

Mapping Missions: New Data for the Study of African History

Social and Economic History

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Abstract

The study of societal and institutional change has greatly benefited from a growing number of studies exploring sub-national variation in colonialism and its legacies. One vibrant stream in this literature focuses on the role of Christian missionaries in European empires. However, advances are often hampered by the quality and scarcity of available historical data. In this article, the authors introduce a new geospatial dataset of Catholic and Protestant mission stations in colonial Africa that offers a more complete picture than currently used data sources. The authors illustrate the greater coverage their data provides and demonstrate its utility by replicating the effect of missions on the expansion of formal education, one of the most established legacies of Christian missionaries.

Keywords

colonialism – missions – education – map

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- Related data set “Mapping Missions: New Data for the Study of African History” with DOI www.doi.org/10.7910/DVN/EgEEMQ in repository “Harvard Dataverse”

1. Introduction

Research on colonialism and its legacies has provided valuable insights into the development of societies and institutions. A large corpus of literature addresses the role and impact of Christian missionaries in European empires. First and foremost, missionaries from Europe set out to spread Christianity and they have done so with considerable success (Gallego & Woodberry, 2010; Jedwab et al., 2022; Meier zu Selhausen, 2019; Nunn, 2010). They also provided basic social services to local communities (Meier zu Selhausen, 2019) and long-term effects on educational outcomes and human capital are documented particularly well (B. Becker, 2021; Nunn, 2014). There is also evidence for effects on health outcomes, but their direction has been shown to vary depending on the specific transmission mechanism (Cage & Rueda, 2020). Furthermore, missionary presence has been shown to promote political participation (Cage & Rueda, 2016) and to be conducive to democratic development (Woodberry, 2012). It also contributed to a decline of interpersonal trust (Okoye, 2021) and altered social norms, for example by promoting monogamy (Fenske, 2015) and heteronormativity (Ananyev & Poyker, 2021).

Historical data sources are sparse (Fourie & Obikili, 2019; Smaldone, 1976), and so the majority of studies on Christian missionaries relies on geospatial analyses using one and the same source: the map created by Roome (1925) for his *Ethnographic Survey of Africa*. The map documents the extent of the missionary enterprise in Africa shortly after World War I and includes locations of 1,321 mission stations. One of its main advantages over other maps from the same era is that it features both Catholic and Protestant missions rather than focusing on a single denomination. The digitization through Nunn (2010) spurred interest across the social sciences as it offered access to missions data that was unprecedented in detail and precision. However, its widespread use implies that a whole literature has become dependent on the validity of a single source. Between 2010 and 2020, 22 out of 26 social science studies on the long-term impact of colonial-era missions in Africa used the Roome map (see Jedwab et al., 2022, Table A1).

The map and its use in scientific research have come under increased criticism. Jedwab et al. (2022) show that the map includes only a subset of all

mission stations and is biased towards larger, European-run stations that were established early and thus better located, while it misses most smaller stations and outposts, most of which were run by African converts. They also demonstrate that this results in an overestimation of the positive long-term effects on education, a central claim made by Nunn (2014) and others in the literature.

One immediate consequence of this critique is the need for more complete data on the locations of Christian missions. In this article, we introduce the more recent map of colonial-era mission locations by Binder Johnson (1967). The map is based on primary sources from the 1920s. It features about a thousand additional stations compared to Roome (1925), an increase of 72 percent, and thus offers a more complete picture of the missionary enterprise.

Furthermore, alternative data sources are necessary for replication in historical research, where data is often of limited quality. Dependence on a single data source risks inducing systemic biases into the literature. In this article, we replicate the well-established human capital legacy of Christian missions. We find even larger effects using the Binder Johnson map compared to results from the more incomplete Roome map. In contrast to Jedwab et al. (2022), this suggests that earlier studies might have omitted highly effective mission stations and therefore underestimated long-term effects. In addition, we find evidence that Protestant missions promote human capital more than Catholic missions. This aligns with historical and ethnographic research (S. O. Becker & Woessmann, 2008; Gallego & Woodberry, 2010), but is the reverse of what Nunn (2014) found—and we successfully replicate—using the Roome map.¹

The article proceeds as follows. The second section introduces the Binder Johnson map and compares it to the map by Roome. The third section investigates the long-term educational effects of missions, comparing estimates based on both maps, including several robustness tests. A final section concludes with implications for the broader literature.

2. New Data on Christian Missions in Colonial Africa

- **Mapping Missions: New Data for the Study of African History deposited at Harvard Dataverse** – DOI: <https://www.doi.org/10.7910/DVN/EgEEMQ>
- **Geographic coverage:** Africa
- **Temporal coverage:** around 1923–1927

¹ Note that this finding in Nunn (2014) only applies to location-specific effects but not if transmission through ethnic linkages is considered.

The modern missionary movement and its consequences have been subject to considerable debate. This is also true for Africa, where the expansion of Christian missions was closely accompanied by colonial expansion (B. Becker, 2022). For these debates, it is of utmost importance to understand the geographic distribution of Christian missions in colonial Africa.

Social scientists draw on a variety of historical works to better capture how geography and missionary movement were intertwined. One of the most influential studies was published in 1967 by Hildegard Binder Johnson. The author presents various case studies to systematically deduct general insights about the geographic determinants of missionary expansion in 19th and 20th century Africa. Although the study is frequently cited by contemporary social scientists, one of its main contributions has not been recognized. It is supplemented by a map that portrays the geographic extent of mission stations in the 1920s. This is unfortunate as the map provides a more complete picture than similar sources. The map is itself a combination of two earlier maps (Beach & Fahs, 1925; Streit, 1929), which show residence locations of Protestant stations in 1923 and Catholic stations in 1927, respectively (Binder Johnson, 1967, pp. 169–170).

The stated goal of Binder Johnson was to provide a map that is “more objective than the one [by Roome]” (Binder Johnson, 1967, p. 170). She acknowledges that the map only provides a snapshot of the end of the “pioneer period” and does not include most of the mission expansion after World War I. In that regard, the map suffers from the same drawbacks as the one by Roome, as it does not account for mid-century developments like the increase in stations run by African staff or the expansion of Catholic stations in the Sudan belt. It likely also includes relatively more better-located stations. However, Protestant stations run by German and Swiss staff that were vacated during World War I and mostly reoccupied after 1923 are accounted for. All in all, the map offers an improvement in terms of representativeness, but it still exhibits bias in the ways mentioned above. In total, the map entails 2,278 mission stations, compared to 1,321 in Roome’s map.

To render the map accessible to researchers, we georeferenced a high-resolution scan of the map using the open-source software *QGIS*² and added layers of points indicating the positions of mission stations. The resulting geospatial vector data is represented as a shapefile that can be read into any GIS software

2 Software version 3.10. Coordinate reference system: WGS84; EPSG 4236. Transformation of ground control points: Thin Plate Spline.

for further analyses. Amongst other auxiliary files,³ the shapefile comes with attributes describing the mission stations:

- xcoord, the longitude of the mission station's location.
- ycoord, the latitude of the mission station's location.
- denom, indicating the mission station's denomination. This is either *Catholic* or *Protestant*.
- vacated, indicating whether the station was vacated during World War I (only applies to Protestant stations).

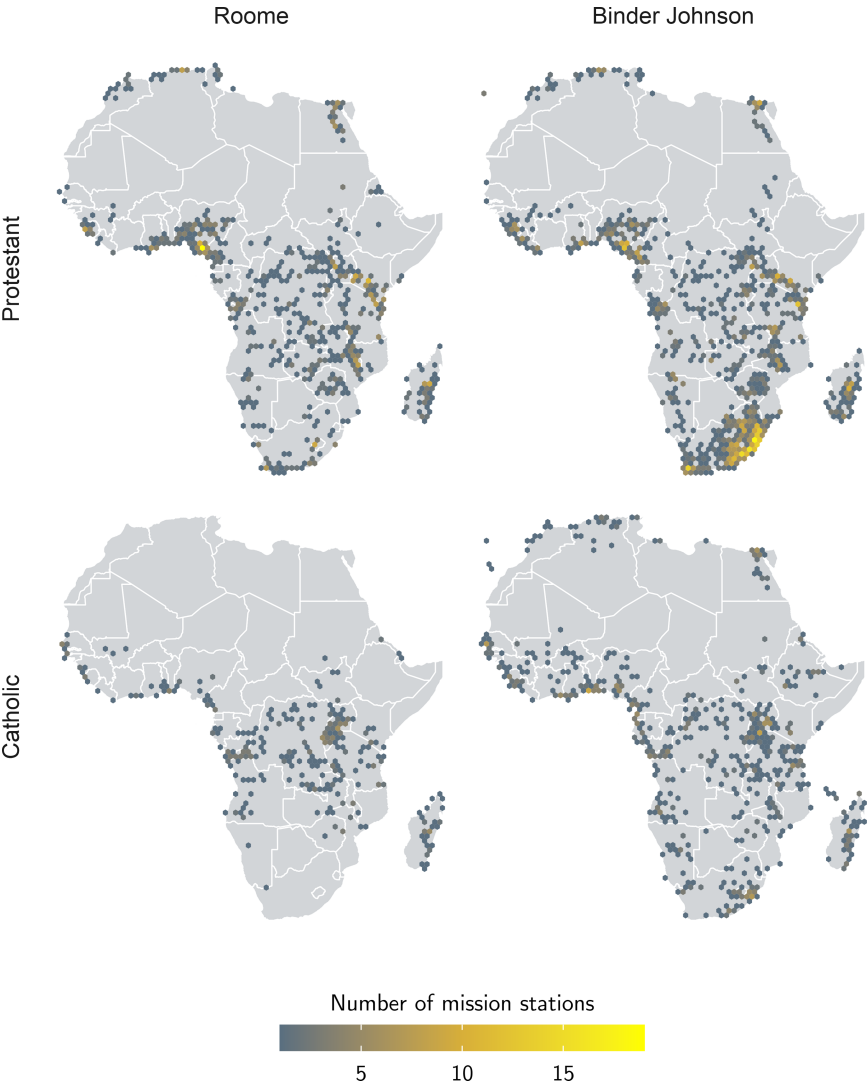
Each station can be uniquely identified by its combination of coordinates. Figure 1 shows an aggregated plot of the mission stations obtained from the new map as compared to the widely used map by Roome.

What stands out immediately when comparing the maps is the presence of Catholic stations in countries and regions not captured by Roome, most notably in Northern and Southern Africa. Those additions cause the location pattern of Catholic stations to coincide more closely with that of Protestant stations. Looking at the Protestant stations, Binder Johnson adds to their presence especially in South Africa. In the country's East, as well as at the Cape of Good Hope, the density of mission stations is particularly high.

For additional comparisons, Table A1 lists the number and share of included mission stations by country and map.⁴ The table highlights that the magnitude of additions by Binder Johnson is in many cases still marginal when considering the findings by Jedwab et al. (2022, Figure 1b): Based on census data, they show that Roome covers only about ten percent of mission stations in most African countries. Nonetheless, Binder Johnson's additions lead to a now complete coverage of Ethiopia and at least 92 percent of Gabon. For Mali, there are now 79 percent of stations included by the map. Further large improvements could be made for Namibia, Côte d'Ivoire, Somalia, and Senegal, with differences between maps ranging from 19–40 percentage points. Tanzania and Sudan are now also more than 40 percent complete. Five countries were improved by up to ten percentage points, 13 countries by at most five percentage points. The same number or slightly fewer stations are observed in five cases. For the remaining 17 countries, comparing the coverage of mission stations is not possible since the data for Roome is either missing in Jedwab et al. (2022), or the share of included stations is zero.

3 Auxiliary files to the shapefile (.shp) are: attribute data of the points (.dbf), projection of the map (.prj), positional index file (.shx). These files do not usually have to be read in individually but are associated with the shapefile by the GIS software automatically.

4 Tables A1 to 10 are included in the Appendix.



Note: Number of stations (left to right, top to bottom): 960, 1522, 361, 756.
FIGURE 1 Mission stations by map and denomination.

The addition of Catholic stations in areas not covered by Roome (1925), and to a lesser extent the numerous additions of Protestant stations in South Africa, already hint at important differences in the local characteristics of the stations covered by both maps, such as proximity to the coast. To get a more detailed picture of these differences, we next examine covariates that are frequently considered in empirical research on Christian missions, for example to account for the endogeneity of locational choices.

Where missionaries decided to settle has been associated with a broad range of factors. The existing infrastructure, societal composition, as well as topographic and natural conditions all influenced locational choices. Furthermore, colonial governments had an interest in where mission stations should be set up and thus encouraged mission stations in some places but restricted them in others. In empirical research, these location covariates have to be accounted for in any study that is interested in the effects of Christian missions.

Figure 2 presents density distributions of frequently considered location covariates. Descriptions and sources of the data are presented in Table A2. For most covariates, distributions across both maps are surprisingly similar. Most perceptible differences, such as the distance from Islamic pilgrimage routes, population density, or Malaria burden, can be attributed to the additional stations in Southern Africa. Notwithstanding these differences, the visual comparison suggests that despite the smaller number of stations covered in Roome, there is little discernible bias on particular observable covariates.

That being said, there might still be important differences with regards to unobserved covariates. These include neglected locational characteristics but also characteristics of the mission stations themselves, e.g., their size, the time they were established, the residence of European missionaries, or the presence of a mission school. To better understand the consequences of the observed, as well as possibly unobserved differences between the maps, we next present an analysis of the long-term effects of missions on education.

3. Analysis

3.1. *Hypotheses*

In our replication analysis, we focus on the well-established human capital legacy of Christian missionaries. This legacy is associated with better educational outcomes in locations where missionaries were historically active (Nunn, 2010). As Protestants valued literacy more highly than Catholics, there should also be differences between the two denominations (Gallego & Woodberry, 2010). We test the following two hypotheses:

- H1:** Colonial-era exposure to Christian missions is associated with higher educational attainment in the long run.
- H2:** Colonial-era exposure to Protestant missions is associated with higher educational attainment in the long run than exposure to Catholic missions.

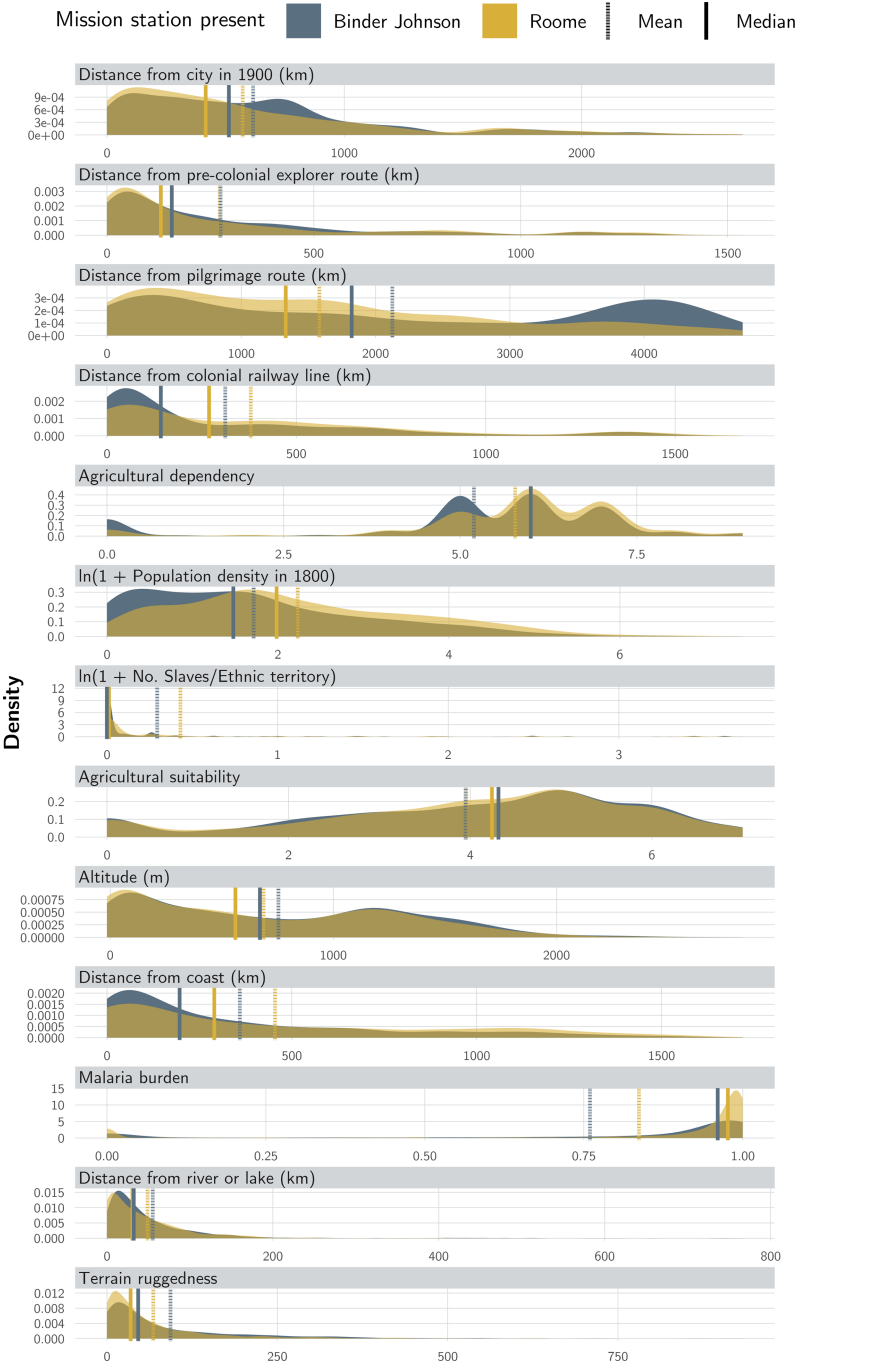


FIGURE 2 Distributions of location covariates by mission presence.

3.2. *Data and Method*

Our main contemporary data source is the Afrobarometer survey (Round 5, 2011–2013), which provides data on individual educational outcomes as well as additional individual controls (Afrobarometer, 2013). The data covers 34 countries.⁵ Based on georeferenced locations in the Afrobarometer survey (BenYishay et al., 2017), we can determine the exact distance to the nearest colonial-era mission station. To improve the identification of effects, we restrict the Afrobarometer sample to respondents within 100 kilometers of colonial-era mission stations (on either of the two maps).⁶ This leaves us with a sample of 41,192 respondents.

Our main dependent variable is the years of education each respondent completed, and our main independent variable the presence of a colonial-era mission within in 25 kilometers of a respondent's location. We include a range of control variables at the individual and location level of the respondent. Individual controls in all regressions are gender, age (incl. a squared term), and an indicator for being Christian. The location level is defined as a radius of 25 kilometers around the respondent, and the included variables correspond to the location covariates of mission stations in the previous section, plus an indicator for the respondent living in an urban area. Detailed descriptions of all variables and their sources can be found in Table A2, summary statistics in Table A3.

To test the two hypotheses, we devise linear regression models with country fixed-effects, which we estimate using a least squares estimator with robust standard errors that account for clustering in Afrobarometer locations.⁷ The first equation captures the general effect of Christian missions to test hypothesis 1. The second equation concerns the denomination-specific effects as specified in hypothesis 2.

$$Y_i = \alpha_c + \beta M_l + \gamma_1 Z_i + \gamma_2 Z_l + \varepsilon_i \quad (1)$$

$$Y_i = \alpha_c + \beta_1 M_l^{Cath} + \beta_2 M_l^{Prot} + \gamma_1 Z_i + \gamma_2 Z_l + \varepsilon_i \quad (2)$$

In the above, i indexes individuals, l survey locations, and c countries. The central independent variables of mission influence are M_l in (1) and M_l^{Cath} and

5 Algeria, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Cote d'Ivoire, Egypt, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Senegal, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia, and Zimbabwe.

6 Robustness checks show that our results do not depend on this choice.

7 For all analyses we use the *feols* function from the *fixest* R-package (Berge, 2018).

M_l^{Prot} in (2). Z_i and Z_l are vectors of control variables at the individual and location level, respectively. Finally, α_c denotes country level fixed effects, and ε_i the random error.

3.3. *Results*

Results of the estimations are presented in Table 1. The first two models are estimated using the mission locations from the new Binder Johnson map, and the other two using the standard Roome data. In models 1 and 3 the overall mission effect is estimated, and it is split by denomination in models 2 and 4. All models yield significantly positive coefficients for the effect of mission stations. Looking at the overall effect, the coefficient for mission stations from Binder Johnson's map is 0.1 education years larger than for the Roome map. In comparison to the sample average of 7.2 education years, the coefficients based on the Binder Johnson map imply an increase of 6.4 percent and 5.0 percent for Roome.

When estimating coefficients for Catholic and Protestant stations separately, we see that for Binder Johnson the positive effect of Protestant stations is about 0.2 education years larger than that of Catholic stations. This is in line with a large body of historical and anthropological work. In his seminal study, Nunn (2014) used the Roome map and unexpectedly found the effect of Catholic missions to exceed that of Protestants. We are able to replicate this surprising result, which suggests that differences do arise from the use of the different maps, not other design choices.

3.4. *Further Analyses*

In this section we describe the findings of further analyses. Complete regression tables can be found in the Appendix (Tables A1 to 10).

We begin by assessing the robustness of our main findings. First, we redefine our mission variable to a narrower radius of ten kilometers, which is closer to a day's walking distance (see Table A4). The results are largely the same, although the Catholic mission effect now diverges more sharply between both maps. With the Binder Johnson data, the effect even loses statistical significance. Second, we limit the sample to a narrower radius around mission stations, that is, 50 instead of 100 kilometers, to improve identification (see Table A5). All coefficients remain virtually unaffected by this change.

We also check whether our findings depend on deviations from the set-up in Nunn's seminal study (Nunn, 2014). We re-estimate the main regressions including only Nunn's set of control variables (see Table A6), limiting the sample to the original set of countries (see Table A7), and removing the sample restriction to include all survey respondents instead of only those within

TABLE 1 Main analysis results for mission influence on education.

	Binder Johnson		Roome	
	(1)	(2)	(3)	(4)
Mission	0.462*** (0.068)		0.364*** (0.070)	
Mission Catholic		0.253*** (0.075)		0.446*** (0.090)
Mission Protestant		0.426*** (0.070)		0.241** (0.076)
Sample	Within 100km of station	Within 100km of station	Within 100km of station	Within 100km of station
Controls	Extended	Extended	Extended	Extended
Mission indi-cator radius	25km	25km	25km	25km
Countries	All	All	All	All
Num.Obs.	41192	41192	41192	41192
R2	0.315	0.315	0.314	0.315
R2 Adj.	0.314	0.314	0.313	0.314
AIC	230594.3	230582.8	230633.5	230601.9
BIC	231025.6	231022.7	231064.8	231041.8
Log.Lik.	-115247.168	-115240.393	-115266.766	-115249.941

Note: DV = Years of education. IV = Mission station present within 25 kilometers. Sample is reduced to respondents living within 100 kilometers of any mission station. Extended set of control variables included as specified in Table A2. Countries included as fixed effects. Standard errors clustered at the town/village level.

100 kilometers of mission stations (see Table A8). All of these analyses confirm the robustness of our results and successful replication of Nunn's results.

Finally, we assess how our results are influenced by relative regional over- or underrepresentation of Protestant or Catholic stations. However, neither the exclusion of South Africa (see Table A9) nor of the North African countries where mission stations were present (see Table A10) leads to noteworthy changes in the estimates.

4. Conclusion

In this article, we have introduced a new geospatial dataset of Christian missions in colonial Africa based on the map by Binder Johnson (1967). It is more complete than the one Roome (1925) map that most research currently relies on. It thus offers new possibilities to explore the short and long-term effects of colonial-era missions and to probe established results. We have demonstrated the utility of our map by comparing it to the widely used map by Roome. We have shown that our map provides more complete coverage and using it in analyses can lead to substantively different findings.

Our analyses of long-term effects have focused on contemporary education, a well-documented legacy of Christian missions. Nevertheless, this literature has recently been criticized for its strong reliance on the Roome map, which covers only a small share of all colonial-era mission stations (Jedwab et al., 2022). Using our dataset constructed from Binder Johnson (1967), we affirm the human capital legacy of Christian missions, in particular—as historians and anthropologists have suggested—those run by Protestants. We also show that the use of a more incomplete map in prior studies might have led to an underestimation of missions' long-term effects rather than an overestimation. As education is an important transmission mechanism for many other outcomes related to missionary intervention, we hope that our map can help to advance our understanding of missions' short and long-term effects.

Against this backdrop, we would also recommend using the new map in combination with other contemporary data sources. Even though the Afrobarometer facilitates the comparison to and replication of earlier studies like the one by Nunn (2014), more elaborate datasets like the Demographic Health Survey (DHS) might provide even better insights.

While the map by Binder Johnson offers an improvement in quantitative coverage of the Christian missionary expansion over existing sources, it still comes with the important caveat that it is by no means an exhaustive and

completely unbiased data source. Only a small fraction of the mission stations established in Africa during colonial times is captured, as can be inferred from Jedwab et al. (2022), and it is possible that analyses based on a complete dataset would yield different results. Furthermore, the data presented here only shows a snapshot of a moment in time, while in reality the presence of mission stations varied over time, as did their societal influence (as exemplified for the case of Ghana, Jedwab et al. [2022]). It is apparent that further research is still needed to advance the availability of data and improve our insights into the legacies and mechanisms of missionary interventions.

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Conflict of Interest

No conflicts of interest declared.

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Appendix

The Appendix contains Tables A1 through A10. Table 1 is included in the main text of the article.

TABLE A1 Number and share of included mission stations by country and map, sorted by differences in coverage from high to low.

Country	Binder Johnson		Roome		Difference Pct.
	N	Pct. covered	N	Pct. covered	
Ethiopia	23	115.00	2	10.0	105.00
Mali	12	79.20	5	33.0	46.20
Gabon	24	92.31	13	50.0	42.31
Namibia	55	65.48	21	25.0	40.48
Côte d'Ivoire	14	38.50	4	11.0	27.50
Somalia	5	55.00	3	33.0	22.00
Senegal	18	49.09	11	30.0	19.09
Tanzania	168	41.24	110	27.0	14.24
Sudan	8	44.67	6	33.5	11.17
Cameroon	52	17.33	24	8.0	9.33
South Africa	548	9.29	59	1.0	8.29
Liberia	28	9.33	6	2.0	7.33
Zimbabwe	52	16.77	31	10.0	6.77
Sierra Leone	40	14.78	23	8.5	6.28
Botswana	8	8.00	4	4.0	4.00
Angola	79	13.86	57	10.0	3.86

TABLE A1 Number and share of included mission stations by country and map (*cont.*)

Country	Binder Johnson		Roome		Difference Pct.
	N	Pct. covered	N	Pct. covered	
Lesotho	28	5.09	11	2.0	3.09
Benin	8	8.00	5	5.0	3.00
Togo	15	7.50	10	5.0	2.50
Mozambique	31	6.74	23	5.0	1.74
Ghana	39	2.89	27	2.0	0.89
Kenya	76	11.77	71	11.0	0.77
Madagascar	126	2.65	95	2.0	0.65
Gambia	2	1.00	1	0.5	0.50
Rwanda	18	8.47	17	8.0	0.47
Nigeria	157	5.45	144	5.0	0.45
Malawi	50	5.32	47	5.0	0.32
Burundi	6	5.00	6	5.0	0.00
Uganda	53	0.95	56	1.0	-0.05
Dem. Rep. Congo	207	4.91	211	5.0	-0.09
Zambia	54	10.45	62	12.0	-1.55
Eritrea	4	2.25	8	4.5	-2.25
Algeria	45	NA	23	NA	NA
Burkina Faso	8	NA	0	0.0	NA
Central African Rep.	8	NA	6	NA	NA

TABLE A1 Number and share of included mission stations by country and map (*cont.*)

Country	Binder Johnson		Roome		Difference Pct.
	N	Pct. covered	N	Pct. covered	
Comoros	3	NA	0	0.0	NA
Congo	21	NA	16	NA	NA
Djibouti	0	NA	1	NA	NA
Egypt	65	NA	40	NA	NA
Eq. Guinea	14	NA	6	NA	NA
eSwatini	20	NA	0	0.0	NA
Guinea	18	NA	9	NA	NA
Guinea-Bissau	1	NA	0	0.0	NA
Libya	5	NA	1	NA	NA
Mauritania	2	NA	0	0.0	NA
Morocco	22	NA	13	NA	NA
S. Sudan	21	NA	17	NA	NA
Somaliland	1	NA	0	0.0	NA
Tunisia	8	NA	7	NA	NA

Note: Percentages are calculated based on Jedwab et al. (2022), Figure 1b. The percentage of stations covered by Roome's map is taken from Jedwab et al. (2022), Figure 1b. Based on the absolute number of stations for each map and country, we could then calculate the percentage covered by Binder Johnson. The counts do not add up to a total of 2,278 and 1,321 for Binder Johnson and Roome, respectively, due to missing values. For the map by Binder Johnson (NA = 8), missing values correspond to stations located on islands not belonging to the modern-day territory of African countries. In the case of Roome (NA = 9), missings result mostly from unprecise digitization of the original map. Note further that the percentages given for Roome in Jedwab et al. (2022) are visually extracted from a barplot and may therefore contain slight inaccuracies. The implausible percentages for Ethiopia are likely a result of inaccurate original sources.

TABLE A2 Variable description

Variable	Source	Source coding	Coding in analyses	Description
Location				
Covariates				
(Figure 2)				
Distance from city in 1900 (km)	Becker 2021, Jedwab and Moradi 2016		0-Max	Distance from a city with population 10,000+ in 1900
Distance from pre-colonial explorer route (km)	Century Company 1911 via Nunn and Wantchekon 2011		0-Max	Distance from pre-colonial explorer route (1768-1894)
Distance from pilgrimage route (km)	Ciolek 2012		0-Max	Distance from an Islamic pilgrimage route
Distance from colonial railway line (km)	Century Company 1911 via Nunn and Wantchekon 2011		0-Max	Distance from a colonial railway line
Agricultural dependency	Gray 1999		0-9	Measure of reliance on agriculture for historical ethnicity
ln(1 + Population density in 1800)	Klein Goldewijk et al. 2010		0-Max	Population density in 1800
ln(1 + No. Slaves/Ethnic territory)	Murdock 1967, Nunn and Wantchekon 2011		0-Max	Slave export measure for historical ethnicity

TABLE A2 Variable description (*cont.*)

Variable	Source	Source coding	Coding in analyses	Description
Location				
Covariates				
(Figure 2)				
Agricultural suitability	FAO/IISA 2011	8-1: not suitable-very suitable	0-7	Agricultural suitability of location
Altitude (m)	FAO/IISA 2011		Min-Max	Altitude of location
Distance from coast (km)	Natural Earth 2021		0-Max	Distance from nearest coast
Malaria burden	Malaria Atlas Project 2021		0-1	Measure of local Malaria burden
Distance from river or lake (km)	FAO/IISA 2011, Natural Earth 2021		0-Max	Distance from a river or other waterbody (lake, lagoon)
Terrain ruggedness	Shaver et al. 2019		0-Max	Terrain ruggedness of location
Survey data analyses				
Mission	Binder Johnson 1967, Roome 1925		0/1	Mission station of any denomination within 25km of respondent
Mission Catholic	Binder Johnson 1967, Roome 1925		0/1	Catholic mission station within 25km of respondent

TABLE A2 Variable description (*cont.*)

Variable	Source	Source coding	Coding in analyses	Description
Location				
Covariates				
(Figure 2)				
Mission Protestant	Binder Johnson 1967, Roome 1925		0/1	Protestant mission station within 25km of respondent
Years of education	Afrobarometer 2013	Levels 0-9	0,1,3,7,9, 12,13,14,16,18	Education in years
Female	Afrobarometer 2013	1=male, 2=female	0/1	Respondent is female
Age	Afrobarometer 2013		Min-Max	Age of respondent
Age2	Afrobarometer 2013		Min-Max	Age of respondent squared
Urban	Afrobarometer 2013	1=urban, 2=rural	0/1	Respondent lives in urban location
Christianity	Afrobarometer 2013	Codes 1-13, 15-17, 31-37, 144, 145, 220, 420-422, 461, 463, 464, 540, 542, 701, 702, 780, 821-824, 860-865, 1140, 1260-1262	0/1	Respondent is Christian

TABLE A2 Variable description (*cont.*)

Variable	Source	Source coding	Coding in analyses	Description
Location				
Covariates				
(Figure 2)				
Pre-colonial explorer route	Century Company 1911 via Nunn and Wantchekon 2011		0/1	Pre-colonial explorer route within 25km of respondent
Colonial railway line	Century Company 1911 via Nunn and Wantchekon 2011		0/1	Colonial railway line within 25km of respondent
ln(1 + No. Slaves/Ethnic territory)	Murdock 1967, Nunn and Wantchekon 2011		0-Max	Slave export measure of ethnicity that lived in location of respondent
Altitude (100m)	FAO/IISA 2011		Min-Max	Average altitude of 25km respondent radius
Agricultural suitability	FAO/IISA 2011	8-1: not suitable-very suitable	0-7	Average agricultural suitability of 25km respondent radius
Water access	FAO/IISA 2011, Natural Earth 2021		0/1	A river, lake, or lagoon lies within 25km respondent radius

TABLE A2 Variable description (*cont.*)

Variable	Source	Source coding	Coding in analyses	Description
Location				
Covariates				
(Figure 2)				
Distance from city in 1900 (100km)	Becker 2021, Jedwab and Moradi 2016		0-Max	Distance from a city with population 10,000+ in 1900
Distance from pilgrimage route (100km)	Ciolek 2012		0-Max	Distance from an Islamic pilgrimage route
ln(1 + Population density in 1800)	Klein Goldewijk et al. 2010		0-Max	Population density in 1800
British colony	Becker 2019		0/1	Country of respondent was a British colony
Agricultural dependency	Gray 1999		0-9	Reliance on agriculture of ethnicity that lived in location of respondent
Distance from coast (100km)	Natural Earth 2021		0-Max	Distance from nearest coast
Terrain ruggedness	Shaver et al. 2019		0-Max	Average terrain ruggedness of 25km respondent radius
Malaria burden	Malaria Atlas Project 2021		0-1	Average malaria burden of 25km respondent radius

Note: Afrobarometer 2013 always includes BenYishay et al. (2017).

TABLE A3 Summary statistics of survey data analyses

	N	Mean	SD	Min	P25	P50	P75	Max
Years of education	51461	7.01	4.87	0	3.00	7.00	12.00	18
Mission Binder Johnson	51587	0.42	0.49	0	0.00	0.00	1.00	1
Mission Binder Johnson Cath.	51587	0.20	0.40	0	0.00	0.00	0.00	1
Mission Binder Johnson Prot.	51587	0.35	0.48	0	0.00	0.00	1.00	1
Mission Roome	51587	0.35	0.48	0	0.00	0.00	1.00	1
Mission Roome Cath.	51587	0.14	0.34	0	0.00	0.00	0.00	1
Mission Roome Prot.	51587	0.31	0.46	0	0.00	0.00	1.00	1
<i>Controls as included in Nunn (2014)</i>								
Female	51587	0.50	0.50	0	0.00	1.00	1.00	1
Age	51143	37.19	14.59	18	26.00	34.00	46.00	105
Age ²	51143	1596.26	1301.64	324	676.00	1156.00	2116.00	11025
Urban	51587	0.40	0.49	0	0.00	0.00	1.00	1
Christianity	51263	0.57	0.49	0	0.00	1.00	1.00	1

TABLE A3 Summary statistics of survey data analyses (*cont.*)

	N	Mean	SD	Min	P25	P50	P75	Max
Pre-colonial explorer route	51587	0.16	0.36	0	0.00	0.00	0.00	1
Colonial railway line	51587	0.16	0.37	0	0.00	0.00	0.00	1
ln(1 + No. Slaves/ Ethnic territory)	51587	0.36	0.79	0.00	0.00	0.00	0.26	3.73
Altitude (100m)	51587	6.34	5.81	-0.02	1.30	4.05	11.05	26.85
Agricultural suitability	51587	3.81	1.91	0.00	2.78	4.23	5.23	7.00
Water access	51587	0.36	0.48	0	0.00	0.00	1.00	1
<i>Extended controls not included in Nunn (2014)</i>								
Distance from city in 1900 (100km)	51587	5.83	6.53	0.00	1.60	3.63	6.91	29.88
Distance from pilgrim-age route (100km)	51587	14.96	14.79	0.00	1.94	9.25	28.54	47.23
ln(1 + Population density in 1800)	51419	2.33	1.35	0.00	1.33	2.13	3.20	6.69

TABLE A3 Summary statistics of survey data analyses (*cont.*)

	N	Mean	SD	Min	P25	P50	P75	Max
British colony	51587	0.63	0.48	0	0.00	1.00	1.00	1
Agricultural dependency	49179	5.59	1.73	0	5.00	6.00	7.00	9
Distance from coast (100km)	51587	3.74	3.51	0.00	0.49	2.75	6.45	17.12
Terrain ruggedness	51459	7.02	7.83	0.00	1.74	4.01	9.66	51.82
Malaria burden	51587	0.65	0.41	0.00	0.13	0.92	0.99	1.00

TABLE A4 Results of additional analyses (1): Smaller mission indicator radius

	Binder Johnson		Roome	
	(5)	(6)	(7)	(8)
Mission	0.413*** (0.077)		0.459*** (0.079)	
Mission Catholic		0.226 (0.117)		0.774*** (0.125)
Mission Protestant		0.404*** (0.083)		0.298*** (0.084)
Sample	Within 100km of station	Within 100km of station	Within 100km of station	Within 100km of station
Controls	Extended	Extended	Extended	Extended
Mission indicator radius	10km	10km	10km	10km
Countries	All	All	All	All
Num.Obs.	41192	41192	41192	41192
R2	0.314	0.314	0.314	0.315
R2 Adj.	0.313	0.313	0.313	0.314
AIC	230630.2	230639.8	230618.3	230558.7
BIC	231061.5	231079.8	231049.6	230998.6
Log.Lik.	-115265.076	-115268.916	-115259.151	-115228.342

* p < 0.05, ** p < 0.01, *** p < 0.001
Note: DV = Years of education. IV = Mission station present within 10km. Sample is reduced to respondents living within 100km of any mission station. Extended set of control variables included as specified in Table A2. Countries included as fixed effects. Standard errors clustered at the town/village level.

TABLE A5 Results of additional analyses (2): Smaller sample radius

	Binder Johnson		Roome	
	(9)	(10)	(11)	(12)
Mission	0.396*** (0.072)		0.294*** (0.073)	
Mission Catholic		0.242** (0.076)		0.470*** (0.091)
Mission Protestant		0.370*** (0.072)		0.164* (0.078)
Sample	Within 50km of station	Within 50km of station	Within 50km of station	Within 50km of station
Controls	Extended	Extended	Extended	Extended
Mission indicator radius	25km	25km	25km	25km
Countries	All	All	All	All
Num.Obs.	34427	34427	34427	34427
R2	0.304	0.304	0.303	0.304
R2 Adj.	0.303	0.303	0.302	0.303
AIC	192801.2	192787.3	192830.0	192793.9
BIC	193223.6	193218.0	193252.3	193224.7
Log.Lik.	-96350.615	-96342.632	-96364.977	-96345.963

* p < 0.05, ** p < 0.01, *** p < 0.001
Note: DV = Years of education. IV = Mission station present within 25km. Sample is reduced to respondents living within 50km of any mission station. Extended set of control variables included as specified in Table A2. Countries included as fixed effects. Standard errors clustered at the town/village level.

TABLE A6 Results of additional analyses (3): Nunn (2014) controls

	Binder Johnson		Roome	
	(13)	(14)	(15)	(16)
Mission	0.622*** (0.063)		0.560*** (0.065)	
Mission Catholic		0.330*** (0.074)		0.593*** (0.087)
Mission Protestant		0.549*** (0.066)		0.390*** (0.072)
Sample	Within 100km of station	Within 100km of station	Within 100km of station	Within 100km of station
Controls	Nunn 2014	Nunn 2014	Nunn 2014	Nunn 2014
Mission indi-cator radius	25km	25km	25km	25km
Countries	All	All	All	All
Num.Obs.	41224	41224	41224	41224
R2	0.311	0.311	0.310	0.311
R2 Adj.	0.310	0.310	0.309	0.310
AIC	230983.7	230972.8	231034.5	230964.4
BIC	231354.6	231352.4	231405.4	231344.0
Log.Lik.	-115448.830	-115442.409	-115474.238	-115438.200

* p < 0.05, ** p < 0.01, *** p < 0.001
Note: DV = Years of education. IV = Mission station present within 25km. Sample is reduced to respondents living within 100km of any mission station. Nunn (2014) control variables included as specified in Table A2. Countries included as fixed effects. Standard errors clustered at the town/village level.

TABLE A7 Results of additional analyses (4): Nunn (2014) countries

	Binder Johnson		Roome	
	(17)	(18)	(19)	(20)
Mission	0.411*** (0.078)		0.368*** (0.078)	
Mission Catholic		0.202* (0.086)		0.480*** (0.100)
Mission Protestant		0.353*** (0.078)		0.170* (0.082)
Sample	Within 100km of station	Within 100km of station	Within 100km of station	Within 100km of station
Controls	Extended	Extended	Extended	Extended
Mission indi-cator radius	25km	25km	25km	25km
Countries	Nunn 2014	Nunn 2014	Nunn 2014	Nunn 2014
Num.Obs.	27330	27330	27330	27330
R2	0.329	0.329	0.329	0.329
R2 Adj.	0.328	0.328	0.328	0.328
AIC	148523.2	148529.2	148537.9	148516.4
BIC	148819.0	148833.2	148833.6	148820.4
Log.Lik.	-74225.605	-74227.620	-74232.933	-74221.199

* p < 0.05, ** p < 0.01, *** p < 0.001
Note: DV = Years of education. IV = Mission station present within 25km. Sample is reduced to respondents living within 100km of any mission station. Reduced to countries in Nunn (2014). Extended set of control variables included as specified in Table A2. Countries included as fixed effects. Standard errors clustered at the town/village level.

TABLE A8 Results of additional analyses (5): No restriction of sample radius

	Binder Johnson		Roome	
	(21)	(22)	(23)	(24)
Mission	0.445*** (0.068)		0.394*** (0.070)	
Mission Catholic		0.250*** (0.075)		0.440*** (0.090)
Mission Protestant		0.407*** (0.069)		0.270*** (0.076)
Sample	No restriction	No restriction	No restriction	No restriction
Controls	Extended	Extended	Extended	Extended
Mission indi-cator radius	25km	25km	25km	25km
Countries	All	All	All	All
Num.Obs.	48288	48288	48288	48288
R2	0.331	0.331	0.330	0.331
R2 Adj.	0.330	0.330	0.330	0.330
AIC	270895.0	270883.9	270919.5	270890.0
BIC	271343.1	271340.7	271367.6	271346.8
Log.Lik.	-135396.510	-135389.939	-135408.763	-135392.983

* p < 0.05, ** p < 0.01, *** p < 0.001
Note: DV = Years of education. IV = Mission station present within 25km. Extended set of control variables included as specified in Table A2. Countries included as fixed effects. Standard errors clustered at the town/village level.

TABLE A9 Results of additional analyses (6): Excluding North African countries

	Binder Johnson		Roome	
	(25)	(26)	(27)	(28)
Mission	0.445*** (0.070)		0.389*** (0.071)	
Mission Catholic		0.251** (0.078)		0.434*** (0.091)
Mission Protestant		0.439*** (0.072)		0.255** (0.078)
Sample	Within 100km of station	Within 100km of station	Within 100km of station	Within 100km of station
Controls	Extended	Extended	Extended	Extended
Mission indicator radius	25km	25km	25km	25km
Countries	Without North Africa	Without North Africa	Without North Africa	Without North Africa
Num.Obs.	36531	36531	36531	36531
R2	0.333	0.334	0.333	0.334
R2 Adj.	0.333	0.333	0.332	0.333
AIC	201625.8	201606.7	201650.3	201620.7
BIC	202008.6	201998.0	202033.1	202012.0
Log.Lik.	-100767.913	-100757.362	-100780.161	-100764.352

* p < 0.05, ** p < 0.01, *** p < 0.001
Note: DV = Years of education. IV = Mission station present within 25km. Sample is reduced to respondents living within 100km of any mission station. Morocco, Algeria, Tunisia, Egypt, and Sudan were removed from the sample. Extended set of control variables included as specified in Table A2. Countries included as fixed effects. Standard errors clustered at the town/village level.

TABLE A10 Results of additional analyses (7): Excluding South Africa

	Binder Johnson		Roome	
	(29)	(30)	(31)	(32)
Mission	0.476*** (0.071)		0.378*** (0.073)	
Mission Catholic		0.272*** (0.078)		0.445*** (0.090)
Mission Protestant		0.439*** (0.072)		0.249** (0.079)
Sample	Within 100km of station	Within 100km of station	Within 100km of station	Within 100km of station
Controls	Extended	Extended	Extended	Extended
Mission indicator radius	25km	25km	25km	25km
Countries	Without South Africa	Without South Africa	Without South Africa	Without South Africa
Num.Obs.	38932	38932	38932	38932
R2	0.314	0.314	0.313	0.314
R2 Adj.	0.313	0.313	0.313	0.313
AIC	218395.3	218382.7	218433.8	218403.8
BIC	218815.2	218811.2	218853.7	218832.2
Log.Lik.	-109148.666	-109141.375	-109167.907	-109151.884

* p < 0.05, ** p < 0.01, *** p < 0.001
Note: DV = Years of education. IV = Mission station present within 25km. Sample is reduced to respondents living within 100km of any mission station. South Africa was removed from the sample. Extended set of control variables included as specified in Table A2. Countries included as fixed effects. Standard errors clustered at the town/village level.