African Economic History Working Paper No. 72

Women on a Mission: Protestant Legacies of Gender Equality in Africa?

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April 2023

ISBN 978-91-981477-9-7

Women on a Mission: Protestant Legacies of Gender Equality in Africa?

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This version: April 26, 2023

Abstract

Christian missions, especially Protestants missions, have been shown to advance long-run education outcomes and gender equality in Africa. However, the mechanisms behind this benign legacy and the contribution of missionary women, who constituted more than half of all Western mission staff, are not well-understood. We compile a new extensive data set on the locations of missions in colonial Africa, including the gender composition of their staff. In combination with contemporary survey data on one million respondents in 29 African countries, we provide evidence of missions' equalizing effects with regards to education and a wide range of female agency outcomes. We document that Protestant missions left no more benign legacy than Catholics, questioning the Protestant exceptionalism highlighted by prior studies. We also document a strong association between missionary women and girls' school enrollment in colonial times but find no evidence of any lasting gendered effects. Post-independence expansion of public education and the secularization of school curricula may have offset persistence of Africa's earliest centers of female education.

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1 Introduction

Beginning in the 19th century, a wave of missionary efforts led to a rapid expansion of Christianity worldwide. The provision of formal schooling by missions played a key role in attracting converts, prompting an unprecedented global expansion of education. Focus on girls' education intensified in the early 20th century when 18,000 Protestant missionary women represented an overwhelming majority (61%) of Western missionary staff, advancing female education worldwide.[1] Recent literature has given ample credit to the benign effects of Protestant missionary activities on women's present-day educational attainment and gender norms in sub-Saharan Africa (Kudo, 2017; Montgomery, 2017; Nunn, 2014), India (Calvi et al., 2022; Lankina & Getachew, 2012), China (Ma et al., 2023), Korea (Becker & Won, 2021; Izumi et al., 2023), and Turkey (Amasyali, 2022; Ersan & Can Ozen, 2022). While a large body of literature has studied the gendered consequences of evangelization, the mechanism and dynamics behind this benign Protestant legacy on women's human capital and agency remain poorly understood. The underlying channel that has received most attention is Protestantism's emphasis on both men's and women's Bible-literacy (*sola scriptura*), which helped to promote girls' schooling and reduced gender gaps in 19th century Prussia (Becker & Woessmann, 2008).

These benign Protestant legacies stand in stark contrast to substantial historical evidence that during the first half of the 20th century, when Christian missions provided the bulk of schooling in most African colonies, gender gaps in education widened markedly in favor of men (Baten et al., 2021; Chiseni & Bolt, 2022; De Haas & Frankema, 2018; Meier zu Selhausen & Weisdorf, 2016). Major gains towards educational gender equality were only achieved post-independence under African states' public education system (Barro & Lee, 2015; Evans et al., 2021). Moreover, mission schools had an ambiguous impact on women. On the one hand they raised girls' educational attainment, built specific vocational skills, and often provided exclusive career opportunities for female employment as teachers and nurses (Izumi et al., 2023; Meier zu Selhausen, 2014; Meier zu Selhausen & Weisdorf, 2016). On the other hand, the emphasis of missionaries on girls' education was not concerned with securing gender equality. Girls in mission schools were taught separately from boys; gender-biased curricula prioritized writing, arithmetic and vocational skills for boys and Victorian domestic skills for girls (i.e. needlework, cookery and laundry), training them for Christian marriage and motherhood (Meier zu Selhausen & Weisdorf, 2023; Musisi, 1992). This limited women's

[1] In comparison, 20% of African Protestant mission staff were female in 1922 (Beach & Fahs, 1925), making up 30,000 workers.

relative access to both secondary education and formal labor markets decisively (Aboagye, 2021; De Haas & Frankema, 2018; Meier zu Selhausen, 2014).

In this paper, we (i) investigate the long-term influence of Protestant versus Catholic missionary activity on female education and agency in sub-Saharan Africa, and (ii) examine both colonial-era and post-independence effects of Protestant female missionary presence, and thereby the earliest centers of female education, in particular. In the late 19th century, the Protestant Woman's Movement transformed from a male-dominated religious organization to be run overwhelmingly by female missionaries. By the early 20th century, 6,289 Protestant Western missionaries, the majority (55%) being female missionaries, served in 1,659 African missions that accounted for the teaching of 42% of all girls enrolled into missionary primary schools worldwide (Beach & Fahs, 1925, p. 78). Can the early feminization of the mission explain these benign long-term effects on women's education (emphasized in previous literature) and did the early presence of female missionaries also induce long-term shifts in female labor market participation and female agency?

To study colonial-era and long-term gendered effects of Christianization, we create a novel data set that combines contemporary survey data on 1,037,276 individuals in 29 countries from the Demographic and Health Surveys (DHS) with digitized archival data on the spatial location of 2,278 Protestant and Catholic missions in sub-Saharan Africa in the 1920s, covering almost twice as many African stations as mission atlases commonly used in the literature (e.g. Roome, 1925).[2] In addition, we digitized archival information on the gender composition of Western missionaries at each Protestant station operating in 1922, which provides a new measure of missions' relative investment into female education. We use this data for the first time to examine the role of Africa's early centers of women's formal education in advancing female education and agency.

We find that both Protestant and Catholic mission activities are positively correlated with post-independence educational attainment and in particular with female educational outcomes, reducing gender gaps. However, we document no differences between mission denominations in both general and gendered educational legacies, contrary to Gallego and Woodberry (2010) and Nunn (2014) who show comparatively superior Protestant long-term effects. We also find no evidence that this benign educational legacy across mission denominations translates into greater female labor market participation. However, it is strongly associated with gains in women's agency within marriage and household. Overall, the absence of any denominational differences in women's educational and agency long-term outcomes

[2] See Jedwab et al. (2022) for a survey on the literature on missionary long-term effects and sources used.

casts doubt on Protestants' exceptionalism in shaping women's outcomes and gendered cultural legacies relative to Catholic mission schooling found typically in the literature.

Next, using data on the gender composition of Western staff at each Protestant mission station, we assess the short-term and long-term effects of the degree of female missionary presence in 1922 on women's education post-independence. In the short-term, we find that a greater share of female missionaries among Protestant missionary societies is associated with higher girls' primary school enrollment and in particular with the recruitment of trained female African teachers. We then investigate whether these early centers of women's formal education continue to affect female educational and agency outcomes. We find no evidence for a benign legacy of a higher share of Western female staff in the past on female educational outcomes of post-independence birth cohorts (1950-2000), nor their labor market participation or female agency. Our evidence of non-persistence differs from results obtained by Calvi et al. (2022) for India who showed that the degree of feminization of Protestant missionaries in colonial Indian districts is associated with greater female education and empowerment for much of the 20$^{\text{th}}$ century.

Our results are robust to a variety of checks and controls. To control for endogeneity of mission placement and activity we create an extensive set of relevant geographical, historical, individual and mission-level controls demonstrated in Jedwab et al. (2022). We vary sample restrictions that we impose for better causal identification, and use Conley standard errors as an alternative estimation technique to account for spatial auto-correlation (Kelly, 2019). We exclude South Africa where 26.6% of all missions, and 35.7% of Protestant missions, were located and explore differences between colonizer identity. We also test whether single missionary women generated different effects from married women missionaries, whether competition between Catholics and Protestants mattered, and whether effects differ when adopting a temporal perspective of human capital formation by individuals' birth year for 1950-2000.

We discuss potential mechanisms that may have led to the absence of historical persistence of Africa's earliest centers of formal women's education into the post-independence period. Firstly, the effects began to wane with the continued Africanization of the mission over the course of the colonial era, and in particular the expansion of African female mission workers following in the footsteps of European female missionaries as more cost-efficient teachers and clerics. Secondly, female missionary legacies diminished once missionaries lost their monopoly over mass education during the 1950s. Post-independence enrollment rates expanded dramatically in sub-Saharan Africa and gender gaps declined under the public edu-

cational system that implemented programs of Universal Primary Education in the 1980-90s, including further feminization of teachers (Baten et al., 2021; Evans et al., 2021).

Our contribution is threefold. First, we contribute to a large body of literature on the impact of Christian missions on long-term development outside Europe (Becker, 2022a; Calvi & Mantovanellli, 2018; Dulay, 2021; Jedwab et al., 2021, 2022; Okoye, 2021; Valencia Caicedo, 2019; Waldinger, 2017; Wantchekon et al., 2015). In particular, Protestant missions have been associated with better educational outcomes in sub-Saharan Africa (Alesina et al., 2021; Cagé & Rueda, 2016; De Haas & Frankema, 2018; Gallego & Woodberry, 2010; Hedde-von Westernhagen & Becker, 2022; Nunn, 2014), India (Calvi et al., 2022) and China (Bai & Kung, 2015; Chen et al., 2022), suggesting that Protestants placed a higher value on human capital formation as shown for 19th century Europe (Becker & Woessmann, 2008). While our study also finds that Protestant missionary presence is positively related to present-day educational attainment in Africa, we show that this benign legacy equally applies to Catholic missionary presence, thus questioning differing denominational legacies on education.

Second, we contribute to a thriving scholarship that investigates the gendered long-term influence of Christian missions across the world, reporting particularly benign effects of Protestant missionary activity on women's relative education and empowerment in Africa (Baten et al., 2021; De Haas & Frankema, 2018; Fourie et al., 2014; Kudo, 2017; Okoye & Pongou, 2022) and Asia (Amasyali, 2022; Becker & Won, 2021; Ersan & Can Ozen, 2022; Izumi et al., 2023; Lankina & Getachew, 2013; Ma et al., 2023). Nunn (2014) finds that ethnic Protestant missionary exposure in early colonial Africa is associated with greater women's educational attainment today, while Catholic missionaries are linked to superior male educational attainment. Montgomery (2017) observes a positive impact of early Protestant and Catholic missions on both men's and women's years of education in Tanzania, but also finds that Protestant missionary legacies are associated with smaller contemporary gender gaps compared to Catholics. Contrary, we document no denominational differences in missions' positive influence on present-day women's education, labor market outcomes and a number of female agency outcomes, thus questioning the Protestant exceptionalism for African women's education and agency outcomes. Our results align with Baten et al. (2021) who compile district-level data on 19 sub-Saharan African countries from censuses, finding that both Protestant and Catholic missionary presence reduced educational gender gaps for 1920-1979 birth cohorts but identify no differential effect between denominations. Our results are also consistent with Jedwab et al. (2021) who observe no heterogeneous effects across gender from Protestant and Catholic missions in Ghana on current gender gaps in education. Likewise, for Cameroon Baumert (2022) documents a positive link between mission school

enrollment pre-World War I and present-day female educational attainment across both mission denominations.

Third, we advance this literature one step further, decomposing the gendered colonial-era and long-term influence of missions by their degree of feminization of their staff for the first time for sub-Saharan Africa. Thereby we illuminate the history of the feminization of the mission and tie in with a recent literature that explores Protestant missionary influence beyond denominational differences by their specific type of activity (Cagé & Rueda, 2016, 2020; Jedwab et al., 2022; Ma et al., 2023), and the role of female missionaries in particular (Calvi et al., 2022; Guirkinger & Villar, 2022). By studying both short and long-term mission effects we also expand our understanding of the temporal dynamics of effects and reduce compression of history (Austin, 2008). Relatedly, Guirkinger and Villar (2022) use demographic surveys from the 1970s and investigate the impact of Catholic nuns versus Protestant female missionaries on fertility outcomes in the Belgian Congo. They find that missions staffed by Catholic nuns stimulated fertility, while missions run by Catholic male missionaries and Protestant missionaries are linked to lower fertility in the long-run.

Particularly relevant to our study is Calvi et al. (2022) who investigate the long-term impacts of Protestant missions on human capital in India. Using district- and individual-level data from colonial India and the gender composition of mission staff, they find that both the presence of Protestant missions and Western female missionaries in 1908 are associated with higher female literacy, educational gender equality, and a number of female empowerment outcomes. Our findings for Africa are consistent with Protestant missions' benign effect on women's educational attainment in India as well as female missionaries raising girl's primary schooling during colonial times. However, contrary to the Indian case we do not find that a higher concentration of female missionaries continues to affect women's present-day education and empowerment that may suggest that educational policy post-independence resulted in differentiated long-term regional effects. Our paper differs in focusing on sub-Saharan Africa, the region with the highest number of Christians today (Johnson & Grim, 2020) and the largest Protestant missionary field worldwide in the early 20$^{\text{th}}$ century, making up 42% of girls' mission school enrollment, 29% of all Protestant missions, 20% of total Western missionary staff and 28% of native staff in 1922 (Beach & Fahs, 1925, pp. 76-77).

The remainder of the paper is organized as follows. Section 2 describes the historical background on female missionaries. Section 3 describes the data and sources used. Section 4 investigates the comparative long-run effects of Protestant and Catholic missions, as well as the short-term and long-term effects of Protestant female missionaries. Section 5 concludes.

2 Background: Female Missionaries in Africa

Christian Missions in Africa

Christian missionary efforts preceded European colonization of Africa. Since the early 19th century, Protestant missions had been spreading ahead of the Catholics. Missionary expansion intensified once quinine extended missionary survival in tropical Africa and European colonial rule unfolded in the second half of the 19th century (Becker, 2022b; Jedwab et al., 2022). Colonial education departments strongly interested in keeping costs low outsourced formal education to missions that came to provide the bulk of schooling in most of colonial Africa (c. 1885-1960) with the aim of attracting new converts (Cogneau & Moradi, 2014; Frankema, 2012). In British colonies, mission schools were partly subsidized through grants-in-aid when fulfilling colonial government's quality standards, while France kept missionaries' responsibility for education low, opting for public schools (Becker & Schmitt, forthcoming). Most of the financing and building of mission schools however came from African congregations (Meier zu Selhausen, 2019).

The Feminization of the Mission

In the early 19th century, the Protestant missionary movement was built upon a male evangelical enterprise. Women were excluded from preaching the gospel within Protestant denominations which reflected the wider female marginalization in public roles and formal careers in industrializing Europe and America (Midgley, 2006; Murray, 2000; White, 1988). Despite the fact that missionary societies only employed men as missionaries overseas, the voluntary work of women who accompanied their missionary husbands had been central to conversion efforts already in the early mission field (Haggis, 1998).[3] Missionary wives served as suitable role models for monogamous Christian family life, and became teachers of the local female Christian community, inculcating the domestic skills of sewing, cooking and laundry (Kirkwood, 1993, p. 26; Midgley, 2006).

Attitudes towards female missionaries started to change in the second half of the 19th century when the Church Mission Society realized that in India, where cultural norms secluded women within their homes which socially barred men's access, only female missionaries could

[3] The first British missionary wife to teach in Africa was Sarah Hartwig, sent out in 1805 by the Church Missionary Society to Freetown (Leach, 2012).

be admitted (Murray, 2000). With the objective of providing female teachers to promote girls' education, domestic skills, and medical care in their global mission fields, the Wesleyan Methodist Missionary Society, the Church Missionary Society, the Baptist Missionary Society, and the London Missionary Society founded Ladies' Associations between 1858 and 1875 (Kirkwood, 1993, p. 32; Seton, 1996). Moreover, from the 1870s growing legitimization of female lay ministry and professional work in Protestant churches and the founding of missionary training colleges for women opened-up an institutional path for single middle-class women with aspirations for overseas missionary work - not only as wives, sisters and daughters of male missionaries but increasingly as single missionaries.[4] Thus, overseas Protestant missionary work provided professional career opportunities that allowed single women to practice their evangelical, educational and medical expertise to a degree rarely possible in the sending societies, such as Victorian Britain (Semple, 2003; Seton, 1996; Bowie, 1993, p. 5-6; Taylor Huber and Lutkehaus, 1990, p. 9).

From the late 19th century, Protestant missions expanded rapidly in Africa, seeing their number of stations tripling from 585 in 1881 (Dobbins, 1881, p. 61) to 1,676 in 1924 (Becker, 2022b). Missionary presence was most intense in South Africa where 35.7% of Protestant missions were located (see Figure 1a). Expansion was driven by Protestant mission societies' shifting institutional focus to medical and educational services from the late 19th century onward, which actively endorsed women's status as missionaries. Mission societies favored the recruitment of professional and single women missionaries over unpaid missionary wives (Murray, 2000), sliding "mission objectives away from the wifely domain of the mission home towards professionalization and public female activity" (Manktelow, 2014, p. 153). Unhindered by family responsibilities, mission societies viewed young unmarried women as possessing greater dedication and liberty to develop girls' education, vocational skills, health care and the training of female African teachers, catechists and nurses (Prevost, 2008). Barred from ordination prior to World War I and earning lower salaries than men, Western women's missionary work mainly focused on girls' and women's schooling and health care in mission hospitals and dispensaries (Cox, 2008, p. 189; Sheldon, 1998; White, 1988).

In 1881, female missionaries, largely the wives of male missionaries, made up 17% of the 886 Western Protestant missionaries in Africa (Table 1). By 1901, women's share had grown to 42% of which about two-thirds were missionary wives. Although ordained men continued to dominate administrative functions and hierarchies, by 1922 women outnumbered men:

[4] Haggis (1998, p. 174) describes the intense competition of middle-class women for becoming missionaries for the London Missionary Society that preferably recruited females "comparatively young between the ages twenty-one and twenty-eight, full of health and vigour [...] - ladies of some education, culture, and refinement".

55% of Western missionary staff were women (and 63% of foreign medical staff, mainly working as nurses) of which 42% were single female missionaries.[5] On average, 85% of principal Protestant missions were staffed by at least one female missionary and out of an average of 3.2 Western staff members per African mission station, 1.8 were women. The African mission field was no exception. Globally in 1922, out of 29,188 Protestant foreign missionary staff, female workers made up the majority (60.8%) (Beach & Fahs, 1925, p. 76).[6] According to Hastings (1993, p. 111), this testified that "[...] the missionary church saw itself as champion of the dignity and education of women, and in terms of a local African environment the impact of a woman missionary must often have been very considerable [...]."

In contrast, the feminization of African mission staff was much less dynamic. Only 6% of the local missionary workforce were women. Nevertheless, African women still made up 44% of total female missionary staff (see Table 1).[7] European and American women thus made up the majority (56%) of total female Protestant mission staff in Africa, which was significantly higher than Western women's relative presence in the other major missionary fields of China (42%) and India (20%) (Beach & Fahs, 1925).

Table 1: Western and African staff at Protestant missions in Africa, 1881-1922

	Western staff					**African staff**				
	1881	1901	1910	1916	1922	1881	1901	1910	1916	1922
Ordained men	664	1,257	1,566	1,758	1,999	211		1,552	1,641	2,021
Unordained men	68	670	818	725	847	6,726		26,485	18,114	38,126
Married women*	154	878	1,309	1,457	1,993				1,709	2,656
Single women		530	752	949	1,450					
Total staff	886	3,335	4,553	4,885	6,289	6,937	22,279	28,037	32,175	43,181
Female share	17%	42%	45%	49%	55%				8%	6%

Note: * Marriage-status not stated for African women staff. For 1881 unordained men African staff includes "Other native helpers".
Sources: (Dobbins, 1881, p. 61); (Beach, 1903, p. 19); (Dennis et al., 1911, p. 83); (Beach & Burton, 1916, p. 59); (Beach & Fahs, 1925, p. 76).

[5] Similarly, among Catholic Western missionary staff working in Africa, sisters and nuns made up 52% (Streit, 1913, p. 102) in 1910. However, most of Catholic female staff concentrated in South Africa. When excluding South Africa, the Western female share reduces to 32%. Also, Guirkinger and Villar (2022) document an intensification of Catholic nuns' presence in Belgian Congo only post-1920s, while Protestant missions relied heavily and much earlier than Catholic missions on Western female missionaries who occupied at least one mission by 1907.

[6] In China and India, the two largest mission fields in Asia, women made up 64% and 66% of Western personnel respectively.

[7] Until the mid-colonial era, mission work provided exclusive formal careers in the colonial economy for Christian African women, as teachers and nurses (Meier zu Selhausen, 2014).

Protestant Missionaries and Women's Education

The substantial rise in female missionary recruitment shown in Table 1, reflects the increasing weight in missionary investment in the formal education of girls and building of vocational skills in health care as well as increasing parental acceptance of sending girls to school (Aboagye, 2021; Baten et al., 2021).[8] Missions thus became the principal providers of female education. For example, only 4% of girls enrolled in primary schools in Southern Nigeria attended a government school in the 1920s, while the majority of girls studied at schools run by missions (Denzer, 1992). Female missionaries were essential, as they were primarily (93%) employed as teachers (Beach & Fahs, 1925), instructing African girls separately from boys a gender-biased curriculum that prioritized domestic skills (e.g. needlework) besides basic literacy and Christian devotion. In contrast, boys were taught literacy, arithmetic and vocational carpentry skills (Leach, 2008; Musisi, 1992; Coquery-Vidrovitch, 1997, p. 155). Female missionaries were also responsible for the training of local female teachers. Only a minor share of European missionary women (7%) were employed in medical professions as nurses in mission hospitals and dispensaries in 1922 (Beach & Fahs, 1925, p. 159).[9] Beyond education and health care, female missionaries often opposed and campaigned against indigenous practices of FGM that in the case of Kenya led to the murder of a female missionary and backlash of Christians deserting missions to found their own independent churches in the 1930s (Anderson, 2018; Murray, 1976).

3 Data

To examine the long-term effects of Christian missions at the individual-level, we combine contemporary survey data with novel information on the location, activities, and gender composition of missionary staff present in sub-Saharan Africa during the early 20th century. This section introduces all variables and the main data sources. Additional details and descriptive statistics can be found in Appendix A1.

Christian Missions in Africa. We construct a new data set on the location of Christian missions in Africa from two missionary atlases: (i) the *World Missionary Atlas* (Beach & Fahs, 1925) on Protestant missions, which report the location of 1,659 missions in 1922

[8] Between 1901 and 1922 the number of Protestant mission schools almost tripled from 6,528 to 16,516 in which girls' (primary) enrollment made up 38% in 1922.

[9] Only 15 out of 250 Protestant female medical Western staff were physicians vs. 124 male physicians and 157 qualified as trained native female medical assistants vs. 338 male assistants.

(see Figure 1a),[10] and (ii) the *Atlas Hierarchicus* (Streit, 1929), which maps the location of 770 Catholic missions in 1927 (see Figure 1b), but is silent on missions' staff composition. Jointly, these atlases provide a more complete picture than the mission atlases used in the literature thus far, counting twice as many (i.e. 88% more) missions than the *Ethnographic Survey of Africa* by Roome (1925), which was digitized by Nunn (2010) and represents the most widely used source in the literature (Jedwab et al., 2022).[11] We digitized and geocoded the mission locations from both atlases.

Our contemporary survey data (more information below) is geocoded and contains exact information on each respondents' place of residence, which allows us to compute the distance between each survey location and the nearest Protestant and Catholic mission station. Following common practice, and taking typical walking distances as well as the distribution of nearby outstations into account (Jedwab et al., 2022), distances below 25 kilometers are coded as exposed to early colonial missionary activities (see, e.g. Becker, 2022a; Nunn, 2014). Mission atlases have been shown to represent residence missions, which are headed by European missionaries, thus omitting large numbers of smaller outstations run by African missionary clergy. Jedwab et al. (2022) have shown that most outstations are situated in the proximity of 22 kilometers from their main station. We interpret residence mission stations in the 1920s as the early "heartlands" of Christian missionary activities, with the strongest supply of (female) missionary education and health care, and potentially the largest number of converts.

Protestant Missionary Women. Uniquely, Beach and Fahs (1925, pp. 224-249) feature a detailed index of Protestant mission stations, which includes information on the number and gender composition of "foreign" staff at each mission. We identify the number of foreign female missionaries at each mission station by summing over the number of (i) single missionary women (i.e. unmarried women and widows), and (ii) missionary wives. Then we count the number of foreign male missionary workers (ordained and unordained men) and compute the share of female missionaries among Western staff for each station, as shown in Figure 1a.[12] In total, we located 1,659 Protestant stations, home to 2,656 male missionaries and 3,394 female missionaries of which 57.4% were the wives of male missionaries. Each mission is on average composed of 3.6 Western staff members. Figure 1 maps

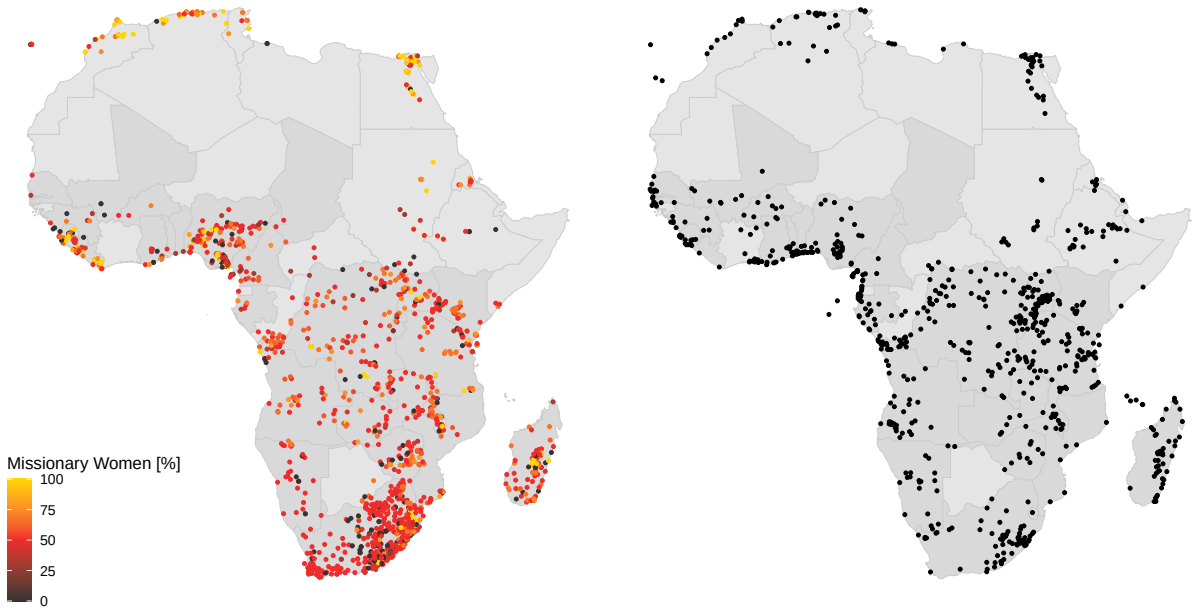
[10] We build on the data set by Becker (2022b) who digitized Beach and Fahs (1925) and additionally extract data on the staff composition of each mission.

[11] Roome (1925) features 933 Protestant and 361 Catholic mission stations in 1924.

[12] In case survey respondents were exposed to multiple missions, we compute a weighted average when merging the mission data with the survey data. This approach follows the coding by Calvi et al. (2022). Results remain unchanged, when estimating the effect of single female missionaries alone (see Table A27).

Figure 1: Christian Missions and Missionary Women in Colonial Africa

(a) Protestant Missions, 1924 (b) Catholic Missions, 1927



Note: Each dot in the panel *(a)* corresponds to a Protestant mission in 1924 (N=1,659, based on Beach and Fahs, 1925), and in panel *(b)* to a Catholic mission in 1927 (N=770, based on Streit, 1929). Colors in panel *(a)* indicate the share of women among Western mission staff at each Protestant station; no corresponding station-level data is available for Catholics. Grey shaded countries are part of our sample, which is restricted to Sub-Saharan Africa with colonial-era Protestant missions and limited by the availability of survey data.

the concentration of female missionaries at each Protestant station in Africa. Comparable staff data on African mission workers is unfortunately not reported on the station-level but is stated on the mission-field level by each missionary society in Beach and Fahs (1925, pp. 77-78), which we use. For Catholic stations, Streit (1929) does not provide data on the gender composition of their Western or African staff.

Locational Factors. *(i) Geographic Factors:* Accessibility, living standards, and disease environments were important determinants of early missionary expansion. Building on Jedwab et al. (2022) we account for distances from the coastline and the nearest navigable waterway as well as for altitude, terrain ruggedness, agricultural suitability, and malaria intensity c. 1900. *(ii) Social and Economic Factors:* We obtain an exhaustive set of control variables, analogous to Jedwab et al. (2022), to account for social and economic conditions during the pre-colonial and colonial eras. We account for population densities c. 1800, exposure to the transatlantic slave trade, and local ethnic customs (i.e. pastoralism, patrilineality, and polygamy). Further controls include distances to the nearest colonial city, capital city,

railroad, and Muslim faith centers. We also account for local economic conditions in 1950s, in particular the output from the cultivation of cash-crops and mining; due to data limitations these variables are analyzed in separate models (see Appendix A3.2 for results). Appendices A1.1.1 and A1.1.2 provide further details on individual data sources.

Mission Controls. Our analysis of the determinants of female missionary destinations (Table A2) reveals that missions with relatively more female missionaries are on average larger in size as measured by the total number of Western staff. At the same time, there are relatively fewer women at medical stations, which we measure by the presence of a medical doctor. Therefore, we include controls for (i) the number of Western missionaries and (ii) the presence of a medical station in our analyses.

Contemporary Survey Data. To investigate the effect of missionary activities on individual's literacy, education, labor market participation and a range of female agency outcomes, we combine our historical mission data with geospatial individual-level data from the Demographic and Health Surveys (DHS) (USAID, 2022).[13] We join data from all country-waves which feature geocoded locations and literacy tests (to measure human capital). Our final data set includes data on over one million male and female adults (N=1,037,276), aged 20-49 years, in 29 sub-Saharan African countries over the period 1992-2020. As of 2020, those sampled countries represent approximately two thirds of sub-Saharan Africa's population.[14]

The outcome variables used include information of individual's (i) *Human capital:* years of education and literacy,[15] *(ii) labor market participation:* We distinguish whether respondents have been in any kind of continued employment over the past 12 months and whether they have been paid for it in cash. *(iii) Female agency:* We study effects on women's age at first marriage, previous divorces, the desired number of children, female genital mutilation (FGM)[16], and the presence of a co-wife (polygamy). *(iv) Inter-marital decision-making:* We also analyze women's economic and non-economic decision-making power within the household. We construct a dummy variable indicating whether women partake in decisions over their own income, large household purchases, their health care, and contraceptive use, or whether these decisions are entirely left to their partners.

[13] To preserve anonymity locations of respondents in the DHS data are randomly offset by up to the 2 (urban locations) and 5 kilometers (rural locations).

[14] The sample includes: Angola, Benin, Burkina Faso, Burundi, Cameroon, Chad, Dem. Rep. of the Congo, Eswatini, Gambia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, Togo, Uganda, Zambia, and Zimbabwe. The number of waves per country varies (2.5 on average).

[15] We code respondents that can read a full sentence as literate.

[16] FGM has different manifestations and is coded in the DHS as: circumcised, flesh removed from genital area, and genital area sewn closed. We create a dummy variable comprising all types of FGM.

In our main analyses, we include no individual control variables as they might–due to their post-treatment status–bias the results. However, we show in Appendix A3.3 that controlling for respondents' year of birth, place of residence, and religion does not alter our results.

4 Results

Our analysis unpacks the missionary legacy from three different angles. First, we investigate the comparative long-run link of Protestant versus Catholic missions on post-independence education and labor market participation. Most studies find that Protestants contributed more to educational expansion in the long-run. Second, we assess whether Protestant missions differ in their legacy on women's education and labor market participation, and female agency, relative to Catholics. Again, most studies report that Protestant missions are associated with comparatively benign effect on female educational attainment over Catholic activities. Third, we analyze the importance of the feminization of missionary staff, as measure of early investment into girls education, to further unpack the gendered legacy of Protestant missions. A small number of studies on this topic attest to the contribution of missionary women to gender equality.

4.1 Protestants, Catholics, and (Gendered) Legacies

Estimation strategy

We estimate linear regression models with country and survey fixed effects to account for any national or temporal idiosyncrasies, and clustered standard errors ($1° \times 1°$) to account for spatial autocorrelation. Appendix A3.1 shows that results are robust to the use of Conley standard errors to account for spatial correlation within 100 kilometers (Conley, 1999). We estimate the general effects of Protestant and Catholic missions using the following specification:

$$y_i = \alpha_0 + \alpha_{c[i]} + \alpha_{s[i]} + \beta_1 fem + \beta_2 prot + \beta_3 cath + \gamma_z Z + \epsilon_{g[i]} \quad (1)$$

where y stands for the outcome of interest, e.g. years of education or employment status, for each individual i. α refers to the intercept as well as fixed effects for country c and

survey wave s. fem is a simple dummy variable. Similarly, $prot$ and $cath$ indicate the presence of a Protestant and Catholic mission in the 1920s respectively within 25 kilometers of respondents' residence. Z refers to our set of control variables. g indicates the 1°-grid cells in which observations are clustered. In this specification β_2 and β_3 capture the general effect of Protestant and Catholic missions respectively.[17]

We then extend this specification to capture the gendered legacy of missions (see Equation 2). Here, β_2 and β_3 capture the effect of missions on men, whereas β_4 and β_5 capture the relative effect on women:

$$y_i = \alpha_0 + \alpha_{c[i]} + \alpha_{s[i]} + \beta_1 fem + \beta_2 prot + \beta_3 cath + \beta_4 fem \times prot + \beta_5 fem \times cath + \gamma_z Z + \epsilon_{g[i]} \quad (2)$$

When estimating our models, we restrict the sample to improve the validity of our estimates. First, in models assessing the general and gendered impact of Protestant and Catholic missions (Tables 2-5), we use dummy variables to indicate the presence of a mission in the survey location, i.e. within a 25-km radius. In these models, we restrict the sample to survey locations within 100-km of historical mission stations to avoid comparisons with locations that had a near-zero propensity to receive a mission (Becker, 2022a; Cagé & Rueda, 2016). Appendix A3.4 shows that our results do not depend on this restriction. All specification include colony and survey fixed-effects as well as a range of geographical and historical factors that likely influenced missionaries' settlement choices.

Educational Expansion

We begin our analysis by examining the long-run link of Protestant and Catholic missions in the 1920s on post-independence education outcomes. Table 2 presents the results. Columns (1) and (3) show a positively and statistically significant effect of both Protestant and Catholic missionary presence on current years of education and literacy. The estimates imply that respondents living in proximity to early colonial-era Protestant and Catholic missions have on average attained 14.5% and 16.4% more years of education respectively. The likelihood of being literate increases by 5.5 and 6.7 percentage points for Protestant and Catholic missions respectively. Overall, denominational differences are barely visible.

[17] Note that some of our models are only interested in the effect on women, thus men are omitted from the analysis and the corresponding coefficients removed from the model specification.

Table 2: Christian Missions and Education Outcomes

	Education [log years]		Literacy	
	(1)	(2)	(3)	(4)
Female	−0.314***	−0.380***	−0.146***	−0.175***
	(0.018)	(0.019)	(0.009)	(0.009)
Protestant Mission	0.135***	0.069**	0.055***	0.027**
	(0.028)	(0.029)	(0.011)	(0.012)
Catholic Mission	0.152***	0.090**	0.067***	0.039**
	(0.028)	(0.039)	(0.010)	(0.016)
Prot. Mission × Female		0.093***		0.040***
		(0.026)		(0.012)
Cath. Mission × Female		0.087***		0.039***
		(0.028)		(0.014)
N Individual	888002	888002	888002	888002
N Country	29	29	29	29
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.307	0.308	0.219	0.220

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Education in years of schooling (log); literacy indicates reading test result (binary). Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Location controls include altitude, terrain ruggedness (log), agricultural suitability, population density (log), malaria burden, slave trade, pastoralism, polygamy, patrilineality, and distances from coast, waterways, capitals, cities, railways, and Muslim centers; see text for details. (*=.1, **=.05, ***=.01)

As such we cannot confirm any superior Protestant educational legacy over Catholics in sub-Saharan Africa, as shown by earlier studies (Gallego & Woodberry, 2010; Hedde-von Westernhagen & Becker, 2022; Nunn, 2014). Why do our results differ? Potentially, because of major differences in mission sources, sample sizes and country inclusions. Our study uses educational data on over one million individuals in 29 countries compared to 21,000 in Nunn (2014) from Afrobarometer surveys in 17 countries. Moreover, our mission data covers twice as many main stations in the 1920s than Nunn (2014). Gallego and Woodberry (2010) use a less fine-grained measure of province-level (n=189) missionary exposure in the year 1900, also in only 17 countries. Between 1900 and 1924 the number of Protestant missions more than doubled (Becker, 2022b), such that our data reflects the spatial and personnel expansion at the beginning of the 20$^{\text{th}}$ century that earlier sources miss.

When we restrict the sample to British colonies, in which missionaries provided the bulk of education and missionary competition was tolerated by the colonial state, we find that the educational effects of Protestant missions are twice as large than Catholic presence (see Table A3). Vice-versa, in non-British colonies (i.e. French, Belgian and Portuguese) the effect of Catholic missions are twice as strong (see Table A6). Both results are consistent with Catholics being both favored and protected from Protestant missionary competition in

colonial French and Portuguese Africa (Becker & Schmitt, forthcoming; Gallego & Woodberry, 2010). When we trace effects by respondents' birth year (i.e. 1949-2000) over the second half of the 20th century in Table 10 (more below), we find that both denominational long-term effects on educational attainment remain stable over the past decades, although declining in magnitude between respondents born 1949-74 and 1985-2000.

Gender Gaps in Education

Previous works have found that Protestant missionary presence disproportionately advanced African female education and gender equality in the long-run, arguing for a more favorable doctrine of Protestantism to women's education that placed greater importance on both men's and women's Bible-reading (*sola scriptura*) ability, contrary to the Catholic Church (Becker & Woessmann, 2008; Calvi et al., 2022; Montgomery, 2017; Nunn, 2014). Motivated by these findings for sub-Saharan Africa and more globally, we examine whether the effect of missions on post-independence education outcomes is different for men relative to women.

Our estimates indicate that exposure to colonial-era missions advances women's long-run educational attainment more than men's attainment. In columns (2) and (4) of Table 2 we estimate the gendered effects by interacting the baseline mission denominations with an indicator variable equal to one if the respondent is female. However, contrary to Nunn (2014) and Montgomery (2017), we document that *both* Protestant and Catholic missions have an equally positive and strong effect on women's attainment relative to men, both narrowing gender gaps. Protestant missions are associated with a 7.1% increase in years of education for men and a 17.6% increase for women; for Catholics the increases are 9.4% and 19.4% respectively. A similar pattern can be observed for literacy: Protestant missions are associated with a 2.7 and 6.7 percentage point increase for men and women respectively; Catholic missions with 3.9 percentage points for women, and 7.8 percentage points for men.

We also observe no denominational differences on female education in British colonies (Table A3, columns 2-3), whereas in non-British colonies only Catholic missions benefit women's educational attainment (Table A6, column 2). Our finding is in line with Baten et al. (2021) that show that both Protestant and Catholic missions mitigate 20th century gender gaps in education on the district-level in 19 sub-Saharan African countries. Our results also align with Jedwab et al. (2021) who observe no heterogeneous literacy effects across sexes from Protestant and Catholic missions in Ghana for 2000. Furthermore, for Cameroon Baumert (2022, pp. 197-255) shows that enrollment at both Protestant and Catholic mission

schools pre-World War I is positively linked to female educational attainment today, and the Catholic impact being twice as large.

Labor Market Participation and Female Agency

Can the relatively benign missionary legacy on female education also be observed in improved African women's social and economic position in society and within the household? Positive spillovers on gender norms have been documented for instance for Africa (Nunn, 2014), India (Calvi et al., 2022) and Korea (Izumi et al., 2023). Here we examine the long-term relationship between missions and women's present-day: (i) labor market participation, (ii) female agency in marriage[18], and (iii) household decision-making.

First, we examine the effect of historical missionary exposure on formal labor market outcomes. Columns (1) and (3) of Table 3 report a small positive and–for Catholics–statistically significant effect of missions on overall employment status; exposure increases the probability to be in employment by 1.1 percentage points and paid employment by 1.6 percentage points. The probability to be in paid employment increases by 4.3 percentage points if living in proximity to Protestant missions and 6.9 percentage points for Catholic missions. However, these effects do not differ between men and women, nor denomination (columns 2 and 4). If anything, Protestant missions are correlated with relatively less paid employment for women (column 4).

Second, we study the long-term effects of missions on outcomes related to women's agency. The results are presented in Table 4 and show the effects on women only. Again, we find that effects barely differ between Protestant and Catholic missions. In locations exposed to missions, women tend to marry 4 and 5 months later respectively (column 1).[19] Mission locations are also linked to women's lower fertility preferences (column 4), reducing the number of desired children by about 0.24 on average (i.e. one child less for every fourth woman). Consistent with earlier studies (Becker, 2022a; Fenske, 2015), we document that both mission denominations are linked to lower polygamy (column 2) where the probability to be in a polygamous union decreases by 3.4-3.6 percentage points. Furthermore, women living in proximity to historically Catholic-settled areas appear to be more likely to divorce (column 3) and have a 4.5 percentage point lower likelihood of having experienced genital mutilation (as

[18] Measures of female agency include: women's (i) age at first marriage, (ii) polygamous marital status, (iii) experience of a divorce, (iv) desired number of children, (v) experience of genital mutilation.

[19] We find similar effects for age at first birth of 2 months (Protestant) and 3 months (Catholic) (results not shown).

Table 3: Christian Missions and Labor Market Participation

	Employed		Paid	
	(1)	(2)	(3)	(4)
Female	−0.131***	−0.132***	−0.171***	−0.158***
	(0.006)	(0.007)	(0.006)	(0.007)
Protestant Mission	0.011	0.018*	0.043***	0.064***
	(0.007)	(0.011)	(0.010)	(0.014)
Catholic Mission	0.017**	0.009	0.069***	0.072***
	(0.007)	(0.011)	(0.011)	(0.013)
Prot. Mission × Female		−0.009		−0.030***
		(0.010)		(0.011)
Cath. Mission × Female		0.011		−0.003
		(0.010)		(0.009)
N Individual	850930	850930	872151	872151
N Country	29	29	29	29
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.092	0.092	0.106	0.106

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Employed indicates current employment status; paid whether respondent is in paid employment. Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Location controls as in Table 2. (*=.1, **=.05, ***=.01)

a child) (column 5). However, this long-term relationship remains statistically insignificant for Protestant missions, which suggests limited success of Protestant missionaries' anti-FGM campaigns in the past as described in Anderson (2018).[20]

Third, we investigate the effect of missions on partnered women's decision-making today. Table 5 shows that Protestant and Catholic missions are positively linked to women's decision-making over their own income (column 1), increasing the probability of involvement by 1.4-2.5 percentage points, and health care (column 3), 2.1-2.6 percentage points. Similarly, the effects on large household purchases are also positive (column 2), inducing increases by 1.4-3.1 percentage points, though only statistically significant for Protestant missions. We find no statistically significant effects on decisions over contraceptive use (column 4).

Overall, our analysis on mission's gendered long-term effects has shown that both Protestant and Catholic missionaries' benign female legacy can also be observed beyond education. Although we find that missions' educational legacy has not spilled over to female gains in labor market outcomes, we show that both Protestant and Catholic missions have an overall positive effect on women's agency in marriage and household decision-making power. Our

[20] The corresponding DHS module was fielded only in countries with high prevalence of FGM, 12 are in our sample: Benin, Burkina Faso, Chad, Guinea, Kenya, Liberia, Malawi, Nigeria, Senegal, Sierra Leone, Tanzania, and Togo. Of all surveyed women in these countries, 52.5% had experienced FGM. In 86.5% of cases, this involved the removing of flesh, and in 8.5% the sewing up of the genital area.

Table 4: Christian Missions and Female Agency (Female sample)

	(1) Age Married	(2) Polygamous	(3) Divorced	(4) Desired Children	(5) Genital Mutilation
Protestant Mission	0.312***	−0.034***	0.002	−0.232***	−0.020
	(0.074)	(0.006)	(0.002)	(0.052)	(0.021)
Catholic Mission	0.412***	−0.036***	0.006***	−0.250***	−0.045*
	(0.071)	(0.007)	(0.001)	(0.044)	(0.023)
N Individual	544582	452961	638018	592127	189070
N Country	29	29	29	29	12
N Survey	5	5	5	5	3
Colony FE	✓	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓	✓
Location controls	✓	✓	✓	✓	✓
R^2	0.109	0.108	0.025	0.222	0.470

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells; women only sample. Outcome variables are binary, except for Age Married and Desired Children which are numeric. Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Location controls as in Table 2. (*=.1, **=.05, ***=.01)

Table 5: Christian Missions and Women's Decision-Making Power (Female sample)

	(1) Income	(2) Large Purchases	(3) Healthcare	(4) Contraception
Protestant Mission	0.014***	0.031***	0.026***	−0.001
	(0.005)	(0.008)	(0.008)	(0.004)
Catholic Mission	0.025***	0.014	0.021***	0.005
	(0.005)	(0.009)	(0.008)	(0.003)
N Individual	242760	485541	482283	136063
N Country	29	29	29	29
N Survey	5	4	4	4
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.061	0.131	0.155	0.020

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells; women only sample. Binary outcomes variables indicating whether woman is involved in decision over (1) her own income, (2) large household purchases, (3) her healtcare, and (4) contraceptive use. Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Location controls as in Table 2. (*=.1, **=.05, ***=.01)

results differ from Nunn (2014) who finds no effects on attitudes about gender equality in Africa, but are in line with Calvi et al. (2022) who find a positive relationship of Protestant missions on women's independence and decision-making power. Our demographic results on missionary effects on women's age at marriage and birth, and fertility preferences also speak to Okoye and Pongou (2022) and Guirkinger and Villar (2022) who find that areas with greater colonial-era missionary activities have lower levels fertility in Nigeria and the Congo respectively.

4.2 Legacies of Missionary Women

Thus far we have shown positive long-run effects of both Protestant and Catholic missions on present-day educational attainment of survey respondents and relatively stronger effects of both mission denominations on women. What may be the mechanism behind this benign legacy? On the mission-level, has this positive effect been driven by the greater provision of girls' schooling through female missionaries in particular?

Women made up the majority of Western missionary staff among Protestant missionary societies by the 1920s, playing an essential role in facilitating girls' education in mission schools. In this section we explore the effects of the degree of feminization of the mission in 1922 on (i) colonial-era girls' enrollment and training of female African staff in the short-term, and (ii) present-day education and gender norms in the long-run. We hypothesize that a larger share of missionary women in 1922 is linked to higher levels of female education in both the short and the long-run.

Determinants of Female Missionary Presence

Where were female missionaries sent to in the African missionary field? Table A2 regresses the share of Protestant female missionaries in 1922 at each mission station showing that female missionaries were pioneers on the mission frontier.[21] They were more likely to work at stations located in more malaria prevalent, rural (i.e. less populated) and remote (rugged) areas. Partly by default, as missions expanded further from the African coast into the hinterland and men potentially moving up the hierarchy into more managerial roles at the center. Women missionaries worked at stations with more European staff but were less likely to locate at medical missions (hospital), which resonates with their employment primarily in schools and churches.

Short-term Effects of the Feminization of the Mission

To study the short-term effects of the feminization of the mission we rely on the statistical tables in Beach and Fahs (1925, pp.77-78). These contain primary school enrollment statistics for Protestant mission societies that were active in Africa including the number of Western

[21] The sample size is slightly reduced due to a small number of missing values on covariates.

and African female missionary staff on the missionary society level in each missionary field (i.e. colony) in 1922. Appendix A1.2 provides further detail.

We regress the share of women among Western staff per Protestant missionary society on the share of girls enrolled in primary schools, and the share of women among African mission staff, in each colony in 1922.[22] Table 6 reports the results. It shows that on the mission-field level, mission societies composed of a higher female missionary share were positively linked to both increased girls' primary mission school enrollment: A one percentage point increase in the share of missionary women is associated with a 0.55 percentage point increase in girls' enrollment (column 1). In addition, such an increase in the share of missionary women is also associated with a 0.72 percentage point increase in the share of African female teaching staff (column 3) in the short-term. Although the curriculum markedly differed between girls and boys, it indicates that women were assigned to teach girls and train African female teachers, making the degree of feminization of Western mission staff a useful measure of early investment into female schooling. Next, in column 5 we regress the share of female African staff on the share of girls primary school enrollment and find a statistically significant positive effect similar in size to those of Western female missionaries. One interpretation may be that the Africanization of female staff effectively generated trust and demand among parents to send their daughters to school to be taught by local women.

Our results hold across two different missing data strategies, which we use to accommodate the limited data on girls' enrollment and African staff; only 67 out of 166 Protestant mission fields report data on both variables, while the data on female missionary staff, which we extract from the index and then combine with the information from to the statistical tables, is more complete. First, we use list-wise deletion (i.e. columns 1, 3 and 5), which ensures that the same sample is maintained in different models. Second, we use pair-wise deletion, which involves only the exclusion of observations with missing values on variables included in the respective model (i.e. columns 2 and 4).[23]

We include a range of control variables in our analysis. Female missionaries often engaged in tasks different from male missionaries. Apart from more commonly teaching girls' classes, Western women were also active in medical work (see Table A2). Still, the lion's share of female mission staff worked in schools and churches, as only 6% of female mission staff

[22] Data for Mali and Burkina Faso is reported together and thus is analyzed as one colony. As mission education rarely extended to female secondary education in the early 20th century (Baten et al., 2021), we excluded it from our analysis.

[23] We present no pairwise deletion results for the model presented in column 5 as it is equivalent to listwise deletion in this case.

Table 6: Missionary Women and Girls' Primary School Enrollment in 1922

	Primary School Girls [%]		African Women [%]		Primary School Girls [%]
	(1)	(2)	(3)	(4)	(5)
Missionary Women [%]	0.547**	0.250*	0.718***	0.583***	
	(0.229)	(0.144)	(0.187)	(0.126)	
African Women [%]					0.777***
					(0.125)
Residence stations (log)	0.034	0.036	−0.086***	−0.049**	0.101***
	(0.038)	(0.028)	(0.031)	(0.021)	(0.031)
Primary Students per m. (log)	−0.020	−0.004	−0.020	−0.014	−0.005
	(0.018)	(0.015)	(0.015)	(0.011)	(0.013)
Hospitals per m.	−0.223	−0.143	0.190	0.108	−0.374***
	(0.152)	(0.113)	(0.124)	(0.074)	(0.115)
Colony FE	yes	yes	yes	yes	yes
R^2	0.500	0.510	0.673	0.479	0.705
Adj. R^2	0.215	0.301	0.486	0.344	0.536
Num. obs.	67	81	67	127	67

Note: OLS with colony FE; unit of analysis corresponds to the missionary society per colony. per m. = per mission station. Missionary/African Women indicates share of women among Western/African staff of each society; Primary School Girls indicates share of women among primary school students. Data source covers 166 education-providing colony-societies but gender disaggregated student and staff figures are missing frequently; Models 1, 3, and 5 use list-wise deletion; models 2 and 4 use pair-wise deletion. (*=.1, **=.05, ***=.01)

were trained medical nurses.[24] We therefore control for the number of hospitals of each missionary society in a colony, adjusted for the number of mission stations. We also control for the overall investment into primary education by each society through the log number of primary students and include colony fixed effects. We also account for the size of the mission society in each colony (i.e. number of main stations).

Long-Term Effects of the Feminization of the Mission

Have the positive short-term effects of the feminization of missionary staff during early colonial times persisted into the second half of the 20$^{\text{th}}$ century? Western female missionaries may have acted as examples of well-educated women with agency over their marriage and leading a successful formal career, a status exceptional also for women in Victorian Britain. We thus investigate whether the degree of feminization of Western missionary staff during colonial times can partly explain the benign Protestant legacy on women's education and empowerment as documented in Section 4.1?

To investigate this question, we use information on the gender composition of Western staff in each Protestant mission station and contemporary individual-level survey data (DHS)

[24] Nurses represented 63% of total Western medical staff compared to 31% among African medical staff (Beach & Fahs, 1925, p. 80).

from 29 African countries and estimate the long-term effects of the early centers of female education.[25] We limit the sample to locations that have been exposed to Protestant missions and thus only explore variation in the female missionary share among mission stations. This way we avoid comparisons with locations that received no missions, making sure that our variables capture the effect of female missionaries only. We adjust our estimation framework accordingly (see Equation 3).

$$y_i = \alpha_0 + \alpha_{c[i]} + \alpha_{s[i]} + \beta_1 fem + \beta_2 prot_W + \beta_3 fem \times prot_W + \gamma_z Z + \epsilon_{g[i]} \tag{3}$$

whereby y again refers to the outcome of interest (e.g. education), α to the intercept and country c as well as survey s fixed effects, fem to respondents' gender, Z to control variables, and g to the geographic clusters (see description of Equation 1 for details). Most importantly, $prot_W$ indicates the share of women at all Protestant stations within 25 kilometers of respondents' residence. β_2 thus captures the effect of missionary women on male respondents, whereas β_3 captures the relative effect on female respondents.[26] In addition to colony and survey fixed-effects, we include geographical, historical as well as mission-level controls.

Table 7 documents the results on the long-run influence of the relative female presence of mission staff on women's education and formal work. A higher share of female missionaries consistently did not make a difference for human capital (columns 1-2) or formal employment (columns 3-4) of female survey respondents residing within areas exposed to Protestant missions. Also, a birth cohort analysis (1949-2000) shown in Table A10 reveals the absence of statistically significant effects remains stable throughout the post-independence period. Moreover, Table 8 shows that women living in Protestant-settled areas with a higher female missionary concentration among staff has no distinct long-run effect on women's agency. Equally, Table 9 documents no long-term effects on women's household decision-making power. Our results are no different when separating Western missionary women being single vs. married that may represent different female role models (see Table A27). Our results are in line with Fernandez Cebrian (2022) who investigates the feminization of the mission in colonial Mozambique. Using the number of sisters and female wage workers at each Catholic mission in 1952-1962 he finds no evidence of female missionary presence being associated with gender parity in primary education.

[25] Comparable detailed information on the gender composition of staff is unavailable from Catholic missionary atlases.

[26] Note that some of our models are only interested in the effect on women, thus men are omitted from

Table 7: Protestant Missionary Women and Economic Outcomes

	(1) Education	(2) Literacy	(3) Employed	(4) Paid
Female	−0.346***	−0.162***	−0.134***	−0.152***
	(0.067)	(0.030)	(0.020)	(0.022)
Missionary Women [%]	−0.054	−0.021	0.016	0.036
	(0.115)	(0.048)	(0.031)	(0.037)
Missionary Women × Female	0.101	0.042	−0.001	−0.065*
	(0.130)	(0.056)	(0.036)	(0.035)
N Individual	348414	348414	331926	340267
N Country	29	29	29	29
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Mission controls	✓	✓	✓	✓
R^2	0.256	0.181	0.085	0.112

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Education in years of schooling (log); literacy indicates reading test result (binary); employed indicates current employment status; paid whether respondent is in paid employment. Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Missionary Women equals share of women among Western staff at Protestant mission stations. Location controls as in Table 2, plus a Mission controls, i.e. medical stations and total number of Western staff at Protestant missions (log), and an interaction between Catholic mission and male. (*=.1, **=.05, ***=.01)

Table 8: Protestant Missionary Women and Female Agency (Female sample)

	(1) Age Married	(2) Polygamous	(3) Divorced	(4) Desired Children	(5) Genital Mutilation
Missionary Women [%]	0.208	−0.015	0.002	0.103	−0.020
	(0.196)	(0.024)	(0.005)	(0.161)	(0.050)
N Individual	202497	159376	247177	231747	62194
N Country	29	29	29	29	12
N Survey	5	5	5	5	3
Colony FE	✓	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓	✓
Location controls	✓	✓	✓	✓	✓
Mission controls	✓	✓	✓	✓	✓
R^2	0.105	0.080	0.027	0.195	0.468

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells; women only sample. Outcome variables are binary, except for Age Married and Desired Children which are numeric. Missionary Women equals share of women among Western staff at Protestant mission stations. Control variables as in Table 7. (*=.1, **=.05, ***=.01)

Table 9: Protestant Missionary Women and Women's Decision-Making Power (Female sample)

	(1) Income	(2) Large Purchases	(3) Healthcare	(4) Contraception
Missionary Women [%]	−0.024	0.014	0.004	0.006
	(0.017)	(0.030)	(0.032)	(0.014)
N Individual	91608	176177	174075	61427
N Country	29	29	29	29
N Survey	5	4	4	4
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Mission controls	✓	✓	✓	✓
R^2	0.072	0.120	0.104	0.021

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells; women only sample. Binary outcomes variables indicating whether woman is involved in decision over (1) her own income, (2) large household purchases, (3) her healtcare, and (4) contraceptive use. Missionary Women equals share of women among Western staff at Protestant mission stations. Control variables as in Table 7. (*=.1, **=.05, ***=.01)

We conclude that, overall, the early centers of female education carry no distinct gender progressive long-term effects but generate the same effects as their male counterparts, thereby contributing to the overall legacies of Protestant missions in Africa. These results differ from Calvi et al. (2022) for India who find a positive long-run link between Protestant missions with higher female presence and women's literacy and a range of gender norms. We also find no effects on female fertility related outcomes, such as age at first marriage or desired number of children in Table 9, that have been reported for colonial Belgian Congo (Guirkinger & Villar, 2022).

Potential Explanations for the Absence of Persistence of Female Missionaries

What may explain the absence of persistent effects of the feminization of Protestant missions on women's education and empowerment, while observing general positive Christian missionary long-term effects?

First, the effects may have diminished with the continued Africanization of female mission staff over the colonial era with female African teachers following in the footsteps of Western female missionaries (as shown in Table 1). This diminished the relative importance of Western missionary women to predict women's long-run educational and agency outcomes. Since the 1940s, there was a substantial increase in the demand for female teachers (Meier zu Selhausen and Weisdorf, 2023; Tripp, 2004; Keniston McInotsh, 2009, p. 75) as girls'

the analysis and the corresponding coefficients removed from the model specification.

secondary and boarding schools, and teacher training centers proliferated in the years to independence. Those schools featured more academic curricula for girls that enabled them increasingly to enter teacher training colleges (Reid, 2017, p. 248). Similar trends were noted by Denzer (1992) in Nigeria, where an expansion of girls' (secondary) education in the 1940s and 1950s in Nigeria made it possible for large numbers of women to become teachers, education officers, and administrators.

Second, enrollment rates expanded rapidly in post-independence Africa and gender gaps declined under the public educational system, colonial gender-biased curricula focusing on female domesticity were secularized and streamlined between sexes. Moreover, African governments made progress towards universal primary education programs that aimed at lowering the costs and fostering gender equality regarding access to education (Baten et al., 2021; Evans et al., 2021).[27] The teaching profession in sub-Saharan Africa has also seen increasing feminization. From 1970 to 2020, the proportion of female primary teachers in sub-Saharan Africa has grown from 33% to 48% (World Bank, 2023). These developments potentially have contributed to the lack of spatial path-dependence of the early centers of female education, while the general long-term effect of missions on women's education and agency can still be observed throughout post-independence era, suggesting that the expansion of education may have benefited former mission locations disproportionately.

4.3 Additional Analyses

Were individuals born and educated closer to the colonial era, when mission schools provided provided the bulk of formal schooling, more strongly affected by their locality's exposure to missionary activities? And did missions' long-term influence on education fade over the course of the second half of the 20th century? The DHS data allows us to estimate educational effects by respondents' birth year, which reduces compressing different historical periods and paths (Austin, 2008). Given that education is typically attained early in life, a birth cohort approach enables us to trace the temporal dynamics of individuals' human capital formation. Table 10 shows how the effects of missions vary over three similarly-sized cohorts between 1949 and 2000. We find that both mission denominational effects on years of education are consistently positive and statistically significant but decline in magnitude from the earliest (1949-1974) to the latest cohort (1985-2000), by about 17% for Protestant and 16% for Catholic missions. Similarly, literacy effects diminish by about 9% for Protestant

[27] From 1970 to 2020 the percentage of children who completed primary school rose from 46% to 71% in sub-Saharan Africa (World Bank, 2023).

and 11% for Catholic missions. Further analyses in Appendix A2.3 indicate that this decline is most pronounced among men, and least among women currently residing in the vicinity of colonial-era Protestant missions. Moreover, we find no evidence of any statistically significant effects of the presence of missionary women in any of the birth cohorts.

Table 10: Christian Missions and Education Outcomes by Birth Cohort

	Education [log years]			Literacy		
	1949-1974	1975-1984	1985-2000	1949-1974	1975-1984	1985-2000
Female	−0.390***	−0.297***	−0.278***	−0.183***	−0.134***	−0.129***
	(0.021)	(0.021)	(0.019)	(0.010)	(0.010)	(0.009)
Protestant Mission	0.140***	0.135***	0.116***	0.055***	0.056***	0.050***
	(0.029)	(0.028)	(0.028)	(0.011)	(0.011)	(0.011)
Catholic Mission	0.163***	0.144***	0.137***	0.072***	0.062***	0.064***
	(0.025)	(0.028)	(0.031)	(0.009)	(0.010)	(0.012)
N Individual	287250	324234	276518	287250	324234	276518
N Country	29	29	29	29	29	29
N Survey	5	5	3	5	5	3
Colony FE	✓	✓	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓	✓	✓
Location controls	✓	✓	✓	✓	✓	✓
R^2	0.342	0.349	0.256	0.247	0.251	0.183

Note: OLS with country and survey fixed effects, samples correspond to similarly-sized birth cohorts; standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Education in years of schooling (log); literacy indicates reading test result (binary). Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Control variables as in Table 2. (*=.1, **=.05, ***=.01)

Other studies attest to the role played by competition between missionary denominations, suggesting that the benign Protestant legacy was largely a response to encroaching Catholic missions (Gallego & Woodberry, 2010; Lankina & Getachew, 2013). To explore whether this pattern holds true in our data and whether competition was particularly relevant for early centers of female education, we estimate additional interaction models. The corresponding results are at odds with the existing literature (see Appendix A2.4). We find that competition between Catholic and Protestant missions, measured by their common presence in a community, reduced long-term education outcomes. At the same time, it does not alter missions' gendered legacies or the effects of missionary women.

Finally, we look at differences between colonizer, running separate models for British colonies and their non-British counterparts. The results attest to a dominant role of Protestant missions in British colonies; Catholic missions have a smaller though still statistically significant effects, at least on women's education. Vice versa, Catholic missions have larger effects on long-term education outcomes outside of British colonies. These results are in line with earlier studies that attest to the importance of the denominational adherence of colonial metropoles (Protestantism in England, Catholicism in France etc.).

4.4 Robustness

In Appendix A3 we present evidence on a wide range of robustness tests. The tests focus on missions' economic legacy and unambiguously corroborate our main findings.

To address concerns about spatial autocorrelation, we estimate our models with Conley standard errors (see Appendix A3.1). In Appendix A3.2 we add controls for colonial economic activities (i.e. cash crops and mining), and Appendix A3.3 adds contemporary individual controls. In Appendix A3.4 we remove the 100-km sample restriction (i.e. survey location to mission), which we applied in our main models to improve causal identification. This increases the sample to over one million respondents. Appendix A3.5 confirms that our results also hold when South Africa, which received most European missionaries during the colonial era, is removed from the analysis. Finally, our results are robust to recoding our missionary women variable to capture the percentage share of only single women instead of all Western women (see Appendix A3.6).

Our study is also subject to a number of caveats. First, only few respondents covered by the survey data were born in the colonial era. This gives us little leverage to assess mission effects when they were likely to have been the strongest. That being said, our primary interest is in the assessment of long-term effects post-independence. Second, our evidence is–like in most related studies–correlational and causal interpretations have to be conducted with care. We follow the advice by Jedwab et al. (2022) and include a rich set of possible confounding factors that determined missionary locational choices to reduce endogeneity. However, this is not equivalent to a causal design.

5 Conclusion

Using the most extensive data set of mission locations in colonial Africa, we studied (i) the long-term effects of Christian missionary presence, the major provider of formal education in colonial Africa, and (ii) both short and long-term effects of the growing feminization of Protestant missionary staff in particular. First, we document a persistent and robust positive link between colonial-era missions and educational outcomes in the second half of the 20^{th} century. This relationship is mainly driven by women's educational attainment. While this reduced gender gaps in education, we find no evidence that it translated into more gender equal participation in formal labor markets. However, we find a positive effect of

missions on female agency in private spheres, in particular with regards to family, marriage, and household agency. These results are remarkably consistent across both Protestant and Catholic mission denominations, and question the exceptionalism of Protestant missionary activity inducing long-term shifts favoring women, as documented in earlier studies (e.g. Cagé & Rueda, 2016; Gallego & Woodberry, 2010; Nunn, 2014).

Second, we document the rise of the women's missionary movement in colonial Africa and explore its consequences on female education and empowerment. We find a strong relationship between the share of female Western missionary staff, African girls primary school enrollment and the training of local female teaching staff in the early 20$^{\text{th}}$ century. However, we find no evidence of a persistent benign legacy of the early centers of female schooling on women's education and a range of female agency outcomes in the second half of the 20$^{\text{th}}$ century. This should not be interpreted as women making no contribution to the mission enterprise, but suggests that female missionaries had very much the same effects as their male counterparts.

Together, our results suggest that while Christian missionary locations continue to be linked to higher educational and agency outcomes for women in the long-run, the early centers of female education, as proxied by the female composition of Western Protestant missionary staff, exert no persistent contribution to Christian missions' gendered legacy. This may be due to the continued Africanization and feminization of mission staff over the colonial era, which reduced the relative importance of Western missionary women as a long-term proxy of the supply of female education. Moreover, modern African states' rapid expansion of public education post-independence that saw a process of widening access to education, increasing gender inclusiveness, and a secularization school curricula, have potentially contributed to the offset of any spatial advantage of the early centers of female education.

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APPENDIX

A1 Data description

A1.1 Long-term analysis

This section describes in more detail the control variables and sources used for the long-term analysis. The following subsections describe (i) Geographic controls, (ii) historical controls, (iii) mission controls, and (iv) individual controls. Table A1 provides summary statistics for all variables.

A1.1.1 Geographic controls

Geography played an important role in determining the locations of missions stations. Typically, missions favored locations with favorable environmental conditions and easy accessibility. Given that most missionaries traveled to Africa by sea, venturing inland incurred significant costs. Consequently, missionaries opted to settle near the coast, not only due to lower expenses but also because coastal areas presented more economic opportunities, such as trade. Therefore, we control for the distance to the nearest point on the *coast*.[28]

The difficulty of traveling further into the continent depended on various factors. Navigable waterways, of which there are few in Africa, made it much easier to reach certain locations. We control for the distance to the nearest *navigable waterway*. Locations in higher altitudes or more rugged terrain were generally harder to reach, and made it harder to set up new stations (Nunn & Puga, 2012). Hence we control for each location's *elevation* above sea-level and terrain *ruggedness*, data on which we derive from Shaver et al. (2016). Terrain ruggedness indicates the degree to which the elevation of each cell differs from that of its neighbors, which the authors measure using a grid-cell approach ($1km^2$).

Malaria-transmitting mosquito posed a great threat to European missionsaries and they avoided regions with a high incidence. We draw on the map by (Lysenko & Semashko, 1968)

[28] Data on basic spatial attributes, including coastlines, altitudes, and waterways, come from the Natural Earth project (www.naturalearthdata.com).

Table A1: Descriptive Statistics

Variable	Min	Median	Mean	Max	N Missing
Individual variables					
Female	0.00	1.00	0.72	1.00	0
Years of education	0.00	6.00	5.83	26.00	0
Literacy	0.00	1.00	0.53	1.00	0
Urban	0.00	0.00	0.38	1.00	0
Christian	0.00	1.00	0.65	1.00	37,385
Year of Birth	1949.00	1981.00	1979.85	2000.00	0
Employed	0.00	0.00	0.47	1.00	37,072
Paid	0.00	0.00	0.43	1.00	15,851
Age Married	1.00	19.00	20.06	49.00	170,315
Polygamous	0.00	0.00	0.21	1.00	274,623
Divorced	0.00	0.00	0.05	1.00	15
Genital Mutilation	0.00	1.00	0.52	1.00	698,932
Age First Birth	3.00	20.00	20.69	49.00	175,311
Desired Children	0.00	4.00	5.02	30.00	62,739
Decision: Income	0.00	0.00	0.12	1.00	645,242
Decision: Large Purchases	0.00	0.00	0.44	1.00	402,461
Decision: Healthcare	0.00	0.00	0.42	1.00	405,719
Decision: Contraception	0.00	0.00	0.10	1.00	751,939
Mission variables					
Protestant Mission	0.00	0.00	0.39	1.00	0
Catholic Mission	0.00	0.00	0.33	1.00	0
Missionary Women	0.00	0.50	0.50	1.00	539,588
Medical Station	0.00	0.00	0.06	1.00	0
Western Staff	0.00	0.00	4.12	166.00	0
Location variables					
Ruggedness	0.00	27.26	72.50	1151.19	0
Altitude	-2.00	520.00	725.75	3589.00	0
Agricultural Suitability	0.00	3333.00	3564.62	10000.00	0
Population density c.1800	0.00	10.63	39.32	933.41	0
Malaria Burden	0.00	0.75	0.73	1.00	0
Muslim Center [km]	0.31	528.56	674.88	2557.77	0
Colonial City [km]	0.11	250.61	304.81	1237.61	0
Railways [km]	0.00	194.28	287.03	1676.13	0
Colonial Capital [km]	0.06	177.11	198.11	1093.47	0
Coast [km]	0.00	377.66	462.90	1753.00	0
Waterways [km]	0.00	33.26	44.92	321.61	0
Slave trade	0.00	0.00	0.14	7.09	0
Polygamy	0.00	1.00	0.92	1.00	0
Patrilineality	0.00	1.00	0.68	1.00	0
Pastoralism	0.00	3.00	2.97	10.00	0
Cash Crops	0.00	0.00	0.43	1.00	79,381
Mining	0.00	0.00	0.11	1.00	79,381

Note: The high number of missing values on several individual-level variables results from the women-specific questionnaires (i.e. no responses collected from males).

which indicates the endemicity of malaria in 1900 to control for the varying the *malaria burden* across the continent. Values range from malaria-free (0) to holoendemic (5).

Finally, farming constituted an important part of missionaries' livelihoods. Missions preferred to settle where conditions where suitable for agriculture. Our measure for *agricultural suitability* comes from FAO/IIASA (2011) and indicates the suitability of local conditions for the cultivation of high-level rain-fed crops.

A1.1.2 Historical controls

Social and economic conditions also play into the locational choices of missionaries. Generally speaking, economically more developed regions were more attractive. This promised higher living standards as well as more prospective converts. In line with other work, we capture economic development with the local *population density* (Fresh, 2018; Stasavage, 2014). We use data from Klein Goldewijk et al. (2010) for the year 1800. As the variable is highly skewed, we apply a logarithmic transformation.

The extent to which missionaries could settle in a particular region and achieve success was influenced by the receptiveness of the local population. In cases where Islam was already the dominant religion, religious tensions could make it challenging for missionaries to make progress. Consequently, the presence of Islam had a direct impact on mission settlements. To address this factor, we incorporate a variable measuring the distance to the closest *Muslim center* (Jedwab et al., 2022).

Transatlantic slave networks were a significant factor in determining the locations of early mission stations. Missionaries frequently relied on the same shipping routes and were involved in anti-slavery movements. Consequently, early mission stations were often established in areas impacted by the Transatlantic *slave trade*. We capture exposure by the number of slaves taken from the dominant ethnic group in a given location. These ethnic homelands are identified based on a map by Murdock (1967). The corresponding slavery data comes from Nunn (2008), which we transform to per capita values, based on population data by Klein Goldewijk et al. (2010).

Missionaries sought to impress their values and beliefs on local populations, which could lead to resentment and conflict. Arguably, one of the most contentious topics was polygamy. Becker (2022) argues that missionaries' insistence on monogamy suppressed educational demand with lasting consequences for contemporary outcomes. Therefore, we control for whether *polygamy* was traditionally practiced in a given area with a binary variable based on Murdock (1967). Using the same source, we also account for whether *patrilineality* was the major type of descent. Becker (forthcoming) has shown that restrictions on women's freedom in Africa are often rooted in pastoralism. Again based on Murdock's Atlas, we use her cording scheme to assess the local dependence on *pastoralism*, i.e. the husbandry of large herd animals, ranging from 0 (no dependence) to 10 (fully dependent).

As previously noted, missionaries frequently relied on the transportation networks es-

tablished by other European actors. During earlier periods, missionaries relied heavily on commercial ventures. With the increased engagement of European governments on the continent, investments in transportation infrastructure grew significantly, which created more opportunities for missionaries. As a result, remote locations that were previously inaccessible became more reachable, expanding the scope of missionary work beyond coastal areas.

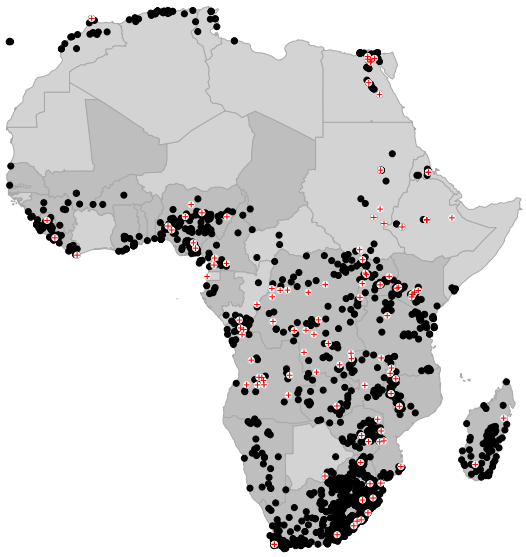
Colonial capitals and larger cities became important transportation hubs for European activities and missionaries often settled in their proximity. Therefore, we include measures of the distance to each *colonial capital* and the nearest *colonial city* with more than 10,000 inhabitants at the beginning of the twentieth century, using data from Jedwab and Moradi (2016) and Becker (2022). In addition, many colonial governments invested in railways, which greatly improved accessibility to inland destinations. Hence, we also include a measure of the distance to the nearest railway, using the map provided by Jedwab and Moradi (2016).

Integration into the colonial economy played an important role in the demand for educated labor and education as well as the prosperity of different regions, and thus also the locations of missions. Arguably, the cultivation of *cash crops* and *mining* were the two economic activities most decisive for long-term economic and political development (Knutsen et al., n.d.; Pengl et al., 2021; Roessler et al., 2022). Therefore, we account for both activities by adding two binary variables to indicate whether the activity took place in a certain location or not. For this purpose we use the map by Hance et al. (1961) As the map does not cover our entire sample, we use the variables to test the robustness of our main results (see Appendix A3.2).

A1.1.3 Mission controls

Drawing on the World Missionary Atlas (Beach & Fahs, 1925) we include two control variables, which we have shown to be associated with the presence of missionary women, in our analyses of missionary women's long-term effects. Our first control variables is the number of Westerners in a given location. We measure this by the number of Western personal at Protestant mission stations. Second, we account for the presence of a medical station, indicated by whether a doctor resided at any of the local stations. Figure A1 shows a map of all medical stations in our data.

Figure A1: Protestant Missions with Medical Staff (1922)



Note: Locations of Protestant mission stations in 1922, based on (Beach & Fahs, 1925). Dark-shaded countries are included in the analysis.

A1.1.4 Individual controls

In some models we account for individual covariates to capture their potentially confounding influence. The data comes directly from the Demographic and Health Surveys. First, we control for respondents' *year of birth*, which we retrieve by subtracting respondents' age from the year the interview was conducted. Controlling for the year of birth instead of respondents' age allows us to better capture any fading colonial legacies. Second, we account for respondents place of living through a dummy variable, indicating whether they reside in an *urban* area or not. Third, we control for religion, in particular whether the respondent identifies as *Christian* or not.

A1.2 Short-Term Analysis

Protestant Missions in Colonial Africa. To explore the gendered effects of female missionaries we collect new historical data on Protestant missions in colonial Africa. The data comes from the *World Missionary Atlas* (Beach & Fahs, 1925), which documents the global activities of Protestant missionaries in 1922. The Atlas contains a rich set of statistics on the activities of 142 mission societies active on the continent. We use them to provide evidence on the positive association between female missionaries and female education in the colonial era.

Beach and Fahs (1925) features statistical tables on a range of topics. The tables are broken up by mission fields and mission societies. In most cases, mission fields correspond to colonies, though in some they cover larger territories. Within each mission field, the tables further distinguish between different sending societies, such as the Church Missionary Society. For each society then the tables provide information on staff, buildings, and community members. We can extract most data we need for our society-level analysis directly from these tables.

Dependent variables To assess the short-term effects on women, we collect two variables. First, we use enrollment figures to compute the share of females in primary schools (*Primary students [% Female]*). As mission education rarely extended to secondary education, we do not include it in our analysis. Second, we compute the share of women among native staff (*Native staff [% Female]*). This variable indicates the employment opportunities African women had at missions.

Independent variable To assess the contribution of female missionaries to gender equality, we construct a variable for the share of women among Western staff (*Missionaries [%Female]*). While the statistical tables in Beach and Fahs (1925) provide no such breakdown by gender, we can calculate the share based on information available in the directory for each mission stations. This is possible because we know for each station which mission society they belonged to.

Control variables To account for possible confounding factors, we include a range of control variables in our analyses. Female missionaries often engaged in tasks different from male missionaries. Apart from more commonly teaching girls classes, Western women performed

medical mission work. Nurses represented 63% of total Western medical staff compared to 31% among African medical staff (Beach & Fahs, 1925, p. 80). We therefore control for the number of *hospitals* societies operated in each colony, which we adjust for the number of residence stations. Women often worked for larger society, which we account for through a variable on the number of *residence stations* a society had. African boys usually joined mission schools before girls did. Girls' access to schools might therefore depend on how expansive educational operations were. We therefore account for the total number of *primary school students* at each mission society.

A2 Further results

A2.1 Determinants of Female Missionary Presence

Table A2: Determinants of Missionary Women Presence (%) at Protestant Missions

	Missionary Women [%]		
	Model 1	Model 2	Model 3
Medical station	−0.046		−0.063*
	(0.025)		(0.025)
Western staff	0.010***		0.010***
	(0.002)		(0.002)
Distance Coast		−0.000*	−0.000*
		(0.000)	(0.000)
Distance Capital		0.000	0.000*
		(0.000)	(0.000)
Distance City		0.000	0.000
		(0.000)	(0.000)
Distance Waterway		−0.000	−0.000
		(0.000)	(0.000)
Ruggedness		0.000	0.000
		(0.000)	(0.000)
Altitude		0.000	0.000
		(0.000)	(0.000)
Distance Railway		−0.000	−0.000
		(0.000)	(0.000)
Agricultural Suitability		−0.000	−0.000
		(0.000)	(0.000)
Malaria Burden		0.054*	0.053*
		(0.024)	(0.024)
Population Density		−0.000**	−0.000***
		(0.000)	(0.000)
Polygamy		0.027	0.020
		(0.024)	(0.024)
Patrilineality		−0.015	−0.012
		(0.022)	(0.022)
Pastoralism		0.005	0.005
		(0.006)	(0.006)
Distance Muslim		−0.000	−0.000*
		(0.000)	(0.000)
Colony FE	yes	yes	yes
R^2	0.130	0.137	0.159
Adj. R^2	0.106	0.106	0.128
Num. obs.	1647	1647	1647

Note: Linear regression with colony FE. Sample consists of Protestant mission stations. Missionary Women equals share of women among Western staff at each station. List-wise deletion. (*=.05, **=.01, ***=.001)

A2.2 Colonizer differences

It is well-established that British colonial governments relied more heavily on missions as education providers and had closer relationships to Protestants than Catholics. In this section we separately estimate models for British and Non-British colonies; The results are summarized in Tables A3-A5 and A6-A8 respectively.

Table A3: Christian Missions and Education Outcomes (British Colonies)

	Education [log years]		Literacy	
	(1)	(2)	(3)	(4)
Female	−0.258***	−0.331***	−0.123***	−0.157***
	(0.022)	(0.025)	(0.011)	(0.012)
Protestant Mission	0.140***	0.075**	0.057***	0.028**
	(0.027)	(0.029)	(0.011)	(0.013)
Catholic Mission	0.061**	−0.006	0.040***	0.005
	(0.029)	(0.035)	(0.011)	(0.016)
Prot. Mission × Female		0.092***		0.040***
		(0.025)		(0.012)
Cath. Mission × Female		0.094***		0.048***
		(0.033)		(0.017)
N Individual	491100	491100	491100	491100
N Country	13	13	13	13
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.257	0.258	0.186	0.187

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 2 but sample limited to British colonies. (*=.1, **=.05, ***=.01)

Table A4: Christian Missions and Labor Market Participation (British Colonies)

	Employed		Paid	
	(1)	(2)	(3)	(4)
Female	−0.130***	−0.127***	−0.181***	−0.166***
	(0.007)	(0.008)	(0.008)	(0.009)
Protestant Mission	0.019**	0.024**	0.027***	0.047***
	(0.008)	(0.012)	(0.009)	(0.013)
Catholic Mission	0.024***	0.022*	0.062***	0.065***
	(0.008)	(0.012)	(0.009)	(0.012)
Prot. Mission × Female		−0.007		−0.028**
		(0.012)		(0.012)
Cath. Mission × Female		0.003		−0.004
		(0.011)		(0.012)
N Individual	467277	467277	478884	478884
N Country	13	13	13	13
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.108	0.108	0.107	0.107

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 3 but sample limited to British colonies. (*=.1, **=.05, ***=.01)

Table A5: Protestant Missionary Women and Economic Outcomes (British Colonies)

	(1) Education	(2) Literacy	(3) Employed	(4) Paid
Female	−0.276***	−0.137***	−0.130***	−0.181***
	(0.076)	(0.035)	(0.020)	(0.030)
Missionary Women [%]	0.009	0.005	0.013	−0.004
	(0.104)	(0.047)	(0.034)	(0.050)
Missionary Women × Female	0.059	0.033	0.006	−0.016
	(0.133)	(0.059)	(0.032)	(0.047)
N Individual	243113	243113	230174	236311
N Country	13	13	13	13
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Mission controls	✓	✓	✓	✓
R^2	0.241	0.165	0.103	0.110

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 7 but sample limited to British colonies. (*=.1, **=.05, ***=.01)

Table A6: Christian Missions and Education Outcomes (Non-British Colonies)

	Education [log years]		Literacy	
	(1)	(2)	(3)	(4)
Female	−0.382***	−0.432***	−0.173***	−0.192***
	(0.034)	(0.028)	(0.015)	(0.012)
Protestant Mission	0.123**	0.112**	0.051***	0.048**
	(0.049)	(0.055)	(0.019)	(0.022)
Catholic Mission	0.253***	0.168**	0.097***	0.065**
	(0.051)	(0.074)	(0.018)	(0.029)
Prot. Mission × Female		0.016		0.006
		(0.044)		(0.020)
Cath. Mission × Female		0.116***		0.044**
		(0.043)		(0.021)
N Individual	396902	396902	396902	396902
N Country	16	16	16	16
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.267	0.267	0.231	0.231

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 2 but sample limited to Non-British colonies. (*=.1, **=.05, ***=.01)

Table A7: Christian Missions and Labor Market Participation (Non-British Colonies)

	Employed		Paid	
	(1)	(2)	(3)	(4)
Female	−0.132***	−0.140***	−0.155***	−0.145***
	(0.011)	(0.012)	(0.010)	(0.012)
Protestant Mission	−0.001	0.003	0.068***	0.081***
	(0.012)	(0.018)	(0.020)	(0.028)
Catholic Mission	0.007	−0.010	0.070***	0.079***
	(0.013)	(0.019)	(0.022)	(0.024)
Prot. Mission × Female		−0.005		−0.019
		(0.016)		(0.016)
Cath. Mission × Female		0.023		−0.012
		(0.017)		(0.013)
N Individual	383653	383653	393267	393267
N Country	16	16	16	16
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.077	0.077	0.103	0.103

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 3 but sample limited to Non-British colonies. (*=.1, **=.05, ***=.01)

Table A8: Protestant Missionary Women and Economic Outcomes (Non-British Colonies)

	(1) Education	(2) Literacy	(3) Employed	(4) Paid
Female	−0.467***	−0.204***	−0.165***	−0.119***
	(0.120)	(0.057)	(0.039)	(0.028)
Missionary Women [%]	−0.013	−0.003	−0.007	0.086*
	(0.185)	(0.078)	(0.050)	(0.049)
Missionary Women × Female	0.051	0.005	0.012	−0.111**
	(0.198)	(0.086)	(0.068)	(0.047)
N Individual	105301	105301	101752	103956
N Country	16	16	16	16
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Mission controls	✓	✓	✓	✓
R^2	0.233	0.209	0.049	0.127

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 7 but sample limited to Non-British colonies. (*=.1, **=.05, ***=.01)

A2.3 Birth cohort analysis

In this section we examine whether effects change over time when effects of missionary educational provision fade over time, reducing compression of history (Austin, 2008). Based on respondents' birth year, we split our sample into three sub-samples (1949-1974, 1975-84, 1985-2001) of similar sample size, making sure that all countries are represented in each birth cohort. The first cohort includes respondents born before 1975, the second is 1975-1984, and the third 1985 or after.

Table 10 shows how the general mission effects change over time. It can be seen that they are somewhat weaker for younger birth cohorts, though the differences are barely statistically significant. Table A9 shows that the decline is most pronounced for men, especially in relation to Protestant missions. Finally, the results presented in Table A10 indicate that missionary women at Protestant missions have no statistically significant effects on any of the three birth cohorts.

Table A9: Christian Missions and Gendered Education Outcomes by Birth Cohort

	Education [log years]			Literacy		
	1949-1974	1975-1984	1985-2000	1949-1974	1975-1984	1985-2000
Female	−0.447***	−0.365***	−0.358***	−0.209***	−0.165***	−0.161***
	(0.021)	(0.022)	(0.021)	(0.009)	(0.010)	(0.010)
Protestant Mission	0.092***	0.066**	0.023	0.033**	0.024*	0.015
	(0.032)	(0.031)	(0.028)	(0.013)	(0.013)	(0.012)
Catholic Mission	0.098***	0.084*	0.072*	0.043***	0.036*	0.035**
	(0.037)	(0.043)	(0.040)	(0.015)	(0.019)	(0.017)
Protestant M. × Female	0.069**	0.097***	0.129***	0.032**	0.045***	0.049***
	(0.028)	(0.030)	(0.027)	(0.014)	(0.014)	(0.014)
Catholic M. × Female	0.091***	0.083**	0.090***	0.041***	0.036**	0.041***
	(0.033)	(0.033)	(0.027)	(0.015)	(0.016)	(0.013)
N Individual	287250	324234	276518	287250	324234	276518
N Country	29	29	29	29	29	29
N Survey	5	5	3	5	5	3
Colony FE	✓	✓	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓	✓	✓
Location controls	✓	✓	✓	✓	✓	✓
R^2	0.342	0.350	0.257	0.248	0.251	0.184

Note: OLS with country and survey fixed effects, samples correspond to similarly-sized birth cohorts; standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Education in years of schooling (log); literacy indicates reading test result (binary). Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Control variables as in Table 2. (*=.1, **=.05, ***=.01)

Table A10: Protestant Missionary Women and Education Outcomes by Birth Cohort

	Education [log years]			Literacy		
	-1974	1975-1984	1985-	-1974	1975-1984	1985-
Female	−0.316***	−0.293***	−0.280***	−0.152***	−0.129***	−0.131***
	(0.077)	(0.083)	(0.075)	(0.034)	(0.038)	(0.033)
Missionary Women [%]	0.136	−0.012	−0.078	0.071	−0.000	−0.039
	(0.121)	(0.128)	(0.115)	(0.048)	(0.055)	(0.050)
Missionary Women × Female	−0.028	0.130	0.183	−0.010	0.053	0.074
	(0.140)	(0.152)	(0.138)	(0.059)	(0.066)	(0.061)
N Individual	114836	129871	103707	114836	129871	103707
N Country	29	29	29	29	29	29
N Survey	5	5	3	5	5	3
Colony FE	✓	✓	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓	✓	✓
Location controls	✓	✓	✓	✓	✓	✓
Mission controls	✓	✓	✓	✓	✓	✓
R^2	0.272	0.300	0.205	0.197	0.208	0.154

Note: OLS with country and survey fixed effects, samples correspond to cohorts born before 1975, between 1975 and 1984, and 1985 or afer; standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Education in years of schooling (log); literacy indicates reading test result (binary). Missionary Women equals share of women among Western staff at Protestant mission stations. Control variables as in Table 7. (*=.1, **=.05, ***=.01)

A2.4 Competition

Earlier studies explore the role of competition between Protestant and Catholic missions by including interactions effects in their models. Corresponding results based on our data are presented in Table A11. We find no evidence of any competition effects.

Table A11: Christian Missions, Competition, and Education Outcomes

	Education [log years]			Literacy		
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.314***	−0.376***	−0.297***	−0.146***	−0.172***	−0.131***
	(0.018)	(0.018)	(0.075)	(0.009)	(0.008)	(0.031)
Protestant Mission	0.171***	0.114***		0.068***	0.046***	
	(0.029)	(0.029)		(0.011)	(0.012)	
Catholic Mission	0.203***	0.154***	0.237**	0.085***	0.067***	0.110**
	(0.035)	(0.052)	(0.120)	(0.013)	(0.022)	(0.049)
Protestant M. × Female		0.081***			0.031***	
		(0.025)			(0.012)	
Catholic M. × Female		0.068*	−0.016		0.025	−0.022
		(0.035)	(0.124)		(0.017)	(0.054)
Protestant M. × Catholic M.	−0.109**	−0.133**		−0.037**	−0.056**	
	(0.044)	(0.061)		(0.017)	(0.025)	
Missionary Women [%]			0.078			0.044
			(0.112)			(0.044)
Missionary Women × Female			0.006			−0.017
			(0.147)			(0.057)
Missionary Women × Catholic M.			−0.404*			−0.191**
			(0.227)			(0.091)
Protestant M. × Catholic M. × Female		0.035			0.027	
		(0.044)			(0.021)	
Missionary Women × Catholic M. × Female			0.243			0.149
			(0.235)			(0.101)
N Individual	888002	888002	348414	888002	888002	348414
N Country	29	29	29	29	29	29
N Survey	5	5	5	5	5	5
Colony FE	✓	✓	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓	✓	✓
Location controls	✓	✓	✓	✓	✓	✓
Mission controls					✓	✓
R^2	0.308	0.309	0.257	0.219	0.220	0.181

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Education in years of schooling (log); literacy indicates reading test result (binary). Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Missionary Women equals share of women among Western staff at Protestant mission stations. Control variables as in Table 2 for models 1-2 & 4-5 and Table 7 for models 3 & 6. (*=.1, **=.05, ***=.01)

A3 Robustness of main results

In this section we demonstrate the robustness of our results to a variety of plausible statistical re-specifications. In doing so we focus on the long-term effects of Protestant and Catholic missions, and female missionaries, on educational outcomes and labor market participation.

A3.1 Conley standard errors

In line with recent studies, we re-estimate our models with Conley standard errors (Kelly, 2019). Due to the high computational intensity of the models, we use DHS gender-specific survey clusters as units of analysis, i.e. one male and one female unit per cluster. We aggregate individual data through averaging and exclude small clusters with less than 20 individual observations. Our results are robust.

Table A12: Christian Missions and Education Outcomes (Conley SE)

	Education [log years]		Literacy	
	(1)	(2)	(3)	(4)
Female	−0.253***	−0.312***	−0.141***	−0.165***
	(0.015)	(0.016)	(0.008)	(0.008)
Protestant Mission	0.120***	0.077***	0.052***	0.035***
	(0.025)	(0.025)	(0.011)	(0.011)
Catholic Mission	0.139***	0.100***	0.062***	0.046***
	(0.025)	(0.031)	(0.010)	(0.014)
Prot. Mission × Female		0.086***		0.033***
		(0.020)		(0.012)
Cath. Mission × Female		0.076***		0.032**
		(0.022)		(0.013)
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
N Observation	100946	100946	100946	100946
R^2	0.233	0.236	0.210	0.212

Note: OLS with country and survey fixed effects; Conley standard errors (Bartlett kernel, 100km); sample consists of gender groups in unique survey locations (all variables aggregated through averaging). Education in years of schooling (log); literacy indicates reading test result (binary). Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Location controls as in Table 2. (*=.1, **=.05, ***=.01)

Table A13: Christian Missions and Labor Market Participation (Conley SE)

	Employed		Paid	
	(1)	(2)	(3)	(4)
Female	−0.096***	−0.096***	−0.168***	−0.153***
	(0.007)	(0.008)	(0.007)	(0.007)
Protestant Mission	0.015**	0.022***	0.046***	0.066***
	(0.007)	(0.008)	(0.010)	(0.013)
Catholic Mission	0.017**	0.007	0.069***	0.070***
	(0.007)	(0.009)	(0.011)	(0.012)
Prot. Mission × Female		−0.015		−0.038***
		(0.009)		(0.011)
Cath. Mission × Female		0.018*		−0.002
		(0.010)		(0.009)
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
N Observation	98238	98238	100774	100774
R^2	0.079	0.080	0.184	0.186

*Note:*OLS with country and survey fixed effects; Conley standard errors (Bartlett kernel, 100km); sample consists of gender groups in unique survey locations (all variables aggregated through averaging). Employed indicates current employment status; paid whether respondent is in paid employment. Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location; Missionary Women equals share of females among staff at the corresponding mission stations. Location controls as in Table 2. (*=.1, **=.05, ***=.01)

Table A14: Protestant Missionary Women and Economic Outcomes (Conley SE)

	Human Capital		Labor Market Participation	
	(1) Education	(2) Literacy	(3) Employed	(4) Paid
Female	−0.275***	−0.156***	−0.106***	−0.154***
	(0.046)	(0.027)	(0.022)	(0.024)
Missionary Women [%]	−0.050	−0.014	0.021	0.033
	(0.074)	(0.037)	(0.027)	(0.033)
Missionary Women × Female	0.094	0.039	−0.010	−0.079**
	(0.089)	(0.050)	(0.041)	(0.038)
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Mission controls	✓	✓	✓	✓
N Observation	39472	39472	38730	39444
R^2	0.184	0.163	0.078	0.208

Note: OLS with country and survey fixed effects; Conley standard errors (Bartlett kernel, 100km); sample consists of unique survey locations (all variables aggregated through averaging). Education indicates years of schooling; literacy indicates reading test result (binary); employed indicates current employment status; paid whether respondent is in paid employment. Missionary Women equals share of females among European staff at Protestant mission stations. Control variables as in Table 7. (*=.1, **=.05, ***=.01)

A3.2 Additional colonial controls

In this section we add control variables for colonial-era economic activities, in particular cash crop cultivation and mining. These variables are available only for a subset of our data. The results are the same.

Table A15: Christian Missions and Education Outcomes (Additional controls)

	Education [log years]		Literacy	
	(1)	(2)	(3)	(4)
Female	−0.360***	−0.419***	−0.169***	−0.193***
	(0.019)	(0.019)	(0.009)	(0.008)
Protestant Mission	0.135***	0.083***	0.055***	0.036***
	(0.030)	(0.030)	(0.011)	(0.012)
Catholic Mission	0.160***	0.091**	0.070***	0.039**
	(0.031)	(0.043)	(0.011)	(0.018)
Prot. Mission × Female		0.073***		0.027**
		(0.027)		(0.013)
Cath. Mission × Female		0.095***		0.043***
		(0.029)		(0.014)
N Individual	808621	808621	808621	808621
N Country	25	25	25	25
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.310	0.310	0.214	0.214

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 2 but with additional controls for colonial-era economic activities (cash crop cultivation, mining). (*=.1, **=.05, ***=.01)

Table A16: Christian Missions and Labor Market Participation (Additional controls)

	Employed		Paid	
	(1)	(2)	(3)	(4)
Female	−0.138***	−0.134***	−0.175***	−0.159***
	(0.007)	(0.007)	(0.007)	(0.008)
Protestant Mission	0.011	0.026**	0.042***	0.069***
	(0.007)	(0.012)	(0.010)	(0.015)
Catholic Mission	0.015*	0.005	0.064***	0.067***
	(0.008)	(0.012)	(0.012)	(0.014)
Prot. Mission × Female		−0.020*		−0.038***
		(0.011)		(0.011)
Cath. Mission × Female		0.013		−0.004
		(0.011)		(0.010)
N Individual	772402	772402	792921	792921
N Country	25	25	25	25
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.089	0.089	0.107	0.108

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 3 but with additional controls for colonial-era economic activities (cash crop cultivation, mining). (*=.1, **=.05, ***=.01)

Table A17: Protestant Missionary Women and Economic Outcomes (Additional controls)

	(1) Education	(2) Literacy	(3) Employed	(4) Paid
Female	−0.395***	−0.187***	−0.141***	−0.150***
	(0.066)	(0.028)	(0.021)	(0.023)
Missionary Women [%]	−0.045	−0.019	0.035	0.045
	(0.114)	(0.046)	(0.033)	(0.038)
Missionary Women × Female	0.096	0.037	−0.011	−0.085**
	(0.127)	(0.052)	(0.038)	(0.037)
N Individual	300167	300167	284165	292100
N Country	25	25	25	25
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Mission controls	✓	✓	✓	✓
R^2	0.265	0.179	0.084	0.120

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 7 but with additional controls for colonial-era economic activities (cash crop cultivation, mining). (*=.1, **=.05, ***=.01)

Table A18: Christian Missions and Education Outcomes (Individual controls)

	Education [log years]		Literacy	
	(1)	(2)	(3)	(4)
Female	−0.341***	−0.409***	−0.157***	−0.186***
	(0.019)	(0.019)	(0.009)	(0.009)
Protestant Mission	0.070***	0.008	0.028***	0.002
	(0.018)	(0.023)	(0.007)	(0.010)
Catholic Mission	0.055***	−0.014	0.025***	−0.006
	(0.019)	(0.030)	(0.007)	(0.012)
Prot. Mission × Female		0.089***		0.037***
		(0.026)		(0.012)
Cath. Mission × Female		0.096***		0.043***
		(0.030)		(0.014)
N Individual	850617	850617	850617	850617
N Country	28	28	28	28
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Individual controls	✓	✓	✓	✓
R^2	0.398	0.399	0.279	0.280

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Education in years of schooling (log); literacy indicates reading test result (binary). Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Control variablesas in Table 2, plus respondent birthyear, urban residence, and religion. (*=.1, **=.05, ***=.01)

A3.3 Individual controls

In this section we add individual control variables from the survey data. The additional controls are the birth year of the respondent and two dummies indicating whether they live in an urban area and whether they identify as Christian. The results are not affected.

Table A19: Christian Missions and Labor Market Participation (Individual controls)

	Employed		Paid	
	(1)	(2)	(3)	(4)
Female	−0.129***	−0.127***	−0.164***	−0.151***
	(0.006)	(0.007)	(0.007)	(0.007)
Protestant Mission	0.002	0.012	0.024***	0.046***
	(0.007)	(0.011)	(0.008)	(0.012)
Catholic Mission	−0.001	−0.009	0.032***	0.034***
	(0.007)	(0.011)	(0.009)	(0.011)
Prot. Mission × Female		−0.013		−0.032***
		(0.011)		(0.011)
Cath. Mission × Female		0.011		−0.002
		(0.010)		(0.009)
N Individual	814316	814316	834855	834855
N Country	28	28	27	27
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Individual controls	✓	✓	✓	✓
R^2	0.120	0.120	0.144	0.144

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Employed indicates current employment status; paid whether respondent is in paid employment. Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Control variables as in A18. (*=.1, **=.05, ***=.01)

Table A20: Protestant Missionary Women and Economic Outcomes (Individual controls)

	(1) Education	(2) Literacy	(3) Employed	(4) Paid
Female	−0.388***	−0.181***	−0.131***	−0.148***
	(0.066)	(0.029)	(0.019)	(0.021)
Missionary Women [%]	−0.051	−0.020	0.013	0.039
	(0.104)	(0.042)	(0.029)	(0.034)
Missionary Women × Female	0.116	0.049	−0.002	−0.066*
	(0.130)	(0.055)	(0.035)	(0.034)
N Individual	329982	329982	313928	321878
N Country	28	28	28	27
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Mission controls	✓	✓	✓	✓
Individual controls	✓	✓	✓	✓
R^2	0.333	0.231	0.121	0.149

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Education in years of schooling (log); literacy indicates reading test result (binary); employed indicates current employment status; paid whether respondent is in paid employment. Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Missionary Women equals share of women among Western staff at Protestant mission stations. Control variables as in Table 7, plus respondent birthyear, urban residence, and religion. (*=.1, **=.05, ***=.01)

A3.4 Unrestricted sample

In the main analysis we restrict our sample to survey locations with a 100 kilometer radius of former mission stations. Here we drop this restriction and use the complete survey data. The results remain unchanged.

Table A21: Christian Missions and Education Outcomes (Unrestricted sample)

	Education [log years]		Literacy	
	(1)	(2)	(3)	(4)
Female	−0.329***	−0.392***	−0.152***	−0.178***
	(0.016)	(0.016)	(0.008)	(0.007)
Protestant Mission	0.163***	0.090***	0.066***	0.036***
	(0.029)	(0.029)	(0.011)	(0.012)
Catholic Mission	0.148***	0.082**	0.066***	0.037**
	(0.027)	(0.039)	(0.010)	(0.016)
Prot. Mission × Female		0.102***		0.043***
		(0.025)		(0.012)
Cath. Mission × Female		0.092***		0.040***
		(0.028)		(0.014)
N Individual	1028003	1028003	1028003	1028003
N Country	29	29	29	29
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.337	0.338	0.248	0.249

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 2 but with sample not restricted to 100km from colonial-era missions. (*=.1, **=.05, ***=.01)

Table A22: Christian Missions and Labor Market Participation (Unestricted sample)

	Employed		Paid	
	(1)	(2)	(3)	(4)
Female	−0.138***	−0.142***	−0.162***	−0.146***
	(0.006)	(0.006)	(0.006)	(0.007)
Protestant Mission	0.013*	0.016	0.046***	0.073***
	(0.007)	(0.011)	(0.010)	(0.014)
Catholic Mission	0.018**	0.006	0.071***	0.078***
	(0.007)	(0.011)	(0.011)	(0.012)
Prot. Mission × Female		−0.003		−0.038***
		(0.010)		(0.011)
Cath. Mission × Female		0.017*		−0.010
		(0.010)		(0.009)
N Individual	985094	985094	1009591	1009591
N Country	29	29	29	29
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.097	0.097	0.100	0.100

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 3 but with sample not restricted to 100km from colonial-era missions.(*=.1, **=.05, ***=.01)

Table A23: Protestant Missionary Women and Economic Outcomes (Unrestricted sample)

	(1) Education	(2) Literacy	(3) Employed	(4) Paid
Female	−0.346***	−0.162***	−0.134***	−0.152***
	(0.067)	(0.030)	(0.020)	(0.022)
Missionary Women [%]	−0.054	−0.021	0.016	0.036
	(0.115)	(0.048)	(0.031)	(0.037)
Missionary Women × Female	0.101	0.042	−0.001	−0.065*
	(0.130)	(0.056)	(0.036)	(0.035)
N Individual	348414	348414	331926	340267
N Country	29	29	29	29
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Mission controls	✓	✓	✓	✓
R^2	0.256	0.181	0.085	0.112

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 7 but with sample not restricted to 100km from colonial-era missions. (*=.1, **=.05, ***=.01)

A3.5 Excluding South Africa

The bulk of colonial-era Protestant missions was situated in South Africa. This subsection shows that our results are robust even when South Africa is removed from the sample.

Table A24: Christian Missions and Education Outcomes (South Africa excluded)

	Education [log years]		Literacy	
	(1)	(2)	(3)	(4)
Female	−0.318***	−0.383***	−0.148***	−0.177***
	(0.018)	(0.019)	(0.009)	(0.009)
Protestant Mission	0.137***	0.075***	0.056***	0.030**
	(0.028)	(0.029)	(0.011)	(0.012)
Catholic Mission	0.158***	0.093**	0.069***	0.040**
	(0.028)	(0.040)	(0.010)	(0.016)
Prot. Mission × Female		0.088***		0.037***
		(0.026)		(0.013)
Cath. Mission × Female		0.090***		0.041***
		(0.028)		(0.014)
N Individual	878863	878863	878863	878863
N Country	28	28	28	28
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.305	0.306	0.218	0.219

Note: OLS with country and survey fixed effects, standard errors clustered by 1° × 1°-grid cells. Same as Table 2 but with South Africa excluded. (*=.1, **=.05, ***=.01)

Table A25: Christian Missions and Labor Market Participation (South Africa excluded)

	Employed		Paid	
	(1)	(2)	(3)	(4)
Female	−0.132***	−0.132***	−0.170***	−0.157***
	(0.006)	(0.007)	(0.006)	(0.007)
Protestant Mission	0.012	0.019*	0.043***	0.064***
	(0.007)	(0.011)	(0.010)	(0.014)
Catholic Mission	0.018**	0.009	0.070***	0.073***
	(0.007)	(0.011)	(0.012)	(0.013)
Prot. Mission × Female		−0.010		−0.029***
		(0.011)		(0.011)
Cath. Mission × Female		0.011		−0.004
		(0.010)		(0.009)
N Individual	841791	841791	863012	863012
N Country	28	28	28	28
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
R^2	0.092	0.092	0.106	0.107

Note: OLS with country and survey fixed effects, standard errors clustered by 1° × 1°-grid cells. Same as Table 3 but with South Africa excluded. (*=.1, **=.05, ***=.01)

Table A26: Protestant Missionary Women and Economic Outcomes (South Africa excluded)

	(1) Education	(2) Literacy	(3) Employed	(4) Paid
Female	−0.358***	−0.169***	−0.135***	−0.150***
	(0.067)	(0.030)	(0.020)	(0.022)
Missionary Women [%]	−0.062	−0.025	0.013	0.035
	(0.115)	(0.048)	(0.031)	(0.037)
Missionary Women × Female	0.105	0.044	0.000	−0.068*
	(0.130)	(0.055)	(0.037)	(0.035)
N Individual	341077	341077	324589	332930
N Country	28	28	28	28
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Mission controls	✓	✓	✓	✓
R^2	0.254	0.181	0.085	0.113

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Same as Table 7 but with South Africa excluded. (*=.1, **=.05, ***=.01)

A3.6 Single women

Both single women and women married to male missionaries worked at Protestant missions. Instead of the overall share of female missionaries, this section looks at the effect of single female missionaries only. The results remain virtually the same (see Table A27), with the exception of model 4, which suggests a anti-emancipatory effect of female missionaries.

Table A27: Protestant Missionary Women and Economic Outcomes

	(1) Education	(2) Literacy	(3) Employed	(4) Paid
Female	−0.267***	−0.131***	−0.139***	−0.185***
	(0.025)	(0.013)	(0.010)	(0.012)
Missionary Women (Single) [%]	0.021	0.009	0.009	−0.035
	(0.079)	(0.034)	(0.024)	(0.028)
N Individual	348414	348414	331926	340267
N Country	29	29	29	29
N Survey	5	5	5	5
Colony FE	✓	✓	✓	✓
Survey FE	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Mission controls	✓	✓	✓	✓
R^2	0.257	0.181	0.085	0.112

Note: OLS with country and survey fixed effects, standard errors clustered by $1^\circ \times 1^\circ$-grid cells. Education in years of schooling (log); literacy indicates reading test result (binary); employed indicates current employment status; paid whether respondent is in paid employment. Protestant and Catholic Mission indicate presence of a mission station within 25-km of survey location. Missionary Women (Single) equals share of single women among Western staff at Protestant mission stations. Location controls as in Table 2, plus a Mission controls, i.e. medical stations and total number of Western staff at Protestant missions (log), and an interaction between Catholic mission and male. (*=.1, **=.05, ***=.01)

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