Long-Lasting Effects of Exposure to Bible Translations: Evidence from Sub-Saharan Africa*

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Abstract

This paper evaluates the impact of early life exposure to mother-tongue Bible translations in the 1980s on adult educational outcomes. We analyze data from a sample of approximately 75,000 adults in the Demographic and Health Surveys in 13 sub-Saharan African countries. Our difference-in-differences strategy compares educational outcomes within and across ethno-linguistic groups and accounts for the differential timing of Bible translations and trends in outcomes over time. Individuals born ten years after the first-known Bible translation for their ethno-linguistic group have an 11 percentage point increase in the likelihood of being literate as adults, a gain of 1.2 years of education, and a 17 percentage point gain in the likelihood of completing primary school. Effects do not vary greatly by gender or by regional prevalence of Muslim faith. We discuss possible mechanisms underlying our results, finding evidence of the potential importance of complementarities with inputs concentrated around historical missions.

Keywords: Literacy, Bible translations, Languages, Missions, Ethnicity, Cohort, Difference-in-Differences.

JEL Classification: I25, J15, O15, N37, Z12

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1. Introduction

A large literature within economics has examined the effect of Christianity on economic prosperity, generally finding a positive association between Christianity and human capital.[1] The positive relationship between Christianity and educational outcomes has been documented across a variety of settings and contexts, with researchers finding that Christian missions increased educational inputs such as schools and teachers (Cogneau and Moradi, 2014; Wantchekon et al., 2015) as well as access to printing presses and printed material (Cagé and Rueda, 2016).[2] While there are anecdotal claims that the Bible played a key role in the positive impact of Christianity on education (S. Becker and Woessmann, 2009; Feld, 2022), to date, isolating the separate effect of the Bible from other factors has proven challenging.[3] In this paper, using a novel empirical strategy, we isolate and identify the causal effect of Bible translations on educational outcomes by measuring how early life exposure to a mother-tongue Bible translation in the 1980s affected adult literacy and educational attainment in Africa.

Simply comparing individuals whose language was translated (or translated earlier) with those whose language was not translated (or translated later) would result in bias due to non-random selection into language translation.[4] Using data on Bible translation timing and pre-colonial characteristics of ethno-linguistic groups in Africa, we first document that, indeed, ethno-linguistic groups with earlier Bible translations are different than groups that received later (or no) translations; groups with earlier translations relied less on gathering and agriculture, depended more on fishing, and were less likely to be nomadic. We then show that OLS estimates from simply comparing educational outcomes across ethno-linguistic groups with early vs. later (or no) Bible translations are biased upward.

[1] Christianity is positively associated with literacy (Moilanen and Sommerseth, 2021) and overall cognitive skills (Boppart et al., 2014; Fernihough and Henderson, 2015); see also Odén (1975) and Guttormsson (1990). Over fifty papers in Economics attempt to measure causal effects of missions (Jedwab et al., 2022), utilizing various empirical strategies such as mission fixed effects (Nunn, 2014; Nunn, 2010) or instrumental variables (Boppart et al., 2014; Huillery, 2009; Kim, 2020; Ricart-Huguet, 2022). See also S. Becker et al. (2021). Jedwab et al. (2022) and Jedwab et al. (2021) argue that the positive relationship between missionary activity and human capital may be overstated due to issues related to data quality and non-random placement of missions.

[2] The impacts of missionaries on human capital have been studied in Africa (Alesina et al., 2020; S. Becker et al., 2021; Cagé and Rueda, 2020; Cagé and Rueda, 2016; Cappelli and Baten, 2017; Doyle et al., 2020; Fourie and Swanepoel, 2015; Gallego and Woodberry, 2010; Huillery, 2009; Nunn, 2014; Okoye and Pongou, 2014; Okoye and Pongou, 2023; Wantchekon et al., 2015; Woodberry, 2012), India (Calvi and Mantovanelli, 2018; Castelló-Climent et al., 2018; Lankina and Getachew, 2013), China (Bai and Kung, 2015; Ma, 2021), Mexico (Waldinger, 2017), and South America (Alston et al., 2022; Gómez-i-Aznar, 2022; Valencia Caicedo, 2019; Waldinger, 2017).

[3] Within the larger empirical literature studying the impact of missions, a small number of papers have attempted to examine the separate impact of the Bible on development. Nunn (2010) compares ethnic groups in Africa with and without a Bible translation, controlling for the level of exposure to missionary activity, and finds no effect on Christian conversions. Bai and Kung (2015) estimate the relationship between urbanization and Protestantism in China, controlling for the number of Bible schools as a regressor. Brown (2024) studies the impact of Bible translations, also during early colonial times, utilizing a rich set of controls, yet may also suffer from the potential endogeneity of non-random Bible translations. All of these papers focus on exposure to the Bible during the late 19th and early 20th century. These papers, for the most part, are not able to disentangle Bible exposure from the larger confounding set of missionary and Christian influences.

[4] Comparing geographical areas with earlier vs. later (or no) Bible translations, as in Brown (2024), poses similar identification challenges.

To address the non-random selection of languages into Bible translation, we use an event-study difference-in-differences strategy that compares within and across ethno-linguistic groups and accounts for the differential timing in exposure to a local-language Bible translation (Sun and Abraham, 2021). Our specification relies on variation in the timing of a Bible translation relative to the year of an individual's birth. This approach accounts for the increasing literacy and educational attainment trends over time as well as differences across ethno-linguistic groups.[5]

Our educational outcomes are from questions and literacy assessments in round 7 of the Demographic and Health Surveys (DHS) in 13 sub-Saharan African countries. We match each respondent's ethno-linguistic group to data on Bible translations (Eberhard et al., 2023). Our main analytical sample consists of approximately 75,000 adult men and women representing 42 different ethno-linguistic groups, of which nine had a Bible translated into their mother-tongue during the 1980s, when they were young.

We find large positive effects of exposure to a Bible translation on educational outcomes later in life. Across a balanced panel of birth cohorts born before or after a mother-tongue Bible translation, those in ethno-linguistic groups with a Bible translations who were born between zero and 14 years after a Bible translation have a 6.4 percentage point gain in the likelihood of being able to read a complete sentence, a gain of 0.7 additional years of education, and an 8.4 percentage point increase in the likelihood of completing primary school, compared to those born in the fifteen years prior to a translation, relative to ethno-linguistic groups without a Bible translation. These estimates account for differential timing in language translation, following Sun and Abraham (2021). The results are similar for partial literacy, any schooling, and secondary school completion, as well as across men and women.

We then examine the effect of the number of years of exposure to a Bible translation on educational outcomes, using the relative timing of an individual's year of birth compared to the year of a Bible translation in their mother-tongue. We find that the effects of a Bible translation gradually increase with years of exposure, reaching a maximum impact at approximately ten years of exposure to a Bible translation. Individuals in ethno-linguistic groups with a Bible translation who are born ten years after the first translation in their mother-tongue experience an 11 percentage point gain in the likelihood of being literate compared to those born the year before a translation and relative to those in ethno-linguistic groups without a Bible translation. This gain is almost twice the overall average effect across all 15 post-translation years. The effects for educational attainment are similar: gains of an additional 1.2 years of education and 17 percentage points in the likelihood of completing primary school. Our results are estimated following Sun and Abraham (2021) and are consistent across various methods, including estimates obtained using traditional two-way fixed effects,

[5]Average years of education has increased dramatically in sub-Saharan Africa, from four years for women (seven years for men) born in the 1950s, to nine years for women (10 years for men) born in the late 1990s (Le Nestour et al., 2021).

imputation-based (Gardner, 2022), and Callaway and Sant'Anna (2021) estimators and for other related outcomes including partial literacy, completing any schooling, and secondary school completion. The effects are also similar across gender.

There are several potential mechanisms, spanning distinct strands of literature, through which exposure to a Bible translation may have increased literacy and educational attainment. These mechanisms are likely complementary rather than entirely independent, and our data do not allow us to precisely disentangle the different mechanisms.[6] However, we present some empirical evidence that provides additional understanding of our results. We explore three categories of potential mechanisms through which exposure to a Bible translation might affect later-life educational outcomes: 1) a direct religious mechanism related to the Christian ideas or values contained within the Bible that could be easier to access with a mother-tongue translation; 2) additional or complementary inputs such as missionaries, schools, or print text that interacted with, or increased after, a mother-tongue translation; and 3) literary and mother-tongue aspects of the translated Bible, which could have lowered the cost of literacy acquisition and schooling.

The first potential mechanism through which a Bible translation could have influenced educational outcomes is related to Christian ideas and values contained within the Bible, which may have become more accessible with a mother-tongue translation. To understand the role of this mechanism, we divide the sample into geographical areas that are predominantly Muslim and those that are not. We find little difference in the impact of exposure to a Bible translation across predominantly Muslim locations compared to non-Muslim areas in literacy or primary school completion, although we find somewhat larger effects on years of education in levels in non-Muslim areas (1.1 years increase) compared to Muslim areas (0.6 years).[7] Ideally, we would like to also test whether Bible translations resulted in conversions to Christianity. Any causal effect of access to a translation on Christian affiliation would be an indication that the mother-tongue translations provided new access to the ideas contained within the Bible. However, our identification strategy relies on differential exposure to translations across birth cohorts and on the fact that the later life educational outcomes that we study accrue predominantly during younger years. This identification strategy does not work well for outcomes that are affected by the Bible translations equally across birth cohorts, over time, such as religious conversions. We find no impact of Bible translations on the probability of holding Christian beliefs, which could mean either that there was no impact of the translations on religious affiliation or that the translations affected all birth cohorts of translated ethno-linguistic groups equally in changing religious beliefs. We see some evidence of substitution across Christian denominations for younger cohorts, with a small increase of

[6] Choy (2022) critiques the current literature linking religion and human capital investments and outcomes, arguing that, despite a large body of evidence, there is a dearth of thoughtful work on mechanisms explaining why the relationship exists.

[7] In relative terms, the effects of Bible translations on years of education are similar across Muslim and non-Muslim areas because the overall levels of schooling for ethno-linguistic groups without translations in non-Muslim areas are over twice that in Muslim areas. Alesina et al. (2023) also find large gaps in educational mobility in majority Muslim areas.

2.2 percentage points in the likelihood of Protestant affiliation and an equal decrease in the likelihood of Catholic affiliation for cohorts born after ten years of exposure to a Bible translation.[8] Taken together, the evidence suggests that our results on educational outcomes are unlikely to be primarily due to translations increasing access to the religious ideas contained within the Bible, although we cannot completely rule out this mechanism.

A second potential mechanism for our results is related to resources or inputs – such as literacy programs, print materials, or schools – that may have either been introduced to ethno-linguistic groups receiving a Bible translation or already existed and interacted as complements with the Bible translations. We do not have data on inputs during the 1980s and beyond to fully test whether the Bible translations that we study were associated with additional educational inputs. However, if such inputs were important for our results, individuals living closer to historical mission centers might respond differently to a Bible translation than those living further away, since historical missions are plausible entry points for outside inputs to be brought into African communities. We test this in our data by matching respondents with the locations of historical Christian missions (Cagé and Rueda, 2020; Nunn, 2010) and disaggregating our event-study results by distance from a historical mission. We find that the impact of exposure to a Bible translation accrued more quickly for those living closer to a mission and that the size of the impact is larger across all of our educational outcomes. Historical archival materials suggest that the greater impact of Bible translations in areas closer to missions is more likely to be due to complementarities with existing infrastructure rather than additional inputs associated with the Bible translations.[9] Ultimately, however, we cannot rule out that literacy- or education-related investments targeted at specific ethno-linguistic groups, such as influxes of Bibles or print materials after a translation, contribute to our findings.

A third potential mechanism that could be an important driver of our results is related to the literary and mother-tongue aspect of a Bible translation. Historical Bible translations were often associated with the codification and development of local language orthographies (Laitin and Ramachandran, 2022; Ranger, 1984), as well as providing increased community support for local language reading (Buzasi, 2015; Laitin and Ramachandran, 2016; Wild-Wood, 2017). A growing number of studies within the Economics of Education literature have found that mother-tongue early grade reading programs are enormously effective (Buhl-Wiggers et al., 2018; Kerwin and R. Thornton, 2021; Laitin and Ramachandran, 2022; Ouane, Glanz, et al.,

[8] This pattern is consistent with the fact that eight of the nine translated languages in our study were translated by Protestant organizations. We also show strong pre-trends of opposite sign in Catholic affiliation (negative) and Protestant affiliation (positive).

[9] Annual reports available through archive.org and compiled each year from Bible Society country offices in Africa during the 1970s, 80s, and 90s suggest fairly limited programmatic activities and severe resource constraints (United Bible Society, 1986-1995). Throughout three decades of reports, there is not a single mention of initiatives specific to an ethno-linguistic group, even related to the completion of new Bible translation projects. In related analyses, Brown (2024) finds significant increases in infrastructure, such as schools, hospitals, and printing presses, prior to 1900 in areas with earlier Bible translations but finds no such correlations with additional infrastructure investments for translations conducted after 1900.

2005; Seid, 2016) and have resulted in shifts towards mother-tongue-first policies and local-language literacy programs throughout Africa (Brunette et al., 2019; Bühmann, 2008; Ouane, Glanz, et al., 2005; Piper et al., 2016; Trudell, 2016). Mother-tongue text reduces the cost of learning to read and schooling overall. A recent experimental evaluation of one mother-tongue reading program in Uganda resulted in enormous gains in literacy and increased grade progression (Buhl-Wiggers et al., 2023), consistent with our results on education attainment. Unfortunately, however, we cannot test this mechanism in our data directly.[10]

Our paper contributes to research documenting a relationship between religion and economic prosperity through the means of human capital accumulation (Barro and McCleary, 2003). We build on existing literature that estimates the effects of Christianity on education, which has broadly examined the impact of the geographic diffusion of Christianity and the expansion of Christian missions (Gallego and Woodberry, 2010; Jedwab et al., 2022; Meier zu Selhausen, 2019; Nunn, 2010). In these previous papers, causal effects are generally identified by controlling for observables or other strategies to overcome the non-random spread of Christianity and missions.[11] We propose a new empirical strategy that makes comparisons within and across ethno-linguistic groups and uses the variation in the timing of a Bible translation relative to an individual's year of birth. This strategy accounts for underlying differences across ethno-linguistic groups, non-random selection into Bible translation, and underlying trends in education over time. Our results show that parallel pre-trends hold generally across most subgroups.[12]

A second strand of literature we contribute to is a small but growing literature on the determinants of religious affiliation and conversions. Barro et al. (2010) present a model of conversions based on the cost of switching religions and test their hypotheses across 40 countries. Other papers have pursued identification strategies involving panel data on school enrollment to test the role of education on Protestant affiliation (S. Becker et al., 2017), evaluation of education policy reforms (Hungerman, 2014), following respondents longer term after a health intervention (Alfonsi et al., 2024), or randomizing access to theology (Bryan et al., 2020). Alesina et al. (2023), using historical census data across Africa, document very few inter-generational conversions across Christian and Muslim faiths within a family. We find no impact of Bible translations on affiliating as a Christian or as a Muslim, which is consistent with earlier work that found no relationship between early Bible translations and Christianity (Nunn, 2010). We do find some substitution across affiliations in Catholicism and Protestant denominations, which is consistent with Alfonsi et al. (2024),

[10] Brown (2024) finds that languages that received early Bible translations were more likely to be used as a medium of instruction, although this mechanism is unlikely to drive our results, given that mediums of instruction would be unlikely to be adopted in the ten years following a Bible translation in our context in the 1980s.

[11] In Europe, S. Becker and Woessmann (2009) use distance from the center of the Protestant Reformation to identify causal effects. In Africa, Wantchekon et al. (2015) argue that expansion was close to random, while Cogneau and Moradi (2014) utilize the random discontinuity of country borders. In South America, Valencia Caicedo (2019) uses closures of historical missions as controls .

[12] The exceptions are for our sub-sample of men, which was not sampled representatively and is much smaller than our sample of women, and when we examine the likelihood of conversions to Catholicism and Protestantism.

who see switching across denominations rather than across broader religions (e.g. between Christian and Muslim).

Our paper is most similar to recent work by Brown (2024), who studies the impact of living in an area with an ethno-linguistic group that received Bible translations prior to 1930 on literacy and educational attainment, using multiple rounds of Demographic and Health Survey Data. To empirically identify causal effects, Brown (2024) relies on controlling for geographic area-specific observables as well as using an instrumental variables approach to predict the likelihood of having Bible translations. While the conclusions of the papers are similar, we differ in several key ways. First, we demonstrate that simply comparing across early vs. later (or never) translated languages will bias estimates towards larger effects due to positive selection. Our identification strategy provides a credible solution for this issue. Second, we estimate the effects of Bible translations in the 1980s, well after colonial times, plausibly allowing us to disentangle the Bible translation effect from that of other historical mission influences. Our heterogeneity analysis finds stronger effects around historical missions, suggesting important complementarities, yet our results also suggest widespread effects of the translations, even in areas that were further away from missions and in predominantly Muslim areas. Our paper also contributes to the work of Nunn (2010) and Bai and Kung (2015), who examine the relationship between Bibles and long-term outcomes (Christian conversions and urbanization, respectively).[13]

The remainder of the paper is organized as follows. In Section 2, we discuss the background of Christianity and missions in Africa and our data on Bible translations, as well as present evidence on the non-random translation of languages. In Section 3, we describe our data on education outcomes, our empirical approach, and our analytical sample. In Section 4, we present our main findings, and in Section 5 we explore heterogeneity by gender and discuss three possible mechanisms that could drive our main results. Finally, in Section 6, we discuss the implications and conclude.

2. Background

We study the impact of Bible translations that occurred during the 1980s in Africa. To understand the context that led to Bible translations during the late 20th century, this section briefly outlines the historical background, the spread of Christianity in Africa, and Bible translations during this time.

[13]Tangentially-related papers on Bible translations include Buzasi (2015), who shows that ethno-linguistic groups with early Bible translations in Africa are less likely to have an endangered language, and Solá (2023), who examines the effects of a modern Bible translation on the likelihood of Pentecostal affiliation and political leaning in Brazil.

2.1. Historical Background of Christianity and Missions in Africa

The arrival of Christian missionaries and the establishment of missions in the late 19th century and early 20th century led to a rapid wave of conversions to Christianity in Africa (Jedwab et al., 2022; Nunn, 2010). In Africa, 9% of the population was Christian in 1900, increasing to 38% in 1970 and 47% in 2000.[14] The diffusion of Christianity has been found to occur more quickly in areas that are closer in proximity to historical missions (Nunn, 2010) and is likely dependent on the favorability of conditions. The literature on Christian missions in Africa has found that missionaries strategically settled in more advantageous locations, such as areas with better access to clean water, nearby rivers for trade, better soil, closer proximity to the slave trade, and access to colonial railroads (Johnson, 1967; Michalopoulos and Papaioannou, 2020; Nunn, 2010; Okoye and Pongou, 2014). Additionally, historical missions tended to locate closer to the coast and in areas with lower malaria, better weather, higher population densities, and higher levels of development (Cagé and Rueda, 2016; Jedwab et al., 2022). The economics literature evaluating the impact of missions on subsequent outcomes has recognized this selection issue for causal inference and the existence of upward bias, pointing out the need for careful identification strategies in any analysis (Jedwab et al., 2022).

Figure A.1 shows the locations of 665 historical missions (224 Catholic and 441 Protestant) across Africa, using data from Nunn (2010) and Cagé and Rueda (2020).[15] In Figure A.1, the countries in white (not shaded) are those for which we have outcome data and are included in our analytical sample, which we describe below. While we do not use the geographical location of the missions to estimate our main effects, we use this information to understand potential mechanisms.[16]

When discussing the role of Christianity for educational outcomes, it is important to consider the differences between Protestants and Catholics. Since Martin Luther and the Protestant Reformation in the early 1500s, Protestants invested in educational inputs, such as schools, printing presses, and mother-tongue Bible translations, to promote universal schooling and literacy so that everyone could learn to read the scriptures (Plass, 1958). A fairly large literature has found associations and causal evidence linking the spread of Protestantism with literacy in Europe and beyond, and studies have found Christianity's influence on education to be larger in Protestant areas compared to Catholic (S. Becker et al., 2016; S. Becker and Woessmann, 2009; Calvi et al., 2022; Cantoni et al., 2018; Moilanen and Sommerseth, 2021; Nunn, 2014).[17] Researchers

[14] Authors' calculations from the World Christian Database, see Zurlo et al. (2023).

[15] The information on mission locations in these two papers comes from three historical maps. Nunn (2010) digitized the map from Roome (1924). Cagé and Rueda (2020) uses Protestant mission locations from *Geography and Atlas of Christian Missions* (H. P. Beach, 1903). Catholic mission locations in Cagé and Rueda (2020) come from official Vatican sources with a map by Streit (1913) in the 1913 *Atlas Hierarchicus*.

[16] Jedwab et al. (2021) assert that missing data on missions and Christian influence may bias causal analysis of impacts of missions. To the extent that missing data is uncorrelated with Bible translations, these concerns should not affect our mechanisms analyses.

[17] S. Becker and Woessmann (2009) present a model of human capital in which the lower costs and higher benefits of schooling for Protestants result in higher rates of schooling and literacy among Protestants as compared to Catholics. These predictions

have also found differences in the provision of schooling between Protestant and Catholic missionaries in Africa. For example, Frankema (2012) finds that Catholics sent more European teachers than Protestants, resulting in Catholics reaching a larger number of native students and lower student-teacher ratios. Almost all of the translated languages included in our analysis were translated by Protestants, and our exploration of mechanisms considers Protestant and Catholic influences separately.

2.2. Historical Background and Bible Translation Data

2.2.1. Bible Translations over Time

The original books of the Bible were written primarily in Hebrew and Aramaic (Old Testament) or Greek (New Testament). Early translations into more accessible languages were controversial and, at times, political and dangerous (Bible Manuscript Society, 2023; Lawson, 2017). In the early 1800s, the Bible Society Movement began with a wave of Bible translations, as well as the printing and distribution of millions of Bibles globally (Browne, 1859; Canton, 1910; Vries, 2016; Walls, 1996). The translation of a language was often associated with the "invention of alphabets," "preservation of languages," "development of national literatures," and "writing of dictionaries and grammars" (Delisle and Woodsworth, 1995; Mojola, 2018).[18] The history of Bible translations in Africa goes hand in hand with the history of missions, missionaries, Bible Societies, and colonialism, all of which are important for the historical context of our paper.However, as we describe below, the languages that we study are those that were translated in the second half of the 20th century, well after the transition to independence from colonial powers. Lastly, we note that reading the Bible is one of the cornerstones of Protestantism, promoted since the Reformation by Martin Luther (S. Becker and Woessmann, 2009; Plass, 1958), and most of the recent Bible translation efforts were conducted by Protestant organizations (Boppart et al., 2014; Boppart et al., 2013; Spater and Tranvik, 2019).

Our data on Bible translations come from the 16$^{\text{th}}$ edition of the *Ethnologue: Languages of the World* by Eberhard et al. (2023). The *Ethnologue* is a language atlas of all living languages spoken in the world, providing information on the year of the first Bible translation for each language and the portion of the Bible translated (Bible verses, New Testament, or complete Bible). For our analyses, we consider a language to have been translated if it had an entire or partial translation.[19]

are supported empirically with data from 19th century Prussia and using the distance to Wittenberg as an instrument for Protestantism, finding that most of the economic gap between Protestants and Catholics can be explained by higher literacy among Protestants (S. Becker and Woessmann, 2009). Previous papers have also documented that religious competition across Protestants and Catholics in Africa was important for literacy (Gallego and Woodberry, 2010; Henn et al., 2021).

[18]The history of Bible translations into local languages in sub-Saharan Africa dates back to the ancient language of Ge'ez in the 5th and 6th century in Ethiopia (Mojola, 2018), with additional languages being translated into parts of the Bible beginning in the 16th century such as the Kikonga in Angola (West and Dube, 2001) and in the 18th century with the Yoruba translation in Nigeria (Akintoye, 2010), Kiswahili in East Africa (Nurse and Spear, 1985), and Kikuyu in Kenya (Kenyatta, 1953).

[19]Bibles were translated with varying degrees of accuracy (Mojola, 2006). We make no attempt to study the quality of a Bible translation. To some extent, our study of languages translated in the 1980s are likely to be less prone to early translation

Figure 1 graphs the number of languages in Sub-Saharan Africa into which the Bible was translated over time on the left axis, with the percentage of languages translated on the right axis.[20] The first languages were translated in the mid-19th century, with a steady increase over time. The number of translations sharply increased in the late 20th century.[21] By the end of the 1990s, just over 20 percent of the languages in Sub-Saharan Africa had at least some portion of the Bible translated, while by the end of 2020, almost 50 percent of the languages had a translation.[22]

The red shaded vertical band between 1980 and 1990 in Figure 1 represents the years in which the sample of translated languages we use in this paper were translated. We explain the rationale behind our sample construction below. The languages translated in our sample include nine languages translated between 1979 and 1988. Appendix E describes the timeline of translations for these languages, including the organizations involved. Eight of the nine translations in our analysis were completed by Protestant organizations.[23] Most of the translations involved written Scriptures.[24]

2.2.2. Non-Random Selection into Bible Translations

In addition to the choice of where to locate missions in Africa, Christian missionaries strategically made decisions on Bible translations. Historical accounts suggest that early missionaries would often translate the largest spoken language encountered in an area first.[25] Other factors contributed to the decision to translate a language, including the linguistic abilities of missionaries, adverse shocks to missionary health or rela-

issues, especially given the development of the study of languages and translation as an academic field of inquiry (See for example the *Journal of Translation*.

[20] Our Figure 1 differs somewhat from Brown (2024), Figure 1, which presents similar statistics. However, we graph the likelihood of complete or partial Bible translations while Brown (2024) graphs the number of Bible verses. We also present the total number and percent of languages translated from Eberhard et al. (2023), representing all languages in Africa, while Brown (2024) shows the percent of respondents in his analysis with a translated language. The languages that we use in our analyses were translated later than the ones evaluated in Brown (2024), and most were complete translations, making analyses conducted at the Bible verse level redundant.

[21] Gerner (2018) analyzes Bible translations from 260 BCE to 2013 and characterizes the translation movement in the 19th century as being associated with the Pentecostal and Charismatic movements, especially after the 1960s. Beginning in the 1970s, Andrew Walls and Lamin Sanneh developed the "translation principle" in which if Christian scripture could be translated to any language, Christianity itself could be relevant for any culture (Gbule, 2019; Seat, n.d.).

[22] The development of personal computers and word processing software in the late 1980s may also have led to an increase in the number of translations at the end of the 20th century. As a result, comparing translations begun before vs. after 1980, the average time to complete a New Testament translation decreased by half to 10.8 years, and the average time to translate a complete Bible decreased by one-third to 15.8 years (Gerner, 2018). The main translating agencies in the later half of the 20th century consisted of SIL/Wycliffe, United Bible Societies, Bible League, and International Bible Society, all multi-national organizations. For a detailed history of all of these agencies, see Gerner (2018).

[23] For example, the Bible Society of Uganda published the Lango and Acholi Bibles, and the Bible Society of Chad published the Somali and Sara Bibles. Karo/Zime/Peve does not have information on which organization translated the Bible. Additionally, Somali, Wolof, and Acholi were translated by both Protestant and Catholic groups in parallel.

[24] One ethno-linguistic group, the Karo/Zime/Peve, only had an audio recording translation, which was also quite popular during the late 20th century. As noted in United Bible Society (1997, p. 28), "With such a high illiteracy rate..., there is no better option than to record the Gospel message onto audio media so that people may listen to it."

[25] In Uganda, missionaries in the late 19th century chose to translate the Bible into Luganda first, the language of the largest ethno-linguistic group, the Baganda people (Mutibwa, 2016; Tuma and Mutibwa, 1978). An account from Ethiopia describes how a Protestant missionary in the 1840s, Johann Ludwig Krapf, translated the Gospels into the language of one of the largest ethno-linguistic groups, the Oromo, as well as beginning a Bible translation into Swahili to be completed in 1891 (Vilhanova, 2006).

tives, proximity to the coast, prioritization from the sending missionary societies, and colonial institutional background (Albaugh, 2014, p. 23; Brown, 2024).[26]

To further understand the non-random selection of languages into a Bible translation, we combine our data on the timing of Bible translations with data on pre-colonial characteristics of ethno-linguistic groups across the globe (Kirby et al., 2016).[27] We first match languages to ethno-linguistic groups and summarize the pre-colonial characteristics of those ethno-linguistic groups, disaggregated by having an early Bible translation, a later Bible translation, and no Bible translation.[28] We consider two definitions of 'early' and 'late': before and after 1920 (roughly marking the beginning of the colonial era) and before and after 1970 (roughly the end of the colonial era).

Table 1 summarizes the pre-colonial characteristics of ethno-linguistic groups by translation timing, based on whether a group received a Bible translation prior to 1970, after 1970, or never received a translation. Each column shows the percentage of ethno-linguistic groups with various pre-colonial characteristics from the Ethnoatlas. Ethno-linguistic groups with earlier translations relied less on gathering and agriculture, were more dependent on fishing, specialized less in farming cereal crops, and were less likely to be nomadic than the ethno-linguistic groups with later (or no) Bible translations. The patterns are roughly similar using a pre- and post-1920 definition of early or late Bible translations (Table B.1). These pre-colonial differences show a non-random, possibly positive, selection of languages into translation. The implication is that a simple comparison of outcomes between ethno-linguistic groups with earlier and later translations is likely (upward) biased. We present evidence of this upward bias in Section 3.3. To deal with the selection into early Bible translation, our main results compare within and across ethno-linguistic groups and exploit birth cohort-level variation to estimate the impact of exposure to a Bible during schooling on educational outcomes.

2.2.3. Education Over Time in Africa

There has been tremendous growth in education in Africa over the past century. In the late 19th century, primary school enrollment rates varied considerably, from close to zero in Kenya and Nigeria to as high as 60-80 percent in Freetown, Sierra Leone; enrollment rates maintained some level of variation well into the 1950s, with the presence of Christian missions explaining "nearly all of the variation in enrolment

[26] Brown (2024) also finds that Christian missions with translated Bible verses were located in areas more favorable to agriculture, had higher population densities, and were further from railroads and the coast. Missions with translated languages were located in areas with higher rates of malaria and were closer to historical Muslim centers.

[27] This combines cultural data from the *Ethnographic Atlas* by Murdock (1959), the Binford Hunter-Gatherer Dataset, the Standard Cross-Cultural Sample, and the Western North American Indians datasets (Lowes, 2021).

[28] For details on the data linking process, see Appendix D.

rates" (Frankema, 2012).[29] After the consolidation of colonial rule, school enrollment increased exponentially, especially in Central and Southern Africa (Frankema, 2012).

Le Nestour et al. (2021) use data from the Demographic and Health Surveys and document that, for birth cohorts born from 1950 to 1990, literacy increased from 30 to 63 percent for women and from 61 to 76 percent for men. Primary school completion increased from 27 to 66 percent for women and from 53 to 77 percent for men over these five decades. Despite the large gains in schooling and literacy overall, Le Nestour et al. (2021) show that nearly all the gains were due to access to school rather than improvement in school quality, which, if anything, has fallen over time. Across most African countries, educational resources are limited, and learning outcomes are poor (Bashir et al., 2018).

3. Data and Empirical Approach

This section introduces the data we use to measure educational outcomes and describes the link with Bible translations and historical mission locations. We then describe the empirical approach and analytical sample used to measure the causal effects of exposure to a mother-tongue Bible translation.

3.1. Outcome Data: Demographic and Health Surveys (DHS)

The main data we use to study the impact of Bible translations on educational outcomes are from round 7 of the Demographic and Health Surveys (DHS). Round 7 was the first round in the DHS that conducted literacy assessments for those who had any secondary schooling or had completed secondary school (The DHS Program, 2017).[30]

Our empirical approach relies on each respondent's year of birth and ethnicity to measure exposure to a Bible translation. The need for ethnicity data restricts us to 13 countries that contain data on respondent ethnicity. These countries include: Benin, Chad, Ethiopia, Gambia, Ghana, Guinea, Kenya, Malawi, Mali, Nigeria, Senegal, Sierra Leone, and Uganda. The DHS data in these countries were collected between 2008 and 2020 and include a representative sample of married women ages 15 to 49 in each country and adult men living within a sampled woman's household.[31] We discuss further below how we use ethnicity to match each respondent to a local language group and, ultimately, to our Bible translation data.

[29] Frankema (2012) finds that most of the mission staff were African converts rather than foreigners. In the early 1900s, for example, Europeans constituted just over 3 percent of the total teaching staff in Ugandan missions schools (Haslan P Beach, Fahs, et al., 1925; Frankema, 2012; Uganda, 1938).

[30] Prior to DHS round 7, respondents who had completed primary school were assumed to be literate. Starting with round 7, only those who reported completing secondary school or higher were assumed to be literate. See The DHS Program (2017).

[31] The men in our sample are between 15 and 64 years old, but because of the survey design, the sample of men is not nationally representative of men ages 15 to 64 in each country.

We identify each individual spatially using the GPS coordinates of each DHS cluster.[32] We use this information to match respondents to historical Christian mission locations, discussed in detail below. Figure A.2 shows the geographic distribution of the DHS clusters in the 13 countries in our data.[33]

Our main outcome variables are literacy and educational attainment. Literacy is measured by an assessment in which respondents are asked to read a sentence in their chosen language and are then evaluated by interviewers. Our main results focus on the effects of a Bible translation on being literate (able to read the entire sentence of the assessment). Educational attainment is measured by the number of years of education a respondent reports completing as well as an indicator of primary school completion. In addition to our main outcome variables, we also present the effects of exposure to a Bible translation on being partially literate (able to read a part of a sentence) and indicators for completing any years of education and completing secondary school or higher.

Figure A.3 presents the average rate of literacy (Panel A), years of education (Panel B), and primary school completion (Panel C), separately for men and women by birth cohort. Our data show how literacy and educational attainment generally increased over time.

To explore some of the mechanisms for our results, we use data on each respondent's reported religious affiliation to create indicators of Christian affiliation and Muslim affiliation, as well as indicators for Protestant or Catholic religious affiliation (among those who report being Christian).[34]

3.2. Linking DHS Data to Bible Translations and Historical Missions

To link the DHS data with our Bible translation data, we match respondent ethnic groups in the DHS data to languages in the Bible translation data using the package "Linking Ethnic Data from Africa" (Müller-Crepon et al., 2021). Appendix D provides additional details on the linking process using ethno-linguistic identities.

Next, we match the DHS data with the historical mission data using GPS coordinates in both datasets. For each DHS cluster, we calculate the Euclidean distance from each mission and record the distance and denomination, either Protestant or Catholic, of the closest mission, regardless of country. The average distance to the closest mission in our analytical sample is 124 kilometers. We categorize respondents as living closer to or further away from the nearest mission, defined as above or below the median distance of 57.5 km; for robustness, we also show results for those living less than or greater than 10 kilometers away

[32] The DHS has two types of GPS cluster locations: urban clusters (with a 2-kilometer radius) and rural clusters (with a 5-kilometer radius). In all of our analyses, we include controls for whether a respondent's cluster is urban or rural.

[33] Figure A.2 shows the geographical distribution of the DHS clusters in our analytical sample, described below.

[34] Christian denominations include: Catholic, Methodist, Protestant, Orthodox, Christian, Pentecostal, Anglican, Presbyterian, Roman Catholic, Seventh Day Adventist, Baptist, Evangelical, Jehovah's Witness, the Church of Central Africa Presbyterian, and the Celestial Church of Christ. Non-Christian affiliations include: Muslim, "traditional", animist, and no-affiliation.

from the closest mission.

3.3. Empirical Strategy

This sub-section begins by demonstrating the bias that is present when simply comparing educational outcomes across ethno-linguistic groups with earlier Bible translations vs. later (or no) Bible translations. We then outline a difference-in-differences approach that overcomes the issues stemming from comparing across ethno-linguistic groups. This approach involves comparing individuals within ethno-linguistic groups before vs. after a mother-tongue translation. Lastly, we present our preferred estimation approach, an event-study difference-in-differences strategy.

3.3.1. Naive Analysis Comparing Across Ethno-linguistic Groups

Simply comparing across ethno-linguistic groups with and without (early) Bible translations could produce biased estimates, since Bible translations were non-random. To illustrate the issue of selection bias, using all available individuals with ethnicity information in the DHS born between 1948 and 2005 that match with Ethnoatlas data (N=254,262), we estimate simple OLS regressions of literacy and educational attainment on having a Bible translation prior to 1970.[35] We first run specifications without controls and then compare the estimates to those with a rich set of controls and fixed effects.[36]

Table 2 presents the results. For each outcome (literacy, years of education, and primary school completion), we show the relationship between access to an earlier translated Bible, with and without controls. Comparing across the first and third columns for each outcome shows the degree of bias controlled for with observables. The relationship between having an earlier translation and literacy is reduced by 83 percent, and is almost entirely erased for years of education (99 percent) and primary school completion (97 percent), respectively.[37]

3.3.2. Comparing Cohorts Born Before vs. After a Bible Translation

To address the issue of bias, we begin by describing a difference-in-differences specification to estimate the effect of being born after a mother-tongue Bible translation on educational outcomes, following Sun and

[35] Of the groups for which we have the full set of controls, forty-five treated groups received a Bible translation before 1970, and 93 groups had no Bible translation available before 1970. Results are similar using various cut-off dates (available upon request).

[36] Specifically, we estimate a regression without controls; one with DHS individual controls (indicators of being male and living in a rural area) as well as DHS cluster, country, year of birth, and mission fixed effects; and one with individual controls, fixed effects, and Ethnoatlas characteristics. Ethno-linguistic group characteristics include gathering dependence, hunting dependence, fishing dependence, agriculture intensity, marital composition, major crop types, and settlement patterns. See Appendix C for more details and the regression equations.

[37] The results are similar for partial literacy, any schooling, and secondary school completion Table C.1 and also exhibit similar patterns when restricting the naive estimates to respondents living close to historical missions, as seen in Table C.2 and Table C.3.

Abraham (2021) to account for the differential timing of Bible translations. The following is the two-way fixed effects regression underlying our estimating approach:

$$y_{ilt} = \alpha + \beta\left(Translated_l \times BornAfter_{lt}\right) + \delta X_i + \gamma_l + \lambda_t + \varepsilon_{ilt} \tag{1}$$

where y_{ilt} represents our main educational outcomes for respondent i within ethno-linguistic group l and birth cohort t. γ_l is an ethno-linguistic group fixed effect, and λ_t is a fixed effect for the year of the respondent's birth. X_i is a vector of individual-level characteristics, which include indicators for being male and living in an urban area.[38] Our main outcomes include an indicator for whether a respondent is literate, the number of years of completed education, and an indicator for completing primary school. We restrict the sample to a 30-year time window ranging between 15 years prior to and 14 years after a mother-tongue Bible translation.

To estimate the impacts of Bible translations on education using the difference-in-differences approach, we exploit both language and cohort variation. $Translated_l$ takes the value of 1 if an ethno-linguistic group had a Bible translation between 1979-1988. $BornAfter_{lt}$ captures a cohort t's exposure to a translation in language l and is equal to 1 if an individual within the cohort was born after the year of the Bible translation for that ethno-linguistic group. The coefficient β represents the average increase in outcome y_{ilt} for ethno-linguistic groups with a Bible translation across cohorts born into a world in which their ethno-linguistic group had access to a translation, relative to cohorts born prior to the translation, over and above the gain in outcomes for ethno-linguistic groups without a Bible translation. Since the treatment occurs at the ethno-linguistic group level, the standard errors are clustered at the ethno-linguistic group level (Abadie et al., 2023).

To estimate Equation 1, we follow Sun and Abraham (2021) to account for the differential timing in treatment across languages. In addition to the main specification estimated on our full analytical sample, we also present estimates for various subgroups of the sample when we discuss heterogeneity and potential mechanisms. Using the estimated coefficient β and standard error, we conduct tests for equality of effect present the p-values of these tests in the text.[39]

In the next section, we describe our event study approach that also tests and shows evidence of parallel pre-trends, supporting the validity of our empirical specification.

[38] We do not include Ethnoatlas controls since they do not vary within ethno-linguistic groups. We do not include country fixed effects because most ethno-linguistic groups are only present within a single country, so these are nearly co-linear with the ethno-language group fixed effects. The same is true for the mission fixed effects, which are located primarily within a single country.

[39] We estimate the p-values using the following equation:

$$D = \frac{\beta_1 - \beta_2}{\sqrt{SE(\beta_1)^2 + SE(\beta_2)^2}}$$

3.3.3. Event Study Difference-in-Differences

In addition to studying the overall impact of being born after a local language Bible translation, we also evaluate the impact of the number of years of exposure to a Bible translation. We estimate a reduced form event study, of the form,

$$y_{ilt} = \sum_{\alpha \neq -1} \delta_\alpha I(Exposure_{lt}) + \delta X_i + \mu_t + \lambda_l + \epsilon_{ilt} \tag{2}$$

where y_{ilt} are educational outcomes for respondent i within ethno-linguistic group l and birth cohort t. We include ethno-linguistic group fixed effects, λ_l, and year of birth fixed effects, μ_t, as well as X_i, which includes individual-level characteristics, namely indicators for being male and living in an urban area.

$Exposure_{lt}$ measures the exposure to a Bible translation at the ethno-linguistic group by birth cohort level. *Exposure* is calculated as:

$$Exposure_{lt} = (BirthYear_{lt} - BibleYear_l) \tag{3}$$

which measures the difference between the year of birth of cohort t and the year of the Bible translation, for ethno-linguistic group l. $Exposure_{lt}$ can take both positive and negative values and indicates, for a given cohort, the number of years that a given ethno-linguistic group had access to a Bible translation at the time of the cohort's year of birth. Negative values indicate that the ethno-linguistic group had not yet received a Bible translation at the time of the cohort's birth (representing the length of time that passed after that cohort's birth and before translation).[40] This measure of exposure is not specific to the individual, and ethno-linguistic groups can be exposed to a Bible translation even before an individual is born.

Figure A.4 illustrates how exposure to a Bible translation is measured relative to the year of birth. In this figure, there are three languages: Language #1 was translated in 1980; Language #2 was translated in 1985; and Language #3 was never translated. Comparing individuals from the cohort born in 1983 in each ethno-linguistic group, language #1 will have $Exposure_{lt} = 3$ for individuals from the cohort born in 1983, because the language was translated three years before the individual was born. Language #2 will have $Exposure_{lt} = -2$ for individuals in this cohort, since the Bible was not translated until two years after the individual was born. And Language #3 will have $Exposure_{lt} = -1$ for individuals in this cohort, since never-translated languages are included in the reference category. We estimate an event study following Sun and Abraham (2021), correcting for the differential timing of Bible translations.

[40] For example, *Exposure* of -10 indicates that the cohort was born 10 years before a Bible translation was completed in their mother tongue, meaning that the ethno-language group was not exposed to treatment until 10 years after this cohort was born.

By comparing across cohorts and ethno-linguistic groups, these estimates account for the underlying trends of increasing literacy over time among all ethno-linguistic groups in Africa (Le Nestour et al., 2021). The differential treatment timing estimate requires the assumption of parallel trends across cohort groups, as described in Cunningham (2021), namely that the treatment effects are constant for ethno-linguistic groups over time.[41]

We restrict the event window to cover a 30-year event-study period from -15 to 14 years of exposure to a Bible translation, and we restrict the analysis to a balanced panel of ethno-linguistic groups across these event times. For the event study, our reference group includes cohorts for whom $Exposure_{lt} = -1$, or cohorts born one year before their ethno-linguistic group received a Bible translation. Ethno-linguistic groups whose language never was translated are also included in the reference group. We estimate the β_α coefficients, which capture the effect of exposure to a Bible translation separately for each level of exposure relative to the reference group as well as allowing us to test for pre-trends in the outcome variables prior to the date of translation.

To test the plausibility of the parallel trends assumption, which states that the outcomes for translated and never-translated ethno-linguistic groups follow the same trends in the absence of the Bible translation, we test for the existence of parallel pre-trends. We first plot the raw trends in literacy. Figure A.5 provides a simple illustration of our approach by plotting the raw trends in literacy by year of birth of ethno-linguistic groups whose language was never translated and ethno-linguistic groups whose language was translated in 1979 (Panel A), 1980 (Panel B), 1983 (Panel C), 1986 (Panel D), and 1988 (Panel E). The idea underlying our estimation strategy is to estimate the change in literacy that occured for ethno-linguistic groups with a translation for cohorts born after translation, compared to cohorts born prior to translation, over and above the change in literacy that occurred over time among ethno-linguistic groups that never received a Bible translation.

Figure A.5 also shows that the raw literacy trends for cohorts born before a Bible translation, follow roughly similar trends, across ethno-linguistic groups with and without a Bible translation. Our event study results, presented below, show a more formal test of pre-trends.

For robustness, we present results using different estimation methods, such as traditional TWFE estimates, a semiparametric method by Callaway and Sant'Anna (2021), and an imputation approach based on Gardner (2022) in Appendix A.[42]

[41] The two-way-fixed-effect (TWFE) model does not account for differential treatment timing, and recent literature demonstrates that estimates can be biased as a result of heterogeneity in treatment timing (Goodman-Bacon, 2021). This is important for our setting since the Bible was translated into different languages over time in different years.

[42] The Callaway and Sant'Anna (2021) (CS) estimates compare ethno-linguistic groups with and without translations, with semiparametric weights. However, these results are not very different from the naive two-way-fixed-effects (TWFE) estimations shown in Appendix A and Appendix B, indicating that differential treatment timing is not causing a large amount of bias in our estimates.

3.4. Analytical Sample

Our reduced form difference-in-differences specification estimates the effect of exposure to a Bible translation in an individual's mother tongue based on the timing of their birth. Our sample is determined by the birth cohorts available in the Demographic and Health Surveys and consists of respondents in 13 sub-Saharan African countries born between 1949 and 2005.

For the event study, we create a balanced sample of ethno-linguistic groups by including all ethno-linguistic groups that never received a translation and ethno-linguistic groups whose languages were ever translated and contain at least one respondent in each birth cohort born between 15 years before and 14 years after a translation.[43] This gives us a balanced panel that is comprised of of 33 ethno-linguistic groups whose language was never translated and 9 ethno-linguistic groups whose language received a Bible translation, with observations for cohorts born over 57 years. Table B.2 shows the nine ethno-linguistic groups with translations used in our main specification and the years they received a Bible translation. Table B.3 lists the 33 ethno-linguistic control groups that did not receive a Bible translation.

The sample includes 75,066 individuals born between 1949 and 2005 whose language was either never translated or was translated between 1979 and 1988. These individuals represent 4,696 DHS clusters. Table B.4 summarizes our final analytical balanced sample after linking the individual DHS data with Bible translations, separately by country. Column 1 shows the number of individuals in the sample, varying from 608 in Ghana to 15,496 in Kenya. Column 2 shows the percentage of those individuals who are literate, varying from 11 percent in Benin to 72 percent in Kenya and Malawi. Column 3 shows the number of languages per country, ranging from one (in Ghana, Guinea, Malawi, Nigeria, and Senegal), to 12 in Chad. Column 4 shows the number of never-translated languages, and, finally, Column 5 displays the number of missions per country, ranging from five in Chad to 96 in Kenya.

4. Results: Impact of Bible Translation Exposure

This section presents the impact of exposure to a Bible translation on adult literacy, years of schooling, and primary school completion. We begin by presenting the estimates of the impact of being born after vs. prior to a translation of a Bible in one's mother-tongue, followed by the event study impacts of the timing of exposure to a translation relative to one's birth year which also provides evidence of parallel pre-trends

[43] For ethno-linguistic groups whose languages were translated to appear in our balanced sample, there must be at least one respondent from that ethno-linguistic group in each event study time from -15 to +14. For example, if a language was translated in 1980, that associated ethno-linguistic group must have at least one respondent in the DHS sample born in 1965, 1966, ..., up to 1994. Since exposure to a Bible translation is not defined for groups that never received a translation, we include all of these ethno-linguistic groups, across all years of available data.

between translated and never-translated languages. We also present robustness estimates for the event-study specification in this section.

4.1. Before vs. After Birth Translation Comparisons

We first show the impact of exposure to a Bible translation using the difference-in-differences approach described in Section 3.3.2 by comparing those who were born in the fifteen years prior to a translation with those born in the fifteen years after a translation, as specified in Equation 1.

Table 3, Panel A, shows the average impact of access to a Bible translation for cohorts born after a translation following Sun and Abraham (2021), accounting for the differential timing of Bible translations. Individuals in ethno-linguistic groups with a Bible translation who were born in the fifteen years after the translation have a 6.4 percentage point increase in the likelihood of being literate than those born in the fifteen years before a translation, over and above the gain among those in ethno-linguistic groups without a Bible translation (Column 1). Being born after a Bible translation also results in 0.723 more years of education (Column 2) and an 8.4 percentage point increase in the likelihood of completing primary school (Column 3).

Table B.5 presents the results using alternative estimation strategies: two-way-fixed-effects (TWFE) (Column 2), Callaway and Sant'Anna (2021) (Column 3), and an imputation approach based on Gardner (2022) (Column 4). The results are consistent in magnitude across estimation methods, with results becoming insignificant when using the estimator following Callaway and Sant'Anna (2021). These similarities of estimates across methods suggest that our results are likely not driven by weights on a particular ethno-linguistic group or changes of the average treatment effect over time as discussed by Goodman-Bacon (2021) and Roth et al. (2023).

Table B.6 presents the difference-in-differences results for partial literacy (being able to read at least a part of a sentence), completing any years of education, and completing secondary school. These results are consistent with our main outcomes.

4.2. Event Study Difference-in-Differences Estimates

We next present the effects of a Bible translation disaggregated by birth cohort to understand whether the impacts are immediate or if there is diffusion of effects over time. We plot in Figure 2 the event study coefficients estimated following Sun and Abraham (2021). The x-axis indicates years of exposure to a Bible translation, as described in Section 3.3.3. Each point is the estimated coefficient for each year of exposure, relative to the year preceding translation (-1 on the x-axis). Estimated coefficients and standard errors are

presented in Table 4.

Figure 2, Panel A, presents the results for literacy. The coefficients to the left of -1 years of exposure to a Bible translation indicate parallel pre-trends between translated and never-translated languages: for almost each year, we cannot reject a difference in each coefficient from zero. There are a couple of estimates that are statistically different than zero, at -4 years and -3 years of Bible translation exposure, with positive and negative effects, respectively. Overall, however, the estimates provide evidence that the parallel trends assumption holds prior to a mother-tongue Bible translation.

The estimated coefficients from zero to positive 14 years of exposure in Figure 2, Panel A, show the impact of different numbers of years of exposure to a Bible translation on literacy. The coefficients are positive and somewhat smaller for cohorts with between 0 and 7 years of exposure to a mother-tongue Bible translation, with larger coefficients for cohorts with between 8 and 15 years of exposure to a translation. Cohorts whose ethno-linguistic group had ten years of exposure to a Bible translation prior to birth have an 11 percentage point increase in the likelihood of being literate as adults. These estimates are similar to those using alternative methods such as traditional TWFE (Panel A), Callaway and Sant'Anna (2021) (Panel B) and Gardner (2022) (Panel C), presented in Figure A.6.[44]

Figure 2, Panels B and C, present the effects of exposure to a Bible translation on years of education and primary school completion, showing similar patterns as the estimated literacy effects. The pre-trends are relatively flat, and birth cohorts whose ethno-linguistic groups were exposed to a Bible translation for 10 years at the time of birth have 1.2 more years of education and a 17 percentage point higher likelihood of completing primary school. These effects are also robust to TWFE, Callaway and Sant'Anna (2021), and imputation approaches (Figure A.7 and Figure A.8).

Figure A.9 presents the results for partial literacy, completion of any education or completion of secondary school, all of which show similar patterns.

5. Heterogeneity and Mechanisms

In this section, we examine what the data can tell us about *how and why* a Bible translation resulted in increased literacy and educational attainment. We first present the main event-study estimates separately by gender, with the caveat that the sample of men is smaller and not as representative. We then explore three broad sets of mechanisms.

[44]Our results are also robust to excluding Ethiopia and Mali, which have a longer history of Christianity and access to written languages, presented in Table B.7 and Figure A.10.

5.1. Heterogeneity by Gender

Table 3, Panels B.1 and B.2, present the difference-in-differences estimates of being born before vs. after a Bible translation separately by gender. The estimates for literacy are similar with a 6 percentage point increase for men and a 7 percentage point increase for women, while the effects on years of education (0.91 years for men and 0.67 years for women) and the probability of completing primary school (15 percentage points for men and 6 percentage points for women) suggest somewhat larger effects for men.[45] Comparing the effects to the gender-specific means of the outcomes for ethno-linguistic groups without a translation, the relative increase in years of education is equal for men and women, at 16 percent. For primary school completion, however, the effect for men (35 percent of the mean) is more than twice that for women (19 percent of the mean).

Figure 3 presents the event-study graph of the effects of a Bible translation for our three educational outcomes, by years of exposure and separately by gender. Across all three panels, the point estimates for the pre-trends (e.g., coefficients for $Exposure_{lt} < 0$) for women are more precise than for men due to differences in sample size. The effect of exposure to a Bible translation on literacy for individuals born after the translation (e.g., coefficients for $Exposure_{lt} > 0$) is similar for men and women (Panel A). For years of education (Panel B) and primary school completion (Panel C), while the effects are similar for men and women after ten years of Bible translation exposure, the coefficients of the effects are larger for men after fewer years of exposure to a Bible translation. The results for other measures of educational attainment separately by gender are presented in Figure A.11 and Table B.8.

The fact that we find no large differences in the effects of the Bible by gender after ten years is consistent with the general findings in Baten et al. (2021) and B. Becker and Meier Zu Selhausen (2023), who examine the gender gap in education in sub-Saharan Africa over the 20th century. The authors find that areas with more Christian missions had lower gender gaps in education. Lankina and Getachew (2013) finds similar results in India. Our results are also consistent with the literature in the Economics of Education that finds limited differences in educational interventions – even girl-specific ones – on boys vs. girls (Evans and Yuan, 2021). On the other hand, other papers have found larger effects of Protestant missions on women (Calvi et al., 2022; Jedwab et al., 2022; Nunn, 2014).

[45] The p-values for tests of equality across gender are 0.737 for literacy, 0.411 for years of education and 0.018 for primary school completion.

5.2. Exploring Potential Mechanisms

Our data and empirical strategy do not allow us to precisely identify a single driver for the effects of the Bible translations. There are three main limitations which make pinpointing the underlying mechanisms difficult. First, it is likely that multiple and complementary factors led to the increases in literacy and educational attainment that we find associated with the translations. Second, our translations occurred in the 1980s, when contemporary outcome or educational input data, which we could use to tease out mechanisms, are limited. Third, our identification strategy relies on different levels of Bible translation exposure across birth cohorts. Any outcome that we study would need to either be collected contemporaneously during the 1980s or be affected differentially by birth cohort. For example, although it might be interesting to understand how the Bible translations affected a variety of attitudes, using post-Bible translation outcome data does not allow us to measure causal effects, because all cohorts in ethno-linguistic groups with translations could be equally affected by the translations. This is not the case for our educational outcomes, because the production of most educational outputs occur when individuals are primary school age.[46]

Nevertheless, despite these limitations, in this subsection we explore three potential mechanisms through which the Bible translations may have affected education. These include: 1) religious aspects of the Bible, 2) increased access to inputs and complementarities associated with translations, and 3) mother-tongue text availability.

5.2.1. Mechanism 1: Religious Aspects of the Bible

The first mechanism through which a mother-tongue Bible translation may have affected literacy and education is related to the religious aspect of the Bible. A mother-tongue translated text may have increased access to the ideas contained within the Bible, resulting in increased human capital investments.[47] However, we show that the ideas contained within the Bible are unlikely to be a main driver for our literacy and education effects.

First, even prior to the timing of the Bible translations we study in the 1980s, Christianity and the ideas contained in the Bible were fairly widespread, even in the most remote areas of Africa. The respondents we study were likely already exposed to Christian ideas and values.

Second, we see no difference in the educational effects of the Bible translation across predominantly Muslim vs. non-Muslim areas.[48] Table 3, Panels C.1 and C.2 show the difference-in-differences estimates for

[46] Adult education programs in Africa are almost non-existent, and literacy rates for those with no schooling are close to zero percent (Le Nestour et al., 2021).

[47] A related literature has studied whether culture Alesina and Giuliano (2015), Fernández (2011), Guiso et al. (2006), and Lopez-Claros and Perotti (2014) or ideas/information Dittmar (2011) and A. Thornton et al. (2015) matter, although disentangling the causal effect of new ideas from other confounding factors is not easy.

[48] Robertson (1996) reports that prior to the 1960s, Bible translations in sub-Saharan Africa avoided Muslim areas but that

geographical regions in which over 50 percent of respondents identify as Muslim compared to regions in which less than 50 percent of respondents identify as Muslim. Overall, levels of education are higher in majority non-Muslim areas, but the effects of being born after a Bible translation on literacy and primary school completion are similar across both types of areas.[49] The impact of exposure to a Bible translation on years of education is somewhat greater in majority non-Muslim areas (1.1 additional years of schooling) than in majority Muslim areas (0.6 additional years of schooling).[50] Figure 4 shows the event study estimates. The coefficients show similar patterns across all three outcomes, with somewhat larger effects of Bible translation exposure on years of education in non-Muslim areas. When looking at the secondary educational outcomes (partial literacy, any education, and secondary completion) the effect of the Bible translation is positive in both types of areas, with slightly larger magnitudes of effects in majority non-Muslim than in majority Muslim areas in Figure A.12. The fact that Bible translations resulted in improved educational outcomes in Muslim areas supports the hypothesis that the religious aspect of the Bible is unlikely to be the key driver for the educational effects we find.

Third, if the Bible translations affected educational outcomes because of increased access to the ideas contained within the Bible, we might expect to see associated increases in conversions to Christianity. It is difficult for us to measure the impact of exposure to a Bible translation on religious conversions with our data and empirical strategy, given that we only observe reported religious affiliation many years after the Bible translations occurred. Educational outcomes are produced predominantly during primary school years, generating potential differential responses to Bible translation exposure by birth cohort. Decisions to convert to Christianity, however, occur across all ages, and thus all birth cohorts within an ethno-linguistic group with a translation are equally exposed. Still, Table B.9 presents the difference-in-differences estimates on the impact of being born after a Bible translation on religious affiliation. The point estimates on the likelihood of being Christian or Muslim are small and close to zero and are consistent with the event-study estimates presented in Figure 5, Panel A, which show no substantive or significant effect of exposure to a Bible translation on religious affiliation. These results are somewhat uninformative - they could mean that the Bible translations resulted in no additional conversions to Christianity or that the Bible translations resulted in many conversions, equally affecting individuals across all birth cohorts. We can only rule out differential affects of Bible translation exposure across birth cohorts.[51]

after around 1960, there was a shift in focus that included translations for Muslim populations.

[49]The p-values associated with testing the effects across Muslim majority and non-Muslim majority areas are 0.799 for literacy and 0.612 for primary school completion.

[50]The p-value associated with testing the effect across Muslim majority and non-Muslim majority areas is 0.053 for years of schooling.

[51]There is very little variation in Christian or Muslim affiliation by birth cohort overall. Figure A.13 presents the percent of respondents who report being Christian by birth cohort, among ethno-linguistic groups that never received a Bible translation and those that received Bible translations in different years. Alesina et al. (2023), using decades of African census data in 21 countries, also find very few inter-generational changes in religious affiliation. Nunn (2010) also finds an absence of a strong

The results for affiliating as a Catholic or Protestant are somewhat different, although the same caveats apply as when estimating the effects of translations on conversion to Christianity or Islam. Table B.9 shows the difference-in-difference estimates that find a 2.2 percentage point increase in the likelihood of affiliating with a Protestant denomination and equal reduction in the likelihood of affiliating as a Catholic. The event study graphs, presented in Figure 5, Panel B, show positive pre-trends for Protestants, and negative pre-trends for Catholics, consistent with the fact that Protestant organizations led the translations for eight of the nine languages translated in our sample. After ten years of Bible translation exposure, the results suggest a substitution from affiliating as a Catholic to affiliating as a Protestant.[52]

5.2.2. Mechanism 2: Additional or Complementary Inputs Associated with Bible Translations

A second set of potential mechanisms that may drive our results are inputs such as schools, additional print materials including other translated texts, or missionaries, which may have increased at the same time and in parallel with the Bible translations or acted as complements to the translations. There are several reasons why additional inputs or infrastructure are unlikely to be the main driver for the effects of Bible translation on literacy and education, although there is some evidence that complementary inputs associated with missions may have interacted with the Bible translations.

First, while Brown (2024) finds evidence of additional infrastructure investments such as schools, hospitals and printing presses for ethno-linguistic groups after a Bible translation in Africa for translations occurring prior to 1900, he finds no evidence of additional investments corresponding to languages translated after 1900. The languages we study were translated in the 1980s.

Second, although Bibles were being distributed throughout Africa during the time of the translations we study, the production of Bibles in Africa, even in 1981, was noted to be "very slow" (Robertson, 1996). In addition, across 30 years of annual reports spanning the 1970s, 80s, and 90s, there was not a single mention of specifically delivering literacy inputs or programs to targeted ethno-linguistic groups or timed with the completion of new Bible translations (United Bible Society, 1986-1995).[53]

Third, the main initiatives during the 70s, 80s, and 90s involved initiatives to produce, distribute, and promote the Bible. However, rather than resources flowing into Africa, most of the reports discuss how Bible Societies were raising money from local groups and congregations. Annual reports most frequently discussed difficulties with infrastructure and resource constraints, including rising paper costs, devaluing of

relationship between early access to the Bible, early Bible translations, and the spread of Christianity in Africa.

[52]This result is similar to (Alfonsi et al., 2024) who find substantial substitution across denominations within Christianity in Kenya, rather than conversions into or away from Christianity more broadly.

[53]While we cannot rule out that such inputs existed and may have been delivered to specific ethno-linguistic groups (and indeed occasional book fairs, Bible weeks, and literacy programs are mentioned within annual reports), any such program is likely to be small given that country-level Bible Society Offices had the incentive to report any known Bible-related activities.

local currencies, import taxes, and staff shortages, not to mention political and civil conflicts that posed challenges to providing additional human capital investments around the time of a language translation.[54]

Fourth, if there were additional inputs coinciding with a Bible translation, such as schools, teachers, literacy programs, or increased missionaries, these inputs would likely be geographically centered around a mission location or concentrated among the specific denomination that helped with the Bible translation. While we do not have data on inputs at the time of the Bible translations we study, we can estimate the effects of exposure to Bible translations separately for individuals living closer to and further away from a historical mission, or closer to and further away from a Protestant vs. Catholic mission. Any difference that we observe in effects across geographical distance from historical missions may be either due to a direct impact of inputs introduced at the time of the translations or a result of complementarities with existing inputs that interact with the Bible translations, although we are unable to distinguish empirically between these two channels.

In Table 3, Panels D.1 and D.2 present the difference-in-differences estimates separately for those living closer to and further away from missions. Note first, that on average, educational outcomes are higher among those living closer to a historic mission. This is consistent with the prior literature on missions and education and the idea that areas closer to a mission had access to more educational inputs. Next, the effects of exposure to a Bible translation are larger in absolute magnitude for those living closer to a historical mission compared to those living further away, although the percent increase is similar across distance when compared to the mean.[55] Figure 6 shows the event study impacts disaggregated by distance from a mission. The pattern of effects is similar as in the differences-in-differences, slightly larger effects for individuals living closer to a mission. In addition, individuals living closer to missions experience educational gains with fewer years of Bible translation exposure. The patterns are similar across all three educational outcomes and when using a cutoff distance of 10km, as shown in Figure A.14 and Table B.10. We do not find evidence of differences across individuals living closer to Protestant vs. Catholic missions, with the difference-in-differences estimates presented in Table 3, Panels E.1 and E.2, and the event study estimates in Figure A.15 and Table B.11.[56]

Taken together, the effects for those living closer to a historical mission are larger than for those living further away. The effects also accrued with fewer years of Bible translation exposure. Historical archives sug-

[54]The United Bible Society (1995, p. 7) Annual Report stated that the "Needs keep growing bigger than the available resources" in Africa, and "we continue to look to God to supply our needs".

[55]The p-values associated with the tests for equal effects across individuals living closer or further away from historical missions are 0.102 for literacy, 0.011 for years of education, and 0.000 for primary school completion.

[56]The estimates disaggregated by distance to Protestant or Catholic missions do not include indicators for urban/rural status, due to issues of multicollinearity between the Sun and Abraham estimator and the urban/rural control for observations closest to Catholic missions. The p-values that test for equality of estimates across Panel E.1 and E.2 are 0.767 for literacy, 0.722 for years of education, and 0.617 for primary school completion.

gest some influx of Bibles and print materials into Africa around this time period, but there is no systematic evidence that inputs were directed at specific ethnic-linguistic groups around the timing of the translations, other than perhaps the print Bibles themselves. It is likely that existing infrastructure in proximity to historical missions, such as schools, missionaries, or a culture of print material, for example, from a historical printing press (Cagé and Rueda, 2016), may have contributed to the large effects of the translations as complementary inputs. The introduction of inputs may have coincided with the Bible translations, or the translations may have been more effective in areas with higher levels of education and literacy already surrounding the historical missions. Complementarities for the effectiveness of educational inputs are difficult to pin down empirically, but a growing number of studies have documented their importance (Delavallade et al., 2021; Kerwin and R. Thornton, 2021; Kremer et al., 2009; Mbiti et al., 2019).

Still, the effects of the Bible translations were widespread across Muslim areas, for both genders, and was present even away from historical missions. This suggests that it was not only printed Bibles or mission infrastructure that led to the effectiveness of the Bible translations. In the next subsection, we explore a remaining mechanism, access to mother-tongue text.

5.2.3. Mechanism 3: Access to Mother-Tongue Text

The last potential mechanism that may have led to Bible translations increasing educational outcomes is that mother-tongue translations reduced the "costs" of reading and schooling. This idea is similar to the model outlined in S. Becker and Woessmann (2007), in which a technology (in their case, Protestantism) leads to both higher literacy and educational attainment. In the case of Bible translations, the technology is less likely to be the ideas contained within the Bible – since we find no impact of translations on religious affiliation– but the fact that the translations resulted in mother-tongue orthographies, print material, and a culture of mother-tongue reading (Delisle and Woodsworth, 1995; Mojola, 2018).

The evidence that mother-tongue first reading programs are effective for literacy is growing. Buhl-Wiggers et al. (2023) evaluate a mother-tongue literacy program and find massive and persistent effects in Northern Uganda. Other mother-tongue literacy interventions or policy evaluations have found similar success.[57] While some organizations have pushed for mother-tongue language policies and programs in Africa (Kioko et al., 2014; Ouane, Glanz, et al., 2005; UNESCO, 1953), others voice concerns that children who begin reading in a mother-tongue will be left behind when they transition to national languages such as French, English, or Portuguese (Kioko et al., 2008; Muthwii, 2007; Ndamba, 2008).[58]

[57] Large effects have been found, for example, in Kenya (Piper et al., 2016), Bangladesh (Leighton, 2022), and Ethiopia (Seid, 2019).

[58] Because of the colonial legacy in Africa, education systems have been dominated with the use of a foreign language in schooling (for example, English, French, or Portuguese) and some have argued this language policy is a major contributor to

Our data and setting do not allow us to precisely disentangle the role of the mother-tongue literary aspect of the Bible translations from the other mechanisms we discuss above. Still, the results in the prior subsections are consistent with the literature on the effectiveness of mother-tongue first literacy for longer term educational outcomes. We see no evidence that the translations affected affiliation with Christianity. We document widespread effects of the Bible translations, even in predominantly Muslim areas. We also find effects of the translations, even in areas that are not near historical missions with existing infrastructure.

6. Conclusion

This paper estimates the causal effect of exposure to mother-tongue Bible translations on long-run literacy and educational attainment. We use a novel empirical strategy that compares outcomes within ethno-linguistic groups, avoiding potential bias from the non-random selection of languages into Bible translations. Using data from the DHS on adult literacy and educational outcomes in Africa and data from the *Ethnologue* on the timing of Bible translation into local languages, we measure the long-term effects of access to a Bible translation in one's mother tongue on literacy, years of schooling, and primary school completion for individuals whose languages were translated into the Bible in the 1980s. We provide evidence that the effects of the Bible translations were widespread, and may have interacted with with existing inputs surrounding historical missions.

First, we document the endogeneity of language translation, showing that language groups with earlier Bible translations are less dependent on gathering and nomadic behavior and more likely to live in villages and towns. As a result, any approach that simply compares educational outcomes across ethno-linguistic groups whose language was translated and never translated, will be biased because of the endogenous selection into translation. We document the existence of this bias.

Second, to overcome the endogeneity of translation timing, we use a novel approach comparing individuals across birth cohorts and within ethno-linguistic groups, using variation in the timing of Bible translations relative to a cohort's year of birth. We show that individuals born 10 years after a mother-tongue Bible translation have an 11 percentage point increase in the likelihood of being literate, 1.2 additional years of schooling, and a 17 percentage point increase in the likelihood of completing primary school.We also show evidence of the diffusion of impacts over time, documenting the fact that the effects of Bible translations are not immediate for cohorts born immediately after the translation. Instead, the effects increase for cohorts more exposed to a Bible. We find that the effects are similar for men and women, although appearing somewhat sooner for men. We also find similar patterns of effects for other educational measures such as

the poor levels of literacy throughout the continent(Alidou, 2003; Ouane, Glanz, et al., 2005).

partial literacy, any schooling, and secondary school completion.

The impacts of exposure to a Bible translation are relatively large. To understand the magnitude of the effects, we can first compare our results to the increases in education that occurred in Africa over the past century. Our effects after 10 years of exposure to a Bible translation represent around 30 to 40 percent of educational gains for women and 40 to 70 percent of the gains in literacy and schooling for men that occurred from 1950 to 1990.[59] Second, our effects are also relatively large compared to the average education intervention in developing countries.[60] Third, although our estimation strategy differs from Brown (2024), our results are substantively similar.[61]

We also find that the effects of exposure to a Bible translation were widespread. In addition to both men and women experiencing increases in literacy and education due to access to a translation, we find similar effects of the translations across areas of both Muslim and non-Muslim majority.

We discuss and, where possible, test three mechanisms for the effects of exposure to a Bible translation on educational outcomes: religious aspects of the Bible, additional or complementary inputs associated with Bible translations, and access to written mother-tongue text. We find no evidence of differential affiliation with Christianity across birth cohorts and ethno-linguistic groups with and without a Bible translation. This could suggest limited scope for the view that the increase in educational outcomes we see with Bible translation exposure was due to the religious ideas contained within the Bible. On the other hand, our empirical strategy cannot rule out that the Bible translations caused widespread conversions equally across birth cohorts.

We find suggestive evidence that complementarities with existing or additional inputs surrounding historical missions may have played a role in the effect of the Bible translations. We see larger effects in areas that are closer to historical missions and that the effects appeared almost immediately after a translation. While we lack quantitative data on inputs to disentangle this mechanism completely, archive reports from United Bible Societies suggest complementarities to be a more likely channel (United Bible Society, 1986-1995). We also discuss how our results are consistent with the current literature on the effectiveness of mother-tongue first literacy, which has drawn attention in post-colonial settings such as Africa.

This paper finds that Bible translations have played a pivotal role in improving literacy and education

[59] Le Nestour et al. (2021) document that between the 1950s to 1990s, literacy increased by 33 percentage points for women and 16 percentage points for men, and schooling increased by five years for women and three years for men. Le Nestour et al. (2021) also find increases in primary school completion of 40 percentage points for women and 24 percentage points for men.

[60] McEwan (2015) finds that the average intervention only increases learning by 0.10 standard deviations, although there is substantial variation across studies in effects, with a recent mother-tongue reading program yielding very large and persistent effects on literacy (Buhl-Wiggers et al., 2023).

[61] Brown (2024) compares geographic areas with early Bible translations using simple OLS estimates and finds that a translated New Testament increased literacy by 2 percentage points and years of education by 0.15 years, about 50-60 percent of the effect of living closer to a Protestant mission. The IV estimates in Brown (2024) are about four times larger than the OLS estimates, which may reflect issues with the set of instruments, the exclusion restriction, or underlying biases in the non-random translation of languages.

in sub-Saharan Africa. Our results highlight that efforts to translate religious texts into mother-tongue languages resulted in long-lasting positive effects on education, pointing to the role of missionary and religious institutions' involvement in development activities and lasting effects in improving education for all. These effects on literacy and education persist regardless of proximity to a mission location, gender, or whether the region is predominantly Muslim. Although we find little evidence to suggest that the Bible translations resulted in widespread changes in beliefs, we caution that our identification strategy, while novel econometrically, cannot be used to study how Bible translations changed attitudes and values measured today.

Our paper has several additional potential limitations. Due to data availability, we study the impact of only a relatively small sample of translated languages. This prevents us from making larger claims on the external validity of our results to other languages or time periods. Still, our results are precisely measured and robust to various specifications and sub-samples. Another limitation is that, while we can reject some possible mechanisms through which the Bible might have affected education, we cannot definitively narrow down the mechanisms to a single cause. For example, we do not have data on additional inputs that may have been introduced at the time of the Bible translations. In addition, our findings are limited to the set of outcomes that we study. While we would love to study the effects of the Bible on a variety of other interesting outcomes, our data and identification strategy do not allow us to expand our set of research questions.

Still, our paper is an important contribution to this literature, providing insights into the effects of historical Bible translations, with potential implications for present-day translation and missionary work in low-literacy settings. Despite centuries of claims of the Bible's profound impact, our paper is a step forward to quantitatively measure the Bible's effect.

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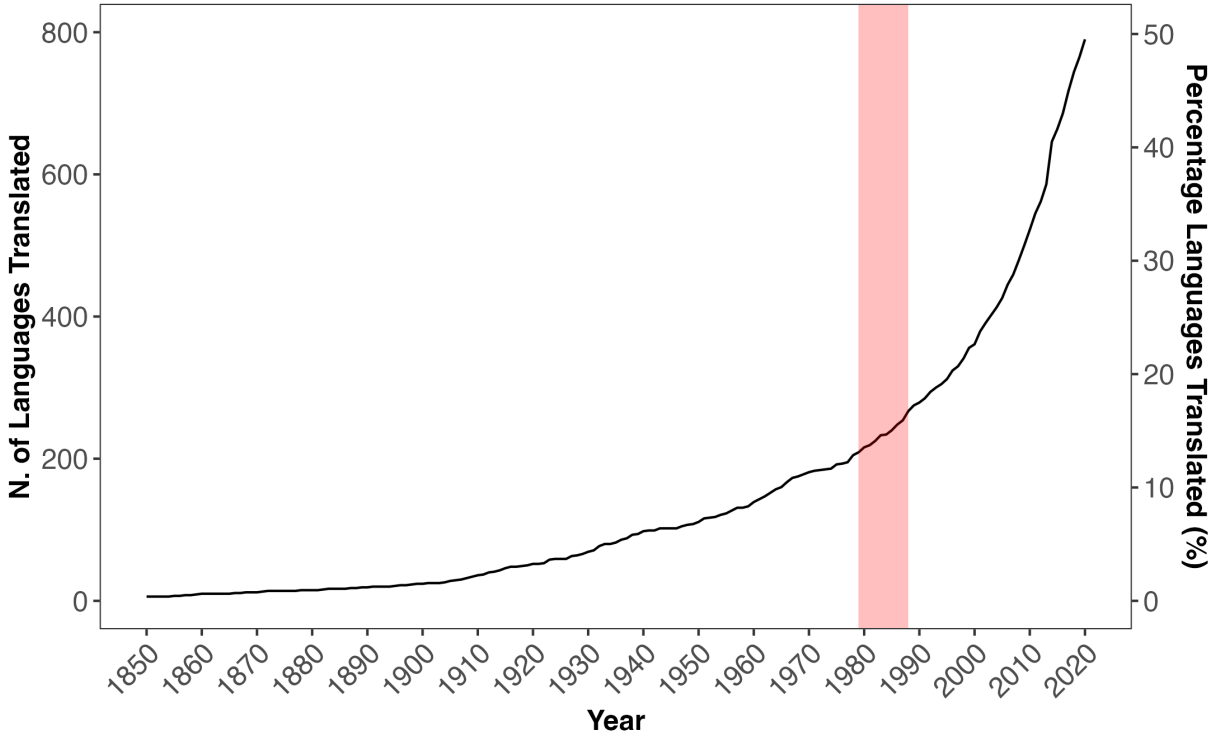
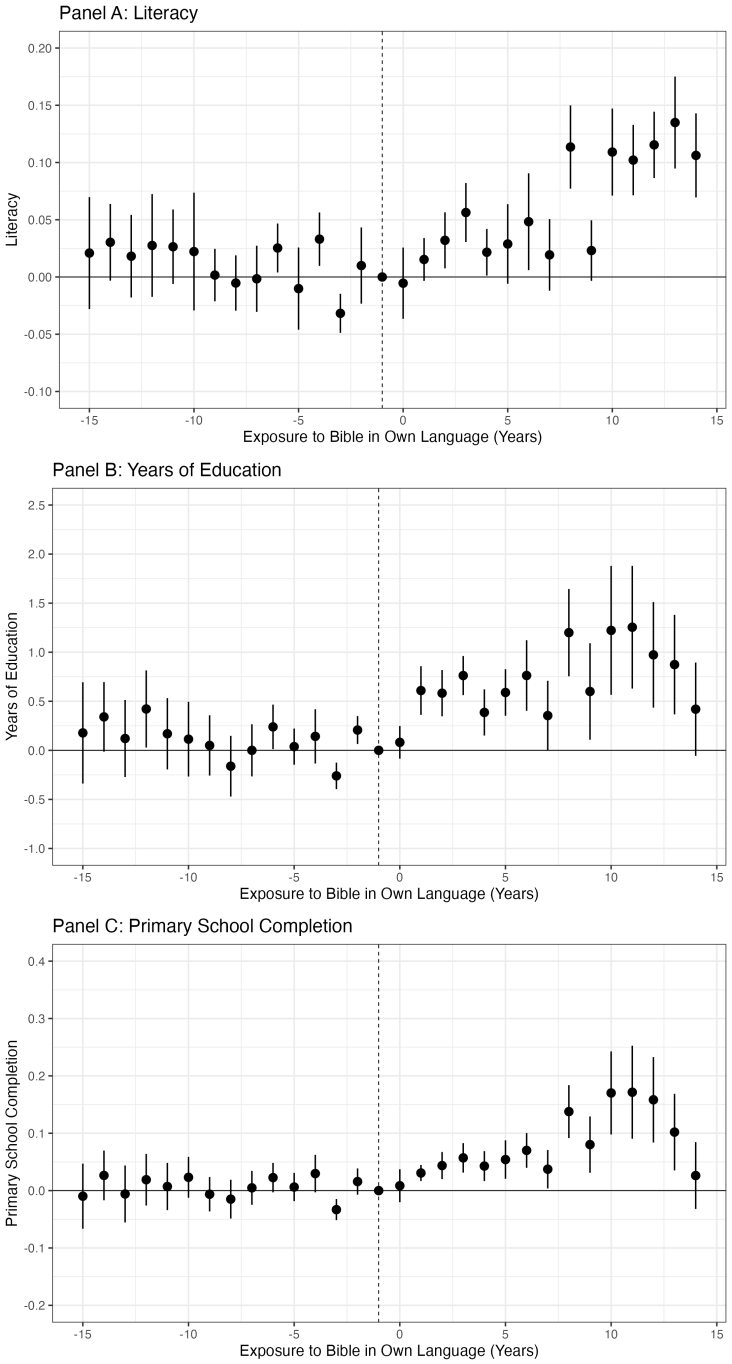
Figures

Figure 1: Bible Translations Over Time in Africa



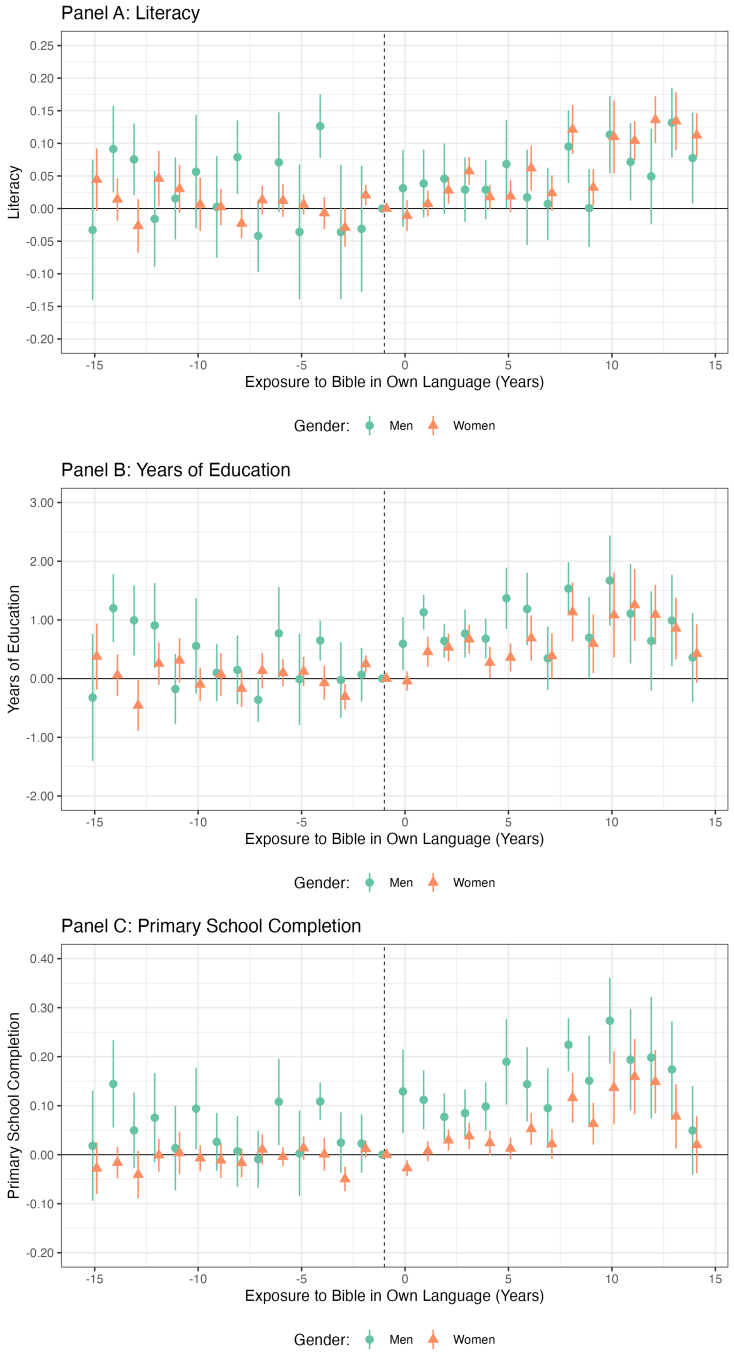
Notes: This figure shows the timing of Bible translations in Africa for each decade from 1850 to 2020, using data from the 16th edition of the *Ethnologue: Languages of the World* by Eberhard et al. (2023). The percentage of languages with a translated Bible is shown on the right hand side axis and the number of languages with a translated Bible on the left hand side axis. The red shaded vertical band indicates the time period of the Bible translations used in our analytical sample.

Figure 2: Event-Study Estimates - Effects of Bible Translations on Education



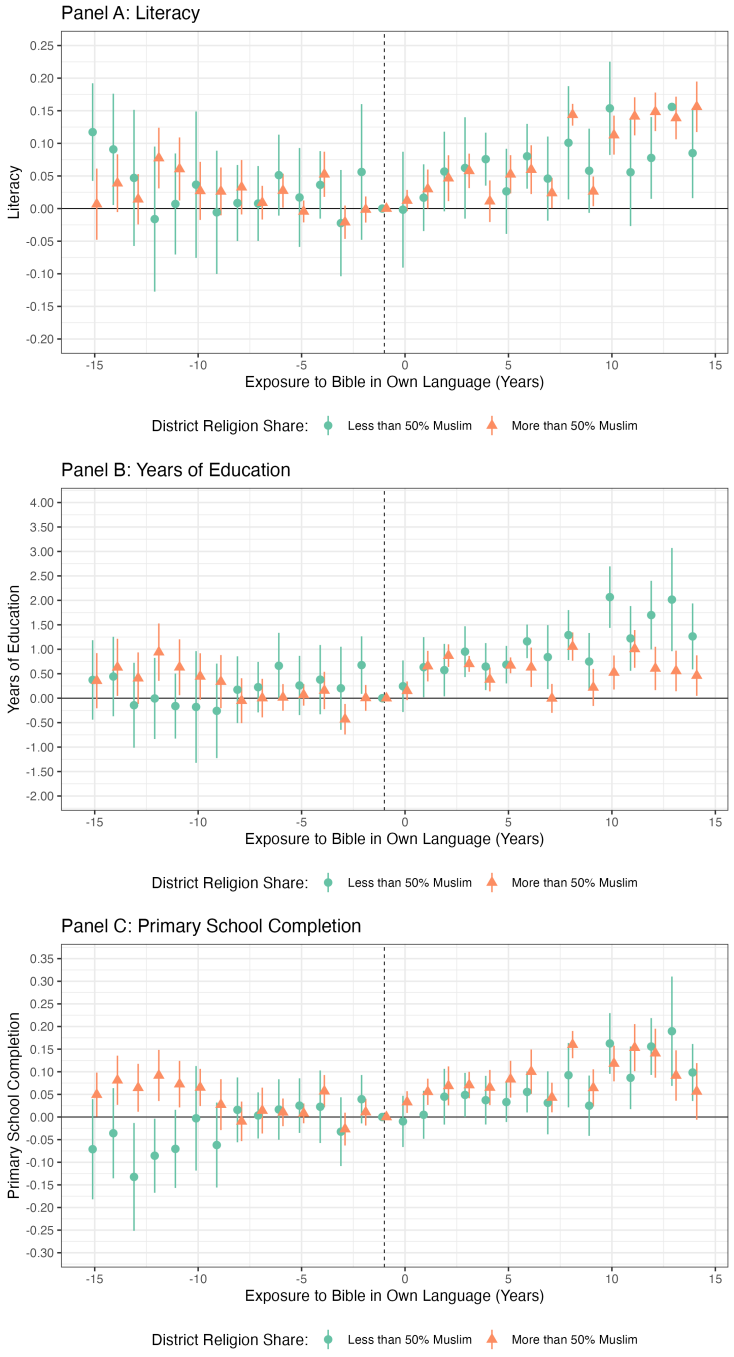
Notes: This figure shows the effect of exposure to a Bible translation on literacy (Panel A), years of education (Panel B), and primary school completion (Panel C), estimated following Sun and Abraham (2021). 95% confidence intervals are shown with standard errors clustered at the ethno-linguistic group level. Point estimates are presented in Table 4.

Figure 3: Event-Study Estimates - Effects of Bible Translations on Education, by Gender



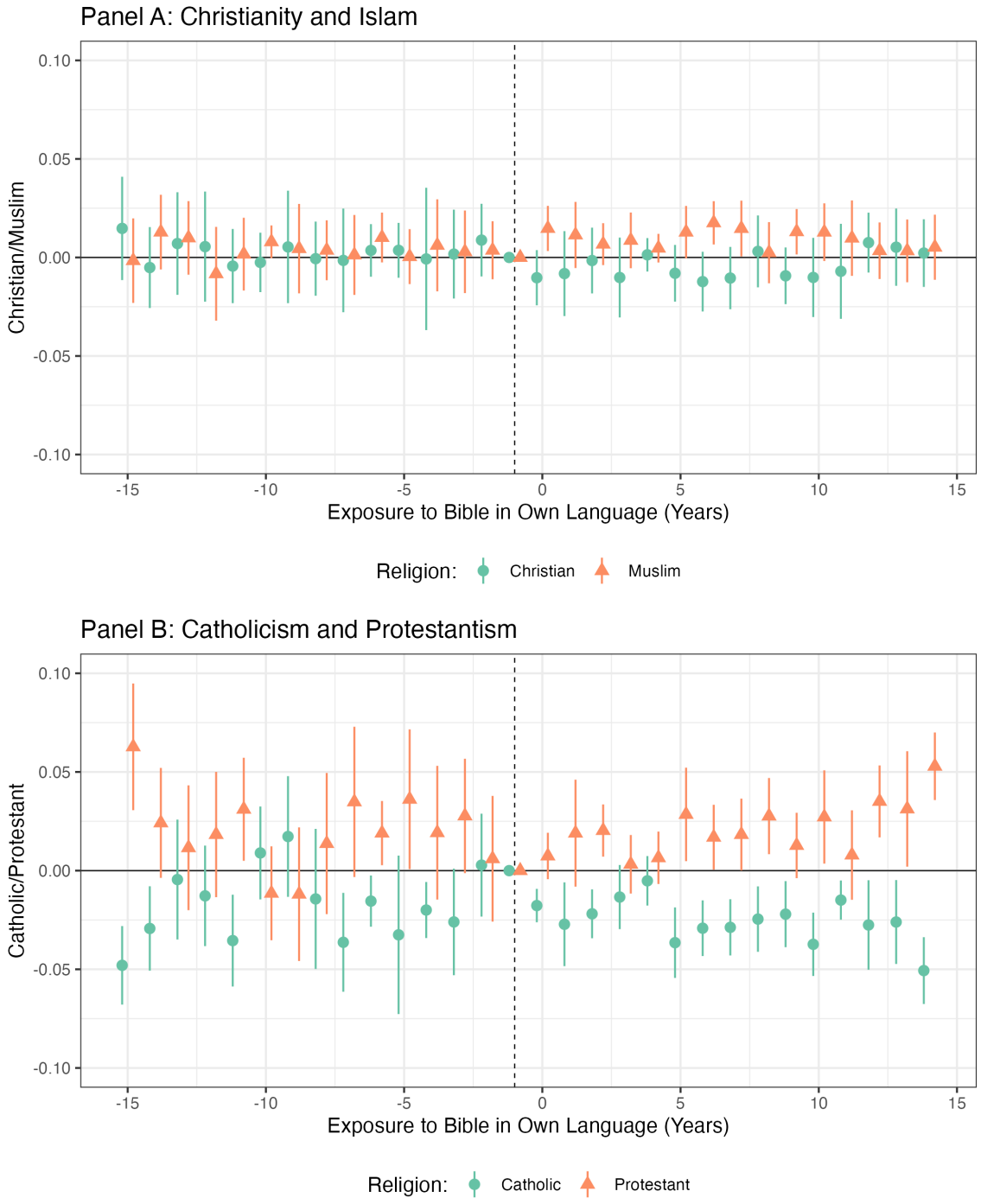
Notes: This figure shows the effect of exposure to a Bible translation on literacy (Panel A), years of education (Panel B), and primary school completion (Panel C), separately for men and women, estimated following Sun and Abraham (2021). 95% confidence intervals are shown with standard errors clustered at the ethnolinguistic group level. Point estimates are presented in Table B.12.

Figure 4: Event-Study Estimates - Effects of Bible Translations on Education, by Muslim Population



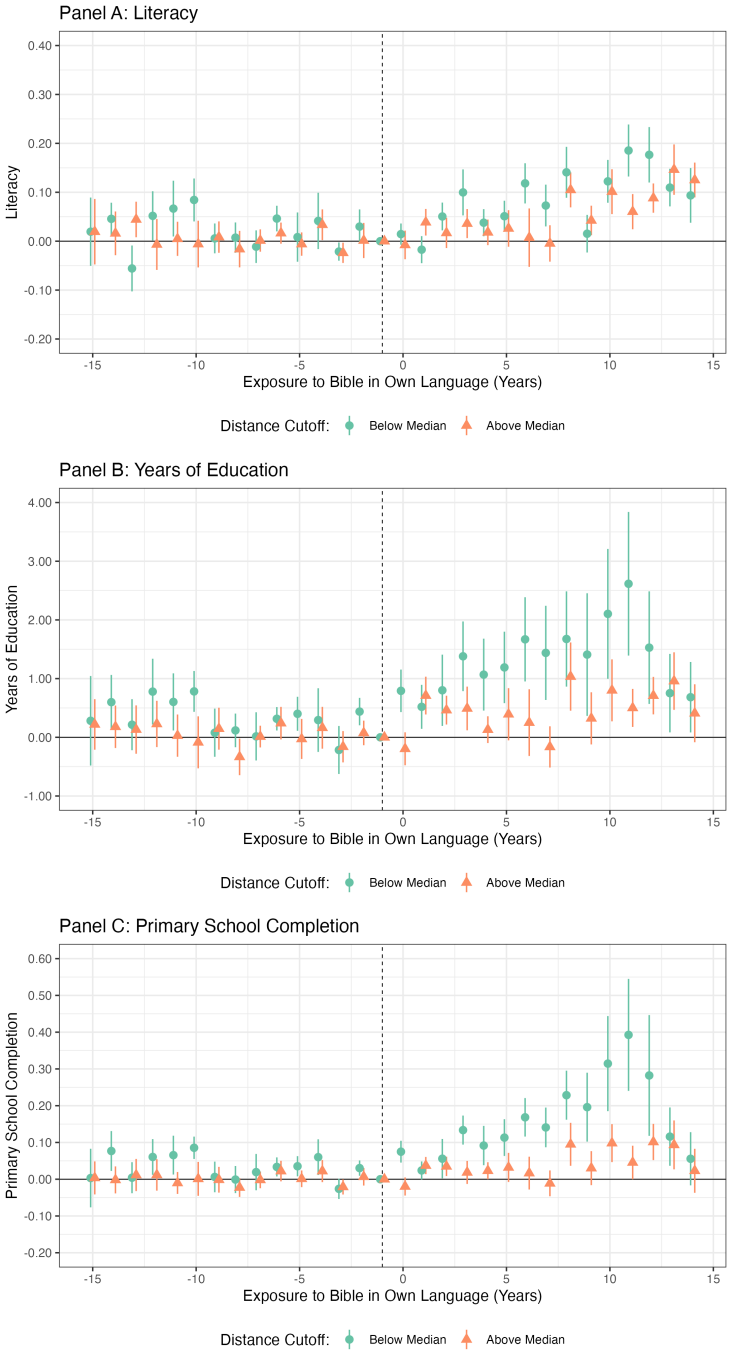
Notes: This figure shows the effect of exposure to a Bible translation on literacy (Panel A), years of education (Panel B), and primary school completion (Panel C), estimated following Sun and Abraham (2021). We compare individuals within Demographic and Health Survey (DHS) districts where less than 50% of respondents are Muslim and DHS districts where more than 50% are Muslim. 95% confidence intervals are shown with standard errors clustered at the ethno-linguistic group level. Point estimates are presented in Table B.13.

Figure 5: Event-Study Estimates - Effects of Bible Translations on Religious Affiliation



Notes: This figure shows the effect of exposure to a Bible translation on Christian or Muslim affiliation (Panel A), and Catholic or Protestant affiliation (Panel B), estimated following Sun and Abraham (2021). 95% confidence intervals are shown with standard errors clustered at the ethno-linguistic group level. Point estimates are presented in Table B.14.

Figure 6: Event-Study Estimates - Effects of Bible Translations on Education, by Distance to a Historical Mission



Notes: This figure shows the effect of exposure to a Bible translation on literacy (Panel A), years of education (Panel B), and primary school completion (Panel C), estimated following Sun and Abraham (2021). We compare individuals who live closer than the median distance (¡57.5 km) to a historical mission with individuals who live further than the median distance (¿57.5 km) from a historical mission. 95% confidence intervals are shown with standard errors clustered at the ethno-linguistic group level. Point estimates are presented in Table B.15.

Tables

Table 1: Distribution on Pre-Colonial Characteristics - Translations Before 1970

	Bible Translated Before 1970 (n = 178)	Bible Translated After 1970 (n = 656)	Never Translated (n = 761)	Mean Difference Before 1970 - After 1970	Mean Difference Before 1970 - Never Translated
Gathering Dependence:					
Gathering 0-5%	79.2	76.2	71.1	-5.1**	-8.1**
	(40.7)	(42.6)	(45.4)	(2.3)	(3.5)
Gathering 6-15%	18.0	18.8	17.1	-1.7	-0.9
	(38.5)	(39.1)	(37.7)	(2.0)	(3.2)
Gathering 16-25%	2.8	3.0	4.7	1.7	1.9
	(16.6)	(17.2)	(21.2)	(1.0)	(1.5)
Hunting Dependence:					
Hunting 0-5%	28.7	33.2	31.3	-2.0	2.6
	(45.3)	(47.1)	(46.4)	(2.5)	(3.8)
Hunting 6-15%	51.1	55.0	47.4	-7.6***	-3.7
	(50.1)	(49.8)	(50.0)	(2.7)	(4.2)
Hunting 16-25%	16.9	8.4	12.5	4.1**	-4.4
	(37.5)	(27.7)	(33.1)	(1.6)	(3.1)
Fishing Dependence:					
Fishing 0-5%	33.7	48.3	42.7	-5.6**	9.0**
	(47.4)	(50.0)	(49.5)	(2.7)	(4.0)
Fishing 6-15%	34.3	33.2	29.3	-3.9	-5.0
	(47.6)	(47.1)	(45.5)	(2.5)	(3.9)
Fishing 16-25%	19.7	9.5	11.8	2.4	-7.8**
	(39.9)	(29.3)	(32.3)	(1.6)	(3.2)
Fishing 26-35%	6.7	6.1	5.3	-0.8	-1.5
	(25.1)	(23.9)	(22.3)	(1.2)	(2.1)
Agricultural Dependence:					
Agriculture 26-35%	2.8	1.7	2.0	0.3	-0.8
	(16.6)	(12.9)	(13.9)	(0.7)	(1.3)
Agriculture 36-45%	10.1	5.6	7.5	1.8	-2.6
	(30.2)	(23.1)	(26.3)	(1.3)	(2.5)
Agriculture 46-55%	23.0	17.8	17.2	-0.6	-5.8*
	(42.2)	(38.3)	(37.8)	(2.0)	(3.4)
Agriculture 56-65%	41.0	32.8	29.6	-3.2	-11.4***
	(49.3)	(47.0)	(45.7)	(2.5)	(4.1)
Agriculture 66-75%	15.2	22.3	20.1	-2.2	4.9
	(36.0)	(41.6)	(40.1)	(2.2)	(3.1)
Agriculture 76-85%	4.5	12.3	9.9	-2.5	5.4***
	(20.8)	(32.9)	(29.8)	(1.7)	(1.9)
Intensity of Cultivation:					
Extensive/shifting	65.7	63.0	62.0	-0.9	-3.7
	(47.6)	(48.3)	(48.6)	(2.6)	(4.0)
Horticulture	1.7	2.7	1.6	-1.2	-0.1
	(12.9)	(16.3)	(12.5)	(0.8)	(1.1)
Intensive	19.7	17.4	15.1	-2.3	-4.6
	(39.9)	(37.9)	(35.8)	(2.0)	(3.3)
Principal type of crop cultivated:					
Tree-fruit	11.2	5.9	8.4	2.5*	-2.8
	(31.7)	(23.7)	(27.8)	(1.4)	(2.6)
Roots/tubers	23.6	16.9	26.0	9.1***	2.4
	(42.6)	(37.5)	(43.9)	(2.2)	(3.6)
Cereals	60.1	68.3	51.5	-16.8***	-8.6**
	(49.1)	(46.6)	(50.0)	(2.6)	(4.1)
Marital composition of family:					
Limited polygny	9.6	10.5	12.1	1.6	2.5
	(29.5)	(30.7)	(32.6)	(1.7)	(2.5)
Polygyny, sororal separate	7.9	2.1	2.5	0.4	-5.4**
	(27.0)	(14.5)	(15.6)	(0.8)	(2.1)
Polygyny, non-sororal cohabit	68.0	63.9	62.0	-1.8	-6.0
	(46.8)	(48.1)	(48.6)	(2.6)	(3.9)
Polygyny, non-sororal separate	5.1	18.6	11.6	-7.0***	6.5***
	(22.0)	(38.9)	(32.0)	(1.9)	(2.0)
Prevailing type of settlement pattern:					
Seminomadic	2.2	2.9	2.1	-0.8	-0.1
	(14.9)	(16.8)	(14.4)	(0.8)	(1.2)
Semisedentary	3.4	1.5	1.7	0.2	-1.7
	(18.1)	(12.3)	(13.0)	(0.7)	(1.4)
Dispersed homesteads	19.1	25.0	19.3	-5.7**	0.2
	(39.4)	(43.3)	(39.5)	(2.2)	(3.3)
Hamlets	14.0	10.4	10.9	0.5	-3.1
	(34.8)	(30.5)	(31.2)	(1.6)	(2.8)
Villages/towns	48.3	48.2	47.8	-0.3	-0.5
	(50.1)	(50.0)	(50.0)	(2.7)	(4.2)

Notes: This table shows the average characteristics from the Ethnoatlas of ethno-linguistic groups with languages that had a Bible translated before 1970, translated after 1970, and never had a Bible translation. In the first three columns, standard deviations are reported in parentheses. In the last two columns, standard errors of the difference in group means are reported in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Effects on Bible Translation Before 1970 on Full Literacy Rate, Years of Education, and Primary School Completion

	Full Literacy			Years of Education			Primary School Completion		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Translation Before 1970	0.145**	0.039***	0.026**	2.280***	0.288**	0.036	0.203***	0.031**	0.008
	(0.059)	(0.010)	(0.011)	(0.649)	(0.136)	(0.143)	(0.057)	(0.013)	(0.014)
Mean Control	0.637	0.637	0.637	7.787	7.787	7.787	0.64	0.64	0.64
Std. Errors Cluster	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group
DHS Controls		✓	✓		✓	✓		✓	✓
Fixed Effects		✓	✓		✓	✓		✓	✓
Ethnolatlas Controls			✓			✓			✓
Num.Obs.	252 195	252 195	252 195	254 230	254 230	254 230	254 262	254 262	254 262

Notes: Controls include: gender, urban or rural. Fixed effects include: DHS cluster by country, country , year of birth, and closest mission. Ethnoatlas control include societal characteristics such as reliance on hunting, gathering, fishing, and agriculture; marital composition, agricultural intensity, major crop types, and settlement patterns.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Difference-in-Differences Effect of Bible Translation Exposure on Education, Pooled and Subgroup Results

	Literacy (1)	Years of Education (2)	Primary School Completion (3)
Panel A: Main Estimates			
Born After Translation	0.064***	0.723***	0.084***
	(0.012)	(0.166)	(0.019)
N	75066	75041	75066
Mean for Never Translated	0.40	4.68	0.36
Panel B.1: Women			
Born After Translation	0.066***	0.665***	0.063***
	(0.011)	(0.171)	(0.017)
N	53798	53780	53798
Mean for Never Translated	0.36	4.28	0.33
Panel B.2: Men			
Born After Translation	0.058**	0.910***	0.151***
	(0.023)	(0.244)	(0.033)
N	21268	21261	21268
Mean for Never Translated	0.50	5.64	0.43
Panel C.1: Majority Muslim Regions			
Born After Translation	0.081***	0.552***	0.090***
	(0.010)	(0.129)	(0.019)
N	47493	47477	47493
Mean for Never Translated	0.22	3.12	0.27
Panel C.2: Majority Non-Muslim Regions			
Born After Translation	0.073**	1.095***	0.074***
	(0.030)	(0.250)	(0.025)
N	27573	27564	27573
Mean for Never Translated	0.72	7.41	0.53
Panel D.1: Close to Missions ($<$ 57.5km)			
Born After Translation	0.090***	1.358***	0.172***
	(0.016)	(0.323)	(0.031)
N	37530	37529	37530
Mean for Never Translated	0.59	6.63	0.51
Panel D.2: Far from Missions ($\geq$ 57.5km)			
Born After Translation	0.056***	0.446***	0.043**
	(0.014)	(0.161)	(0.017)
N	37536	37512	37536
Mean for Never Translated	0.18	2.39	0.19
Panel E.1: Protestant Missions[a]			
Born After Translation	0.089***	0.836***	0.086***
	(0.019)	(0.191)	(0.022)
Mean for Never Translated	0.46	5.12	0.39
N	43006	42984	43006
Panel E.2: Catholic Missions[a]			
Born After Translation	0.095***	0.943***	0.105***
	(0.007)	(0.234)	(0.031)
N	32060	32057	32060
Mean for Never Translated	0.32	3.98	0.31

Notes: This table presents coefficients from difference-in-differences estimators following Sun and Abraham (2021) and described in Section 3.3.2. Controls include indicators for male (excluded during the gender heterogeneity estimates), and rural. Standard errors are clustered at the ethnolinguistic group level.

[a] Panels E.1 and E.2 present subgroups among respondents whose closest historical mission is either Catholic or Protestant. These estimates do not include the rural control, due to collinearity.

* p $<$ 0.1, ** p $<$ 0.05, *** p $<$ 0.01

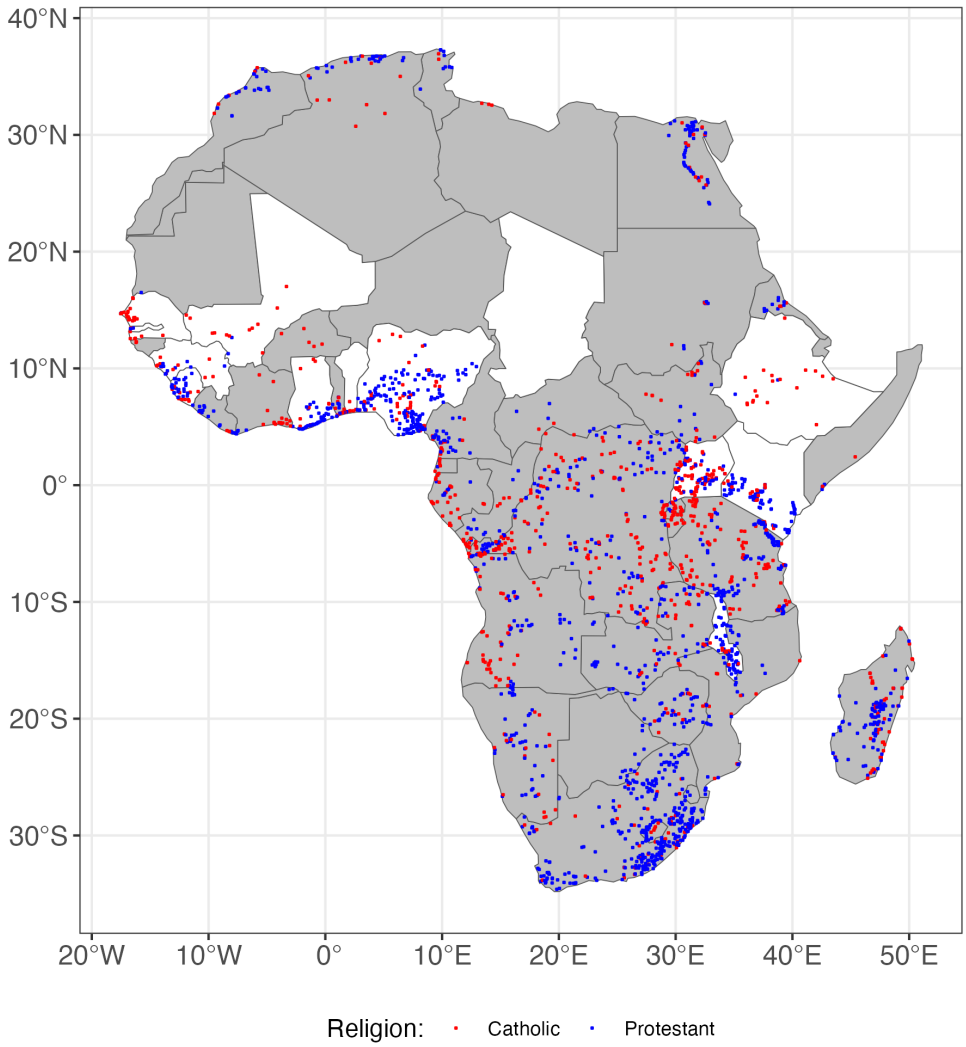
Table 4: Sun and Abraham Event Study Estimates for Literacy, Years of Education, and Primary School Completion

	Literacy (1)	Years of Education (2)	Primary School Completion (3)
Born 15 Years Before the Translation	0.021	0.178	−0.010
	(0.024)	(0.256)	(0.028)
Born 14 Years Before the Translation	0.030*	0.341*	0.026
	(0.017)	(0.176)	(0.021)
Born 13 Years Before the Translation	0.018	0.121	−0.006
	(0.018)	(0.194)	(0.025)
Born 12 Years Before the Translation	0.028	0.422**	0.019
	(0.022)	(0.195)	(0.022)
Born 11 Years Before the Translation	0.026	0.169	0.007
	(0.016)	(0.180)	(0.020)
Born 10 Years Before the Translation	0.022	0.114	0.023
	(0.025)	(0.188)	(0.018)
Born 9 Years Before the Translation	0.002	0.050	−0.006
	(0.011)	(0.152)	(0.015)
Born 8 Years Before the Translation	−0.005	−0.161	−0.015
	(0.012)	(0.153)	(0.017)
Born 7 Years Before the Translation	−0.002	0.000	0.005
	(0.014)	(0.132)	(0.015)
Born 6 Years Before the Translation	0.025**	0.239**	0.023*
	(0.011)	(0.112)	(0.013)
Born 5 Years Before the Translation	−0.010	0.038	0.006
	(0.018)	(0.091)	(0.012)
Born 4 Years Before the Translation	0.033***	0.142	0.030*
	(0.012)	(0.137)	(0.016)
Born 3 Years Before the Translation	−0.032***	−0.260***	−0.033***
	(0.008)	(0.067)	(0.009)
Born 2 Years Before the Translation	0.010	0.207***	0.016
	(0.016)	(0.070)	(0.011)
Born at Year of Translation	−0.005	0.081	0.009
	(0.015)	(0.082)	(0.014)
Born 1 Year After the Translation	0.015	0.609***	0.031***
	(0.009)	(0.123)	(0.007)
Born 2 Years After the Translation	0.032**	0.583***	0.044***
	(0.012)	(0.117)	(0.012)
Born 3 Years After the Translation	0.056***	0.762***	0.057***
	(0.013)	(0.099)	(0.013)
Born 4 Years After the Translation	0.022**	0.386***	0.043***
	(0.010)	(0.117)	(0.013)
Born 5 Years After the Translation	0.029	0.590***	0.054***
	(0.017)	(0.117)	(0.017)
Born 6 Years After the Translation	0.048**	0.763***	0.070***
	(0.021)	(0.178)	(0.015)
Born 7 Years After the Translation	0.019	0.354*	0.037**
	(0.016)	(0.176)	(0.017)
Born 8 Years After the Translation	0.114***	1.200***	0.138***
	(0.018)	(0.220)	(0.023)
Born 9 Years After the Translation	0.023*	0.600**	0.080***
	(0.013)	(0.243)	(0.024)
Born 10 Years After the Translation	0.109***	1.223***	0.170***
	(0.019)	(0.325)	(0.036)
Born 11 Years After the Translation	0.102***	1.255***	0.171***
	(0.015)	(0.310)	(0.040)
Born 12 Years After the Translation	0.115***	0.973***	0.158***
	(0.014)	(0.266)	(0.037)
Born 13 Years After the Translation	0.135***	0.874***	0.102***
	(0.020)	(0.251)	(0.033)
Born 14 Years After the Translation	0.106***	0.420*	0.026
	(0.018)	(0.235)	(0.029)
N	73742	75041	75066
Mean for Never Translated	0.40	4.68	0.36

Notes: This table presents coefficients from event-study estimates based on Sun and Abraham (2021). Controls include indicators for male and rural. Standard errors are clustered at the Ethno-linguistic group level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

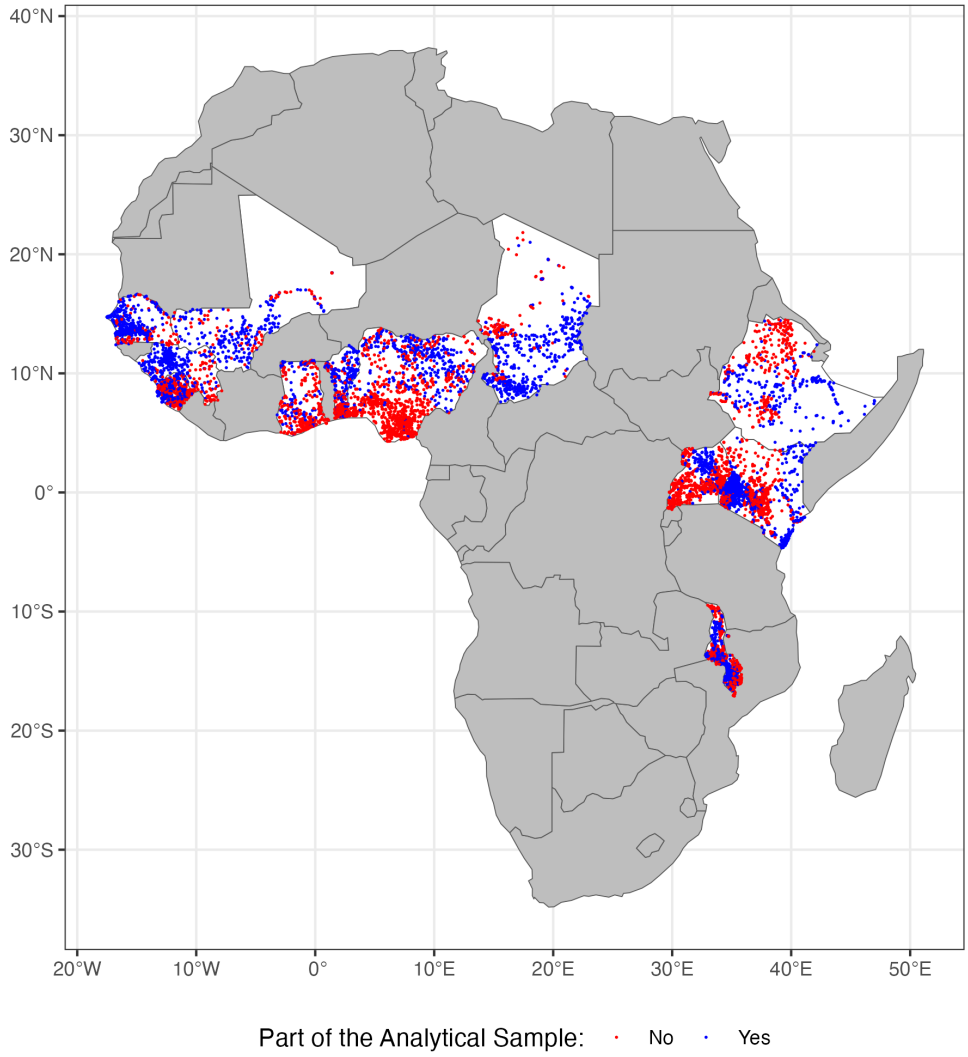
A. Figures

Figure A.1: Geographical Distribution of Historical Missions



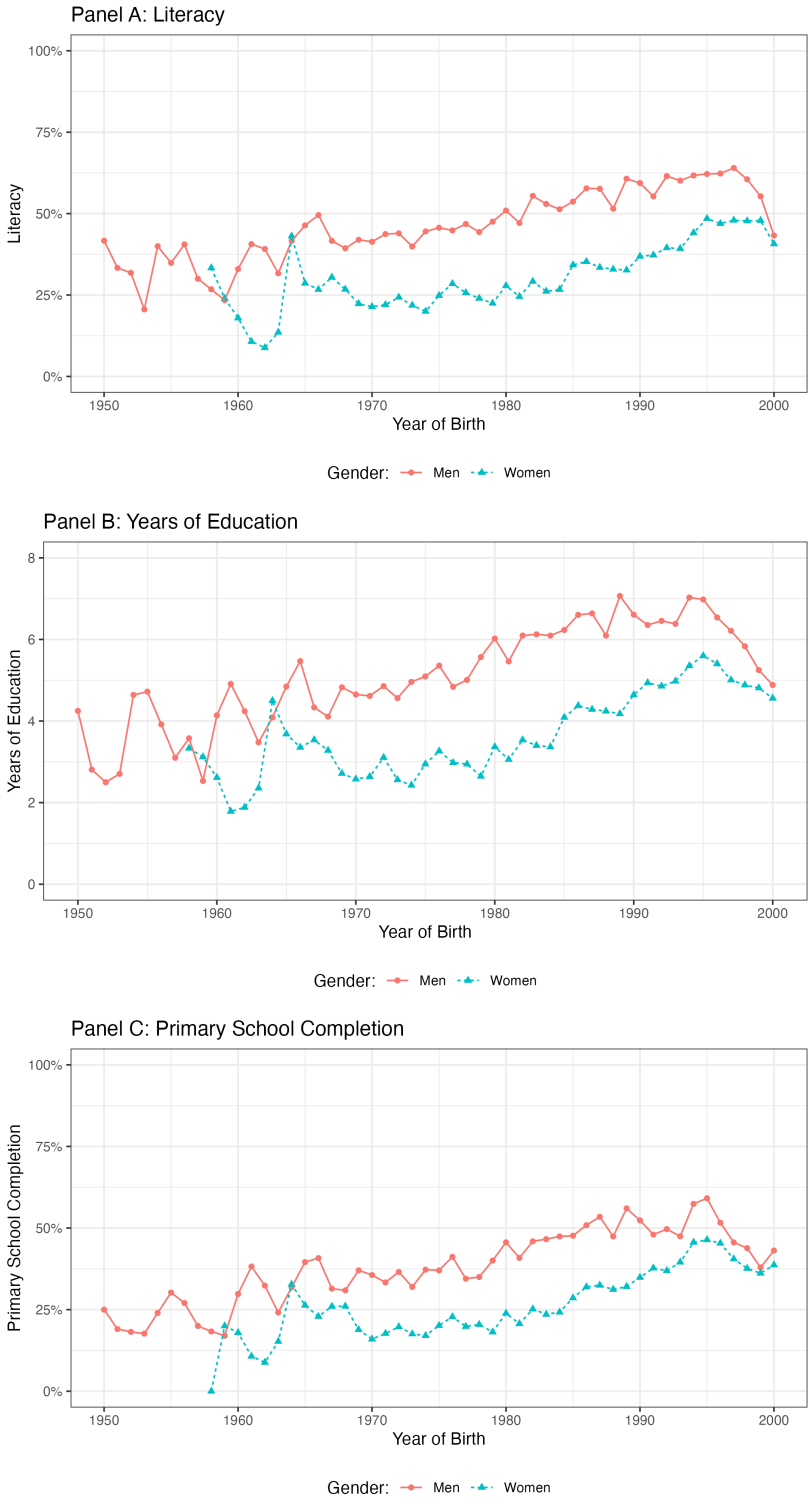
Notes: This figure shows the location of historical Christian missions in Africa by denomination from Cagé and Rueda (2020) and Nunn (2010). Countries in white are included in our analytical sample.

Figure A.2: Geographical Distribution of DHS Clusters Across Analytical Sample of Countries



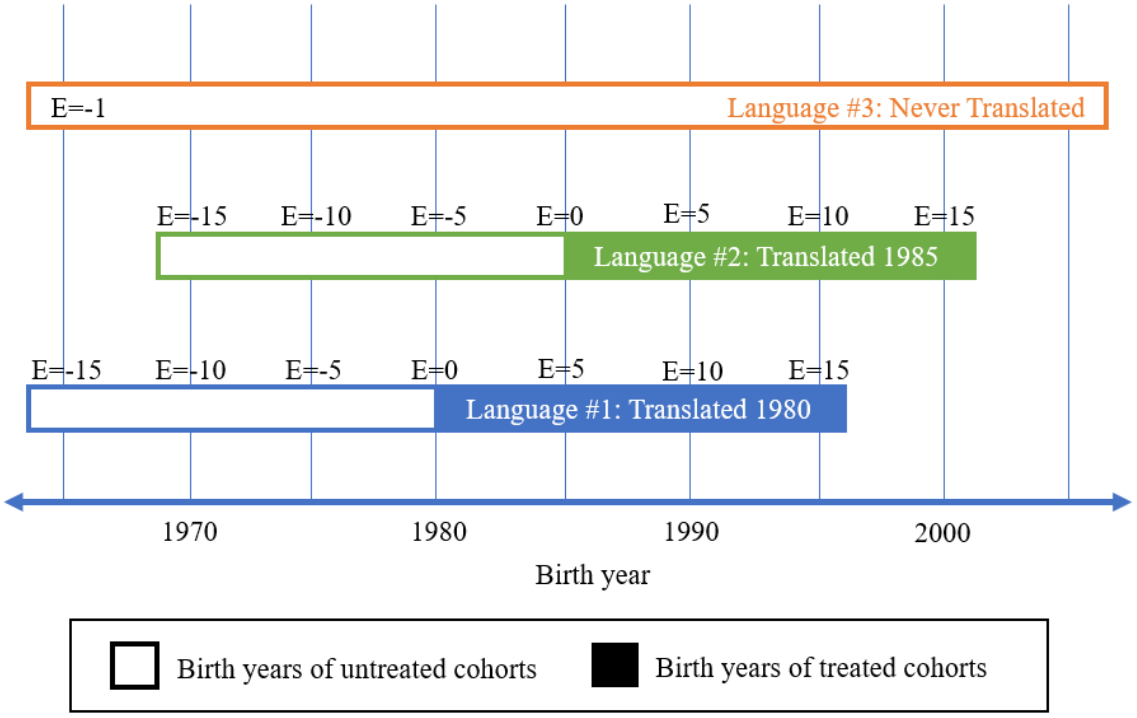
Notes: This figure shows the geographical distribution of respondent survey data used in our sample, from the Demographic and Health Surveys (DHS). Countries in white are included in our analytical sample. Each dot represents a cluster from the DHS used in the paper. Blue dots (N=4,696) represent DHS clusters that are part of the analytical sample used throughout the paper, as discussed in Section 3, and red dots (N=8,677) indicate the DHS clusters that are excluded from our analytical sample.

Figure A.3: Education Outcomes by Year of Birth and Gender



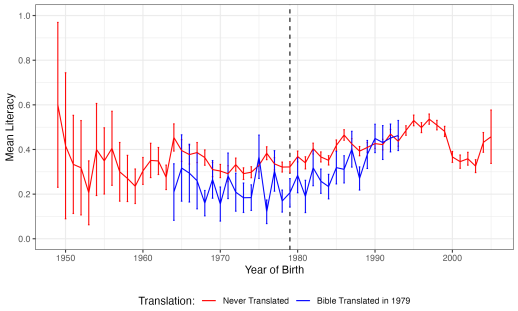
Notes: This figure shows average literacy (Panel A), years of education (Panel B), and primary school completion (Panel C) by gender and year of birth for the main analytical sample of the paper.

Figure A.4: Example of Bible Translation Exposure by Birth Year: Three Hypothetical Languages

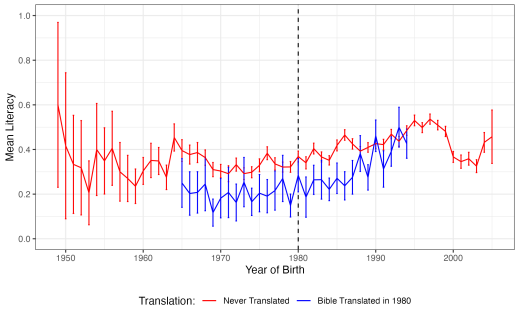


Notes: This figure shows Bible translation exposure for three hypothetical languages, one translated in 1980 (in blue), one translated in 1985 (in green), and one never translated (in orange). The solid colored bars show birth cohorts with positive exposure to a Bible translation, while the hollow bars show birth cohorts that were not exposed to a Bible translation.

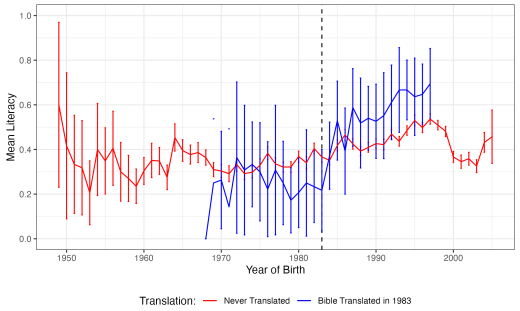
Figure A.5: Literacy by Year of Birth and Bible Translation Status



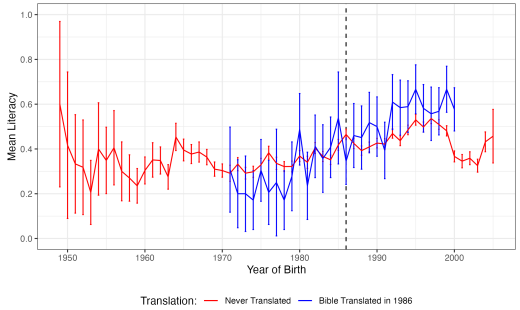
(a) Languages Translated in 1979



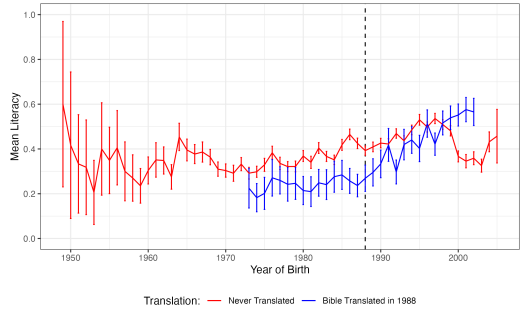
(b) Languages Translated in 1980



(c) Languages Translated in 1983



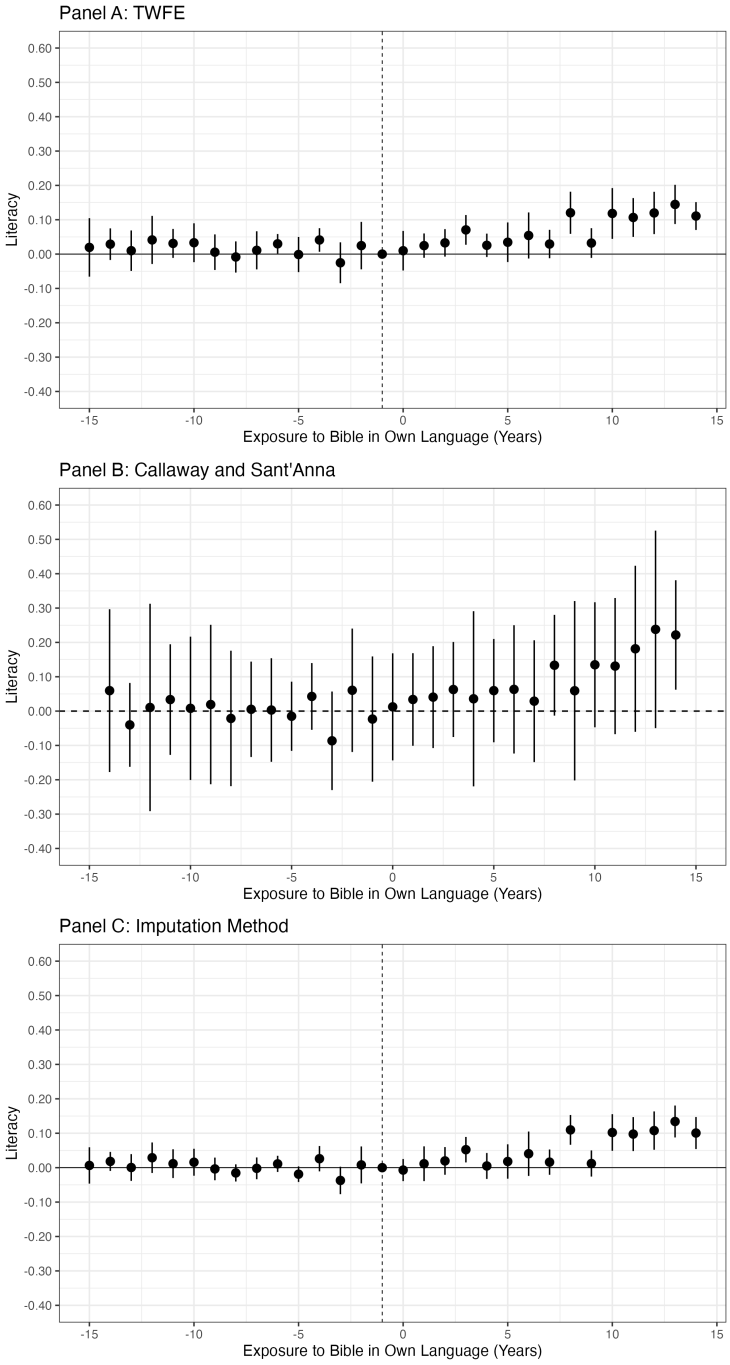
(d) Languages Translated in 1986



(e) Languages Translated in 1988

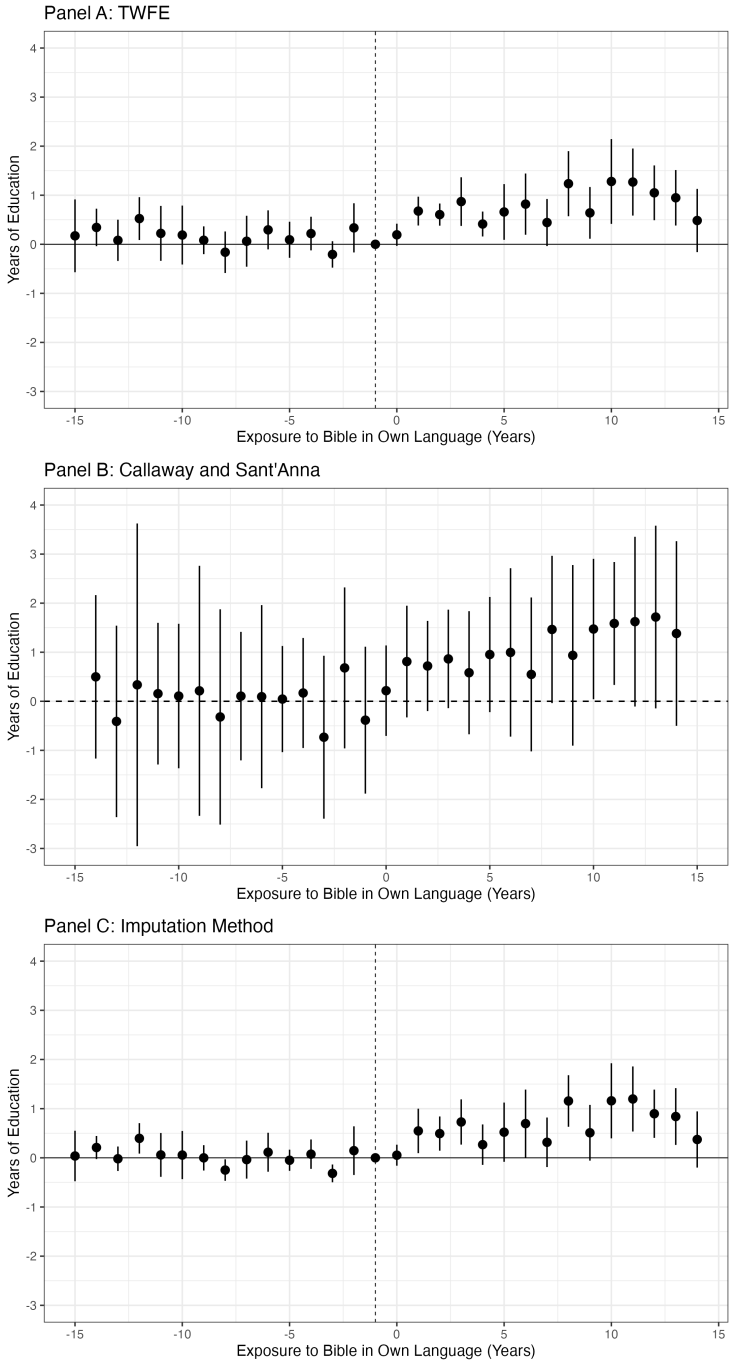
Notes: This figure shows average literacy by year of birth for ethno-linguistic groups whose language never received a Bible translation (in red) and ethno-linguistic groups whose language received a Bible translation between 1979 and 1988 (in blue), separately for ethno-linguistic groups with languages translated in different years. The sample of never-translated ethno-linguistic groups (in red) are the same in each Panel. The number of treated languages in each panel are respectively 2, 2, 2, 2, and 1.

Figure A.6: Alternative Estimation Methods - Literacy



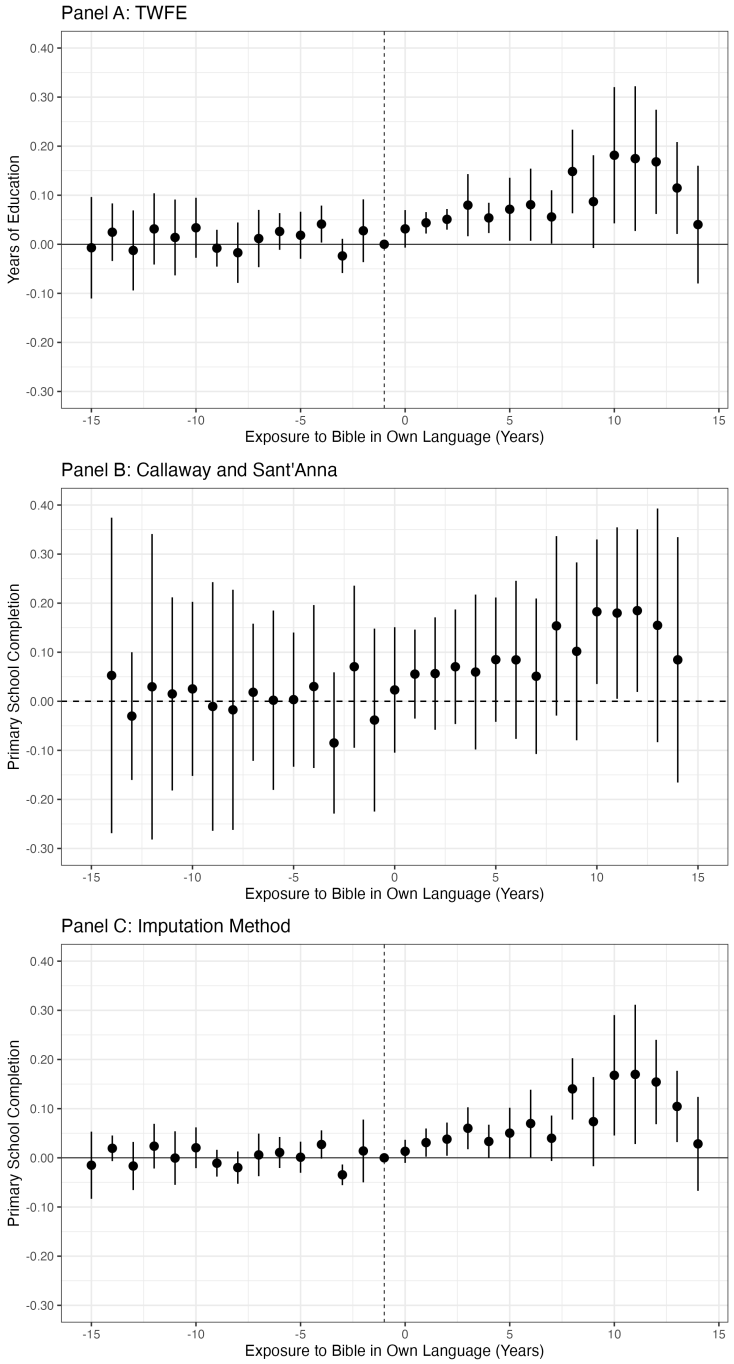
Notes: This figure shows the effect of exposure to a Bible translation on literacy. Panel A shows traditional two-way fixed effects. Panel B shows estimates using Callaway and Sant'Anna (2021). Panel C shows estimates following Gardner (2022). Point estimates are presented in Table B.16.

Figure A.7: Alternative Estimation Methods - Years of Education



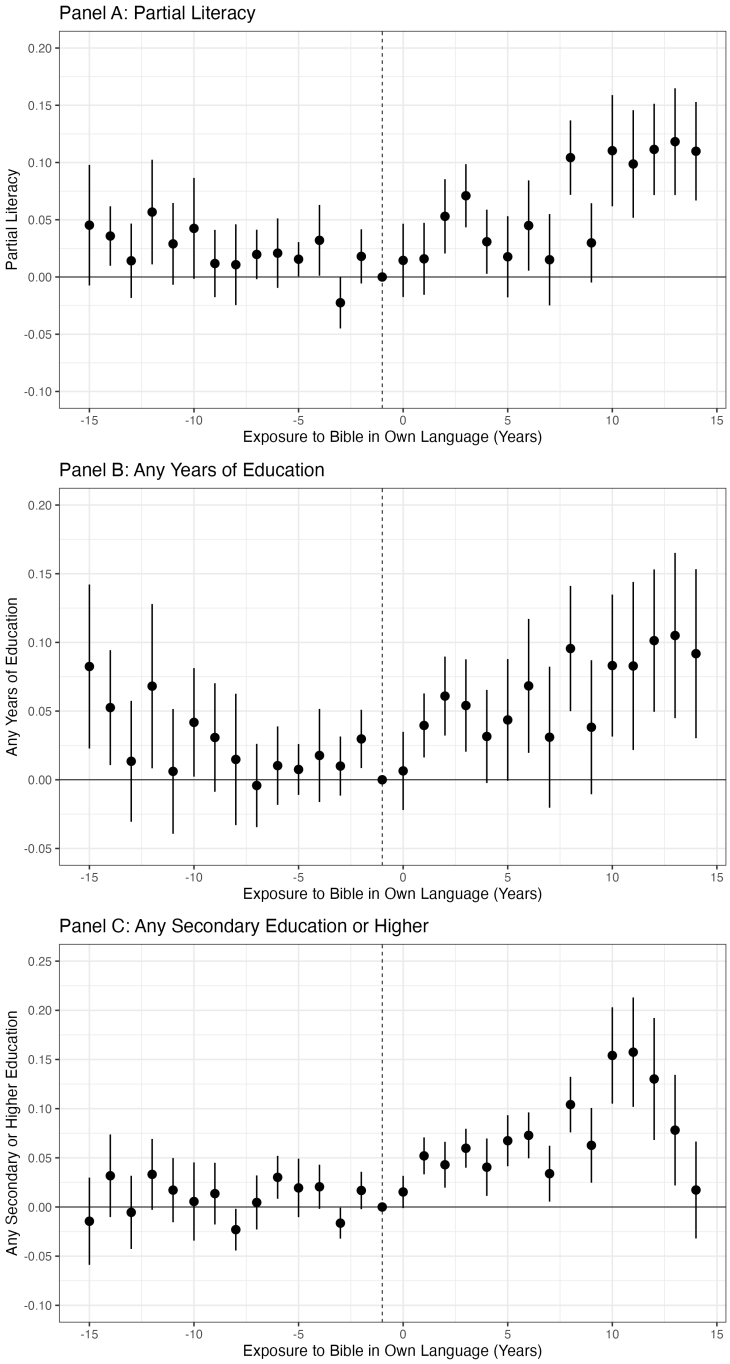
Notes: This figure shows the effect of exposure to a Bible translation on years of education. Panel A shows traditional two-way fixed effects. Panel B shows estimates using Callaway and Sant'Anna (2021). Panel C shows estimates following Gardner (2022). Point estimates are presented in Table B.16.

Figure A.8: Alternative Estimation Methods - Primary School Completion



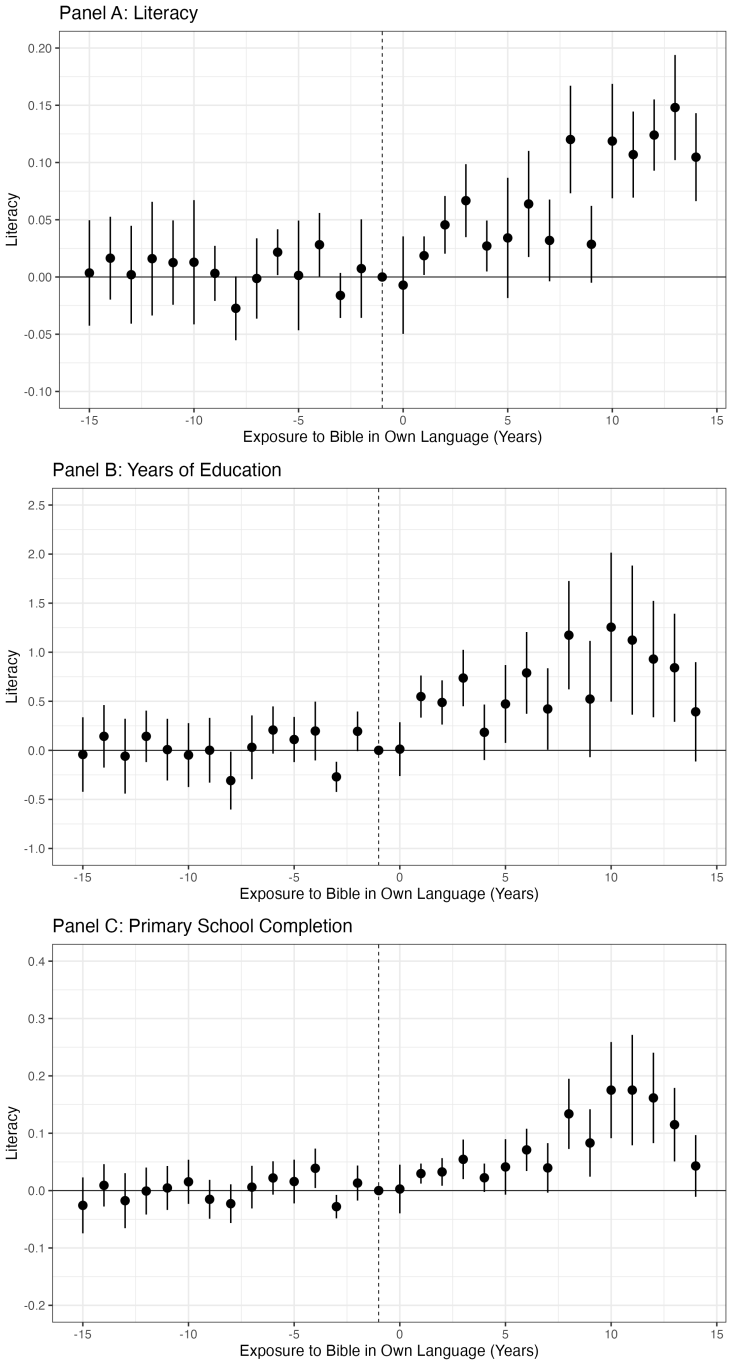
Notes: This figure shows the effect of exposure to a Bible translation on completion of primary school. Panel A shows traditional two-way fixed effects. Panel B shows estimates using Callaway and Sant'Anna (2021). Panel C shows estimates following Gardner (2022). Point estimates are presented in Table B.16.

Figure A.9: Event-Study Estimates - Effects of Bible Translations on Additional Education Outcomes



Notes: This figure shows the effect of exposure to a Bible translation on partial literacy (Panel A), any years of education (Panel B), and secondary school completion (Panel C), estimated following Sun and Abraham (2021). 95% confidence intervals are shown with standard errors clustered at the ethno-linguistic group level. Point estimates are presented in Table B.17.

Figure A.10: Event-Study Estimates - Effects of Bible Translation on Education without Ethiopia and Mali Subsample

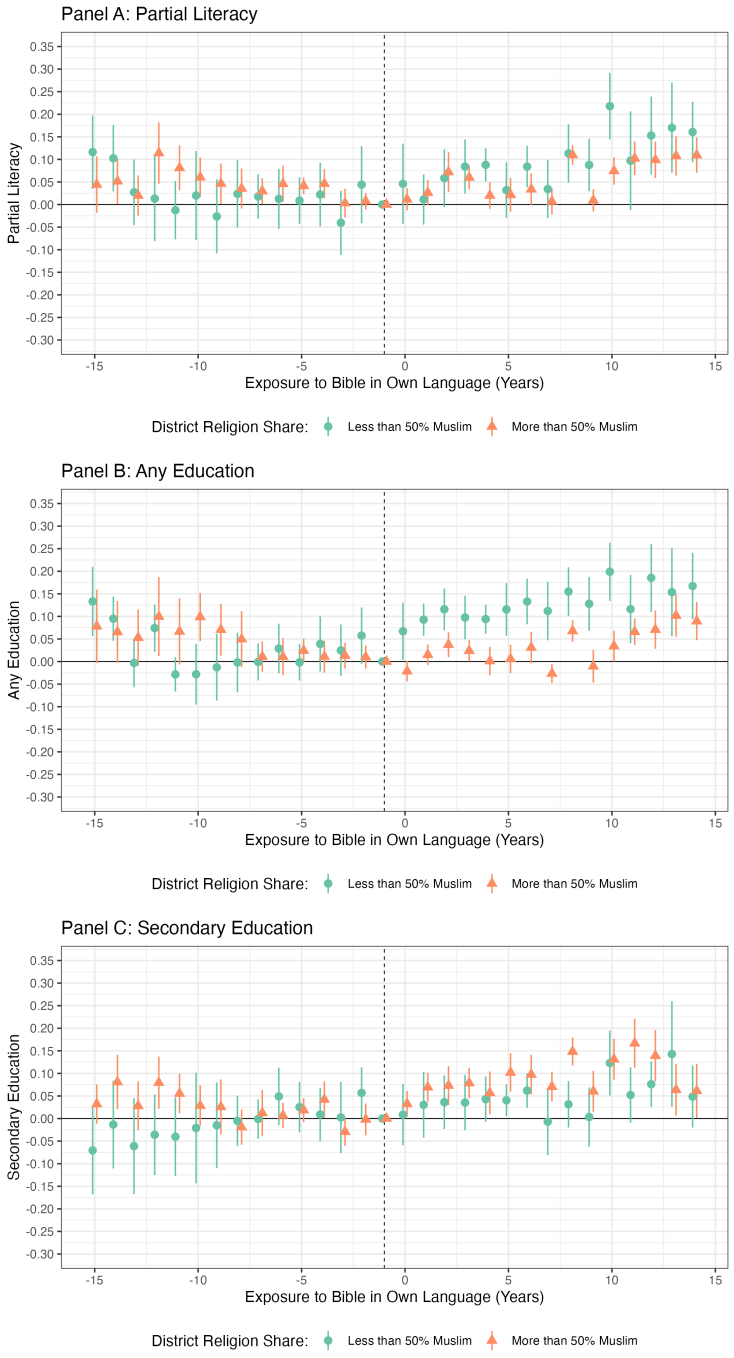


Notes: This figure shows the effect of exposure to a Bible translation on literacy (Panel A), years of education (Panel B), and primary school completion (Panel C), estimated following Sun and Abraham (2021) and excluding Ethiopia and Mali. 95% confidence intervals are shown with standard errors clustered at the ethno-linguistic group level. Point estimates are presented in Table B.7.

Figure A.11: Event-Study Estimates - Effects of Bible Translations on Additional Education Outcomes, by Gender

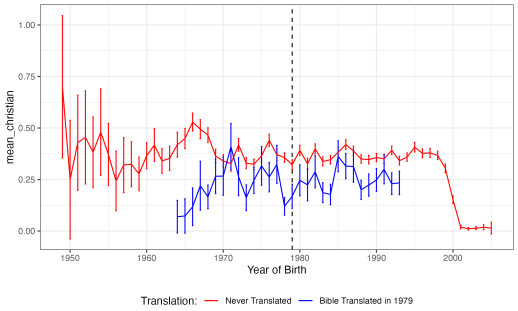
Notes: This figure shows the effect of exposure to a Bible translation on partial literacy (Panel A), any years of education (Panel B), and secondary school completion (Panel C), separately for men and women, estimated following Sun and Abraham (2021). 95% confidence intervals are shown with standard errors clustered at the ethno-linguistic group level. Point estimates are presented in Table B.8.

Figure A.12: Event-Study Estimates - Effects of Bible Translations on Additional Education Outcomes, by Muslim Population

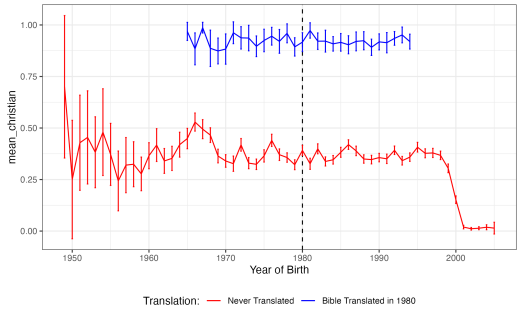


Notes: This figure shows the effect of exposure to a Bible translation on partial literacy (Panel A), any years of education (Panel B), and secondary school completion (Panel C), estimated following Sun and Abraham (2021). We compare individuals within Demographic and Health Survey (DHS) districts where less than 50% of respondents are Muslim and DHS districts where more than 50% are Muslim. 95% confidence intervals are shown with standard errors clustered at the ethno-linguistic group level.

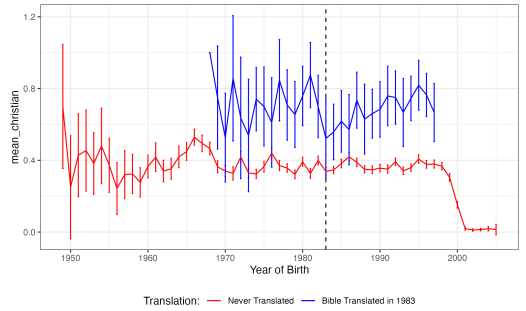
Figure A.13: Affiliation to Christianity by Year of Birth and Bible Translation Status



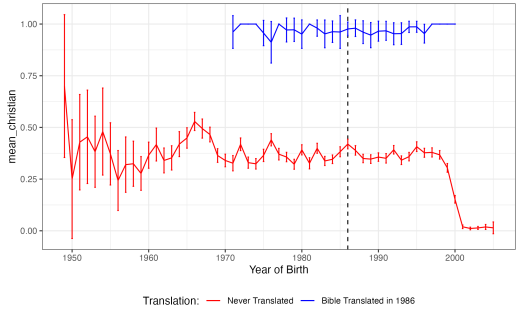
(a) Languages Translated in 1979



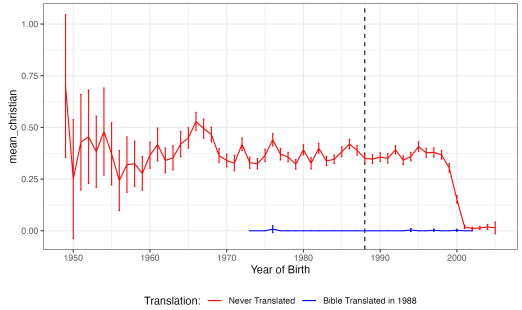
(b) Languages Translated in 1980



(c) Languages Translated in 1983



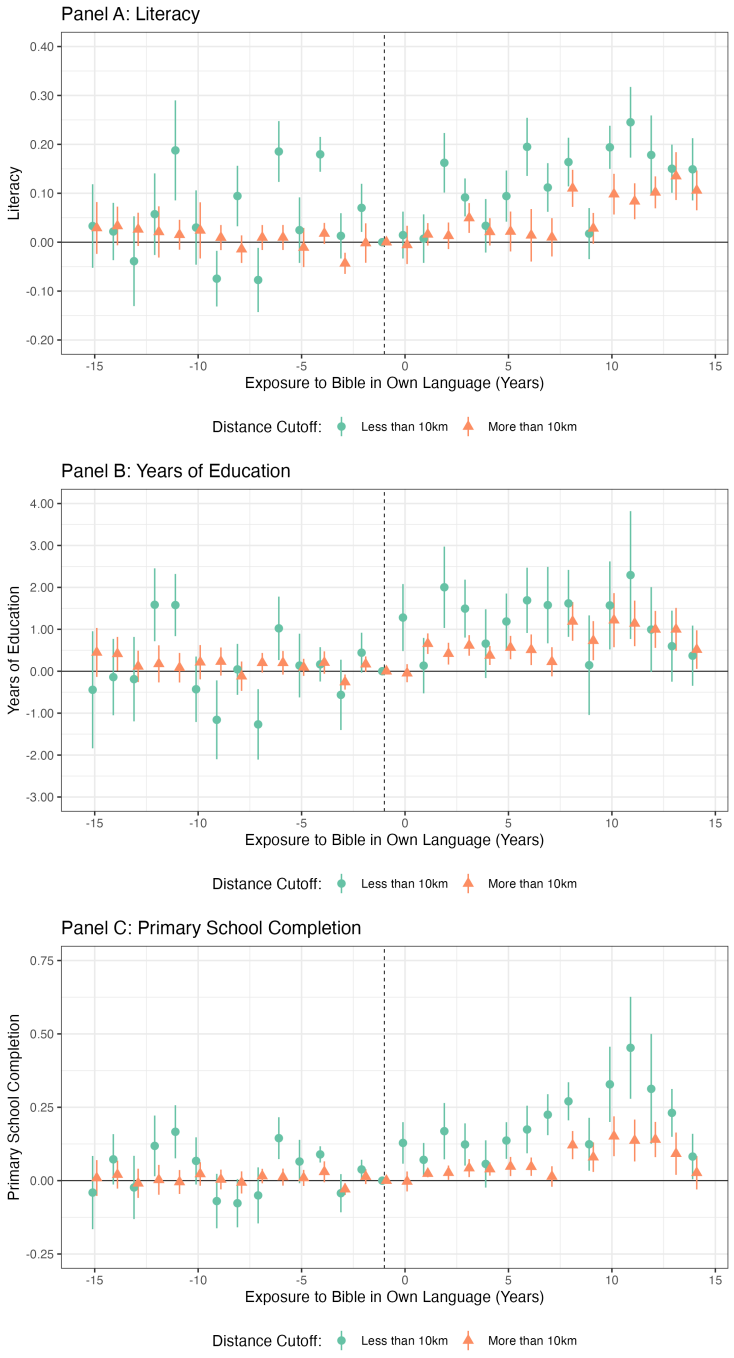
(d) Languages Translated in 1986



(e) Languages Translated in 1988

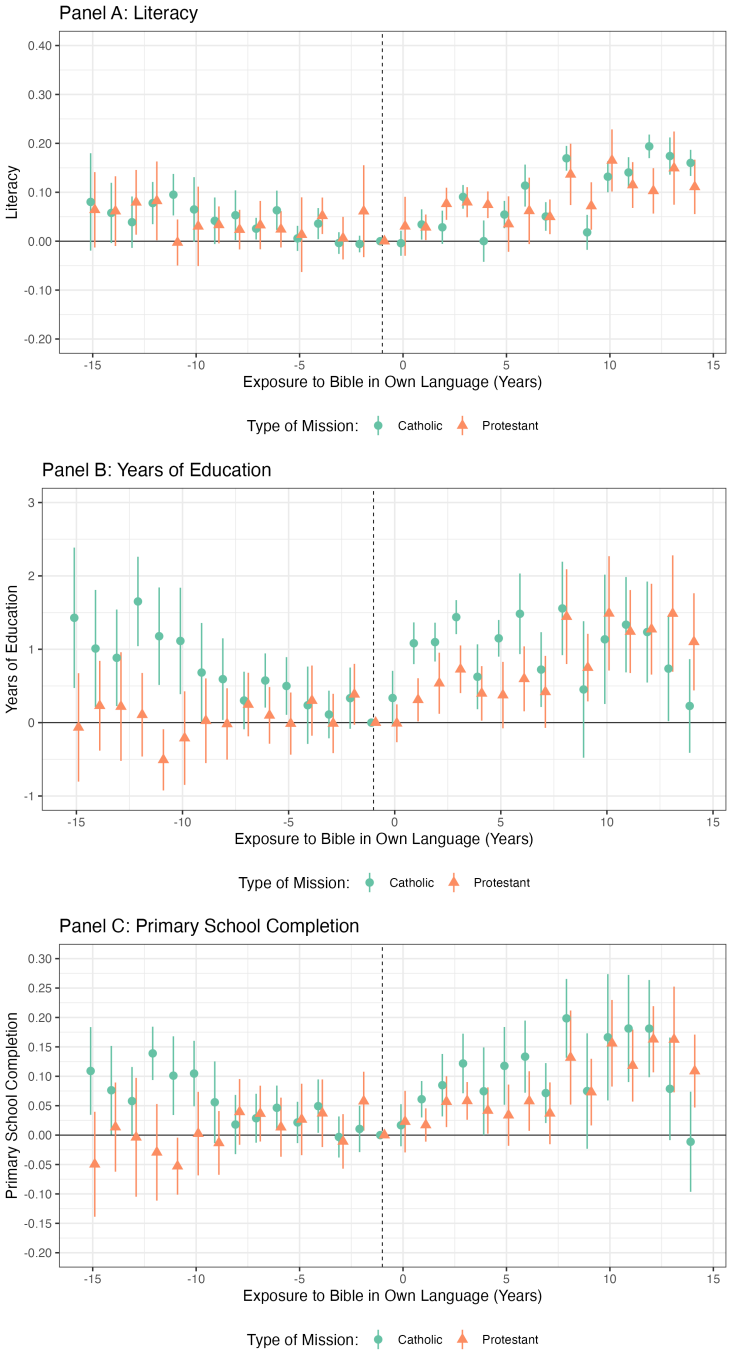
Notes: This figure shows average share of Christians by year of birth for ethno-linguistic groups whose language never received a Bible translation (in red) and ethno-linguistic groups whose language received a Bible translation between 1979 and 1988 (in blue), separately for ethno-linguistic groups with languages translated in different years. The sample of never-translated ethno-linguistic groups (in red) are the same in each Panel. The number of treated languages in each panel are respectively 2, 2, 2, 2, and 1.

Figure A.14: Event-Study Estimates - Effects of Bible Translation on Education with Alternative Distance to Missions Measure



Notes: This figure shows the effect of exposure to a Bible translation on literacy (Panel A), years of education (Panel B), and primary school completion (Panel C), estimated following Sun and Abraham (2021). We compare individuals who live closer than 10 km to a historical mission with individuals who live further than 10 km from a historical mission. 95% confidence intervals are shown with standard errors clustered at the ethno-linguistic group level. Point estimates are presented in Table B.10.

Figure A.15: Event-Study Estimates - Effects of Bible Translation on Education, by Closest Mission Denomination



Notes: This figure shows the effect of exposure to a Bible translation on literacy (Panel A), years of education (Panel B), and primary school completion (Panel C), estimated following Sun and Abraham (2021). We compare individuals who live closest to a Catholic Mission with those who live closest to a Protestant Mission. 95% confidence intervals are shown with standard errors clustered at the ethno-linguistic group level. Point estimates are presented in Table B.11.

B. Tables

Table B.1: Distribution on Pre-Colonial Characteristics - Translations Before 1920

	Bible Translated Before 1920 (n = 50)	Bible Translated After 1920 (n = 784)	Never Translated (n = 761)	Mean Difference Before 1920 - After 1920	Mean Difference Before 1920 - Never Translated
Gathering Dependence:					
Gathering 0-5%	56.0	68.1	65.0	-12.1**	-9.0
	(50.0)	(46.6)	(47.7)	(5.9)	(6.0)
Gathering 6-15%	18.7	18.3	16.6	0.4	2.0
	(39.2)	(38.7)	(37.3)	(4.7)	(4.7)
Gathering 16-25%	0.0	3.0	4.0	-3.0***	-4.0***
	(0.0)	(17.1)	(19.5)	(0.5)	(0.7)
Hunting Dependence:					
Hunting 0-5%	18.7	27.3	28.5	-8.7*	-9.9**
	(39.2)	(44.6)	(45.2)	(4.7)	(4.8)
Hunting 6-15%	52.0	50.3	44.0	1.7	8.0
	(50.3)	(50.0)	(49.7)	(6.0)	(6.0)
Hunting 16-25%	4.0	9.6	12.3	-5.6**	-8.3***
	(19.7)	(29.5)	(32.9)	(2.5)	(2.5)
Fishing Dependence:					
Fishing 0-5%	28.0	39.5	40.0	-11.5**	-12.0**
	(45.2)	(48.9)	(49.0)	(5.4)	(5.5)
Fishing 6-15%	28.0	31.3	25.8	-3.3	2.2
	(45.2)	(46.4)	(43.8)	(5.4)	(5.4)
Fishing 16-25%	5.3	11.8	11.4	-6.4**	-6.1**
	(22.6)	(32.3)	(31.8)	(2.8)	(2.8)
Fishing 26-35%	5.3	5.8	4.7	-0.5	0.7
	(22.6)	(23.5)	(21.1)	(2.7)	(2.7)
Agricultural Dependence:					
Agriculture 26-35%	0.0	1.6	1.5	-1.6***	-1.5***
	(0.0)	(12.6)	(12.2)	(0.4)	(0.4)
Agriculture 36-45%	6.7	5.7	6.9	0.9	-0.2
	(25.1)	(23.3)	(25.3)	(3.0)	(3.0)
Agriculture 46-55%	24.0	19.4	16.3	4.6	7.7
	(43.0)	(39.6)	(37.0)	(5.1)	(5.1)
Agriculture 56-65%	34.7	29.6	28.5	5.1	6.1
	(47.9)	(45.7)	(45.2)	(5.7)	(5.7)
Agriculture 66-75%	6.7	19.0	17.7	-12.4***	-11.0***
	(25.1)	(39.3)	(38.2)	(3.1)	(3.2)
Agriculture 76-85%	1.3	9.4	8.7	-8.1***	-7.4***
	(11.5)	(29.2)	(28.2)	(1.6)	(1.6)
Intensity of Cultivation:					
Extensive/shifting	57.3	62.6	59.5	-5.2	-2.2
	(49.8)	(48.4)	(49.1)	(5.9)	(6.0)
Horticulture	0.0	0.0	0.0	0.0NA	0.0NA
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Intensive	12.0	15.6	14.2	-3.6	-2.2
	(32.7)	(36.3)	(34.9)	(3.9)	(4.0)
Principal type of crop cultivated:					
Tree-fruit	17.3	5.6	8.6	11.8***	8.7*
	(38.1)	(22.9)	(28.1)	(4.5)	(4.5)
Roots/tubers	18.7	15.3	22.6	3.4	-3.9
	(39.2)	(36.0)	(41.8)	(4.7)	(4.7)
Cereals	38.7	63.1	48.9	-24.4***	-10.2*
	(49.0)	(48.3)	(50.0)	(5.9)	(5.9)
Marital composition of family:					
Limited polygny	10.7	9.5	11.9	1.1	-1.2
	(31.1)	(29.4)	(32.4)	(3.7)	(3.8)
Polygyny, sororal separate	13.3	2.6	2.1	10.7***	11.2***
	(34.2)	(16.0)	(14.3)	(4.0)	(4.0)
Polygyny, non-sororal cohabit	40.0	60.3	56.2	-20.3***	-16.2***
	(49.3)	(48.9)	(49.6)	(5.9)	(5.9)
Polygyny, non-sororal separate	6.7	15.2	12.0	-8.5***	-5.3*
	(25.1)	(35.9)	(32.5)	(3.1)	(3.1)
Prevailing type of settlement pattern:					
Seminomadic	0.0	1.9	2.0	-1.9***	-2.0***
	(0.0)	(13.6)	(13.9)	(0.4)	(0.5)
Semisedentary	2.7	1.6	1.9	1.1	0.8
	(16.2)	(12.6)	(13.5)	(1.9)	(1.9)
Dispersed homesteads	10.7	22.0	18.9	-11.3***	-8.2**
	(31.1)	(41.4)	(39.1)	(3.8)	(3.8)
Hamlets	8.0	8.8	9.0	-0.8	-1.0
	(27.3)	(28.3)	(28.6)	(3.3)	(3.3)
Villages/towns	42.7	45.4	45.1	-2.8	-2.4
	(49.8)	(49.8)	(49.8)	(5.9)	(6.0)

Notes: This table shows the average characteristics from the Ethnoatlas of ethno-linguistic groups with languages that had a Bible translated before 1920, translated after 1920, and never had a Bible translation. In the first three columns, standard deviations are reported in parentheses. In the last two columns, standard errors of the difference in group means are reported in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B.2: Ethno-Linguistic Groups with Bible Translations in the Analytical Sample

Ethno-linguistic Group	Year of Bible Translation	Number of Observations	Countries	Type of Bible Translation
Lango	1979	1073	Uganda	Complete Bible
Somali	1979	3566	Ethiopia, Kenya	Complete Bible
Karo / Zime / Peve	1980	248	Chad	New Testament - Audio
Sara (Ngambaye/Sara Madjin-Gaye/Mbaye)	1980	3638	Chad	Complete Bible
Loko	1983	286	Sierra Leone	New Testament
Moundang	1983	532	Chad	Complete Bible
Acholi	1986	1286	Uganda	Complete Bible
Gabri / Kabalaye / Nangtchere / Soumraye	1986	317	Chad	Complete Bible
Wolof	1988	6766	Senegal	New Testament

Notes: This table presents details on the nine translated languages and associated ethno-linguistic groups we study in this paper. The number of observations is the total number of individuals in each ethno-linguistic group, in the analytical sample.

Table B.3: Ethno-Linguistic Groups without Bible Translations in the Analytical Sample

Ethno-linguistic Group	Number of Observations	Countries
Alaba	23	Ethiopia
Arab	2343	Chad
Argoba	24	Ethiopia
Bakenyi	43	Uganda
Boulala / Medego / Kouka	751	Chad
Dadajo / Kibet / Mouro	823	Chad
Dendi And Related	1161	Benin
Dogon	944	Mali
Fula/Tukulur/Lorobo	3635	Gambia
Fulani	3773	Nigeria
Fullah	994	Sierra Leone
Grusi	608	Ghana
Harari	85	Ethiopia
Kalenjin	6075	Kenya
Kuku	13	Uganda
Luhya	5301	Kenya
Mandinka/Jahanka	5064	Gambia
Mao	29	Ethiopia
Mesmedje / Massalat / Kadjakse	155	Chad
Mijikenda/ Swahili	2399	Kenya
Ngoni	4044	Malawi
Nubi	9	Uganda
Oromo	6427	Ethiopia
Ouadai / Maba / Massalit / Mimi	1647	Chad
Peul / Foulbe / Bodore	435	Chad
Peulh	7445	Guinea, Mali
Peulh And Related	1793	Benin
Sheko	122	Ethiopia
Sherbro	455	Sierra Leone
Shinasha	135	Ethiopia
So (Tepeth)	7	Uganda
Tama / Assongori / Mararit	465	Chad
Zaghawa / Bideyat / Kobe	697	Chad

Notes: This table presents details on the ethno-linguistic groups without Bible transations we study in this paper. The number of observations is the total number of individuals in each ethno-linguistic group, in the analytical sample.

Table B.4: Data Description by Country

DHS Country	Obs. by Country	Average Literacy (%)	Total Languages	Total Untreated Languages
Benin	2954	11.30	2	1
Chad	12051	19.43	12	2
Ethiopia	8690	39.13	8	2
Gambia	8699	34.50	2	1
Ghana	608	38.61	1	1
Guinea	5680	15.75	1	1
Kenya	15496	71.56	4	2
Malawi	4044	71.63	1	1
Mali	2709	20.02	2	1
Nigeria	3773	11.80	1	1
Senegal	6766	37.17	1	1
Sierra Leone	1735	27.47	3	2
Uganda	2431	47.38	6	2
Total	**75636**	**38.82**	**44**	**18**

Notes: This table presents a summary of the analytical sample broken down by country.

Table B.5: Difference-in-Differences Estimates - All Methods

	Sun and Abraham (1)	TWFE (2)	Callaway and Sant'Anna (3)	Gardner (4)
Panel A: Literacy				
Born After a Translation	0.064**	0.054**	0.096*	0.057**
	(0.012)	(0.016)	(0.053)	(0.017)
N	75066	75066	75066	75066
Panel B: Years of Education				
Born After a Translation	0.723**	0.636**	1.058***	0.660**
	(0.166)	(0.191)	(0.355)	(0.186)
N	75041	75041	75041	75041
Panel C: Primary School Completion				
Born After a Translation	0.084**	0.082**	0.102**	0.082**
	(0.019)	(0.027)	(0.040)	(0.029)
N	75066	75066	75066	75066

Notes: Estimates based on Sun and Abraham (2021), traditional TWFE, Callaway and Sant'Anna (2021), and Gardner (2022). This table presents coefficients from difference-in-differences estimates of being Born After a Translation. Controls include indicators for male. Standard errors are clustered at the ethnic group level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B.6: Sun and Abraham Differences-in-Differences Estimates for Other Educational Measures

	Partial Literacy (1)	Any Education (2)	Any Secondary (3)
Born After Translation	0.065***	0.064***	0.075***
	(0.015)	(0.020)	(0.014)
N	75066	75043	75066
Mean for Never Translated	0.50	0.57	0.28

Notes: This table presents coefficients from difference-in-differences estimators following Sun and Abraham (2021) and described in Section 3.3.2. Controls include indicators for male and rural. Standard errors are clustered at the ethno-linguistic group level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B.7: Sun and Abraham (2021) Event Study Estimates for Literacy, Years of Education, and Primary School Completion excluding Ethiopia and Mali

	Literacy (1)	Years of Education (2)	Primary School Completion (3)
Born 15 Years Before the Translation	0.004	−0.043	−0.026
	(0.023)	(0.187)	(0.024)
Born 14 Years Before the Translation	0.016	0.143	0.009
	(0.018)	(0.157)	(0.018)
Born 13 Years Before the Translation	0.002	−0.059	−0.018
	(0.021)	(0.187)	(0.024)
Born 12 Years Before the Translation	0.016	0.143	−0.001
	(0.024)	(0.129)	(0.020)
Born 11 Years Before the Translation	0.013	0.007	0.005
	(0.018)	(0.154)	(0.019)
Born 10 Years Before the Translation	0.013	−0.048	0.015
	(0.027)	(0.160)	(0.019)
Born 9 Years Before the Translation	0.003	0.001	−0.015
	(0.012)	(0.162)	(0.017)
Born 8 Years Before the Translation	−0.027*	−0.308**	−0.023
	(0.014)	(0.145)	(0.017)
Born 7 Years Before the Translation	−0.001	0.031	0.006
	(0.017)	(0.160)	(0.018)
Born 6 Years Before the Translation	0.022**	0.207*	0.022
	(0.010)	(0.118)	(0.014)
Born 5 Years Before the Translation	0.001	0.110	0.016
	(0.024)	(0.113)	(0.019)
Born 4 Years Before the Translation	0.028**	0.197	0.039**
	(0.014)	(0.147)	(0.017)
Born 3 Years Before the Translation	−0.016	−0.270***	−0.028***
	(0.010)	(0.076)	(0.010)
Born 2 Years Before the Translation	0.007	0.194*	0.013
	(0.021)	(0.099)	(0.015)
Born at Year of Translation	−0.007	0.012	0.003
	(0.021)	(0.135)	(0.021)
Born 1 Year After the Translation	0.019**	0.548***	0.030***
	(0.008)	(0.105)	(0.009)
Born 2 Years After the Translation	0.046***	0.488***	0.033***
	(0.012)	(0.111)	(0.012)
Born 3 Years After the Translation	0.067***	0.737***	0.055***
	(0.016)	(0.141)	(0.017)
Born 4 Years After the Translation	0.027**	0.184	0.022*
	(0.011)	(0.139)	(0.012)
Born 5 Years After the Translation	0.034	0.472**	0.041*
	(0.026)	(0.195)	(0.024)
Born 6 Years After the Translation	0.064***	0.789***	0.071***
	(0.023)	(0.205)	(0.018)
Born 7 Years After the Translation	0.032*	0.422**	0.040*
	(0.018)	(0.204)	(0.021)
Born 8 Years After the Translation	0.120***	1.174***	0.134***
	(0.023)	(0.271)	(0.030)
Born 9 Years After the Translation	0.029*	0.523*	0.083***
	(0.017)	(0.291)	(0.029)
Born 10 Years After the Translation	0.119***	1.255***	0.175***
	(0.025)	(0.373)	(0.041)
Born 11 Years After the Translation	0.107***	1.123***	0.175***
	(0.018)	(0.374)	(0.047)
Born 12 Years After the Translation	0.124***	0.930***	0.162***
	(0.015)	(0.291)	(0.039)
Born 13 Years After the Translation	0.148***	0.842***	0.115***
	(0.023)	(0.271)	(0.031)
Born 14 Years After the Translation	0.105***	0.393	0.043
	(0.019)	(0.249)	(0.026)
N	63780	63755	63780
Mean for Never Translated	0.41	4.79	0.38

Notes: This table presents coefficients from event-study estimates based on Sun and Abraham (2021). Controls include indicators for male and rural. Standard errors are clustered at the Ethno-linguistic group level.

* p < 0.1, ** p < 0.05, *** p < 0.01

Table B.8: Sun and Abraham Event Study Estimates for Partial Literacy, Any Education, and Secondary or Higher by Gender

	Partial Literacy		Any Education		Secondary Education	
	Men	Women	Men	Women	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)
Born 15 Years Before the Translation	0.016	0.062**	0.020	0.102**	−0.045	0.000
	(0.036)	(0.030)	(0.028)	(0.041)	(0.045)	(0.023)
Born 14 Years Before the Translation	0.162***	−0.006	0.155***	0.009	0.111***	0.006
	(0.029)	(0.015)	(0.031)	(0.023)	(0.037)	(0.018)
Born 13 Years Before the Translation	0.101***	−0.038*	0.098***	−0.041	0.048*	−0.039*
	(0.028)	(0.019)	(0.024)	(0.028)	(0.027)	(0.020)
Born 12 Years Before the Translation	0.108***	0.039*	0.013	0.078**	0.110***	0.008
	(0.031)	(0.022)	(0.031)	(0.033)	(0.040)	(0.016)
Born 11 Years Before the Translation	0.068**	0.017	−0.055**	0.026	−0.005	0.027
	(0.026)	(0.018)	(0.026)	(0.026)	(0.029)	(0.018)
Born 10 Years Before the Translation	0.069*	0.030	0.096***	0.000	0.032	0.001
	(0.040)	(0.019)	(0.030)	(0.017)	(0.043)	(0.013)
Born 9 Years Before the Translation	0.093***	−0.014	0.068***	0.017	0.058	0.004
	(0.026)	(0.013)	(0.020)	(0.023)	(0.035)	(0.017)
Born 8 Years Before the Translation	0.105***	−0.011	0.090**	−0.009	−0.048*	−0.007
	(0.028)	(0.017)	(0.040)	(0.022)	(0.026)	(0.011)
Born 7 Years Before the Translation	0.006	0.024*	−0.038	0.002	−0.005	0.011
	(0.026)	(0.013)	(0.023)	(0.017)	(0.024)	(0.016)
Born 6 Years Before the Translation	0.115***	−0.007	0.023	0.010	0.098**	0.010
	(0.029)	(0.017)	(0.028)	(0.014)	(0.045)	(0.011)
Born 5 Years Before the Translation	0.029	0.017	0.007	0.010	0.038	0.020**
	(0.029)	(0.011)	(0.028)	(0.010)	(0.044)	(0.010)
Born 4 Years Before the Translation	0.146***	−0.014	0.084***	−0.013	0.060***	0.007
	(0.028)	(0.017)	(0.017)	(0.019)	(0.022)	(0.011)
Born 3 Years Before the Translation	0.024	−0.034**	0.029	0.007	0.038	−0.033***
	(0.039)	(0.016)	(0.025)	(0.009)	(0.030)	(0.011)
Born 2 Years Before the Translation	−0.007	0.022**	−0.001	0.035***	0.021	0.018*
	(0.032)	(0.010)	(0.021)	(0.009)	(0.029)	(0.009)
Born at Year of Translation	0.096***	−0.008	0.003	0.004	0.076***	0.002
	(0.020)	(0.015)	(0.021)	(0.014)	(0.022)	(0.008)
Born 1 Year After the Translation	0.091***	−0.010	0.028	0.042***	0.105***	0.038***
	(0.012)	(0.016)	(0.018)	(0.012)	(0.018)	(0.012)
Born 2 Years After the Translation	0.099***	0.037**	0.031	0.062***	0.039*	0.043***
	(0.026)	(0.017)	(0.021)	(0.016)	(0.022)	(0.012)
Born 3 Years After the Translation	0.090***	0.056***	0.013	0.064***	0.069***	0.051***
	(0.024)	(0.014)	(0.023)	(0.016)	(0.023)	(0.013)
Born 4 Years After the Translation	0.110***	0.005	0.027	0.032	0.077***	0.028*
	(0.017)	(0.016)	(0.017)	(0.019)	(0.026)	(0.014)
Born 5 Years After the Translation	0.067***	0.006	0.036*	0.049*	0.183***	0.033***
	(0.024)	(0.020)	(0.021)	(0.025)	(0.039)	(0.011)
Born 6 Years After the Translation	0.030	0.052**	0.063**	0.071**	0.149***	0.057***
	(0.023)	(0.023)	(0.029)	(0.028)	(0.028)	(0.014)
Born 7 Years After the Translation	0.022	0.014	−0.003	0.043	0.054*	0.031**
	(0.026)	(0.021)	(0.026)	(0.026)	(0.029)	(0.014)
Born 8 Years After the Translation	0.115***	0.102***	0.039	0.114***	0.170***	0.090***
	(0.020)	(0.019)	(0.026)	(0.025)	(0.027)	(0.017)
Born 9 Years After the Translation	0.051**	0.025	0.009	0.046	0.103***	0.055***
	(0.020)	(0.021)	(0.026)	(0.027)	(0.033)	(0.020)
Born 10 Years After the Translation	0.156***	0.095***	0.094***	0.073**	0.221***	0.137***
	(0.028)	(0.033)	(0.033)	(0.029)	(0.035)	(0.024)
Born 11 Years After the Translation	0.083***	0.098***	0.033	0.095***	0.169***	0.151***
	(0.029)	(0.024)	(0.032)	(0.031)	(0.043)	(0.028)
Born 12 Years After the Translation	0.047	0.132***	0.014	0.125***	0.152***	0.128***
	(0.033)	(0.021)	(0.030)	(0.027)	(0.054)	(0.026)
Born 13 Years After the Translation	0.109***	0.124***	0.049	0.122***	0.143***	0.059**
	(0.034)	(0.023)	(0.036)	(0.030)	(0.051)	(0.028)
Born 14 Years After the Translation	0.106***	0.108***	0.048	0.100***	0.034	0.016
	(0.037)	(0.021)	(0.037)	(0.031)	(0.042)	(0.024)
N	21268	53798	21261	53782	21268	53798
Mean for Never Translated	0.63	0.45	0.67	0.53	0.35	0.25

Notes: This table presents coefficients from event-study estimates based on Sun and Abraham (2021). Controls include indicators for male and rural. Standard errors are clustered at the Ethno-linguistic group level.
* p < 0.1, ** p < 0.05, *** p < 0.01

Table B.9: Sun and Abraham Estimates for Religious Affiliation

	Christian	Muslim	Catholic	Protestant
	(1)	(2)	(3)	(4)
Born After Translation	−0.004	0.009	−0.026**	0.022**
	(0.007)	(0.006)	(0.006)	(0.007)
N	75066	75066	75066	75066
Mean for Never Translated	0.34	0.64	0.06	0.28

Notes: This table presents coefficients from difference-in-differences estimators following Sun and Abraham (2021) and described in Section 3.3.2. Controls include indicators for male and rural. Standard errors are clustered at the ethno-linguistic group level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B.10: Sun and Abraham Event Study Estimates for Literacy, Years of Education, and Primary School Completion by Proximity to Historical Missions

	Literacy		Years of Education		Primary School Completion	
	< 10km	≥ 10km	< 10km	≥ 10km	< 10km	≥ 10km
	(1)	(2)	(3)	(4)	(5)	(6)
Born 15 Years Before the Translation	0.033	0.029	−0.443	0.449	−0.041	0.009
	(0.041)	(0.026)	(0.676)	(0.289)	(0.060)	(0.030)
Born 14 Years Before the Translation	0.022	0.033*	−0.140	0.416**	0.073*	0.021
	(0.028)	(0.020)	(0.441)	(0.199)	(0.042)	(0.024)
Born 13 Years Before the Translation	−0.039	0.026	−0.189	0.115	−0.023	−0.009
	(0.044)	(0.017)	(0.488)	(0.185)	(0.052)	(0.025)
Born 12 Years Before the Translation	0.057	0.021	1.585***	0.176	0.118**	0.003
	(0.040)	(0.026)	(0.421)	(0.219)	(0.050)	(0.025)
Born 11 Years Before the Translation	0.188***	0.015	1.578***	0.084	0.166***	−0.005
	(0.050)	(0.015)	(0.359)	(0.174)	(0.044)	(0.020)
Born 10 Years Before the Translation	0.030	0.024	−0.430	0.215	0.067*	0.023
	(0.037)	(0.028)	(0.378)	(0.202)	(0.039)	(0.020)
Born 9 Years Before the Translation	−0.075**	0.009	−1.159**	0.231	−0.070	0.004
	(0.028)	(0.013)	(0.456)	(0.166)	(0.045)	(0.017)
Born 8 Years Before the Translation	0.094***	−0.014	0.044	−0.118	−0.077*	−0.006
	(0.030)	(0.014)	(0.294)	(0.173)	(0.040)	(0.019)
Born 7 Years Before the Translation	−0.077**	0.010	−1.268***	0.201*	−0.050	0.016
	(0.032)	(0.013)	(0.407)	(0.116)	(0.046)	(0.012)
Born 6 Years Before the Translation	0.185***	0.010	1.023**	0.201	0.145***	0.012
	(0.030)	(0.013)	(0.367)	(0.139)	(0.035)	(0.014)
Born 5 Years Before the Translation	0.025	−0.011	0.135	0.093	0.065*	0.009
	(0.032)	(0.020)	(0.368)	(0.101)	(0.036)	(0.014)
Born 4 Years Before the Translation	0.180***	0.018	0.164	0.207	0.089***	0.030*
	(0.017)	(0.011)	(0.198)	(0.132)	(0.013)	(0.018)
Born 3 Years Before the Translation	0.013	−0.043***	−0.564	−0.258***	−0.043	−0.029***
	(0.022)	(0.011)	(0.406)	(0.089)	(0.031)	(0.010)
Born 2 Years Before the Translation	0.070***	−0.002	0.442*	0.168*	0.038**	0.014
	(0.024)	(0.020)	(0.231)	(0.091)	(0.016)	(0.013)
Born at Year of Translation	0.015	−0.006	1.280***	−0.047	0.129***	−0.003
	(0.023)	(0.019)	(0.387)	(0.107)	(0.034)	(0.017)
Born 1 Year After the Translation	0.007	0.016	0.134	0.657***	0.071**	0.024***
	(0.024)	(0.011)	(0.320)	(0.121)	(0.028)	(0.006)
Born 2 Years After the Translation	0.162***	0.013	2.003***	0.419***	0.169***	0.027**
	(0.029)	(0.013)	(0.470)	(0.129)	(0.046)	(0.012)
Born 3 Years After the Translation	0.091***	0.049***	1.493***	0.615***	0.123***	0.043***
	(0.019)	(0.015)	(0.335)	(0.121)	(0.035)	(0.015)
Born 4 Years After the Translation	0.033	0.021	0.658	0.376***	0.057	0.039***
	(0.027)	(0.014)	(0.397)	(0.112)	(0.039)	(0.011)
Born 5 Years After the Translation	0.094***	0.022	1.187***	0.565***	0.137***	0.048***
	(0.025)	(0.020)	(0.323)	(0.138)	(0.030)	(0.016)
Born 6 Years After the Translation	0.195***	0.014	1.691***	0.512***	0.174***	0.047***
	(0.029)	(0.027)	(0.377)	(0.181)	(0.039)	(0.015)
Born 7 Years After the Translation	0.112***	0.010	1.577***	0.225	0.225***	0.014
	(0.024)	(0.019)	(0.441)	(0.172)	(0.034)	(0.017)
Born 8 Years After the Translation	0.164***	0.110***	1.618***	1.188***	0.270***	0.121***
	(0.024)	(0.019)	(0.387)	(0.228)	(0.031)	(0.024)
Born 9 Years After the Translation	0.018	0.028*	0.144	0.729***	0.124***	0.080***
	(0.025)	(0.016)	(0.575)	(0.231)	(0.044)	(0.025)
Born 10 Years After the Translation	0.194***	0.098***	1.570***	1.218***	0.328***	0.151***
	(0.021)	(0.021)	(0.509)	(0.319)	(0.062)	(0.034)
Born 11 Years After the Translation	0.245***	0.084***	2.294***	1.141***	0.453***	0.137***
	(0.035)	(0.018)	(0.739)	(0.269)	(0.084)	(0.035)
Born 12 Years After the Translation	0.178***	0.102***	0.994*	0.998***	0.313***	0.140***
	(0.039)	(0.016)	(0.490)	(0.218)	(0.091)	(0.030)
Born 13 Years After the Translation	0.150***	0.135***	0.598	0.999***	0.231***	0.092**
	(0.024)	(0.024)	(0.411)	(0.253)	(0.039)	(0.036)
Born 14 Years After the Translation	0.149***	0.106***	0.371	0.516**	0.082**	0.027
	(0.031)	(0.020)	(0.348)	(0.228)	(0.038)	(0.028)
N	11932	63134	11932	63109	11932	63134
Mean for Never Translated	0.65	0.35	7.52	4.10	0.61	0.31

Notes: This table presents coefficients from event-study estimates based on Sun and Abraham (2021). Controls include indicators for male and rural. Standard errors are clustered at the Ethno-linguistic group level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B.11: Sun and Abraham (2021) Event Study Estimates for Literacy, Years of Education, and Primary School Completion by Type of Closest Historical Mission

	Literacy		Years of Education		Primary School Completion	
	Cath. (1)	Prot. (2)	Cath. (3)	Prot. (4)	Cath. (5)	Prot. (6)
Born 15 Years Before the Translation	0.080	0.064	1.429***	−0.065	0.109***	−0.050
	(0.049)	(0.038)	(0.473)	(0.365)	(0.037)	(0.044)
Born 14 Years Before the Translation	0.058*	0.061*	1.010**	0.230	0.076**	0.014
	(0.030)	(0.035)	(0.395)	(0.302)	(0.037)	(0.037)
Born 13 Years Before the Translation	0.039	0.079**	0.884***	0.219	0.058*	−0.004
	(0.026)	(0.033)	(0.325)	(0.366)	(0.029)	(0.050)
Born 12 Years Before the Translation	0.078***	0.082**	1.652***	0.107	0.139***	−0.029
	(0.021)	(0.040)	(0.301)	(0.281)	(0.022)	(0.041)
Born 11 Years Before the Translation	0.095***	−0.003	1.178***	−0.507**	0.101***	−0.053**
	(0.021)	(0.023)	(0.328)	(0.206)	(0.033)	(0.024)
Born 10 Years Before the Translation	0.065*	0.030	1.114***	−0.211	0.105***	0.003
	(0.033)	(0.040)	(0.358)	(0.315)	(0.027)	(0.035)
Born 9 Years Before the Translation	0.042*	0.033*	0.683**	0.026	0.056	−0.013
	(0.024)	(0.019)	(0.334)	(0.285)	(0.034)	(0.027)
Born 8 Years Before the Translation	0.053**	0.024	0.593**	−0.018	0.018	0.039
	(0.025)	(0.020)	(0.275)	(0.240)	(0.025)	(0.028)
Born 7 Years Before the Translation	0.026**	0.033	0.302	0.247	0.029	0.037
	(0.011)	(0.024)	(0.194)	(0.214)	(0.021)	(0.023)
Born 6 Years Before the Translation	0.063***	0.024	0.574***	0.099	0.046**	0.013
	(0.020)	(0.018)	(0.182)	(0.191)	(0.019)	(0.025)
Born 5 Years Before the Translation	0.006	0.013	0.500**	−0.013	0.022	0.027
	(0.013)	(0.038)	(0.194)	(0.209)	(0.017)	(0.030)
Born 4 Years Before the Translation	0.036**	0.052***	0.237	0.300	0.049**	0.037
	(0.016)	(0.018)	(0.260)	(0.236)	(0.022)	(0.028)
Born 3 Years Before the Translation	−0.004	0.006	0.111	−0.011	−0.003	−0.011
	(0.011)	(0.022)	(0.160)	(0.200)	(0.017)	(0.023)
Born 2 Years Before the Translation	−0.006	0.061	0.333	0.386*	0.010	0.058**
	(0.008)	(0.046)	(0.206)	(0.205)	(0.019)	(0.025)
Born at Year of Translation	−0.004	0.030	0.336*	−0.009	0.017	0.023
	(0.013)	(0.030)	(0.183)	(0.127)	(0.018)	(0.026)
Born 1 Year After the Translation	0.034**	0.028**	1.082***	0.311**	0.061***	0.017
	(0.015)	(0.013)	(0.140)	(0.145)	(0.015)	(0.014)
Born 2 Years After the Translation	0.028*	0.076***	1.098***	0.537**	0.085***	0.057**
	(0.017)	(0.016)	(0.131)	(0.206)	(0.026)	(0.021)
Born 3 Years After the Translation	0.091***	0.080***	1.438***	0.727***	0.122***	0.058***
	(0.012)	(0.015)	(0.115)	(0.160)	(0.025)	(0.016)
Born 4 Years After the Translation	0.000	0.075***	0.625***	0.399**	0.075*	0.042**
	(0.021)	(0.013)	(0.218)	(0.184)	(0.037)	(0.019)
Born 5 Years After the Translation	0.054***	0.035	1.149***	0.375	0.118***	0.034
	(0.014)	(0.028)	(0.123)	(0.224)	(0.033)	(0.026)
Born 6 Years After the Translation	0.114***	0.062*	1.483***	0.597***	0.133***	0.058**
	(0.021)	(0.034)	(0.271)	(0.219)	(0.030)	(0.025)
Born 7 Years After the Translation	0.051***	0.050***	0.723***	0.419*	0.071***	0.037
	(0.014)	(0.018)	(0.252)	(0.242)	(0.025)	(0.026)
Born 8 Years After the Translation	0.169***	0.137***	1.557***	1.445***	0.199***	0.132***
	(0.013)	(0.031)	(0.315)	(0.319)	(0.033)	(0.040)
Born 9 Years After the Translation	0.018	0.072***	0.452	0.750***	0.075	0.073**
	(0.018)	(0.024)	(0.460)	(0.227)	(0.048)	(0.028)
Born 10 Years After the Translation	0.132***	0.165***	1.136**	1.489***	0.166***	0.156***
	(0.016)	(0.031)	(0.435)	(0.385)	(0.053)	(0.036)
Born 11 Years After the Translation	0.141***	0.115***	1.335***	1.242***	0.181***	0.118***
	(0.015)	(0.023)	(0.321)	(0.279)	(0.045)	(0.030)
Born 12 Years After the Translation	0.194***	0.103***	1.235***	1.274***	0.181***	0.163***
	(0.012)	(0.023)	(0.340)	(0.306)	(0.041)	(0.028)
Born 13 Years After the Translation	0.174***	0.149***	0.736**	1.487***	0.079*	0.163***
	(0.019)	(0.037)	(0.354)	(0.392)	(0.043)	(0.044)
Born 14 Years After the Translation	0.160***	0.111***	0.227	1.101***	−0.011	0.109***
	(0.013)	(0.027)	(0.315)	(0.327)	(0.042)	(0.031)
N	32060	43006	32057	42984	32060	43006
Mean for Never Translated	0.32	0.46	3.98	5.12	0.31	0.39

Notes: This table presents coefficients from event-study estimates based on Sun and Abraham (2021). Controls include indicators for male and rural. Standard errors are clustered at the Ethno-linguistic group level.
* p < 0.1, ** p < 0.05, *** p < 0.01

Table B.12: Sun and Abraham Event Study Estimates for Literacy, Years of Education, and Primary School Completio by Gender

	Literacy		Years of Education		Primary School Completion	
	Men	Women	Men	Women	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)
Born 15 Years Before the Translation	−0.033	0.044*	−0.322	0.376	0.018	−0.028
	(0.053)	(0.024)	(0.535)	(0.278)	(0.056)	(0.026)
Born 14 Years Before the Translation	0.091***	0.014	1.200***	0.060	0.145***	−0.016
	(0.033)	(0.016)	(0.287)	(0.176)	(0.044)	(0.016)
Born 13 Years Before the Translation	0.075***	−0.027	0.993***	−0.457**	0.050	−0.041*
	(0.027)	(0.020)	(0.297)	(0.215)	(0.038)	(0.024)
Born 12 Years Before the Translation	−0.016	0.046**	0.907**	0.256	0.076	−0.001
	(0.036)	(0.021)	(0.358)	(0.179)	(0.045)	(0.017)
Born 11 Years Before the Translation	0.016	0.030	−0.177	0.311	0.013	0.004
	(0.031)	(0.018)	(0.295)	(0.186)	(0.043)	(0.021)
Born 10 Years Before the Translation	0.056	0.006	0.556	−0.099	0.094**	−0.007
	(0.043)	(0.020)	(0.401)	(0.140)	(0.041)	(0.013)
Born 9 Years Before the Translation	0.002	0.002	0.100	0.071	0.026	−0.011
	(0.039)	(0.014)	(0.241)	(0.180)	(0.029)	(0.018)
Born 8 Years Before the Translation	0.079***	−0.023**	0.148	−0.169	0.007	−0.017
	(0.028)	(0.011)	(0.291)	(0.154)	(0.036)	(0.015)
Born 7 Years Before the Translation	−0.042	0.013	−0.361*	0.135	−0.009	0.011
	(0.027)	(0.011)	(0.186)	(0.149)	(0.029)	(0.015)
Born 6 Years Before the Translation	0.071*	0.012	0.769*	0.101	0.108**	−0.004
	(0.038)	(0.012)	(0.391)	(0.114)	(0.044)	(0.010)
Born 5 Years Before the Translation	−0.036	0.006	−0.011	0.121	0.003	0.014
	(0.051)	(0.008)	(0.386)	(0.124)	(0.043)	(0.012)
Born 4 Years Before the Translation	0.126***	−0.007	0.649***	−0.071	0.109***	0.001
	(0.024)	(0.012)	(0.169)	(0.144)	(0.019)	(0.017)
Born 3 Years Before the Translation	−0.036	−0.029*	−0.023	−0.307***	0.025	−0.050***
	(0.051)	(0.015)	(0.321)	(0.108)	(0.031)	(0.012)
Born 2 Years Before the Translation	−0.031	0.021**	0.067	0.249***	0.023	0.012
	(0.048)	(0.008)	(0.226)	(0.073)	(0.029)	(0.009)
Born at Year of Translation	0.031	−0.011	0.595**	−0.043	0.129***	−0.027***
	(0.029)	(0.012)	(0.224)	(0.083)	(0.042)	(0.008)
Born 1 Year After the Translation	0.038	0.007	1.130***	0.457***	0.112***	0.007
	(0.026)	(0.010)	(0.146)	(0.127)	(0.030)	(0.010)
Born 2 Years After the Translation	0.046*	0.028***	0.644***	0.530***	0.077***	0.030***
	(0.027)	(0.010)	(0.143)	(0.118)	(0.024)	(0.011)
Born 3 Years After the Translation	0.029	0.057***	0.768***	0.671***	0.085***	0.038***
	(0.024)	(0.011)	(0.203)	(0.124)	(0.024)	(0.013)
Born 4 Years After the Translation	0.029	0.018*	0.682***	0.275**	0.098***	0.024*
	(0.023)	(0.009)	(0.168)	(0.132)	(0.024)	(0.012)
Born 5 Years After the Translation	0.068**	0.019	1.369***	0.360***	0.190***	0.013
	(0.034)	(0.012)	(0.257)	(0.119)	(0.043)	(0.011)
Born 6 Years After the Translation	0.017	0.062***	1.187***	0.691***	0.144***	0.053***
	(0.036)	(0.017)	(0.306)	(0.191)	(0.037)	(0.016)
Born 7 Years After the Translation	0.007	0.024*	0.344	0.385*	0.095**	0.022
	(0.027)	(0.013)	(0.267)	(0.192)	(0.040)	(0.015)
Born 8 Years After the Translation	0.095***	0.121***	1.535***	1.134***	0.224***	0.116***
	(0.027)	(0.019)	(0.223)	(0.249)	(0.027)	(0.025)
Born 9 Years After the Translation	0.001	0.032**	0.698**	0.595**	0.151***	0.063***
	(0.030)	(0.014)	(0.344)	(0.247)	(0.046)	(0.021)
Born 10 Years After the Translation	0.113***	0.110***	1.671***	1.083***	0.273***	0.137***
	(0.029)	(0.028)	(0.380)	(0.358)	(0.043)	(0.037)
Born 11 Years After the Translation	0.072**	0.104***	1.106**	1.255***	0.194***	0.159***
	(0.029)	(0.015)	(0.420)	(0.304)	(0.051)	(0.038)
Born 12 Years After the Translation	0.049	0.136***	0.641	1.091***	0.198***	0.149***
	(0.036)	(0.018)	(0.418)	(0.252)	(0.061)	(0.032)
Born 13 Years After the Translation	0.132***	0.134***	0.991**	0.856***	0.174***	0.078**
	(0.026)	(0.022)	(0.385)	(0.260)	(0.049)	(0.032)
Born 14 Years After the Translation	0.077**	0.112***	0.359	0.427*	0.049	0.020
	(0.035)	(0.017)	(0.376)	(0.247)	(0.045)	(0.029)
N	21268	53798	21261	53780	21268	53798
Mean for Never Translated	0.50	0.36	5.64	4.28	0.43	0.33

Notes: This table presents coefficients from event-study estimates based on Sun and Abraham (2021). Controls include indicators for male and rural. Standard errors are clustered at the Ethno-linguistic group level.
* p < 0.1, ** p < 0.05, *** p < 0.01

Table B.13: Sun and Abraham (2021) Event Study Estimates for Literacy, Years of Education, and Primary School Completion by Share of Muslims in the Region

	Literacy		Years of Education		Primary School Completion	
	Maj. Muslim (1)	Min. Muslim (2)	Maj. Muslim (3)	Min. Muslim (4)	Maj. Muslim (5)	Min. Muslim (6)
Born 15 Years Before the Translation	0.007	0.117***	0.357	0.373	0.049**	−0.071
	(0.027)	(0.037)	(0.277)	(0.400)	(0.024)	(0.054)
Born 14 Years Before the Translation	0.039*	0.091**	0.631**	0.443	0.081***	−0.036
	(0.022)	(0.042)	(0.287)	(0.400)	(0.027)	(0.049)
Born 13 Years Before the Translation	0.014	0.047	0.408	−0.144	0.065**	−0.132**
	(0.019)	(0.051)	(0.259)	(0.427)	(0.026)	(0.059)
Born 12 Years Before the Translation	0.077***	−0.016	0.941***	−0.006	0.092***	−0.086**
	(0.023)	(0.055)	(0.288)	(0.408)	(0.028)	(0.040)
Born 11 Years Before the Translation	0.061**	0.007	0.632**	−0.162	0.073***	−0.070
	(0.024)	(0.038)	(0.280)	(0.327)	(0.025)	(0.042)
Born 10 Years Before the Translation	0.027	0.037	0.445*	−0.180	0.065***	−0.003
	(0.022)	(0.055)	(0.232)	(0.562)	(0.020)	(0.057)
Born 9 Years Before the Translation	0.026	−0.006	0.339	−0.259	0.027	−0.062
	(0.018)	(0.047)	(0.266)	(0.475)	(0.028)	(0.046)
Born 8 Years Before the Translation	0.033	0.009	−0.051	0.173	−0.010	0.016
	(0.020)	(0.029)	(0.225)	(0.336)	(0.021)	(0.035)
Born 7 Years Before the Translation	0.009	0.008	0.002	0.225	0.014	0.003
	(0.013)	(0.028)	(0.193)	(0.254)	(0.025)	(0.025)
Born 6 Years Before the Translation	0.028**	0.051	0.015	0.662*	0.010	0.017
	(0.013)	(0.031)	(0.134)	(0.331)	(0.015)	(0.033)
Born 5 Years Before the Translation	−0.004	0.017	0.067	0.260	0.008	0.025
	(0.008)	(0.037)	(0.108)	(0.298)	(0.011)	(0.030)
Born 4 Years Before the Translation	0.053***	0.036	0.157	0.379	0.057***	0.023
	(0.017)	(0.025)	(0.187)	(0.349)	(0.018)	(0.039)
Born 3 Years Before the Translation	−0.021	−0.022	−0.430***	0.202	−0.027	−0.032
	(0.013)	(0.040)	(0.153)	(0.418)	(0.018)	(0.037)
Born 2 Years Before the Translation	−0.001	0.056	0.005	0.677**	0.011	0.039
	(0.010)	(0.051)	(0.130)	(0.289)	(0.015)	(0.026)
Born at Year of Translation	0.012	−0.002	0.151	0.244	0.033***	−0.010
	(0.008)	(0.044)	(0.094)	(0.259)	(0.012)	(0.028)
Born 1 Year After the Translation	0.030**	0.017	0.655***	0.633**	0.056***	0.005
	(0.015)	(0.025)	(0.153)	(0.302)	(0.014)	(0.026)
Born 2 Years After the Translation	0.047**	0.057*	0.870***	0.573**	0.069***	0.045
	(0.017)	(0.030)	(0.113)	(0.264)	(0.021)	(0.030)
Born 3 Years After the Translation	0.058***	0.062	0.701***	0.951***	0.071***	0.049**
	(0.013)	(0.038)	(0.080)	(0.256)	(0.014)	(0.024)
Born 4 Years After the Translation	0.011	0.076***	0.383***	0.646***	0.065***	0.037
	(0.016)	(0.020)	(0.120)	(0.236)	(0.019)	(0.026)
Born 5 Years After the Translation	0.053***	0.026	0.671***	0.685***	0.084***	0.033
	(0.014)	(0.032)	(0.079)	(0.189)	(0.020)	(0.022)
Born 6 Years After the Translation	0.060***	0.080***	0.631***	1.162***	0.100***	0.055**
	(0.018)	(0.024)	(0.197)	(0.169)	(0.024)	(0.022)
Born 7 Years After the Translation	0.024**	0.046	−0.004	0.840**	0.043**	0.031
	(0.011)	(0.032)	(0.145)	(0.322)	(0.016)	(0.034)
Born 8 Years After the Translation	0.144***	0.101**	1.055***	1.290***	0.160***	0.092**
	(0.008)	(0.043)	(0.142)	(0.251)	(0.015)	(0.035)
Born 9 Years After the Translation	0.026**	0.058*	0.220	0.750**	0.064***	0.025
	(0.011)	(0.032)	(0.185)	(0.287)	(0.020)	(0.033)
Born 10 Years After the Translation	0.113***	0.154***	0.525***	2.066***	0.118***	0.163***
	(0.015)	(0.035)	(0.170)	(0.309)	(0.019)	(0.033)
Born 11 Years After the Translation	0.141***	0.056	1.007***	1.222***	0.153***	0.087**
	(0.014)	(0.041)	(0.189)	(0.326)	(0.026)	(0.034)
Born 12 Years After the Translation	0.148***	0.078**	0.608***	1.699***	0.141***	0.156***
	(0.014)	(0.031)	(0.217)	(0.345)	(0.027)	(0.031)
Born 13 Years After the Translation	0.139***	0.156***	0.557**	2.016***	0.092***	0.190***
	(0.016)	(0.048)	(0.204)	(0.519)	(0.027)	(0.059)
Born 14 Years After the Translation	0.156***	0.085**	0.462**	1.263***	0.057*	0.098***
	(0.019)	(0.034)	(0.203)	(0.332)	(0.031)	(0.031)
N	47493	27573	47477	27564	47493	27573
Mean for Never Translated	0.22	0.72	3.12	7.41	0.27	0.53

Notes: This table presents coefficients from event-study estimates based on Sun and Abraham (2021). Controls include indicators for male and rural. Standard errors are clustered at the Ethno-linguistic group level.
* p < 0.1, ** p < 0.05, *** p < 0.01

Table B.14: Sun and Abraham Estimates for Religious Affiliation

	Christian (1)	Muslim (2)	Catholic (3)	Protestant (4)
Born 15 Years Before the Translation	0.015	−0.002	−0.048**	0.063**
	(0.013)	(0.011)	(0.010)	(0.016)
Born 14 Years Before the Translation	−0.005	0.013	−0.029**	0.024***
	(0.010)	(0.009)	(0.011)	(0.014)
Born 13 Years Before the Translation	0.007	0.010	−0.005	0.012
	(0.013)	(0.009)	(0.015)	(0.016)
Born 12 Years Before the Translation	0.005	−0.008	−0.013	0.018
	(0.014)	(0.012)	(0.013)	(0.016)
Born 11 Years Before the Translation	−0.004	0.002	−0.035**	0.031**
	(0.009)	(0.009)	(0.012)	(0.013)
Born 10 Years Before the Translation	−0.003	0.008***	0.009	−0.011
	(0.007)	(0.004)	(0.012)	(0.012)
Born 9 Years Before the Translation	0.005	0.004	0.017	−0.012
	(0.014)	(0.011)	(0.015)	(0.017)
Born 8 Years Before the Translation	−0.001	0.004	−0.014	0.014
	(0.009)	(0.008)	(0.018)	(0.018)
Born 7 Years Before the Translation	−0.001	0.001	−0.036**	0.035***
	(0.013)	(0.010)	(0.012)	(0.019)
Born 6 Years Before the Translation	0.004	0.010	−0.015**	0.019**
	(0.007)	(0.006)	(0.006)	(0.008)
Born 5 Years Before the Translation	0.004	0.000	−0.033	0.036**
	(0.007)	(0.007)	(0.020)	(0.018)
Born 4 Years Before the Translation	−0.001	0.006	−0.020**	0.019
	(0.018)	(0.012)	(0.007)	(0.017)
Born 3 Years Before the Translation	0.002	0.003	−0.026***	0.028***
	(0.011)	(0.010)	(0.013)	(0.014)
Born 2 Years Before the Translation	0.009	0.004	0.003	0.006
	(0.009)	(0.007)	(0.013)	(0.016)
Born at Year of Translation	−0.010	0.015**	−0.018**	0.007
	(0.007)	(0.006)	(0.004)	(0.006)
Born 1 Year After the Translation	−0.008	0.011	−0.027**	0.019
	(0.011)	(0.008)	(0.011)	(0.013)
Born 2 Years After the Translation	−0.002	0.007	−0.022**	0.020**
	(0.008)	(0.005)	(0.006)	(0.007)
Born 3 Years After the Translation	−0.010	0.009	−0.013	0.003
	(0.010)	(0.007)	(0.008)	(0.007)
Born 4 Years After the Translation	0.001	0.005	−0.005	0.007
	(0.004)	(0.004)	(0.006)	(0.007)
Born 5 Years After the Translation	−0.008	0.013***	−0.037**	0.028**
	(0.007)	(0.007)	(0.009)	(0.012)
Born 6 Years After the Translation	−0.012	0.018**	−0.029**	0.017**
	(0.008)	(0.005)	(0.007)	(0.008)
Born 7 Years After the Translation	−0.010	0.015**	−0.029**	0.018**
	(0.008)	(0.007)	(0.007)	(0.009)
Born 8 Years After the Translation	0.003	0.002	−0.025**	0.028**
	(0.009)	(0.008)	(0.008)	(0.010)
Born 9 Years After the Translation	−0.009	0.013**	−0.022**	0.013
	(0.007)	(0.006)	(0.008)	(0.008)
Born 10 Years After the Translation	−0.010	0.013***	−0.037**	0.027**
	(0.010)	(0.007)	(0.008)	(0.012)
Born 11 Years After the Translation	−0.007	0.010	−0.015**	0.008
	(0.012)	(0.009)	(0.005)	(0.011)
Born 12 Years After the Translation	0.008	0.003	−0.028**	0.035**
	(0.008)	(0.007)	(0.011)	(0.009)
Born 13 Years After the Translation	0.005	0.003	−0.026**	0.031**
	(0.010)	(0.008)	(0.011)	(0.014)
Born 14 Years After the Translation	0.002	0.005	−0.051**	0.053**
	(0.008)	(0.008)	(0.008)	(0.008)
N	75066	75066	75066	75066
Mean for Never Translated	0.34	0.64	0.06	0.28

Notes: This table presents coefficients from event-study estimates based on Sun and Abraham (2021). Controls include indicators for male and rural. Standard errors are clustered at the Ethno-linguistic group level.
* p < 0.1, ** p < 0.05, *** p < 0.01

Table B.15: Sun and Abraham Event Study Estimates for Literacy, Years of Education, and Primary School Completion by Proximity to Historical Missions - Median Distance

	Literacy		Years of Education		Primary School Completion	
	< 57.5km	≥ 57.5km	< 57.5km	≥ 57.5km	< 57.5km	≥ 57.5km
	(1)	(2)	(3)	(4)	(5)	(6)
Born 15 Years Before the Translation	0.019	0.019	0.282	0.219	0.003	0.004
	(0.034)	(0.033)	(0.372)	(0.212)	(0.039)	(0.022)
Born 14 Years Before the Translation	0.046***	0.016	0.599**	0.179	0.077***	−0.002
	(0.016)	(0.022)	(0.226)	(0.178)	(0.026)	(0.018)
Born 13 Years Before the Translation	−0.056**	0.044**	0.215	0.132	0.004	0.011
	(0.023)	(0.018)	(0.212)	(0.203)	(0.021)	(0.022)
Born 12 Years Before the Translation	0.052**	−0.007	0.779***	0.228	0.061**	0.012
	(0.025)	(0.026)	(0.273)	(0.195)	(0.024)	(0.021)
Born 11 Years Before the Translation	0.067**	0.005	0.603**	0.028	0.066**	−0.010
	(0.028)	(0.017)	(0.238)	(0.178)	(0.026)	(0.015)
Born 10 Years Before the Translation	0.084***	−0.006	0.782***	−0.086	0.086***	0.001
	(0.021)	(0.024)	(0.170)	(0.219)	(0.015)	(0.023)
Born 9 Years Before the Translation	0.006	0.008	0.079	0.147	0.006	−0.001
	(0.015)	(0.016)	(0.200)	(0.176)	(0.020)	(0.017)
Born 8 Years Before the Translation	0.007	−0.016	0.118	−0.334**	−0.001	−0.023*
	(0.015)	(0.018)	(0.140)	(0.154)	(0.018)	(0.013)
Born 7 Years Before the Translation	−0.011	0.001	0.016	0.012	0.019	−0.002
	(0.016)	(0.011)	(0.200)	(0.091)	(0.024)	(0.011)
Born 6 Years Before the Translation	0.046***	0.016	0.316***	0.241*	0.033**	0.022
	(0.013)	(0.011)	(0.097)	(0.137)	(0.013)	(0.014)
Born 5 Years Before the Translation	0.008	−0.006	0.401***	−0.028	0.035**	0.001
	(0.025)	(0.012)	(0.141)	(0.168)	(0.013)	(0.011)
Born 4 Years Before the Translation	0.041	0.034**	0.293	0.163	0.060**	0.022
	(0.028)	(0.015)	(0.265)	(0.176)	(0.024)	(0.015)
Born 3 Years Before the Translation	−0.021**	−0.024**	−0.216	−0.161	−0.026*	−0.021**
	(0.009)	(0.010)	(0.199)	(0.132)	(0.013)	(0.010)
Born 2 Years Before the Translation	0.030*	0.001	0.438***	0.075	0.030***	0.007
	(0.017)	(0.018)	(0.114)	(0.103)	(0.010)	(0.012)
Born at Year of Translation	0.014	−0.008	0.792***	−0.196	0.075***	−0.020
	(0.011)	(0.014)	(0.177)	(0.139)	(0.014)	(0.012)
Born 1 Year After the Translation	−0.017	0.039***	0.519***	0.711***	0.024*	0.037***
	(0.014)	(0.013)	(0.183)	(0.159)	(0.012)	(0.012)
Born 2 Years After the Translation	0.050***	0.017	0.801**	0.463***	0.056**	0.035**
	(0.014)	(0.015)	(0.296)	(0.121)	(0.026)	(0.013)
Born 3 Years After the Translation	0.100***	0.036**	1.380***	0.491**	0.134***	0.019
	(0.023)	(0.015)	(0.290)	(0.184)	(0.019)	(0.015)
Born 4 Years After the Translation	0.038***	0.018	1.068***	0.130	0.092***	0.023**
	(0.014)	(0.013)	(0.299)	(0.112)	(0.026)	(0.011)
Born 5 Years After the Translation	0.051***	0.026	1.191***	0.393*	0.113***	0.032
	(0.015)	(0.018)	(0.297)	(0.219)	(0.024)	(0.020)
Born 6 Years After the Translation	0.118***	0.007	1.669***	0.250	0.168***	0.017
	(0.020)	(0.029)	(0.350)	(0.280)	(0.026)	(0.022)
Born 7 Years After the Translation	0.073***	−0.005	1.438***	−0.164	0.141***	−0.011
	(0.021)	(0.018)	(0.392)	(0.173)	(0.026)	(0.017)
Born 8 Years After the Translation	0.141***	0.105***	1.675***	1.035***	0.229***	0.095***
	(0.025)	(0.018)	(0.396)	(0.287)	(0.033)	(0.029)
Born 9 Years After the Translation	0.015	0.042***	1.409***	0.323	0.196***	0.030
	(0.019)	(0.015)	(0.510)	(0.219)	(0.046)	(0.023)
Born 10 Years After the Translation	0.122***	0.101***	2.103***	0.800***	0.314***	0.098***
	(0.021)	(0.023)	(0.540)	(0.261)	(0.063)	(0.025)
Born 11 Years After the Translation	0.185***	0.060***	2.616***	0.501***	0.393***	0.046**
	(0.026)	(0.018)	(0.597)	(0.160)	(0.074)	(0.022)
Born 12 Years After the Translation	0.177***	0.088***	1.528***	0.710***	0.282***	0.101***
	(0.028)	(0.015)	(0.468)	(0.157)	(0.080)	(0.024)
Born 13 Years After the Translation	0.110***	0.146***	0.753**	0.958***	0.116***	0.093***
	(0.019)	(0.025)	(0.326)	(0.242)	(0.039)	(0.033)
Born 14 Years After the Translation	0.094***	0.125***	0.683**	0.410	0.056	0.023
	(0.027)	(0.018)	(0.293)	(0.244)	(0.035)	(0.030)
N	37530	37536	37529	37512	37530	37536
Mean for Never Translated	0.59	0.18	6.63	2.39	0.51	0.19

Notes: This table presents coefficients from event-study estimates based on Sun and Abraham (2021). Controls include indicators for male and rural. Standard errors are clustered at the Ethno-linguistic group level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B.16: Estimates for Literacy, Years of Education, and Primary School Completion Using Other Estimators

	Literacy			Years of Education			Primary School Completion		
	TWFE (1)	CS (2)	Gardner (3)	TWFE (4)	CS (5)	Gardner (6)	TWFE (7)	CS (8)	Gardner (9)
Born 15 Years Before the Translation	0.019		0.006	0.172		0.037	−0.007		−0.015
	(0.042)		(0.027)	(0.367)		(0.262)	(0.051)		(0.035)
Born 14 Years Before the Translation	0.029	0.060	0.018	0.343***	0.498	0.210***	0.025	0.053	0.019
	(0.023)	(0.089)	(0.014)	(0.189)	(0.628)	(0.120)	(0.029)	(0.119)	(0.013)
Born 13 Years Before the Translation	0.010	−0.040	0.000	0.081	−0.410	−0.019	−0.013	−0.030	−0.017
	(0.029)	(0.051)	(0.020)	(0.208)	(0.757)	(0.127)	(0.040)	(0.049)	(0.025)
Born 12 Years Before the Translation	0.041	0.011	0.029	0.524**	0.335	0.396**	0.031	0.030	0.024
	(0.035)	(0.119)	(0.023)	(0.216)	(1.269)	(0.158)	(0.036)	(0.121)	(0.023)
Born 11 Years Before the Translation	0.031	0.034	0.012	0.222	0.155	0.059	0.014	0.015	−0.001
	(0.021)	(0.062)	(0.021)	(0.277)	(0.573)	(0.227)	(0.038)	(0.072)	(0.028)
Born 10 Years Before the Translation	0.033	0.008	0.016	0.188	0.107	0.056	0.034	0.025	0.020
	(0.028)	(0.080)	(0.020)	(0.297)	(0.540)	(0.250)	(0.030)	(0.070)	(0.021)
Born 9 Years Before the Translation	0.006	0.019	−0.004	0.082	0.213	0.000	−0.008	−0.011	−0.011
	(0.026)	(0.089)	(0.017)	(0.140)	(1.035)	(0.132)	(0.019)	(0.098)	(0.014)
Born 8 Years Before the Translation	−0.008	−0.021	−0.015	−0.162	−0.319	−0.249**	−0.017	−0.017	−0.020
	(0.022)	(0.076)	(0.013)	(0.210)	(0.802)	(0.111)	(0.030)	(0.083)	(0.017)
Born 7 Years Before the Translation	0.011	0.005	−0.002	0.062	0.105	−0.036	0.012	0.018	0.006
	(0.027)	(0.052)	(0.016)	(0.257)	(0.528)	(0.197)	(0.029)	(0.050)	(0.022)
Born 6 Years Before the Translation	0.030**	0.003	0.011	0.294	0.094	0.114	0.026	0.002	0.011
	(0.014)	(0.053)	(0.012)	(0.197)	(0.675)	(0.202)	(0.019)	(0.072)	(0.016)
Born 5 Years Before the Translation	−0.001	−0.015	−0.019	0.092	0.045	−0.049	0.018	0.003	0.001
	(0.025)	(0.039)	(0.012)	(0.182)	(0.405)	(0.110)	(0.024)	(0.051)	(0.016)
Born 4 Years Before the Translation	0.041**	0.043	0.026	0.219	0.169	0.075	0.041**	0.030	0.027***
	(0.017)	(0.035)	(0.019)	(0.170)	(0.414)	(0.153)	(0.019)	(0.061)	(0.015)
Born 3 Years Before the Translation	−0.025	−0.086	−0.037***	−0.207	−0.732	−0.317**	−0.024	−0.085	−0.035**
	(0.029)	(0.057)	(0.020)	(0.133)	(0.622)	(0.092)	(0.017)	(0.056)	(0.011)
Born 2 Years Before the Translation	0.025	0.061	0.008	0.335	0.680	0.146	0.028	0.070	0.014
	(0.034)	(0.073)	(0.027)	(0.248)	(0.644)	(0.252)	(0.032)	(0.066)	(0.033)
Born 1 Year Before the Translation		−0.023			−0.385			−0.038	
		(0.068)			(0.616)			(0.066)	
Born at Year of Translation	0.010	0.012	−0.007	0.193***	0.216	0.053	0.031	0.023	0.013
	(0.029)	(0.056)	(0.016)	(0.112)	(0.351)	(0.109)	(0.019)	(0.046)	(0.012)
Born 1 Year After the Translation	0.025	0.034	0.011	0.677**	0.810	0.547**	0.044**	0.055	0.031**
	(0.018)	(0.049)	(0.026)	(0.146)	(0.402)	(0.231)	(0.011)	(0.035)	(0.015)
Born 2 Years After the Translation	0.033	0.041	0.020	0.605**	0.720	0.493**	0.051**	0.056	0.038**
	(0.020)	(0.055)	(0.021)	(0.112)	(0.341)	(0.178)	(0.010)	(0.044)	(0.017)
Born 3 Years After the Translation	0.070**	0.063	0.052**	0.870**	0.864	0.729**	0.080**	0.070	0.060**
	(0.021)	(0.052)	(0.019)	(0.246)	(0.386)	(0.235)	(0.031)	(0.046)	(0.022)
Born 4 Years After the Translation	0.026	0.036	0.005	0.413**	0.582	0.268	0.054**	0.060	0.033***
	(0.017)	(0.099)	(0.019)	(0.126)	(0.434)	(0.210)	(0.015)	(0.056)	(0.017)
Born 5 Years After the Translation	0.035	0.060	0.018	0.659**	0.953	0.521***	0.071**	0.085	0.050***
	(0.029)	(0.060)	(0.025)	(0.281)	(0.409)	(0.307)	(0.032)	(0.045)	(0.026)
Born 6 Years After the Translation	0.054	0.063	0.040	0.819**	0.996	0.696**	0.081**	0.084	0.070**
	(0.033)	(0.075)	(0.033)	(0.309)	(0.599)	(0.353)	(0.036)	(0.065)	(0.035)
Born 7 Years After the Translation	0.029	0.029	0.016	0.443***	0.547	0.316	0.056**	0.051	0.040***
	(0.020)	(0.070)	(0.019)	(0.238)	(0.575)	(0.257)	(0.027)	(0.058)	(0.024)
Born 8 Years After the Translation	0.120**	0.134*	0.110**	1.235**	1.464*	1.156**	0.148**	0.154	0.140**
	(0.030)	(0.057)	(0.022)	(0.328)	(0.578)	(0.268)	(0.042)	(0.064)	(0.032)
Born 9 Years After the Translation	0.032	0.059	0.012	0.640**	0.936	0.510***	0.087***	0.102	0.074
	(0.021)	(0.095)	(0.019)	(0.261)	(0.719)	(0.289)	(0.047)	(0.067)	(0.046)
Born 10 Years After the Translation	0.118**	0.135	0.102**	1.280**	1.473*	1.160**	0.182**	0.183***	0.168**
	(0.037)	(0.071)	(0.027)	(0.428)	(0.509)	(0.390)	(0.069)	(0.057)	(0.062)
Born 11 Years After the Translation	0.107**	0.131	0.098**	1.268**	1.586***	1.197**	0.175**	0.180**	0.170**
	(0.028)	(0.078)	(0.025)	(0.338)	(0.461)	(0.338)	(0.073)	(0.064)	(0.072)
Born 12 Years After the Translation	0.120**	0.181	0.108**	1.049**	1.623*	0.897**	0.168**	0.185**	0.154**
	(0.030)	(0.091)	(0.028)	(0.276)	(0.634)	(0.250)	(0.053)	(0.067)	(0.044)
Born 13 Years After the Translation	0.145**	0.238	0.134**	0.948**	1.717	0.840**	0.115**	0.155	0.104**
	(0.028)	(0.111)	(0.024)	(0.280)	(0.718)	(0.295)	(0.046)	(0.093)	(0.037)
Born 14 Years After the Translation	0.111**	0.222***	0.101**	0.485	1.382	0.373	0.040	0.085	0.028
	(0.020)	(0.064)	(0.024)	(0.319)	(0.723)	(0.292)	(0.059)	(0.092)	(0.049)
N	75 066	75 066	75 066	75 041	75 041	75 041	75 066	75 066	75 066

Notes: This table presents coefficients from event-study estimates based on the traditional TWFE, Callaway and Sant'Anna (2021), and Gardner (2022). Controls include indicators for male and rural. Standard errors are clustered at the Ethno-linguistic group level.
* p < 0.1, ** p < 0.05, *** p < 0.01

Table B.17: Sun and Abraham Event Study Estimates for Partial Literacy, Any Education, and Secondary or Higher

	Partial Literacy (1)	Any Education (2)	Any Secondary (3)
Born 15 Years Before the Translation	0.045*	0.082***	−0.014
	(0.026)	(0.030)	(0.022)
Born 14 Years Before the Translation	0.036***	0.053**	0.032
	(0.013)	(0.021)	(0.021)
Born 13 Years Before the Translation	0.014	0.013	−0.005
	(0.016)	(0.022)	(0.018)
Born 12 Years Before the Translation	0.057**	0.068**	0.033*
	(0.023)	(0.030)	(0.018)
Born 11 Years Before the Translation	0.029	0.006	0.017
	(0.018)	(0.022)	(0.016)
Born 10 Years Before the Translation	0.042*	0.042**	0.006
	(0.022)	(0.020)	(0.020)
Born 9 Years Before the Translation	0.012	0.031	0.014
	(0.015)	(0.020)	(0.016)
Born 8 Years Before the Translation	0.011	0.015	−0.023**
	(0.017)	(0.024)	(0.010)
Born 7 Years Before the Translation	0.020*	−0.004	0.005
	(0.011)	(0.015)	(0.014)
Born 6 Years Before the Translation	0.021	0.010	0.030***
	(0.015)	(0.014)	(0.011)
Born 5 Years Before the Translation	0.016**	0.008	0.019
	(0.007)	(0.009)	(0.015)
Born 4 Years Before the Translation	0.032**	0.018	0.021*
	(0.015)	(0.017)	(0.011)
Born 3 Years Before the Translation	−0.022**	0.010	−0.016**
	(0.011)	(0.011)	(0.008)
Born 2 Years Before the Translation	0.018	0.030***	0.017*
	(0.012)	(0.011)	(0.009)
Born at Year of Translation	0.015	0.006	0.015*
	(0.016)	(0.014)	(0.008)
Born 1 Year After the Translation	0.016	0.040***	0.052***
	(0.016)	(0.012)	(0.009)
Born 2 Years After the Translation	0.053***	0.061***	0.043***
	(0.016)	(0.014)	(0.012)
Born 3 Years After the Translation	0.071***	0.054***	0.060***
	(0.014)	(0.017)	(0.010)
Born 4 Years After the Translation	0.031**	0.032*	0.040***
	(0.014)	(0.017)	(0.014)
Born 5 Years After the Translation	0.018	0.044*	0.067***
	(0.018)	(0.022)	(0.013)
Born 6 Years After the Translation	0.045**	0.068***	0.073***
	(0.020)	(0.024)	(0.012)
Born 7 Years After the Translation	0.015	0.031	0.034**
	(0.020)	(0.025)	(0.014)
Born 8 Years After the Translation	0.104***	0.096***	0.104***
	(0.016)	(0.023)	(0.014)
Born 9 Years After the Translation	0.030*	0.038	0.063***
	(0.017)	(0.024)	(0.019)
Born 10 Years After the Translation	0.110***	0.083***	0.154***
	(0.024)	(0.026)	(0.024)
Born 11 Years After the Translation	0.099***	0.083***	0.157***
	(0.023)	(0.030)	(0.028)
Born 12 Years After the Translation	0.111***	0.101***	0.130***
	(0.020)	(0.026)	(0.031)
Born 13 Years After the Translation	0.118***	0.105***	0.078***
	(0.023)	(0.030)	(0.028)
Born 14 Years After the Translation	0.110***	0.092***	0.017
	(0.021)	(0.030)	(0.024)
N	75066	75043	75066
Mean for Never Translated	0.50	0.57	0.28

Notes: This table presents coefficients from event-study estimates based on Sun and Abraham (2021). Controls include indicators for male and rural. Standard errors are clustered at the Ethnolinguistic group level.
* p < 0.1, ** p < 0.05, *** p < 0.01

C. OLS Estimates of the Effects of Earlier Bible Translations

In this appendix, we estimate the relationship between receiving an earlier mother-tongue Bible translations and educational outcomes. We compare estimates without controls to estimates with a varying set of individual-level, geographic, and ethno-linguistic group controls. We show that, after including controls, estimated effects are reduced by 83 percent for literacy, 99 percent for years of education, and 97 percent for primary school completion, illustrating the bias from simply comparing across ethno-linguistic groups that receive earlier vs. later Bible translations.

Our sample comes from the DHS and includes only individuals from ethno-linguistic groups that have matched Ethnoatlas data. This give us a sample of 254,262 individuals who were born between 1948 and 2005. Of the groups for which we have the full set of controls, 45 treated groups received a Bible translation before 1970, and 93 groups had no Bible translation available before 1970.

In this approach, we compare ethno-linguistic groups with a Bible translation that occurred prior to 1970 with ethno-linguistic groups that did not have an early Bible translation. We first run specifications without controls and then compare the estimates to those with a rich set of controls and fixed effects. Specifically, we estimate:

Without controls:

$$Y_{ilmcdt} = \beta Bible1970_l + \epsilon_{ilmcdt} \tag{4}$$

With DHS individual controls as well as DHS cluster, country, year of birth and mission fixed effects:

$$Y_{ilmcdt} = \beta Bible1970_l + \delta X_i + \theta_m + \gamma_c + \phi_d + \alpha_t + \epsilon_{ilmcdt} \tag{5}$$

With individual controls, fixed effects, and Ethnoatlas controls:

$$Y_{ilmcdt} = \beta Bible1970_l + \delta X_i + \alpha Z_l + \theta_m + \gamma_c + \phi_d + \alpha_t + \epsilon_{ilmcdt} \tag{6}$$

for individual i, ethno-linguistic group l, mission m, country c, DHS cluster d, and cohort t. $Bible1970_l$ is an indicator for whether a Bible translation for ethno-linguistic group l was available before 1970. X_i are individual controls for being male and living in a rural area. Ethno-linguistic group characteristics, Z_l, include gathering dependence, hunting dependence, fishing dependence, agriculture intensity, marital composition, major crop types, and settlement patterns. Fixed effects are included for the nearest mission θ_m, country γ_c, DHS cluster ϕ_d, and year of birth α_t. ϵ_{ilcmdt} is the error term and, we cluster standard errors at the ethno-linguistic group level (Abadie et al., 2023). β captures the correlation between early Bible

translations and education. Our outcomes are literacy, years of schooling, and primary school completion.[1]

Table 2 presents the estimates for our primary educational outcomes. For each outcome, the first column presents the results without controls, the second adds DHS controls as well as fixed effects, and the third column adds additional Ethnoatlas controls. Without including controls, we find that access to a pre-1970 Bible translation is associated with a 14.5 percentage point increase in literacy (Column 1), 2.3 additional years of education (Column 2), and a 20.3 percentage point increase in primary school completion (Column 3). Including individual-level controls and fixed effects reduces the estimates in Columns 2, 5, and 8. Adding all possible individual-level and ethno-linguistic-group-level controls reduces the estimated relationship between an early Bible translation by 83 percent for literacy (Column 1 vs. Column 3), by 99 percent for years of education (Column 4 vs. Column 6), and by 97 percent for primary school completion (Column 7 vs. Column 9).[2] These results are consistent with positive selection into Bible translation.

[1]For robustness, we also identify effects on partial literacy, any education, and completion of secondary school.

[2]We show these results for partial literacy, any education, and secondary school completion in Table C.1. Additionally, we estimate these regressions restricted to individuals who live within 10 km of a historical mission in Table C.2 and Table C.3, which yield similar results.

Table C.1: Effects on Bible Translation Before 1970 on Partial Literacy Rate, Any Education, and Secondary or Higher

	Partial Literacy			Any Education			Secondary or Higher		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Translation Before 1970	0.189***	0.037***	0.018*	0.191***	0.021*	−0.006	0.153***	0.025*	0.005
	(0.059)	(0.010)	(0.010)	(0.065)	(0.012)	(0.010)	(0.048)	(0.013)	(0.014)
Mean Control	0.601	0.601	0.601	0.717	0.717	0.717	0.386	0.386	0.386
Std. Errors Cluster	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group
DHS Controls		✓	✓		✓	✓		✓	✓
Fixed Effects		✓	✓		✓	✓		✓	✓
Ethnolatlas Controls			✓			✓			✓
Num.Obs.	252 195	252 195	252 195	254 230	254 230	254 230	254 262	254 262	254 262

Notes: Controls include: gender, urban or rural. Fixed effects include: DHS cluster by country, country , year of birth, and closest mission. Ethnoatlas control include societal characteristics such as reliance on hunting, gathering, fishing, and agriculture; marital composition, agricultural intensity, major crop types, and settlement patterns.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table C.2: Effects on Bible Translation Before 1970 on Full Literacy Rate, Years of Education, and Primary School Completion

	Full Literacy			Years of Education			Primary School Completion		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Translation Before 1970	0.072	0.030**	0.030**	1.591***	0.203	0.081	0.152***	0.022	0.001
	(0.047)	(0.012)	(0.015)	(0.524)	(0.150)	(0.174)	(0.051)	(0.014)	(0.016)
Mean Control	0.584	0.584	0.584	7.064	7.064	7.064	0.58	0.58	0.58
Std. Errors Cluster	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group
DHS Controls		✓	✓		✓	✓		✓	✓
Fixed Effects		✓	✓		✓	✓		✓	✓
Ethnolatlas Controls			✓			✓			✓
Num.Obs.	57 337	57 337	57 337	57 709	57 709	57 709	57 709	57 709	57 709

Notes: Controls include: gender, urban or rural. Fixed effects include: DHS cluster by country, country , year of birth, and closest mission. Ethnoatlas control include societal characteristics such as reliance on hunting, gathering, fishing, and agriculture; marital composition, agricultural intensity, major crop types, and settlement patterns. Sample includes DHS Clusters within 10km of a former mission.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table C.3: Effects on Bible Translation Before 1970 on Partial Literacy Rate, Any Education, and Secondary or Higher

	Partial Literacy			Any Education			Secondary or Higher		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Translation Before 1970	0.110***	0.026**	0.026*	0.098***	0.006	−0.002	0.102**	0.024	0.013
	(0.038)	(0.011)	(0.013)	(0.036)	(0.011)	(0.011)	(0.046)	(0.015)	(0.018)
Mean Control	0.692	0.692	0.692	0.796	0.796	0.796	0.513	0.513	0.513
Std. Errors Cluster	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group	Ethnic group
DHS Controls		✓	✓		✓	✓		✓	✓
Fixed Effects		✓	✓		✓	✓		✓	✓
Ethnolatlas Controls			✓			✓			✓
Num.Obs.	57 337	57 337	57 337	57 709	57 709	57 709	57 709	57 709	57 709

Notes: Controls include: gender, urban or rural. Fixed effects include: DHS cluster by country, country , year of birth, and closest mission. Ethnoatlas control include societal characteristics such as reliance on hunting, gathering, fishing, and agriculture; marital composition, agricultural intensity, major crop types, and settlement patterns. Sample includes DHS Clusters within 10km of a former mission.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

D. Data Appendix

This appendix describes how we match data from the Demographic and Health Surveys (DHS), the Ethnologue, and the Ethnoatlas. Due to the nature of the data, the links between the datasets are not always one-to-one. Below, we describe the matching process.

D.1. Main Sample

To construct the main sample of data we use in the paper, we match the Demographic and Health Surveys data that contain educational outcomes with the Ethnologue data on Bible translations.

1. DHS Ethnic Groups Matched to Languages: The LEDA package found at `https://github.com/carl-mc/LEDA` allows us to match respondent ethnic groups listed in the DHS to languages (Müller-Crepon et al., 2021). This generates a match between each ethnic group in a country in a DHS survey with a single or multiple languages. Ethnic groups without a match to a language are dropped.

2. Languages Matched to Bible Translation Years: Each of the matched languages in step #1 are manually matched to the languages listed in the Ethnologue (Eberhard et al., 2023), to obtain the year of a Bible translation for each ethno-linguistic group. For Ethnic groups with multiple languages or multiple years of Bible translations, we choose the earliest Bible translation date for our analysis. This occurs four times for our translated languages: Karo/Zime/Peve (five matches), Sara (three matches), Gabri (four matches), and Wolof (three matches). Lango, Somali, Loko, Moundang, and Acholi have only one match. In the entire sample, multiple matches occur around 10% of the time.

D.2. Samples for Demonstration of Selection Bias

We construct two samples of data to demonstrate selection into earlier Bible translations. The first sample is used to show average pre-colonial characteristics among ethno-linguistic groups with and without an early Bible translation. The second sample is used to conduct simple OLS regressions of education outcomes on an indicator of having an an early Bible translations with and without controls. To construct these samples, we match DHS, Ethnologue, and Ethnoatlas data.

D.2.1. Pre-colonial Characteristics of Groups with and Without Earlier Bible Translations

Ethnoatlas Data Matched to Ethnologue Data:

We match data on pre-colonial characteristics from the Ethnoatlas (Kirby et al., 2016) with data on Bible translations in the Ethnologue using the "language ISO" code, which is a unique identifier in both datasets. We restrict ethnic groups to countries in Africa and manually match.[3]

For cases in which a single language in the Ethnologue matches with multiple ethnic groups in the Ethnoatlas, we assign the ethnic group to the average (rounded up) of each characteristic in the Ethnoatlas.

D.2.2. Simple OLS Regressions: Matching DHS, Ethnologue, and Ethnoatlas

We run simple OLS regressions with and without controls using data across the DHS, Ethnologue, and Ethnoatlas samples in Appendix C. This sample is larger than our main sample, since we are not restricted to a balanced event study of cohorts.

1. DHS Ethnic Groups Matched to Languages: Follow step #1 for the main sample above.
2. Languages Matched to Bible Translation Years: Follow step #2 for the main sample above.
3. Languages Matched to Ethnoatlas: We start with the data from step #2 for the main sample above and merge to the Ethnoatlas through the "language ISO" code, which is present in both the Ethnologue and the Ethnoatlas as a unique identifier for each language.[4] In cases where a single language in the Ethnologue matched with multiple ethnic groups in the Ethnoatlas, we took the average (rounded up) of each characteristic in the Ethnoatlas.

[3]For example, the language "Abbey" has a language ISO code of "aba".
[4]For example, the language Abbey has a language iso code of "aba".

E. Information on Bible Translation

This section includes information on the translations for the nine treated languages in our main analysis. These languages are Lango, Somali, Karo / Zime / Peve, Sara (Ngambaye/Sara Madjin-Gaye/Mbaye), Loko, Moundang, Acholi, Gabri / Kabalaye / Nangtchere / Soumraye, and Wolof. All of the languages for which we were able to identify sources either had Protestant translations or are currently distributed by Protestant sources, consistent with the Protestant emphasis on *Sola Scriptura* and on reading the Bible for oneself.[5]

- **Lango** received a full Bible in 1979, published by the Bible Society of Uganda. This group had previously received a New Testament translation in 1974 and Bible portions in 1967. This indicates that the entire translation process took around 13 years. Since Bible Societies are Protestant, this Bible came from Protestant sources (The Bible Society of Uganda, n.d.[b]). This translation has a written version available. The previous Bible portions available included only the Gospel of John, which was translated by a committee of Protestants (Nida, 1972).

- **Somali** also has a full Bible, which was another Protestant translation. This translation was completed by Dorothy and Warren Modricker, in association with the British and Foreign Bible Society, a Protestant organization. Translation work started around 1957 and included creating a script for writing in Somali. The New Testament was printed in around 1971. In 1972, the Somali government announced an official script, and the Bible was converted into the new script. It took over 20 years for the translation to be completed (Miller, 2006). Previous to the 1979 translation of the New Testament into Somali, the Gospels were translated in 1935, with work done on the translation by members of the Roman Catholic Mission of Arabia and British Somaliland (Nida, 1972).

- **Karo / Zime / Peve** received a New Testament translation in 1980. The audio version of this translation is made available by Global Recordings Network, which adheres to the Statement of Faith of the World Evangelical Alliance (Joshua Project, n.d.[b]). As far as we can tell, this translation is only available in the form of an audio recording.

- **Sara (Ngambaye/Sara Madjin-Gaye/Mbaye)** was published in 1990 by the Bible Society of Chad, meaning that this translation is also Protestant (YouVersion, n.d.[c]). This translation has a written version. Previous to this publication of the Bible, Mark was translated in 1936 and Acts in 1941 by Victor Veary. Luke was translated in 1950 and the rest of the New Testament in 1954. A revised version of the New Testament and Psalms became available in 1968 (Nida, 1972).

[5] Somali, Wolof, and Acholi had both Protestant and Catholic translations.

- **Loko** has had a New Testament translation available since 1983. However, there is no full Bible translation available in Loko. This translation is made available by Lutheran Bible translators, which is also Protestant (Bible.is, n.d.[a]). This translation has a written version. Mende may be similar to Loko. Translation of portions of the Bible in Mende began as early as 1928, with a New Testament published in 1956 and the full Bible in 1959 (Nida, 1972).

- The complete Bible in **Moundang** was published by the Bible Society of Chad and became available in 1983. Bible portions were also made available in 1933-1941, and a New Testament translation became available in 1948-1956. Since this is another Bible Society translation, it was also distributed by a Protestant group (Joshua Project, n.d.[c]; YouVersion, n.d.[a]). This translation has a written version. Previous to the translation of the entire Bible, Mark was translated in 1933, John and Acts in 1938, Luke in 1941, and the New Testament in 1948 by Lutheran Brethren Missions (Nida, 1972).

- **Acholi** has had access to a full-Bible translation since 1986. Previous to this, there were Bible portions made available between 1905-1962 and a New Testament made available in 1933. This Nilotic language was translated by the Bible Society of Uganda, again making it a Protestant translation (Joshua Project, n.d.[a]; The Bible Society of Uganda, n.d.[a]). The Acholi language has a written Bible. Prior to the translation of the entire Bible, the gospels and several other New Testament books were translated in beginning in 1905 by both Catholic and Protestant groups. The full New Testament was published in 1933 (Nida, 1972).

- **Gabri / Kabalaye / Nangtchere / Soumraye** has had a complete translation of the Bible available since 1986 (Joshua Project, n.d.[d]). This translation is distributed by the Bible Society of Chad, a Protestant organization (Bible.is, n.d.[b]). Mark was translated in 1947; John, Luke, and Acts in 1949; and the full New Testament in 1956 by Protestant groups (Nida, 1972).

- **Wolof** had a New Testament Bible translation available beginning in 1988. Previous to that, portions of the Bible were available in the Wolof language beginning in 1983 (Joshua Project, 2024). One of the available versions of the Bible in Wolof is distributed by La Mission Baptiste du Sénégal (YouVersion, n.d.[b]). This translation has a written version available. Both dialects of Wolof (that spoken in Gambia and that spoken in Senegal) have had partial translations prior to 1988, translated by both Protestant and Catholic groups. For Wolof: Gambia, Matthew was the first book available in 1882. For Wolof: Senegal, Matthew became available in 1873. Both dialects have a translation of John (1907 and 1874), and Wolof: Senegal also has a translation of Mark, which was completed in 1963 (Nida, 1972).