

Christian Missions and Anti-Gay Attitudes in Africa*

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Abstract

We argue that colonial Christian missions had a long-term impact on anti-gay attitudes in Africa. We use a geo-coded representative survey of African countries and the location of historical Christian missions to estimate a significant and economically meaningful association between proximity to historical missions and anti-gay sentiments today. Using anthropological data on pre-colonial acceptance of homosexual practices among indigenous groups, we show that the establishment of missions, while nonrandom, was exogenous to pre-existing same-sex patterns among indigenous population. The estimated effect is driven by persons of Christian faith and statistically indistinguishable from zero on samples of Muslims, nonbelievers, and followers of traditional indigenous religions. Thus, we argue that our results are indicative of a causal effect of missionary religious conversion to Christianity.

Keywords: Missions, Africa, Tolerance, Homosexuals, Religion.

JEL codes: J15, N37, Z1

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1 Introduction

Christian missionary activity in Africa had substantial influence on development. Missions have been linked to an array of positive outcomes: education (Nunn et al., 2014), democracy (Woodberry, 2012), newspaper readership (Cagé and Rueda, 2016), and intergenerational mobility (Alesina et al., 2019) among others. Despite all those advantageous effects, however, given that major Christian doctrines opposed homosexuality, is it possible that missions have influenced a particular *negative* outcome: present-day anti-gay attitudes? In 33 African countries, surveyed by Afrobarometer, more than 70 percent of people would dislike to have gay persons as neighbors, while homosexuality is criminalized in more than half of countries of the region (Carroll, 2016).

Scholars of economic development only recently started to systematically explore the determinants of discriminatory attitudes towards LGBTQ+ persons (Baranov, De Haas and Grosjean, 2018, Brodeur and Haddad, 2018). This is an important line of inquiry because discrimination against people based on their race, gender, sexual orientation, and other characteristics is antithetical to prosperity. Thus, studying the roots of intolerance — including intolerance to LGBTQ+ persons — is important for understanding multiple inequalities in the developing world. Anti-gay attitudes in Africa have been explained by the influence of the U.S. megachurches (Grossman, 2015) and political scapegoating of gay community during HIV/AIDS epidemic (Anthony, 2018). In this paper, we ask if even earlier events — arrival of Christian missions during the colonial period — could have influenced current attitude towards gay persons.

This is a uniquely suitable setting for this question, because — as we can demonstrate — the arrival of early Christian missions was unrelated to pre-colonial acceptance of homosexuality among indigenous groups, and rejection of homosexuality had been already an established norm within Christianity. We use three sources of data in this paper: (i) locations of the historical missions from Nunn (2010) and Cagé and Rueda (2016), (ii) the spatial data from the sixth Afrobarometer’s wave that contains a question about intolerance toward homosexual persons (whether a respondent would oppose having homosexuals as neighbors), and, (iii) previously untapped for economic research, data on acceptance of homosexual practices among indigenous groups collected by Murray and Roscoe (1998). First, we measure exposure to historical missions as the minimum distance from missions to a village/town where the respondent lives. Then, using ordinary-least-squares (OLS) specification we estimate the effect of proximity to missions on hostility toward gay persons. In our preferred specification, we estimate that respondents located 100 km closer to a mission are 1.3 percentage points more likely to be intolerant to gay persons than those living farther away from a mission site. To put this number in the context, the distance to a mission varies from 0.1 km to 1400 km. Thus our estimate can plausibly explain 19 percentage point variation in intolerance. Given that the average percentage of respondents who have anti-gay attitudes is 63.8, the effect of missions is substantial.

This estimate can be interpreted causally if the locations of the missions are exogenous to counterfactual levels of intolerance. Given that the locations of the missions were nonrandom (Jedwab, zu Selhausen and Moradi, 2019), causal identification can be challenging. However, we use anthro-

pological data on pre-colonial levels of acceptance of homosexual practices (Murray and Roscoe, 1998) to demonstrate that there is no discernible relationship between pre-colonial acceptance of homosexuality and locations of the missions. We also consider a set of other potential violations of identification assumptions. Specifically, we test if geographical determinants of locations of missions (e.g., terrain ruggedness and proximity to coast) could have influenced modern levels of intolerance directly or indirectly (through economic development, polygyny practices, HIV prevalence, literacy, and etc.).

Our results do not depend on the functional form of the minimum distance-to-mission, hold if we use the number of missions in respondent's vicinity as an alternative measure of exposure to historical missions, and are robust to the alternative measures of the dependent variable. In the baseline specification, we only control for the exogenous geographic factors and the set of country, ethnicity, and ethnic homelands fixed effects. In other specifications, we control for a rich set of individual-level variables (education, various proxies for living conditions, employment) and community-level variables (population density and luminosity from satellite images). Our results are not driven by any single country or a set of countries.

We argue that the most plausible channel of influence of colonial Christian missions on modern anti-gay intolerance is religious conversion. It has been demonstrated by Nunn (2010) that the missions were effective in promoting Christian faith among the indigenous population. However, the missions also promoted literacy and provided medical care. We contend that it is plausible that it is precisely the spread of religion (not education or medical practices) that influenced modern anti-gay attitudes. We offer two main pieces of evidence: first, our subsample analysis shows that the effect is entirely driven by Christian respondents, and, second, the effect persists if we control for individual-level and community-level potential consequences of missionary activity (education, material conditions, democratic values). It is also worth pointing out that the secular potential consequences of missionary activity most likely lead to more tolerance, not less. Thus these concerns probably attenuate our estimates. We also find that our main estimate remains significant if we exclude Evangelical respondents, or look only at the subsample of Catholic respondents, thus ruling out the possibility that the effect is entirely driven by modern U.S. "megachurches" (though they were important in promoting values of the U.S. Evangelical movement, including rejection of homosexuality).

Conceptually, the definition of homosexuality used in this paper refers to the same-sex attraction that can be by a part of a wide variety of LGBTQ+ identities. It should be noted, however, that in Christianity the stigma attached to male-to-male attraction appears to be more prominent. Specifically, it is often interpreted to be explicitly prohibited in the Old Testament and in the New Testament, while female-to-female attraction is prohibited only in the New Testament.¹ Relatedly, colonial-era laws enacted in British colonies explicitly copied many features of British "anti-sodomy" legislation. It is also worth pointing out that anthropological data collected in Murray and Roscoe (1998) is noisier when it comes to female homosexuality.² While discrimination against

¹See more detailed discussion in Section 2.

²See discussion in Section 3.

LGBTQ+ persons is not limited to men, these features of the context and the data make our study more informative about the roots of intolerance to male homosexuality than to female homosexuality.

We build on significant body of literature in the field of African studies that analyzes the causes of the intolerance toward homosexuality in Africa. Previous studies (e.g., [Awondo, Geschiere and Reid, 2012](#), [Currier, 2018](#)) argued that anti-gay sentiments were driven by a number of factors including consolidation of power by elites, anti-elite resentment, conspiracy theories, secret societies, witchcraft, and religion. However, this literature only considered how contemporaneous religiosity affects these sentiments. For example, [Awondo, Geschiere and Reid \(2012\)](#) suggest that anti-gay discourse in Uganda was largely facilitated by American conservative Christians who had access to the high levels of government, while [Thoreson \(2014\)](#) emphasize the influence of Christian nationalism. Anti-homosexual attitudes in Zambia were explored by [Klinken \(2014\)](#) who linked anti-gay attitudes to Pentecostal Christianity that influences national identity. These studies offer rich qualitative analysis of contemporary institutions and anti-homosexuality in specific countries. Our paper complements this body of work by bringing a long-term view on the problem and conducting an empirical analysis of the impact of colonial Christian missions on modern anti-gay attitudes in 33 African countries.

Our study is also relevant to literature on the legacies of Christian missions in Africa. Scholars have argued that the missions had positive effects: promoting democracy ([Woodberry, 2012](#)), contributing to printing and written tradition ([Cagé and Rueda, 2016](#)), reducing early marriages ([Kudo, 2017](#)), improving intergenerational mobility ([Alesina et al., 2019](#)), increasing the scope of cooperation ([Bergeron, 2020](#)), and persistence in development ([Nunn, 2010](#), and [Valencia Caicedo, 2019](#)). Only one recent study ([Cagé and Rueda, 2020](#)) shows negative effect of missions on HIV/AIDS instances. We show that missionary activity was not always beneficial but also had a very persistent and large effect on intolerance toward gay persons, possibly influencing the criminalization of homosexuality in many African countries.

The economic literature has established several important historical determinants of current values and attitudes: pre-industrial economic conditions ([Alesina, Giuliano and Nunn, 2013](#)), biased gender ratios ([Baranov, De Haas and Grosjean, 2018](#), [Grosjean and Khattar, 2019](#)), slavery ([Nunn, 2008](#)), and ancestral political autonomy ([Michalopoulos and Papaioannou, 2013](#)).³ In particular, related to the LGBTQ+ people, [Baranov, De Haas and Grosjean \(2018\)](#) show that male-biased gender ratios influenced opposition to same-sex marriage in Australia as well as occupational segregation by gender, while [Brodeur and Haddad \(2018\)](#) argue that in California during the Gold Rush high male-to-female ratio caused more tolerant attitudes towards homosexuality, [Bentzen and Sperling \(2020\)](#) showed that “faith-based initiatives” in the U.S. promoted scepticism towards homosexuality, towards science, and towards female empowerment. Here, we demonstrate how colonial institutions and religious doctrines shaped attitudes of the indigenous African

³The norms and values themselves have been shown to impact economic development. Some examples of such studies are: [Zak and Knack \(2001\)](#), [Algan and Cahuc \(2010\)](#), [Nunn and Wantchekon \(2011\)](#), [Alesina and Giuliano \(2015\)](#), and [Mokyr \(2016\)](#).

population, reverting their attitudes toward homosexual persons.⁴

The paper proceeds as follows. In Section 2, we provide background about historical and contemporary attitudes toward homosexuals in Sub-Saharan Africa and explains attitudes of Abrahamic religions towards homosexuality. Section 3 introduces our data sources. Section 4 provides empirical specification, results, and discuss our identifying assumptions. Section 5, in turn, discusses the mechanisms and provides evidence in favour of the spread of Christianity as the main factor. Section 6 concludes.

2 Historical Background

Indigenous groups of Sub-Saharan Africa are documented to have been tolerant to homosexual relationships. Early European scholars and travelers to the region reported many instances of overt homosexuality and cross-dressing among men. Andrew Batell, an English explorer, who had been imprisoned in the 1590s by the Portuguese in the territory of modern Angola, wrote about the practices among the Imbalanga: “*They have men in women’s apparel, whom they keep among their wives.*” Later, Sir Richard Burton, researching the Portuguese sources from the 16th century found observations of the instances of male homosexuality among the Kongo tribe (Epprecht, 2006). A more systematic anthropological record confirmed those early observations. Pre-colonial acceptance of male and female of homosexuality among various groups in Africa has been also documented by Morgan and Wieringa (2005), Nwoko (2012), and Jjuuko and Tabengwa (2018) as well as many others. Summarizing the scholarship on indigenous African homosexuality, Nigerian gay rights activist Bisi Alimi wrote “*If you say being gay is not African, you don’t know your history.*”⁵

Anthropological literature (De Rachewiltz, 1964, Herdt, 1991, and Epprecht, 2008) documents that indigenous populations of Sub-Saharan Africa were not intolerant to homosexuals. Specifically, Murray and Roscoe (1998, p.280) list 56 African ethnic groups with pre-colonial same-sex patterns. In some of those groups, we see a stark reversal of the attitude following European colonization. For example, if we look at one of these groups, Gikuyu/Kikuyu in Kenya, that was accepting same-sex relationship (and even had a term for gay persons, *onek*, that can be translated as “active male” Murray and Roscoe, 1998, p.218), now 95% of the Afrobarometer respondents of that ethnic groups are Christian and 84.5% of them report a high level of intolerance to homosexuals (according to our baseline measure). Another example is the Pangwe/Pahouian (Fang) ethnic group in Gabon where gay men were called *a bele nnem e bango* (“he has the heart [aspirations] of boys” Murray and Roscoe, 1998, p.219). Now 90% of respondents from this ethnic group are

⁴Our study also contributes to the growing discussion on how religion affects various social and economic outcomes. Many studies in this field explore the impact of religion on economic growth (Barro and McCleary 2003, Rubin 2017), human capital accumulation (Carvalho and Koyama (2016), Chaney (2019) among others), earnings and labor supply (Tomes 1984, Van Hoorn and Maseland 2013), suicide (Becker and Woessmann 2018), and formation of beliefs and religious identities (Gershman 2015, Binzel and Carvalho 2017, Carvalho 2019). See Carvalho, Iyer and Rubin (2019) for a recent systematic review. Our results in this paper suggest that religion can also serve as a powerful source of change and persistence of norms and beliefs.

⁵The Guardian, Sep 9, 2015. If you say being gay is not African, you don’t know your history. www.theguardian.com/commentisfree/2015/sep/09/being-gay-african-history-homosexuality-christianity.

Christian and 83% report a high level of intolerance to homosexuals.

When it comes to the indigenous attitudes to homosexuality in Africa, [Murray and Roscoe \(1998\)](#) do not find evidence of public anti-gay attitudes. In fact, it is noted that “homophobia... is a western import” ([Kendall, 1998](#)).⁶ For some groups without evidence of homosexual practices, ([Murray and Roscoe, 1998](#), p. 209) say that “absence of evidence can never be assumed evidence of absence.” The same-sex practices are not always shared with outsiders ([Gaudio, 1998](#)). For the purpose of our estimations, however, the absence of publicly acknowledged and practiced same-sex relationship is sufficient because the missionaries were unlikely to observe private practices as well. If they were choosing locations in part based on the acceptance of homosexuality among indigenous groups, they would have taken into account public same-sex practices or their absence.⁷

Traditional Abrahamic religions (Judaism, Christianity, Islam) have been traditionally less accepting of homosexuality. The sacred texts of these religions (The Torah, The Bible, The Qur’an) have passages that in different points in time were interpreted as a prohibition of homosexuality. Specifically, The Code of Holiness (Leviticus 17-26) identifies male homosexuality as a sin punishable by death (“*Do not have sexual relations with a man as one does with a woman; that is detestable.*” (Lev: 18:22)).⁸ The Epistle to the Romans in The New Testament has been interpreted as a prohibition of both male and female homosexuality (“*Because of this, God gave them over to shameful lusts. Even their women exchanged natural sexual relationship for unnatural ones. In the same way the men also abandoned natural relations with women and were inflamed with lust for one another.*” (Romans 1:26-27)).⁹ This view is also echoed in the Epistle 1 to Corinthians (“*Or do you not know that wrongdoers will not inherit the kingdom of God? Do not be deceived: Neither the sexually immoral nor idolaters nor adulterers nor men who have sex with men.*” (1 Corinthians 6:9-10)). Qur’an also has verses that have been interpreted as a prohibition of homosexuality (“*Indeed, you approach men with desire, instead of women. Rather, you are a transgressing people.*” (Qur’an 7:81)).¹⁰

These passages from the sacred texts were used later to justify the rejection of homosexual relationships. Influenced by The Bible and early Christian teachings, Roman Christian emperors prescribed the death penalty to those who committed homosexual acts.¹¹ Intolerance to homosexuals has been inherited by all major Christian denominations. Rejection of homosexual practices is a part of the 1992 Catechism of the Roman Catholic Church.¹² While many Protestant denominations now do accept homosexuality, allow gay clergy, and offer blessings for same-sex marriage, this is a relatively recent phenomenon. Martin Luther called homosexuality “monstrous depravity” ([Pelikan, 1958](#)). In 2003, an appointment of an openly gay bishop in New Hampshire caused

⁶This particular passage refers to Lesotho, but it reflects the situation in other countries as well.

⁷As we discuss in Section 4.3.1, we find no evidence of that.

⁸Quotes from the Bible are given according to the New International Version (NIV) published on Bible Gateway: www.biblegateway.com/.

⁹Some scholars insisted that this particular passage condemns heterosexual individuals who commit homosexual acts, while others argue that those verses are influenced by the Code of Holiness and should be interpreted as an unambiguous view that homosexuality violated God’s order.

¹⁰Sahih International Translation. The Quranic Arabic Corpus. <http://corpus.quran.com/>.

¹¹See, for example, Codex Theodosianus, that requires homosexuals to be subjected to “avenging flames.”

¹²See line 2396. http://www.vatican.va/archive/ENG0015/_P88.HTM.

deep divisions within the Anglican Communion, when the group of conservative American bishops threatened to leave the Episcopal Church.¹³ The Protestant community remains divided on the issue of same-sex marriage with some groups accepting it and some groups opposing it.

The earliest Christian communities in Sub-Saharan Africa appeared in Ethiopia in the 4th century. Early missionary work in Sub-Saharan Africa has been done by the Portuguese in the 16th century. Later, with the rise of European trade and colonial expansion, missions from Germany, Belgium, France, and Great Britain appeared on the continent (Zandt, 2011). The main purpose of missions was the religious conversion of indigenous groups to Christianity. The conversion was significantly aided by goods and services offered within the missions — most notably, education and health care (Nunn, 2010). As Nunn et al. (2014) point out, the locations of Christian missions were not random. The most important factors were access to clean water, mild climate, and proximity to European trade routes.

The anti-gay attitudes among the public can be traced back to colonialism. An important norm imported by the European colonizers was “silence” in the aspects related to sex (Kaoma, 2018 attributes it to “Victorian” culture). Another important cultural feature promoted by the colonizers was “heterosexual nuclear family” that was deemed important for agricultural production (Bosia, 2014). Thus, the queer traditions of Africa’s pre-colonial past were silenced, denounced, and gradually supplanted by heteronormativity. In post-colonial times, Christian missions continued to play an important role and influence governments of the newly independent states by leveraging their connection to international donors. In many places, missions were in charge of infrastructural projects, healthcare, education, with local bishops essentially playing the roles of chiefs (Maxwell, 2000). Thus, post-colonial developments in many aspects did not reduce the ideological influence of colonial missions.

The politicization of homosexuality by political elites is often understood as a relatively recent phenomenon. Robert Mugabe started the trend of a nation’s leader speaking against gay persons in 1995, to be later followed by leaders of Uganda and Kenya (M’Baye, 2013). Today, several countries of Sub-Saharan Africa have harsh anti-gay legislation. According to Amnesty International, in Uganda, those found to be involved in a same-sex relationship can face seven years in prison. The Same-Sex Marriage Prohibition Act in Nigeria, signed into law by then-President Goodluck Jonathan in 2014 punishes homosexual meetings and clubs by more than 10 years of prison.¹⁴ Homosexuality is also illegal in Cameroon, Kenya, Tanzania, Zambia, and 24 other countries in Sub-Saharan Africa. These legislations are often supported by rhetoric that juxtaposes protection of “God’s design” with the alleged influence of “Western groups.”¹⁵ People’s “religious inclinations”

¹³See The Guardian, Sep 14, 2003. Anglicans Face Schism Over Gay Row. www.theguardian.com/uk/2003/sep/14/religion.world.

¹⁴The Associated Press, “Nigeria president Goodluck Jonathan bans gay meetings,” Jan 13, 2014, www.cbc.ca/news/world/nigeria-president-goodluck-jonathan-bans-gay-meetings-1.2495376.

¹⁵See, for example, a 2014 speech by President of Uganda: “It seems the topic of homosexuals was provoked by the arrogant and careless Western groups that are fond of coming into our schools and recruiting young children into homosexuality and lesbianism, just as they carelessly handle other issues concerning Africa.” (Daily Monitor, “President Museveni’s full speech at the signing of Anti-Homosexuality bill,” Feb 4, 2014, www.monitor.co.ug/News/National/Museveni-s-Anti-Homosexuality-speech/688334-2219956-4xafil/index.html.)

have been cited by Nigerian officials to justify the anti-gay legislation.

Another religion important to understanding homosexuality in Africa is Islam. Islam first arrived to Africa in the 7th century via conquest of North Africa and later spread further to the South through Transsaharan trade, migration, and religious conversion of the ruling classes (Robinson, 2004). Now Muslims often do support anti-gay policies on par with many Christian groups. For example, in Senegal, local imams were on the forefront of a campaign against a supposed gay marriage in 2008 (M'Baye, 2013). In Nigeria, leaders of the Muslim communities supported gay marriage prohibition similarly to the leaders of Christian communities (Oguntola-Laguda and van Klinken, 2016). According to Anderson (2007), “not only much of Christianity and Islam independently denounce homosexuality, their trans-religious concurrence combines with an unusually susceptible audience to create a formidable anti-gay force.” While Islam is arguably not less important for understanding anti-gay attitudes in many African countries than Christianity, our study is focused on the effect of Christian missions.¹⁶

The idea that the criminalization of homosexuality by the African governments and anti-gay attitudes by the public are partly caused by Western religious expansion — specifically by the U.S. megachurches — has been proposed by journalists, activists, and scholars. Specifically, Cheney (2012) argues that U.S. Evangelicalism was an important source of influence on the anti-gay legislation in Uganda, and Grossman (2015) shows that the LGBT salience is related to the growth of Pentecostal, Renewalist, and Evangelical communities. It has been also suggested that the humanitarian response of George W. Bush administration to HIV/AIDS problem, that emphasized abstinence and faith-based approach, contributed to the proliferation of anti-gay legislation and attitudes (Anthony, 2018). Kaoma (2018) advanced the notion of “Christian-informed protective homophobia” that occurs when the protection of “traditional values” promoted by the Vatican and the U.S. Christian Right coalesces with the desires to protect African cultural identity from globalization. According to Valois (2016), accusations of homosexuality are used as markers of “inauthenticity” in competition between different churches in Uganda. Among many thorough case studies, the influence of Pentecostalism on homophobia in Zimbabwe is highlighted by Connor (2011), while the influence of Pentecostalism in Cameroon is analyzed by Lyonga (2016).

In this paper, while we do not disagree with the role of modern churches and political movements, we contend that the roots of intolerance towards homosexuals might also lie in the European colonialism of the 19th century and early Catholic and Protestant missions. To the best of our knowledge, ours is the first quantitative study of the long-term effect of European colonial religious missions on anti-gay attitudes.

¹⁶In Appendix Table A.1 we show positive correlation between Islam and current level of intolerance toward gay people.

3 Data

Data on Intolerance and other Individual Characteristics The individual data on anti-gay attitudes among the population comes from the sixth (2016) wave of the Afrobarometer survey.¹⁷ Each country’s survey contains 1,200 to 2,400 respondents and is a representative cross-section of all citizens of voting age. We use this particular wave because out of six waves of Afrobarometer, the question regarding attitude toward gay persons was asked only in this one.¹⁸

The main variable of interest is intolerance to homosexuals ($Intolerance_i$). We construct it as an indicator variable by using the following question: “... *Would [you] like having people from this group [Homosexuals] as neighbours, dislike it, or not care?*” These are the possible answers: (i) *Strongly dislike*, (ii) *Somewhat dislike*, (iii) *Would not care*, (iv) *Somewhat like*, (v) *Strongly like*, or (v) *Don’t know*. If a respondent answered that they strongly dislike having gay neighbours, we assign the value of 1 to the $Intolerance_i$ and 0 otherwise.¹⁹ Approximately 0.07% of all observations are missing and we omit these observations. In addition, 1.41% of the respondents answered “don’t know.” We consider these observations as zeroes; however, all results hold if we omit them.²⁰

This is the only question on anti-gay attitudes available in Afrobarometer. It is limited in scope, since it asks only about residential preferences and not, for example, about labor market discrimination (whether the respondent would hire a gay person) or political preferences (whether the respondent would vote for a gay person). It is quite unlikely, however, that anti-gay sentiments this question registers are confined solely to residential preferences and do not translate to other areas. Another potential problem is social desirability bias. Given that homosexuality is politicized in many African countries in various ways, it is possible that people feel pressured to provide a particular answer. The direction of the pressure could be different in every country depending on the nature of politicization of homosexuality. To address this concern, we include country fixed effects in all our specifications to control for country-level pressures, so if everyone’s reported opinion on homosexuality is shifted by the same amount due to the country-level legislation, the bias should be netted out by the country fixed effect.

¹⁷ Available here: <https://afrobarometer.org/data/merged-round-6-data-36-countries-2016>.

¹⁸ We also obtained two additional datasets that contain information on the attitudes toward homosexuals in Africa. First, we use seventh (2019) wave of the Afrobarometer survey with GPS coordinates (available here: <https://afrobarometer.org/data/merged-round-7-data-34-countries-2019>). It is similar to the sixth wave and also contains the question about anti-gay attitudes. Second, we obtained seventh wave of the World Values Survey geo-coded data (available here: www.worldvaluessurvey.org/WVSContents.jsp). It has suitable data for two countries (Nigeria and Zimbabwe) and has a question similar to the one asked in Afrobarometer survey: “*On this list are various groups of people. Could you please mention any that you would not like to have as neighbors? — Homosexuals.*” We created a dummy equal to one if a respondent mentioned homosexuals and zero otherwise. We use these two additional data sources to show that our baseline results hold when we use a different dataset.

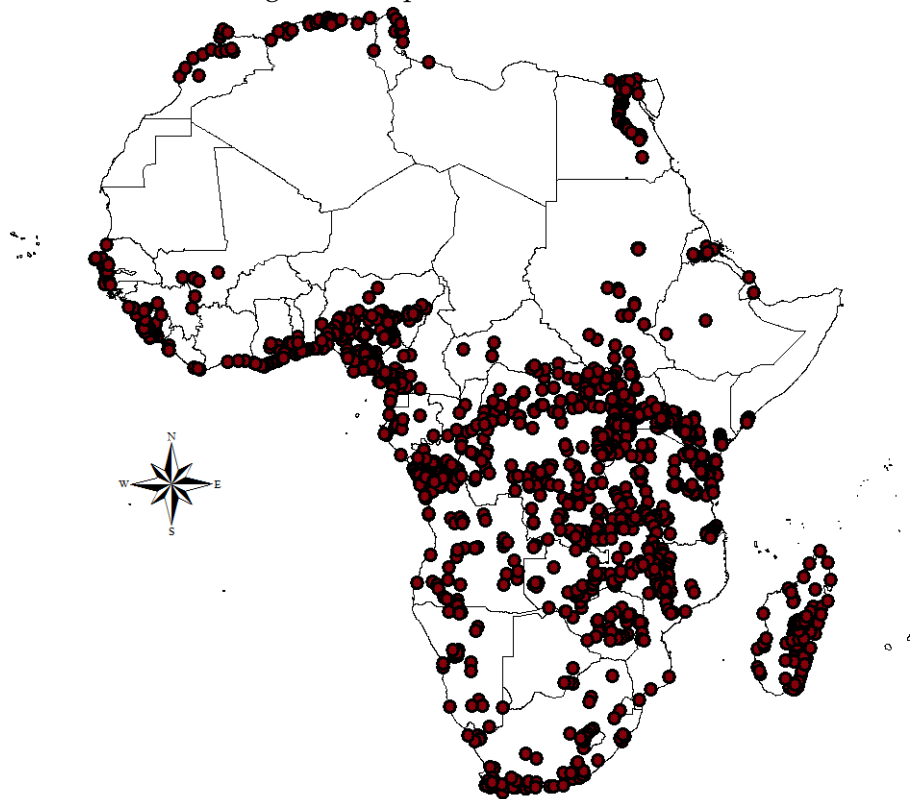
¹⁹ In Section 4 we also use two alternative measures of intolerance. One is also a dummy, equal to one if a respondent answered that they strongly dislike or somewhat dislike having gay neighbours, and 0 otherwise. Another is the ordinal variable ranging from 0 (respondent strongly like to have gay persons as a neighbours) to 4 (respondent strongly dislikes having gay neighbours). The former measures a less extreme level of intolerance toward gay persons, and the latter measure the extent of intolerance. In our sample, 63.83% of the respondents strongly dislike having gay neighbours and 8.11% somewhat dislike it. See the distribution in Appendix Figure C.1.

²⁰ We checked whether a dummy for missing or “don’t know” observations is correlated with the distance to historical missions. We did not find any significant correlation.

We also use a set of additional demographic and socioeconomic variables from Afrobarometer: e.g., gender, age, religion, ethnicity, education, employment, access to public goods (water, toilet, and electricity), and household assets.

Overall, our sample spans 33 African countries: Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Eswatini (Swaziland), Ivory Coast, Gabon, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Saint Thomas and Prince, Senegal, Sierra Leone, South Africa, Tanzania, Togo, Tunisia, Uganda, Zambia, and Zimbabwe.²¹ Following Nunn (2010), we omit from the sample respondents that are not of African descent. Appendix Figure C.2 reports countries' average level of intolerance toward gay people.

Figure 1: Map of Christian Missions



Source: Missions data from Nunn (2010).

Data on Historical Missions Historical mission data comes from Nunn (2010). It contains 1321 mission locations with coordinates and the denomination of Christianity they belong to (see Figure 1). This dataset is the most popular in the literature studying effects of European colonization and missions on African institutions and development. The dataset represents an ESRI shapefile that contains latitude and longitude of the historical missions. We compute the minimum distance

²¹The sixth Afrobarometer's wave has 36 countries; however, the question about the tolerance toward gay persons was not asked in Algeria, Egypt, and Sudan.

(in km) between each respondent of the Afrobarometer survey and the nearest mission. To explore the robustness of our estimates, we also compute alternative functional forms of the minimum distance and the number of missions within a certain radius of the respondent. As missions' data differ in Nunn (2010) and in Cagé and Rueda (2016), for the sake of robustness, we also obtained raw data from Valeria Rueda and estimated our main specification using the explanatory variable calculated from this dataset as well.

Pre-colonial Attitudes Toward Homosexuality and Other Data The novel data on the pre-colonial attitudes toward homosexuals are coming from the anthropological study “Boy-wives and female-husbands: Studies in African homosexualities,” edited by Murray and Roscoe (1998). This book contains articles describing homosexual cultural norms in various African ethnic groups. In Appendix I “African Groups with Same-sex Patterns” of that book, there is a list of the 56 African ethnic groups that practiced any kind of same-sex relationship (see Appendix Figure C.3). We digitized and harmonized the name of those ethnic groups and matched them with our data.²²

It is important to note that Murray and Roscoe (1998) document *same-sex* patterns and not necessarily just *same-gender* patterns. In many cases, acceptance of same-sex attraction is accompanied by patterns of cross-dressing and assuming nonconforming gender identities.²³ Thus, the data can be used to assess not just traditional acceptance of homosexuality, but also — more broadly — as acceptance of wide array of LGBTQ+ identities and practices.

Regarding the difference between male and female homosexuality, Murray and Roscoe, 1998 make the best effort to document male and female same-sex patterns.²⁴ They mention, however, an important limitation of their approach: female homosexuality is “infrequently revealed to men, especially outsiders.”²⁵ Thus, we expect the data to be mainly driven by male homosexuality.

We also use ancestral data from Murdock’s atlas and terrain data (ruggedness, elevation, night light luminosity, and population density) from Nunn and Puga (2012). We supplement our dataset with crop suitability data from Food and Agricultural Organization²⁶ and malaria ecology from the Malaria Atlas Project.²⁷

4 Empirical Specification, Results, and Alternative Explanations

In this section, we present our main specification, discuss assumptions under which our estimates show a causal effect of Christian missions on anti-gay sentiments, and evaluate the plausibility of these assumptions.

²²Names of the ethnolinguistic groups in Murray and Roscoe (1998) and Murdock (1967) are mostly the same making matching straightforward. Appendix Table C.1 contains the crosswalk between the two.

²³For example, Gaudio, 1998 describes the culture of *yan daudu*, individuals who are referred to by others as males but refer to each other using “feminine linguistic forms.”

²⁴For example, they specify separate notions for male and female homosexuality among Hausa and Mombasa.

²⁵Preface, “All Very Confusing,” page XXI, Murray and Roscoe, 1998.

²⁶Global Agro-ecological Zones (GAEZ v3.0), available here: <http://www.gaez.iiasa.ac.at/>.

²⁷Available here: <https://malariaatlas.org/>.

4.1 Empirical Specification and Identification

For our main specification, we use the following cross-sectional regressions where the observation is a respondent i nested in village v :

$$Intolerance_{i(v,e)} = \alpha_c + \beta \cdot Distance_v + X_{i(v)}\Gamma + \lambda_e + \varepsilon_{i(v,e)}, \quad (1)$$

where $Intolerance_{i(v)}$ is the dummy variable equal to 1 if a respondent would not like her neighbours to be gay, and $Distance_v$ is a “treatment” variable equal to the minimum distance (in 100 km) from respondent i from the redvillage v to the historical mission site. For the baseline specification, we do not add any controls to avoid post-treatment biases; however, we include geographic and socioeconomic pre-treatment controls ($X_{i(v)}$) for robustness. We also include a set of ethnicity (λ_e) and country fixed effects (α_c) Afrobarometer defines coordinates on the village/town level, thus all respondents located in the same village/town will have the same treatment. Thus, as the treatment is on the village level, we cluster standard errors on the village level as well.

The causal identification is based on the assumption that the location of historical missions is (i) not impacted by the pre-colonial homosexual behaviors and (ii) not impacted by the unobservable factors that made the establishment of the historical mission more likely and affected future intolerance. In the baseline specification, by using ethnicity fixed effects we address the former concern. In addition, in Section 4.3.1 we also check that historical missions were not strategically placed in homelands of ethnic groups with same-sex practices. We address potential violations of the latter assumptions in Section 4.3.2 where we introduce additional individual and geographic controls and fixed effects, and consider other alternative scenarios.

4.2 Core Results

Panel A of Table 1 reports our main results: respondents living closer to the historical missions are more likely to dislike having gay neighbors. The estimate from Column I suggests that a respondent living farther away from a mission will be less intolerant than one living next to the mission. This specification includes only country fixed effects; hence, identifying variation is the within-country minimum distance to the mission. We also absorb all institutional factors thus severing the effect of missions on anti-gay sentiments through the national institutions. Columns II–V scrutinize the robustness of this pattern to the inclusion of various controls and fixed effects. Column II introduces contemporary geographic controls (ruggedness, elevation, and coordinates). Column III controls for respondents’ exogenous characteristics (gender, age, and age squared). We control for urban status in Column IV. We add respondents’ ethnicity fixed effects in Column V.²⁸ Our estimate holds throughout all columns.²⁹ These results suggest, that historical missions

²⁸The question about the respondent’s ethnicity was not asked in Burundi and Tunisia (in total 4.6% of observations in our sample). We include those observations and also include a dummy equal to one if the ethnicity variable is missing in order not to lose observations. All the estimates remain significant if we omit these countries.

²⁹We show the robustness of our baseline results to the alternative ways of computing standard errors. First, in Appendix Table C.3 we show that results remain significant if we cluster by country, province/state, or regional level

have a large causal but reduced form effect on the tolerance toward homosexuals, such as people living closer to old missions appear to be less tolerant. The coefficient from the most conservative specification in Column V suggests that a respondent living 100 km farther away from the mission will be 1.3 percentage points less intolerant than one living next to the mission.

Table 1: Missions and anti-gay sentiments: Core results

	I	II	III	IV	V
<i>Panel A:</i>					
	Dependent variable: 1(Dislike homosexuals)				
Min. distance-to-mission, 100 km	-0.007** (0.0027)	-0.005* (0.0028)	-0.005* (0.0028)	-0.008*** (0.0028)	-0.013*** (0.0038)
R-squared	0.256	0.256	0.259	0.260	0.282
Observations	50,337	50,337	50,337	50,337	50,337
<i>Panel B:</i>					
	Dependent variable: 1(Dislike or somewhat dislike homosexuals)				
Min. distance-to-mission, 100 km	-0.009*** (0.0026)	-0.006** (0.0027)	-0.006** (0.0027)	-0.010*** (0.0027)	-0.012*** (0.0042)
R-squared	0.256	0.256	0.259	0.260	0.282
Observations	50,337	50,337	50,337	50,337	50,337
<i>Panel C:</i>					
	Dependent variable: Dislike homosexuals (ordinal, from 0 to 4)				
Min. distance-to-mission, 100 km	-0.023*** (0.0068)	-0.017** (0.0069)	-0.017** (0.0068)	-0.025*** (0.0069)	-0.029*** (0.0099)
R-squared	0.230	0.230	0.233	0.235	0.255
Observations	50,337	50,337	50,337	50,337	50,337
Country FEs	✓	✓	✓	✓	✓
Modern geo. controls		✓	✓	✓	✓
Demographic controls			✓	✓	✓
Urban dummy				✓	✓
Ethnicity FEs					✓

Note: (a) Each panel reports on results of a one specification, run for each measure of intolerance toward homosexuals separately across all columns. (b) The dependent variable in Panel A is a dummy equal to 1 if the respondent answered that he/she strongly or somewhat strongly dislikes having gay neighbours and 0 otherwise. (c) The dependent variable in Panel B is a dummy equal to 1 if the respondent answered that he/she strongly dislikes having gay neighbours and 0 otherwise. (d) The dependent variable in Panel C is ordinal variable running from 0 (strongly like having gay neighbours) to 4 (strongly dislike having gay neighbours). (e) All regressions include constant. Modern geographic controls include ruggedness, elevation, and coordinates. Demographic controls include gender, age, and age squared. 33 country fixed effects, 295 ethnicity fixed effects. We add dummy for missing ethnicity if the question about ethnicity was not asked in that country (Burundi and Tunisia). (f) In parentheses we report standard errors clustered on geographical unit (village/town). 7,390 clusters. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table C.7 demonstrates that our results are robust to various functional forms of the main explanatory variable: $\ln(Distance_v)$ in Column II, $\sqrt{Distance_v}$ in Column III, and quadratic (Columns II–IV). Second, we double-cluster standard errors (Cameron, Gelbach and Miller, 2011) by location and ethnicity in Column V to address that fact that intolerance toward gays can be ethnic-specific and by geographical unit and country, in Column VI, to address the fact that Afrobarometer surveys (and, thus, our dependent variable) were conducted on the country-level. Third, we also report spatial HAC (Conley, 2010) standard errors with different distance cutoffs to address possible spatial auto-correlation in Columns I–VI of Table C.5. Additionally, our results also hold if, in Table C.6, we aggregate the data at the country-ethnicity level.

polynomial in Column IV.³⁰ Our results also hold if we use minimum distance along contemporaneous roads in Column V and minimum travel time in Column VI.³¹ In case there are several closely located missions, the minimum distance would underestimate the effect of proximity to the mission. Thus we report robustness of our results to the alternative measure of exposure to historical missions: number of missions in the 150 km and 300 km radius (Columns VII and VIII).³² Finally, we report results for our baseline measure using distances computed based on the mission data from [Cagé and Rueda \(2016\)](#) (Column IX) and results based on minimum distance to mission in either [Cagé and Rueda \(2016\)](#) or [Nunn \(2010\)](#) (Column X). Our results hold across all columns. Hereafter, we use the minimum distance-to-mission measure as the baseline measure.

We also obtain qualitatively identical results when we anti-gay sentiments from the newly released seventh wave of Afrobarometer in Panel A of Table C.8. In Panel B we pool the data from the sixth and seventh Afrobarometer waves and including the wave dummy replicate our baseline results from Table 1. Resulting coefficients appear to be more significant than when estimated separately by wave. In Panel C we use data from two countries (Nigeria and Zimbabwe) from the seventh wave of WVS where we can construct identical to Afrobarometer’s dependent variable. Again, we find significant negative coefficient, similar in magnitudes to those in our baseline specification.

Our results are robust to alternative ways of measuring intolerance toward gay persons. In Panel B of Table 1, we define the dependent variable as a dummy equal to unity if respondents both “strongly dislikes” and “somewhat dislikes” having gay neighbours. And in Panel C we define it as an ordinal variable running from 0 (strongly like having gay neighbours) to 4 (strongly dislike having gay neighbours). The coefficient of interest appears to be significant in all columns.³³

Our results are not driven by a particular subsample of the data. Column II of Appendix Table C.4 demonstrates the robustness of our results to the omission of the North African countries. Appendix Figure C.4 reports on the robustness of our preferred estimate in Panel A of Column V to dropping one country at a time. The estimated coefficient always remains significantly different from zero. Dropping Botswana, reduces the coefficient the most, from -0.013 to -0.018. Dropping Cape Verde, increases the coefficient the most, from -0.013 to -0.011.

4.3 Robustness and Sensitivity Checks Assumptions

4.3.1 Missions Were *Not* Established in Places With Higher Pre-Colonial Levels of Intolerance

As [Murray and Roscoe \(1998\)](#) document, before the arrival of European colonizers, indigenous groups in Sub-Saharan Africa differed in their attitude to homosexuality. One explanation of the

³⁰We repeat our baseline specification from Column V of Table 1 for comparison. The quadratic term appears to be insignificant. Higher-order polynomials yield similar results.

³¹Here we use Google Maps application programming interface to construct minimum travel distance and travel time between a locality and its nearest mission.

³²The results are robust to alternative thresholds.

³³In the next Sections, we continue to use the measure from Panel A; however, all results hold for both alternative measures as well. Our results also hold if we use alternative weights in Column III of Appendix Table C.4.

results in Table 1 is that pre-colonial attitudes to homosexuality might influence both the locations of the missions and modern attitudes to homosexuality. Thus, the results in Table 1 could be spurious because of the confounding factor. Fortunately, Murray and Roscoe (1998) also contain information on which indigenous groups practiced open homosexual relationships, and which groups did not. Here, we provide several pieces of evidence to address this concern.

First, we demonstrate in Panel A of Table 2 that pre-colonial acceptance of homosexual practices does not correlate with the anti-gay attitudes today. Column I shows a bivariate correlation which is not statistically significant, while Columns II–IV show the same relationship with different sets of controls. In none of the specifications, we find a statistically significant association between pre-colonial acceptance of homosexual practices and modern anti-gay sentiments.

Secondly, we explore if there is a plausible connection between the location missions and pre-colonial acceptance of homosexual practices. The results of these tests are shown in Panel B of Table 2. In none of the specifications, the connection is statistically significant. This result is consistent with the literature on historical Christian missions that emphasized that the locations of missions were selected for logistical reasons (distance to coast, access to clean water etc.) and not by the traditions of local indigenous groups (Jedwab, zu Selhausen and Moradi, 2019). At the same time, missions were not intentionally built around ethnic groups practicing same-sex relationships in order to “correct” ungodly behavior.³⁴

Thirdly, in case we have measurement error in ethnic groups with same-sex culture that correlates with mission location it can invalidate our identification. Murray and Roscoe (1998) catalogued ethnic groups with same sex practices, thus it is safe to assume that those label as with same-sex patterns are labeled correctly. However, they could miss some, most likely small and thus less studied ethnic groups. To address, this issue we replicate Table 2 separately on the subset of the half of the largest and smallest ethnic groups. Here we assume that if large groups are more well-studied, their ancestral norms related to same-sex norms are defined with less measurement error. Appendix Table C.10 presents the results: coefficients in both subsamples are insignificant, suggesting that even for the sample of large, potentially more studies ethnolinguistic groups, ancestral norms allowing same-sex relations do not correlate with historical missions locations and current anti-gay sentiments.

Fourthly, in Table 3 we estimate the baseline regression (1) on two different subsamples: Column II presents the estimate on a subsample of individuals belonging to groups with open acceptance of homosexuality in pre-colonial times, and Column III shows the same regression for all the other groups. We find that the coefficients of association between the distance from the nearest mission and modern anti-gay sentiments are similar in both of these subsamples and close to the coefficient in our main regression in Table 1.

³⁴As the treatment (ancestral norms) is computed on ethnicity level, in Table C.9 we also replicate Table 2 on the ethnic homelands level instead of the respondent’s level. None of the coefficient is significant at the conventional levels.

Table 2: Ancestral homosexual practices do not correlate with anti-gay attitudes today and with distance to missions

	I	II	III	IV	V	VI
<i>Panel A:</i>						
	Dependent variable: Dislike homosexuals					
Ancestral norms allowed same-sex relations	0.056 (0.0470)	0.057 (0.0460)	0.057 (0.0460)	0.079 (0.0596)	0.063 (0.0509)	0.080 (0.0609)
Modern geo. controls		✓	✓	✓	✓	✓
Ancestral geo. controls			✓			✓
Moralizing god				✓		✓
Ancestral marital norms					✓	✓
R-squared	0.236	0.236	0.236	0.168	0.222	0.168
Observations	50,337	50,337	49,141	32,717	43,939	31,191
<i>Panel B:</i>						
	Dependent variable: Min. distance-to-mission, 100 km					
Ancestral norms allowed same-sex relations	-0.770 (0.6003)	-0.760 (0.5791)	-0.760 (0.5791)	-1.018 (0.7568)	-0.837 (0.6402)	-1.046 (0.7734)
Modern geo. controls		✓	✓	✓	✓	✓
Ancestral geo. controls			✓			✓
Moralizing god				✓		✓
Ancestral marital norms					✓	✓
R-squared	0.729	0.730	0.724	0.691	0.716	0.677
Observations	50,337	50,337	49,141	32,717	43,939	31,191

Note: (a) Each panel reports on results of a one specification, run for different dependent variables separately across all columns. (b) The dependent variable in Panel A is a dummy equal to 1 if the respondent answered that he/she strongly or somewhat strongly dislikes having gay neighbours and 0 otherwise. (c) The dependent variable in Panel B is the minimum distance (in 100 km) from respondent i to a historical mission. (d) All columns include country fixed effects, age, and female dummy. Modern geographic controls include ruggedness, elevation, and coordinates. Ancestral geographic controls include ancestral ethnic group's distance-to-coast, average ancestral ruggedness, and ancestral coordinates. Moralizing god is a dummy equal to one if respondent's ethnic group's ancestors had a high god present, active, and specifically supportive of human morality. Ancestral marital norms controls includes dummy for presence of preference for cousin marriages and polygamy. (e) Number of observations is decreasing because some control variables from Murdock (1967) are missing for some ethnic groups. All results hold if we add these observations with dummies for a missing observation. (f) In parentheses we report standard errors clustered on the geographical unit level (village/town). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

In Column IV, we introduce the interaction term $\beta^H \cdot Distance_v \cdot 1(\text{Same-sex culture})_e$; however, we do not find any heterogeneous effect of missions on ethnic groups with same-sex culture. Hence, it reinforces our conclusion that missions were not specifically targeting ethnic groups that exhibit tolerance to same-sex relationships.

To isolate the differential effect of missions, aside from adding the interaction between $\beta \cdot Distance_v$ and the dummy for pre-treatment same-sex culture, in Column V, we replace $\beta \cdot Distance_v$ with $\beta^{NH} \cdot Distance_v \cdot 1(\text{No same-sex culture})_e$, so that our specification mirrors a split-sample estimation strategy in which the core estimation (1) would be run separately for respondents with and without same-sex culture, but at the same time imposes a common set of coefficients on other

controls unrelated to ancestral attitudes to gay persons.³⁵ Both coefficients appear to be negative and significant and while the coefficient for the effect of the mission proximity on ethnic groups with same-sex culture is larger in absolute value, the difference between the two coefficients is not significant (p-value=0.308).

Overall, we conclude, that (i) historical missions were not placed near ethnic groups that had some form of same-sex relationship and (ii) there is no differential effect of missions on respondents with different ancestral attitudes toward homosexuals.

Table 3: Ancestral homosexual practices: Subsample analysis

	I	II	III	IV	V
	Dependent variable: Dislike homosexuals				
Sample	Baseline (all)	Had same-sex culture	No same-sex culture	All	
Min. distance-to-mission, 100km	-0.0132*** (0.0038)	-0.018** (0.0086)	-0.011*** (0.0043)	-0.011** (0.0043)	
Min. distance-to-mission, 100km x w same-sex culture				-0.009 (0.0090)	
Min. distance-to-mission, 100 km x Eth. groups w same-sex culture				-0.020** (0.0082)	
Eth. Groups w/o same-sex culture				-0.011** (0.0043)	
Δ , p-value				[0.3080]	
R-squared	0.282	0.232	0.287	0.286	0.286
Observations	50,337	9,338	40,999	50,307	50,307

Note: (a) In all columns, we take the most demanding specification from the baseline results, i.e., Column V in Panel A of Table 1. (b) In Column II, we estimate the specification for the subsample of respondents whose ethnic groups allowed same-sex relationships. (c) In Column III, we estimate the specification for the subsample of respondents whose ethnic groups did not explicitly allowed same-sex relationships. (d) Column IV adds interaction term $\beta^H \cdot Distance_v \cdot 1$ (Same-sex culture)_e. (e) Column V reports on specification (1) but replaces $\beta \cdot Distance_v$ with $\beta^H \cdot Distance_v \cdot 1$ (Same-sex culture)_e and $\beta^{NH} \cdot Distance_v \cdot 1$ (No same-sex culture)_e. (f) Dummy for the same-sex culture is absorbed by ethnicity fixed effects. (g) Δ , p-value is the p-value for the difference between $\hat{\beta}^H$ and $\hat{\beta}^{NH}$. (g) In parentheses we report standard errors clustered on the geographical unit level (village/town). *** p<0.01, ** p<0.05, * p<0.1

4.3.2 The Geographical Features of Missions' Location Did Not Make it Easier to Develop Intolerance to Homosexuality Later

Locations of missions were undoubtedly influenced by geography. Specifically, as documented by [Jedwab, zu Selhausen and Moradi \(2019\)](#), missions were more likely to be located closer to the coast. And coastal cities are likely to have a high concentration of gay couples ([Black et al., 2002](#)). In addition, [Dimico \(2014\)](#) theorizes that rugged terrain mattered for the location of missions because it provided protection from military raids for the groups that have been selected by the

³⁵The dummy for the same-sex culture is absorbed by the ethnicity fixed effects.

missionaries for religious conversion. Also, according to [Nunn and Puga \(2012\)](#), rugged terrain hindered economic activity, and as long as lower levels of economic activity lead to less inclusive values ([Inglehart and Welzel, 2005](#)), ruggedness could have a causal impact on the current level of intolerance through economic development channel. One plausible alternative explanation for our results in [Table 1](#) is that the same geographical characteristics that influenced locations of missions also influenced modern anti-gay sentiments.

We provide several pieces of evidence to alleviate this concern. Our results in [Table 1](#) include an extensive set of geographic controls (including terrain ruggedness, elevation, and coordinates). As a robustness check, in [Appendix Table C.4](#), we offer additional estimations that control for contemporary and geographic factors. Our results hold if in [Columns IV and V](#), we include distance to the coast, distance to the capital, cereal and staple crop suitability controls. [Column VI](#) includes both fixed effects of the respondent and fixed effects of the ethnic groups that lived historically in those locations, absorbing all location-specific and respondent-specific ancestral characteristic. The inclusion of these controls does not change the result.³⁶ Similarly, in [Table C.12](#) we show that our results hold when we control for important for colonial economies cash crops and various determinants of malaria ecology.³⁷ Similarly, the inclusion of these controls does not change the result. Thus, while it is possible that Christian missions were established in places that could have made gradual development of anti-gay sentiments, these potential confounding factors are unlikely to influence our main result.

A specific causal pathway through which geography could possibly matter for the missions and for current anti-gay sentiments is through its impact on number HIV/AIDS cases. Many countries of Sub-Saharan Africa suffered severely from the HIV/AIDS epidemic in the 1990s. It has been demonstrated that the HIV/AIDS prevalence might increase intolerance towards gay people because, among heterosexuals, HIV/AIDS is associated with homosexuality and bisexuality ([Herek and Capitano, 1999](#)). Thus, if the geographical determinants of the location of religious missions overlapped with the determinants of HIV/AIDS cases, then the estimates of the effects of missions on anti-gay sentiments might be spurious. There are at least two causal pathways that might lead to spurious results: the first one operates through current poverty, and the second one operates through polygamy.

Scenario 1: Ruggedness and Poverty Missions were more likely to be located in the areas with rugged terrain that provided protections from raids ([Dimico, 2014](#)). The rugged terrain is a “mixed blessing” since it also hinders economic development ([Nunn and Puga, 2012](#)), and low-development areas were prone to have more HIV/AIDS cases ([Whiteside, 2002](#)). Thus, a correlation between distance to missions and anti-gay sentiments could be spurious if this potential explanation is not

³⁶Additionally, [Column VII](#) of [Table C.4](#) shows that our results hold when we omit all respondents living in their countries’ capital cities.

³⁷We control for cocoa and palm suitability in [Column I](#) of [Table C.12](#). We don’t have data on suitability of rubber and kola nuts. Rubber is mostly prevalent in Democratic Republic of Congo, and Afrobarometer has never conducted surveys there. Kola nuts are also very clustered in a small set of countries: Liberia, Niger, Nigeria, and Sierra Leone. Thus, we omit these countries in [Column II](#) of [Table C.12](#) to show that results are not driven by kola nuts.

adjusted for. In Table 1, we control for terrain ruggedness thus taking into account this explanation. In addition, in Table C.13, we add controls for individual socio-economic status, and in Columns II and III of Table C.14, we add controls for proxies for contemporary economic development (luminosity from satellite images and population density). The main result does not change.

Scenario 2: Slave Trade and Polygyny Missions were also more likely to appear near the coast. Distance to coast influenced the prevalence of slave trade, and legacies of the slave trade influenced modern outcomes (Nunn, 2008; Nunn and Wantchekon, 2011). One of the outcomes that are relevant for HIV/AIDS is the practice of polygyny (one man having several wives). Bertocchi and Dimico (2019) demonstrated that this practice was more likely to emerge in the areas that suffered demographic shock due to the slave trade. In Column V of Table C.4 we control for distance to coast and historical distance to coast is absorbed by ethnic homelands fixed effects in Column VI; our results still hold. Additionally, in Columns VI–VII of Appendix Table C.14, we split the sample into high-polygyny groups and low-polygyny groups and find that the main coefficient is the same for both groups.³⁸

Other Scenarios It is certainly possible that those two scenarios do not exhaust the possibility of potentially unobserved determinants of missionary activity also influencing the HIV/AIDS prevalence, and HIV/AIDS prevalence influencing the anti-gay sentiments. However, all those scenarios involve HIV/AIDS prevalence being on a back-door path between missionary activity and anti-gay sentiments. In Columns IV–V of Table C.14 we show that our results hold in countries that had a high prevalence of HIV/AIDS as well as countries with a low-level of HIV/AIDS (though the point estimates are higher for countries with high HIV/AIDS).

Appendix Table C.15 shows that distance to historical mission does not affect alternative outcomes, such as intolerance toward people of different religions in Column I, people of different ethnicities in Column II, people with HIV/AIDS in Column III, or immigrants and foreign workers in Column IV.

In case missions affected attitudes only in British colonies (because homosexuality was prohibited in the United Kingdom) in Table C.16 we show that our results hold separately on the subsamples of countries with and without British colonial presence (Columns I and II). We also don't find differential effects in Column III.

Because our measure of intolerance toward homosexuals is about residential preferences, our results may not be applicable to other aspects of life. Hence, we use geo-coded WVS data from two countries Nigeria and Zimbabwe that contain two additional questions related to the other aspects of intolerance toward gay people. In particular, one question there asks whether "*Homosexual couples are as good parents as other couples?*" Another question asks, *whether you think [Homosexuality] can ... never be justified ... ?* Using these questions, we define two dummy variables, the first, equal to one if the respondent thinks that gay people can't be good parents, and the second equal to one

³⁸We computed country-level shares of polygamous households and HIV rates using data from the Demographic and Health Survey: <https://dhsprogram.com/data/>.

if the respondent thinks that homosexuality is never justifiable. Columns I and II of Appendix Table C.17 Panel A shows the results; distance-to-mission point estimate is negative and significant. While this evidence comes only from the two countries out of our sample, it suggests, that our results hold beyond residential intolerance toward gay people.³⁹

Counterfactual missions Finally, in the vein of Dell and Olken (2020) we conduct the following placebo test: we create 500 maps of randomly generated missions, conditional on parameters important for their location (Jedwab, zu Selhausen and Moradi 2019); i.e., we generate the same number of missions as we have in our 33 countries 500 times and compute minimum distance-to-counterfactual missions for each respondent in our data.⁴⁰ Appendix Figure C.5 compares our true point-estimate to the distribution of point-estimates obtained using minimum distances with counterfactual missions. The true coefficient has by far the largest magnitude. This permutation test shows that the distance to the missions is of specific importance for current anti-gay sentiments as compared to other locations that have the same geographical features as the missions but lack the missions themselves.

4.4 Potential Spuriousness Because of Spatial Autocorrelation

Kelly (2020) shows that in the studies of the persistence of outcomes if the explanatory variable and the outcome both exhibit a high degree of spatial autocorrelation then the p-value for the statistical tests might be biased downwards, and thus lead to spurious conclusions. This issue might not be remedied by traditional methods such as Conley's standard errors that we report in Tables C.3 and C.5. We follow the approach recommended by Kelly (2020) and also report HAC standard errors with Matern kernel, where the appropriate range is selected using grid search. The results are reported in Table C.21 in Appendix. As expected, the standard errors do widen somewhat, but our results remain significant on the 5 percent level. Thus, given that we use conventional significance reporting thresholds, our results are unlikely to be spurious because of spatial autocorrelation.

³⁹We also check whether proximity to mission affects other cultural norms mentioned in Christianity. Columns III–IX of Appendix Table C.17 Panel A show no effect of missions on whether suicide is justifiable; however, villages located further away from missions are less likely to think that, prostitution, abortions, divorce, sex before marriage, euthanasia, or casual sex are never justifiable. Although, only coefficients for abortion, sex before marriage, and casual sex are statistically significant. We explore the effect of proximity to mission on questions related to violence in Columns I–VI of Panel B, and find that the only significant effect is for the justification for beating children by parents. In Columns VII–IX we explore whether distance to mission is affecting people's attitude toward science: we find, consistently with the impact of Christianity, negative and significant coefficient for the question, "whenever science and religion conflict, religion is always right."

⁴⁰First, we estimate the probability of having a mission in a grid cell using geographic controls (latitude and longitude, ruggedness, elevation, and distance-to-coast). Then, we estimate the propensity score and randomly place missions in cells among the top 15% of the cells that are the most similar to the cells with the actual missions.

5 Religious Conversion by Missions is the Most Plausible Mechanism

In the previous section, we find that proximity to Christian missions is strongly associated with current anti-gay sentiments and argue that this association is indicative of the causal effect. Our interpretation of these results is that the missions influenced the religious conversion of the local indigenous population and the religious norms. In this Section, we provide suggestive evidence, that the spread of Christianity is the most likely channel through which historical missions affect contemporary attitudes toward homosexuals.⁴¹

To substantiate the aforementioned conclusion we perform several additional pieces of analysis. First, in Table 4 we perform the same regressions as in Table 1 using only nonreligious individuals (Column II). We do not find a statistically significant relationship between distance to the missions and anti-gay sentiments (if so, the coefficient even changes its sign). In Column III we also find no effect of missions on the subsample of respondents following traditional beliefs. In Column IV we estimate equation 1 on the subsample of Muslim respondents. While Islam also prohibits homosexual behaviour, if the effect of missions works through the spread of Christianity, we expect no effect on Muslim respondents. The resulting estimate is, indeed, very close to zero and insignificant. The coefficient remains insignificant when we combine all non-Christian respondents in Column V. Finally, in Column VI we include only respondents following any Christian denomination. The estimate is close to our baseline estimate and is highly significant. These results are consistent with the missions influencing current anti-gay attitudes through the mechanism of religious attainment.

Secondly, missions have been demonstrated to improve literacy (Carpenter, 1960; Dimico, 2014) and change political beliefs (Woodberry, 2012). Those things might have an impact on anti-gay sentiments that are not mediated by religion. In Table C.13, we control for those outcomes: educational attainment, urbanization, belief that democracy is the best form of government. Technically, those are “post-treatment” controls that are to be avoided if we are interested in the effects of missions, but we include them here to show that the non-religion channels do not explain away the effect of missions on anti-gay sentiments. Our results are robust to the inclusion of grid-level light intensity, population density, household assets, public goods dummies (access to electricity, type of toilet, and access to water), employment status, education dummies, and pro-democracy beliefs.

It is also worth pointing out that all the potential alternative channels have been shown to improve tolerance.⁴² In our estimations, we find the negative overall effects of missions on intolerance, so the alternative channels are likely to attenuate our estimates.⁴³

⁴¹We also confirm findings of Nunn (2010) by demonstrating that historical missions spread Christianity in Table C.20.

⁴²Both urbanization and education are associated with lower-level of out-group biases. Specifically, Berge et al. (2020) report no significant co-ethnic bias among residents of Nairobi, Kenya, except for those who lived in Nairobi for less than ten years. Economic modernization, in general, is associated with more inclusive values (Inglehart and Welzel 2005).

⁴³Another explanation, unrelated to religion, might be that missions helped spread conservative values that were not necessarily related to any religious doctrine. In an attempt to test this explanation with Afrobarometer, we regress the acceptance of female leaders on the distance to the missions and find no discernible effect (Table C.19).

Table 4: The effect of missions goes through Christians respondents only

	I	II	III	IV	V	VI
	Dependent variable: Dislike homosexuals					
Sample	Baseline (all)	No religion	Traditional beliefs	Muslim	Non-Christian	Christian
Min. distance-to-mission, 100km	-0.0132*** (0.0038)	0.014 (0.0156)	-0.031 (0.0302)	-0.003 (0.0047)	-0.001 (0.0045)	-0.013*** (0.0046)
R-squared	0.282	0.393	0.282	0.223	0.304	0.273
Observations	50,337	1,675	796	13,197	17,590	32,671

Note: (a) In all columns, we take the most demanding specification from the baseline results, i.e., Column V in Panel A of Table 1. (b) In Column II, we estimate the specification for the subsample of respondents that consider themselves not religious. (c) In Column III, we estimate the specification for the subsample of respondents whose religion is "traditional beliefs." (d) In Column IV, we estimate the specification for the subsample of respondents whose religion is any denomination of Islam. (e) In Column V, we estimate the specification for the subsample of respondents that are non-religious or whose religion is not a Christianity. (f) In Column V, we estimate the specification for the subsample of respondents whose religion is any denomination of Christianity. (g) In parentheses we report standard errors clustered on the geographical unit level (village/town). *** p<0.01, ** p<0.05, * p<0.1

In Appendix Table C.18 we provide an additional test for whether the potential "modernizing" effect of missions can render our main results spurious: a separate estimation of the coefficients on the distance to the nearest mission for urban and rural respondents. Column I reports our baseline estimate (taken from Column V of Table 1) where we only control for urban fixed effects. In Column II, we replace $\beta \cdot Distance_v$ with $\beta^U \cdot Distance_v \cdot 1(\text{Urban})_i$ and $\beta^R \cdot Distance_v \cdot 1(\text{Rural})_i$. Thus, we test if the effect of proximity to the historical mission is significantly different from zero separately for rural and urban respondents. Both coefficients appear to be negative and statistically significant. In Column III we estimate the same specification, but with two separate sets of ethnicity fixed effects that are specific to respondent's urban/rural status, so that this specification mirrors a split-sample estimation strategy in which the core estimation (1) would be run separately for rural and urban respondents, but at the same time imposes a common set of coefficients on other controls unrelated to urban status. While the significance of the β^R is lower, both coefficients are significant and negative. The coefficients do not statistically differ from each other, with a p-value of 0.16.

Another plausible mechanism is *modern* religious conversion. As demonstrated by Grossman (2015), U.S. Evangelical religious organizations ("megachurches") had a profound presence in Africa. If their presence was influenced by the same geographical characteristics that influenced the locations of colonial Christian missions, then the effect estimated in Table 1 would be spurious. To alleviate this concern, we perform two exercises in Table 5. First, Column II excludes Evangelical protestants (only 3.0% of our total sample or 4.9% of Christian sample) from our sample to demonstrate that the effect is not driven by the Evangelicals. This test, however, might be prone to error since people often change denominations, and because of the sheer amount of churches, not everyone who is associated with them might call themselves an "evangelical."

Table 5: Missions and anti-gay sentiments: heterogeneous effects by denomination

	I	II	III	IV	V	VI	VII	VIII
	Dependent variable: Dislike homosexuals							
Sample	Christian	No Evangelical	Only Catholic	Only non-Catholic	Christian		All	
Min. distance-to-mission, 100km	-0.013*** (0.0046)	-0.012** (0.0046)	-0.012* (0.0068)	-0.013** (0.0064)				
Min. distance to Catholic mission, 100km					-0.008*** (0.0028)		-0.006** (0.0024)	
Min. distance to Protestant mission, 100km						-0.012*** (0.0043)		-0.007** (0.0030)
R-squared	0.273	0.278	0.297	0.273	0.273	0.273	0.281	0.281
Observations	32,671	31,063	10,504	22,110	32,671	32,671	50,329	50,329

Note: (a) In all columns, we take the most demanding specification from the baseline results, i.e., Column V in Panel A of Table 1. (b) Column I replicates Column VI of Table 4; i.e., we estimate the specification for the subsample of respondents whose religion is any denomination of Christianity. (c) In Column II, we estimate the specification for the subsample of Christian respondents that do not identify themselves as Evangelical. (d) In Column III, we estimate the specification for the subsample of Catholic respondents. (e) In Column IV, we estimate the specification for the subsample of non-Catholic respondents. (f) Columns V–VIII report on specification (1) but replaces minimum distance to any mission ($\beta \cdot Distance_v$) with $\beta^C \cdot \min$ distance to Catholic mission_v and $\beta^C \cdot \min$ distance to Protestant mission_v. (g) In Columns V–VI, we estimate the specification for the subsample of respondents whose religion is any denomination of Christianity. (h) In parentheses we report standard errors clustered on the geographical unit level (village/town). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

To alleviate this issue, we also perform a stronger test by excluding all non-Catholic denominations in Column III. Since conversion to Catholicism is unlikely to result from the activities of U.S. Evangelical Churches, the statistically significant effect we get once non-Catholics are excluded might alleviate the concerns. Column IV reports coefficient for the subsample of non-Catholic Christian respondents. These results suggest no difference on the effects on Catholic and non-Catholic population. Finally, Columns V–VIII also check whether Catholic and Protestant historical missions had differential effects on anti-gay sentiments. We find approximately similar effects for Catholic and Protestant missions.⁴⁴

Overall, while the Christian missions certainly influenced not only religion but an array of other outcomes (literacy, political beliefs, etc.), when it comes to anti-gay sentiments as an outcome, religious conversion is the most plausible mechanism.

6 Discussion and Conclusion

In this paper, we argue that religious conversion by Christian missions in Africa caused anti-gay norms and that these attitudes later persisted. Using geo-coded Afrobarometer data, we demonstrate that negative attitudes towards homosexual persons are positively associated with a distance to colonial Christian mission sites.⁴⁵ We explore the plausible violations of the iden-

⁴⁴While the difference between the effects of Catholic and Protestant missions is statistically insignificant, the point-estimate is slightly larger for the Protestant missions (Column VI). This is in line with Cagé and Rueda (2020) who find that Catholic missions were less successful at converting, especially in former French colonies.

⁴⁵It is important to note that our empirical strategy is designed to identify the effect of historical missions on people who live close to those missions today. Our results indicate that missions were able to create instill attitudes that proved persistent because those attitudes existed in the context of religion. Important areas for further research include

tifying assumptions: geographical fundamentals determining both the locations of the missions and anti-gay attitudes, pre-colonial anti-gay attitudes being correlated with the locations of the missions, and others. We conclude that those alternative explanations do not seem to drive our results. We argue that the most plausible mechanism of the impact of Christian missions on anti-gay attitudes today is religious conversion since the effect only exists in the subsample of Christian respondents, and does not change once both individual-level and aggregate-level variables that also could be potentially influenced by missionary activity (literacy, poverty, etc.) are included in the regression.⁴⁶

Our study demonstrates how religious conversion can change norms and attitudes.⁴⁷ The analysis is necessarily limited to one religion and one set of attitudes. However, we find it plausible that these results might be generalizable to other religions (specifically, the ones prescribing a tight moral code, like Islam and Judaism) and other norms and values.

We have also left out of the discussion the potential impact of norms and values on public policy. Appendix Section B presents correlations between the number of Christian missions and criminalization of homosexuality in African countries, but this evidence is only suggestive.

It is also not our contention that Christian activity is the only important determinant of anti-gay attitudes. It has been documented that the activity of U.S. megachurches (Grossman, 2015) and the abstinence-only response to the HIV epidemic (Anthony, 2018) also contributed to the intolerance. We leave quantitative exploration of interactions of these and other contemporary processes with missionary legacies to further research.

identifying whether out-migration from those areas as well as the inward migration erodes or reinforces those attitudes.

⁴⁶We leave for further research a decomposition of the impact of missions into a direct effect and an indirect one. Missions could have affected anti-gay attitudes directly through the conversion into Christianity, or indirectly, through the impact of missions on HIV prevalence (studied in Cagé and Rueda, 2020). Because our main result is driven only by Christians, it is plausible that the direct effect dominates, but more research is needed.

⁴⁷Scholars have proposed several explanations of the persistence of norms, such as older generations socializing younger cohorts into the norms of older cohorts (Aghion et al., 2010), political regime durability (Poyker, 2019), and cross-generational stability of environment (Giuliano and Nunn, 2017).

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