rural area.
Standard errors, in (), are clustered at the territory level.
* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Table A.2: Mission exposure and cohort fertility in the representative sample of the 1950s
Exposure measured at birth

	(1)	(2)	(3)	(4)
	All (linear distance)	All (log distance)	>35 (linear distance)	>35 (log distance)
ExpCatholics	-0.282**	-0.274**	-0.174	-0.210
	(0.110)	(0.136)	(0.121)	(0.169)
ExpCatholics_x_Nuns	-0.059	0.032	-0.078	-0.206
	(0.089)	(0.118)	(0.098)	(0.163)
ExpProtestants	0.350***	0.312***	0.211	0.381**
	(0.106)	(0.110)	(0.172)	(0.160)
_cons	-11.092	-11.385	-5.009	-5.390
	(9.216)	(9.510)	(13.880)	(13.510)
N	742	742	318	318

Standard errors in parentheses

One observation is one age category in a given territoire. Age categories are: 15-19, 20-24, 25-29, 30-34, 35-44, 45-54, +55.

When exposure is measured by linear distance, we divide the distance by 100 to ease the reading of coefficients.

Observations are weighted by the number of women they represent. Standard errors are clustered at the territoire level.

Controls include district and cohort fixed effects and the following control at the territoire level: distance to Catholic and Protestant missions in 1886, lattitude, longitute and their product, area, area suited for agriculture, mean elevation, standard deviation in elevation, population density in 18xx, tse-tse index, malaria index, the presence of railroad, navigable river and the intensity of the Atlantic slave trade.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: Evidence on mechanisms driving effects of exposure to missionary presence - Exposure measured at birth

	Age at first birth	Birth intervals	
		All births	Btw. 1st and 2nd births
Panel A: Any post in district (0/1)			
	(1)	*(2)*	*(3)*
ExpCatholics	0.049	0.078	−0.671
	(0.398)	(0.556)	(1.415)
ExpCatholics × Nuns	−0.672***	−0.116	−1.306
	(0.203)	(0.375)	(1.006)
ExpProtestants	0.654**	0.823	0.950
	(0.273)	(0.509)	(0.925)
Adjusted R2	0	0	0
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.19	0.95	0.16
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.27	0.38	0.36
pvalue(ExpCatholics = ExpProtestants)	0.033	0.345	0.089
Panel B: Linear distance			
ExpCatholics	0.083	0.998	1.895
	(0.517)	(0.668)	(1.837)
ExpCatholics × Nuns	0.454	−0.334	0.174
	(0.298)	(0.425)	(0.953)
ExpProtestants	−0.773*	−1.401***	−3.640***
	(0.412)	(0.442)	(1.058)
Adjusted R2	0.09	0.01	0.01
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.301	0.236	0.165
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.107	0.012	0.006
pvalue(ExpCatholics = ExpProtestants)	0.288	0.002	0.015
Panel C: Log distance			
ExpCatholics	0.342	0.201	0.885
	(0.368)	(0.489)	(1.125)
ExpCatholics × Nuns	0.678***	−0.258	1.387
	(0.252)	(0.468)	(0.968)
ExpProtestants	−0.851**	−1.075***	−3.053***
	(0.330)	(0.357)	(0.944)
Controls	*Yes*	*Yes*	*Yes*
Territoire FE	*Yes*	*Yes*	*Yes*
N	27701	112014	23439
Mean of dep.var	19.36	30.54	31.95
Adjusted R2	0.09	0.01	0.01
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.023	0.896	0.043
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.002	0.102	0.001
pvalue(ExpCatholics = ExpProtestants)	0.042	0.022	0.017

Data: Demographic survey collected in the 1970s in six major cities in Zaire (see Section 3.1.1).
Sample: women aged 25 or older. (column 1) and women aged 25 or older who gave birth at least twice (columns 2 and 3). OLS regression
Dep variables : age at first child (column 1), birth intervals in months for all birth the woman ever had (column 2), and restricted to the first and second births only (column 3).
ExpCatholics, ExpCatholic × Nuns and ExpProtestants are the exposure measures as described in Section 3.2 : these are either the extensive measure in Panel A (whether there is at least one missionary post in *territory g*), or the intensive margin variables (measures of *territory*-level average distance to missionary posts) in Panel B and Panel C for the log transformation of this measure. In Panel B, we divide the distance by 100 to ease the reading of coefficients. All exposure variables and are measured at birth. Controls included: city of residence and a dummy variable indicating whether the place of birth of the mother is in a rural area. In column 2, we also include birth-order dummy variables.
Standard errors, in (), are clustered at the territory level.
* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Table A.4: Infant mortality
Exposure measured at birth

	Age 25	Age 35	Age 40	Age 45
	(1)	*(2)*	*(3)*	*(4)*
Panel : Any post in district (0/1)				
ExpCatholics	−3.615	−1.520	−1.316	−2.596
	(13.763)	(13.114)	(12.472)	(11.967)
ExpCatholics × Nuns	−0.357	−0.145	0.586	1.180
	(9.150)	(6.920)	(8.009)	(10.095)
ExpProtestants	−3.355	−24.020	−20.561	−21.801
	(8.430)	(15.204)	(14.410)	(13.689)
Adjusted R2	0.02	0.02	0.02	0.02
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.816	0.911	0.959	0.921
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.988	0.341	0.370	0.301
pvalue(ExpCatholics = ExpProtestants)	0.976	0.392	0.404	0.315
Panel B: Linear distance				
ExpCatholics	−32.476*	−34.781**	−24.291	−17.917
	(18.551)	(15.979)	(18.798)	(18.684)
ExpCatholics × Nuns	11.007	13.689	13.743*	13.125
	(9.416)	(8.605)	(8.249)	(8.940)
ExpProtestants	11.646	29.383***	25.701**	14.633
	(13.437)	(9.942)	(10.992)	(11.038)
Adjusted R2	0.02	0.02	0.02	0.02
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.293	0.178	0.552	0.787
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.275	0.017	0.121	0.403
pvalue(ExpCatholics = ExpProtestants)	0.126	0.001	0.029	0.143
Panel c: Log distance				
ExpCatholics	1.059	−13.226	−9.242	−8.308
	(10.819)	(10.555)	(12.193)	(14.069)
ExpCatholics × Nuns	9.055	8.126	7.982	8.130
	(10.314)	(9.469)	(10.444)	(11.820)
ExpProtestants	10.043	33.701***	30.681***	24.286***
	(8.937)	(7.702)	(7.479)	(7.911)
Controls	*Yes*	*Yes*	*Yes*	*Yes*
Territoire FE	*Yes*	*Yes*	*Yes*	*Yes*
N	68197	73166	50471	32522
Mean of dep. var	84.66	85.90	94.49	104.06
Adjusted R2	0.02	0.02	0.02	0.02
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.300	0.637	0.912	0.990
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.996	0.009	0.039	0.182
pvalue(ExpCatholics = ExpProtestants)	0.557	0.001	0.010	0.066

Data: Demographic survey collected in the 1970s in six major cities in Zaire (see Section 3.1.1).
Sample: all births for women aged 25 or older (column 1), 35 or older (column 2), 40 or older (column 3) and 45 or older (column 4). OLS regression.
Dep variable : Dummy equal to 1 if the child died before age 1. This variable is multiplied by 1000 to ease the reading of the coefficients.
ExpCatholics, ExpCatholic × Nuns and ExpProtestants are the exposure measures as described in Section 3.2 : these are either the extensive measure in Panel A (whether there is at least one missionary post in *territory g*), or the intensive margin variables (measures of *territory*-level average distance to missionary posts) in Panel B and Panel C for the log transformation of this measure. In Panel B, we divide the distance by 100 to ease the reading of coefficients. All exposure variables and are measured at birth. Controls included: city of residence and a dummy variable indicating whether the place of birth of the mother is in a rural area.
Standard errors, in (), are clustered at the territory level.
* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Table A.5: Childlessness
Exposure measured at birth

	Age 25 *(1)*	Age 35 *(2)*	Age 40 *(3)*	Age 45 *(4)*
Panel A: Any post in district (0/1)				
ExpCatholics	−0.025	−0.017	−0.009	−0.007
	(0.026)	(0.027)	(0.025)	(0.025)
ExpCatholics × Nuns	−0.043***	−0.009	−0.003	−0.013
	(0.014)	(0.012)	(0.012)	(0.014)
ExpProtestants	0.057***	0.053**	0.036*	0.039**
	(0.021)	(0.024)	(0.021)	(0.016)
Adjusted R2	0.09	0.07	0.06	0.07
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.027	0.376	0.669	0.463
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.027	0.111	0.259	0.189
pvalue(ExpCatholics = ExpProtestants)	0.002	0.080	0.246	0.102
Panel B: Linear distance				
ExpCatholics	−0.002	−0.010	−0.007	0.005
	(0.031)	(0.026)	(0.024)	(0.020)
ExpCatholics × Nuns	0.039*	0.012	0.007	−0.003
	(0.020)	(0.017)	(0.014)	(0.011)
ExpProtestants	−0.062**	−0.036*	−0.025	−0.021
	(0.024)	(0.021)	(0.020)	(0.018)
Adjusted R2	0.09	0.07	0.06	0.07
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.269	0.955	0.995	0.898
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.049	0.337	0.479	0.468
pvalue(ExpCatholics = ExpProtestants)	0.212	0.500	0.603	0.362
Panel C: Log distance				
ExpCatholics	0.021	−0.016	−0.025	−0.011
	(0.024)	(0.023)	(0.023)	(0.023)
ExpCatholics × Nuns	0.058***	0.008	0.006	0.001
	(0.016)	(0.014)	(0.013)	(0.012)
ExpProtestants	−0.061***	−0.033	−0.024	−0.024
	(0.020)	(0.021)	(0.019)	(0.019)
Controls	*Yes*	*Yes*	*Yes*	*Yes*
Birth District FE	*No*	*Yes*	*Yes*	*Yes*
Adjusted R2	0.09	0.07	0.06	0.07
pvalue(ExpCatholics + ExpCatholics × Nuns = 0)	0.014	0.749	0.399	0.677
pvalue(ExpCatholics + ExpCatholics × Nuns = ExpProtestants)	0.001	0.502	0.905	0.694
pvalue(ExpCatholics = ExpProtestants)	0.022	0.629	0.960	0.679

Data: Demographic survey collected in the 1970s in six major cities in Zaire (see Section 3.1.1).
Sample: women aged 25 or older (column 1), 35 or older (column 2), 40 or older (column 3) and 45 or older (column 4). OLS regression.
Dep variables : Dummy equal to 1 if the woman never gave birth before age 25 (column 1), 35 (column 2), 40 (column 3) and 45 (column 4).
ExpCatholics, ExpCatholic × Nuns and ExpProtestants are the exposure measures as described in Section 3.2 : these are either the extensive measure in Panel A (whether there is at least one missionary post in *territory g*), or the intensive margin variables (measures of *territory*-level average distance to missionary posts) in Panel B and Panel C for the log transformation of this measure. In Panel B, we divide the distance by 100 to ease the reading of coefficients. All exposure variables and are measured at birth. Controls included: city of residence and a dummy variable indicating whether the place of birth of the mother is in a rural area.
Standard errors, in (), are clustered at the territory level.
* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Table A.6: Fertility levels at different ages and missionary activities targeting women and their children
Exposure measured at birth

	Age 25	Age 35	Age 40	Age 45
	(1)	*(2)*	*(3)*	*(4)*
Panel A: Linear distance				
ExpCatholics	−0.126	0.074	−0.039	−0.001
	(0.110)	(0.169)	(0.203)	(0.200)
ExpCatholics × Nuns	−0.004	−0.116	−0.065	−0.119
	(0.072)	(0.109)	(0.091)	(0.096)
ExpCatholics × Nuns × Workrooms	−0.000	0.001***	0.001**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
ExpCatholics × Nuns × Housewife School and workshops	−0.001**	−0.001***	−0.002***	−0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
ExpCatholics × Nuns × Women health activities	−0.000	−0.000***	−0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
ExpProtestants	0.355***	0.471***	0.347***	0.261*
	(0.088)	(0.123)	(0.133)	(0.140)
Adjusted R2	0.09	0.13	0.13	0.12
Panel B: Log distance				
ExpCatholics	−0.153*	0.071	0.023	−0.031
	(0.087)	(0.127)	(0.160)	(0.175)
ExpCatholics × Nuns	−0.066	−0.141	−0.064	−0.218
	(0.084)	(0.129)	(0.121)	(0.132)
ExpCatholics × Nuns × Workrooms	−0.039	0.064	0.108	−0.104
	(0.035)	(0.045)	(0.080)	(0.072)
ExpCatholics × Nuns × Housewife School and workshops	−0.092**	−0.113**	−0.208***	−0.219**
	(0.042)	(0.053)	(0.078)	(0.090)
ExpCatholics × Nuns × Women health activities	−0.066	−0.154***	−0.034	0.075
	(0.041)	(0.053)	(0.052)	(0.058)
ExpProtestants	0.405***	0.436***	0.237*	0.221*
	(0.090)	(0.135)	(0.122)	(0.117)
Controls	*Yes*	*Yes*	*Yes*	*Yes*
Territoire FE	*Yes*	*Yes*	*Yes*	*Yes*
N	27659	15752	9941	6354
Mean of dep. var	2.82	5.40	5.96	5.98
Adjusted R2	0.09	0.13	0.13	0.12

Data: Demographic survey collected in the 1970s in six major cities in Zaire (see Section 3.1.1).
Sample: women aged 25 or older (column 1), 35 or older (column 2), 40 or older (column 3) and 45 or older (column 4). OLS regression.
Dep variables : number of birth a women had at age 25 (column 1), 35 (column 2), 40 (column 3) and 45 (column 4).
ExpCatholics, ExpCatholic × Nuns and ExpProtestants are the exposure measures as described in Section 3.2 : these are either the linear *territory*-level average distance to missionary posts in Panel A and, or in Panel B the log transformation of this measure. ExpCatholic × Nuns is further interacted with three set of activities targeting women as defined in section 3.2. The omitted category is the "general health activities" categories. In Panel A, we divide the distance by 100 to ease the reading of coefficients. All exposure variables and are measured at birth.
Controls included: city of residence and a dummy variable indicating whether the place of birth of the mother is in a rural area.
Standard errors, in (), are clustered at the territory level.
* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$.