The Legacy of Colonial Medicine in Central Africa*

Sara Lowes†
Bocconi University, IGIER, and CIFAR

Eduardo Montero‡
Harvard University

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Abstract: Between 1921 and 1956, French colonial governments organized medical campaigns to treat and prevent sleeping sickness. Villagers were forcibly examined and injected with medications with severe, sometimes fatal, side effects. We digitized thirty years of archival records to document the locations of campaign visits at a granular geographic level for five central African countries. We find that greater historical exposure to the campaigns reduces trust in medicine – measured by willingness to consent to a free, non-invasive blood test. The resulting mistrust is specific to the medical sector. We examine relevance for present day health initiatives; we find that World Bank projects in the health sector are less successful in areas with greater exposure to the campaigns.

Keywords: Trust, medicine, colonialism, health, culture.

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†Bocconi University, Department of Economics, IGIER, and CIFAR. Email: sara.lowes@unibocconi.it. Website: www.saralowes.com.

‡Harvard University, Department of Economics, 1805 Cambridge Street, Cambridge, MA, 02138. Email: emontero@fas.harvard.edu Website: http://scholar.harvard.edu/emontero.

1. Introduction

Between the 1920s and 1950s, French colonial governments undertook extensive medical campaigns in sub-Saharan Africa aimed at managing tropical diseases. In Cameroon and former French Equatorial Africa (present day Central African Republic, Chad, Republic of Congo, and Gabon, henceforth AEF; see Figure 1 for a map), the colonial governments organized campaigns against a variety of diseases, including sleeping sickness, leprosy, yaws, syphilis, and malaria.[1] The most extensive of these campaigns focused on sleeping sickness, a lethal disease spread by the tsetse fly. Over the course of several decades, millions of individuals were subjected to medical examinations and forced to receive injections of medications with dubious efficacy and with serious side effects, including blindness, gangrene, and death. The sleeping sickness campaigns constituted some of the largest colonial health investments, and for many, these campaigns were their first exposure to modern medicine (Headrick, 1994; Lachenal, 2014).

There is a large body of anecdotal evidence from Africa of mistrust in medicine leading to under-utilization of health care.[2] Relatedly, research in developing countries has highlighted that even when there is access to high-quality preventative and therapeutic tools, demand remains puzzling low (Dupas, 2011; Dupas and Miguel, 2017). Motivated by work from anthropology and history which links colonial medical campaigns against sleeping sickness and mistrust in medicine (Feldman-Savelsberg et al., 2000; Lachenal, 2014), we hypothesize that the colonial medical campaigns may have had a series of unintended effects on both beliefs about modern medicine and the success of modern health interventions. The campaigns may have affected trust in medicine because: villagers were forced to receive injections, many of the medications had serious negative side effects, and the medications were ineffective. Additionally, the campaigns may have also caused the spread of contagious diseases because of the re-use of unsanitary needles during the campaigns (Pépin, 2011; Lachenal, 2014). Thus, we examine the effects of historical colonial medical campaigns on present day trust in medicine, health outcomes, and the success of World Bank health projects.

To measure exposure to colonial medical campaigns, we construct a novel data set from over 30 years of archival data from French military archives for five countries. We digitized hundreds

[1] Yaws is a skin infection caused by a sub-species of the bacterium that causes venereal syphilis.

[2] For example, during the 2014 Ebola outbreak in West Africa, some communities rejected health workers and did not follow recommended practices to avoid transmission of the virus (Blair et al., forthcoming). In northern Nigeria, communities boycotted the polio vaccination leading to a large outbreak of a nearly eradicated disease (Jegede, 2007).

of tables documenting the locations of sleeping sickness campaign visits at a granular geographic level – either the ethnicity-district or the sub-district level – between 1921 and 1956. We construct two measures of exposure to colonial medical campaigns. The first measure is the share of years that a location is visited during the years of the campaigns. The second measure is the average share of the population visited in a location. The digitization and compilation of this historical data is itself a unique and valuable contribution to understanding the history of sub-Saharan Africa.

We measure trust in medicine by whether an individual consents to a free and non-invasive blood test for either anemia or HIV in the Demographic and Health Survey (DHS). We consider consent to the blood tests to be a revealed preference measure of trust.[3] We find that increased exposure to colonial medical campaigns is correlated with lower levels of trust in medicine today. Approximately 4.7% of the sample refuse the blood tests. Being visited by the colonial medical campaigns 15 years, the average number of years an area is visited, increases refusals by 5.1 percentage points. Equivalently, a one standard deviation increase in the times a region was visited by the medical campaigns increases refusal rates by 0.10 standard deviations. The results are robust to a variety of geographic, colonial, pre-colonial, and individual level controls. The strong correlation remains when we examine anemia blood test refusals or HIV blood test refusals separately.

After presenting the correlations between medical campaign exposure and trust in medicine, we address concerns of reverse causality and omitted variable bias using an instrumental variable strategy. The reverse causality concern is that the medical campaigns targeted places to visit based on their initial levels of trust in medicine (or trust more broadly, given that many of these places would have had little to no exposure to modern medicine prior to these campaigns). For this to bias upward the magnitude of the observed effects, the medial campaigns would need to have targeted *less* trusting places. However, it is more likely that the medical campaigns would target more trusting places because these places would be easier to work in. The second concern is omitted variable bias: that there is some other variable that is jointly determining both trust in medicine and the number and intensity of campaign visits.

A natural instrument for medical campaign exposure might be the tsetse fly suitability index (TSI) developed by Alsan (2015), which predicts where the tsetse fly is able to live and therefore

[3]The DHS does not collect any survey measures of trust in medicine.

is correlated with the prevalence of animal and human sleeping sickness. However, as shown in Appendix Figure A2a, our areas of interest are all highly suitable for the tsetse fly so it does not strongly predict the campaign exposure. Thus, we include it as a disease suitability control in our specifications.

We construct an instrument for exposure to the medical campaigns based on two components. The instrument uses (i) soil suitability for cassava relative to traditional crops (e.g. millet) interacted with (ii) distance to colonial capital. The logic of the instrument is explained in greater detail in the text, but in short, colonial administrators had noted a correlation between growing cassava and sleeping sickness. This is likely due to two features of growing cassava. First, cassava produces more calories per hectare than traditional crops, such that less land needs to be cleared to produce a fixed amount of calories. This leads to more tsetse fly-harboring "bush". Second, the processing of cassava, which is generally done near bodies of water, could increase risk of exposure to the tsetse fly.[4] Thus, the suitability for cassava relative to millet captures the perceived need for medical campaign visits because of the increased potential for human interaction with the tsetse fly (Headrick, 1994). Additionally, growing cassava is an easily observable trait. We use the soil suitability for cassava relative to millet, rather than just soil suitability for cassava, to avoid concerns that we are just capturing the effects of being overall more suitable for agriculture.

The second component of the instrument is distance to colonial capital. This captures the ease with which a medical team could access a particular location. In the appendix we present an alternative instrument which is simply the soil suitability for cassava relative to millet without the distance interaction. With the IV specifications, we find that medical campaigns have a large and significant effect on willingness to submit to a blood test: being visited by the colonial medical campaigns 15 years increases refusals by 6.5 percentage points from a mean rate of refusal of 4.7 percentage points.

One potential concern with the instrument is that soil suitability for cassava relative to millet interacted with distance to colonial capital directly affects trust in medicine. To test whether this is the case, we present results from a falsification test comparing former British Cameroon with French Cameroon. British Cameroon was not exposed to medical campaigns, and therefore, the instrument should have no predictive value for blood test refusal in former British Cameroon. Reassuringly, the results from the falsification test confirm that the instrument only has predictive

[4]This processing is required because otherwise cassava contains cyanide.

power for blood test refusals in former French Cameroon. This suggests that the instrument does not directly affect trust in medicine.

We also explore whether the observed mistrust is specific to trust in medicine or more generalizable to trust in other people or institutions. We use Afrobarometer data from Cameroon and Gabon on trust in a variety of other people and institutions – e.g. neighbors, people you know, local government, police, traditional leaders – to test whether exposure to medical campaigns affects other forms of trust. Both the average effect size (AES) coefficients and the coefficients on individual survey questions suggest that there is no effect of exposure to the medical campaigns on trust in these non-medical individuals and institutions.[5] These results highlight that the effect of exposure to medical campaigns is specific to the medical domain. The Afrobarometer also has a series of questions on: interaction with the health sector, frequency of seeking medical treatment, and ease of access to health facilities. We find that despite no reported differential access to a health clinic, individuals from areas more exposed to the campaigns are more likely to report no interaction with the health sector and a longer amount of time without seeking medical treatment.

We then examine whether the exposure to medical campaigns of an individual's own ethnic group or the exposure to the medical campaigns of those ethnic groups around an individual predicts blood test refusal. One can think of this as a test of the relative importance of vertical transmission of cultural values - i.e. from parent to child - or of horizontal transmission of cultural values (Bisin et al., 2004; Tabellini, 2008). Using detailed ethnicity maps from historical UN reports and the 2004 DHS for Cameroon, we examine individuals who currently reside in a DHS cluster not located in their ethnic group's historical region. We construct a measure of (i) the average exposure of the other ethnic groups located in the DHS cluster, excluding the exposure of the individual's ethnic group, and (ii) a measure of the individual's own ethnic group's exposure, and we test their relative importance in predicting blood test refusal.[6] We present evidence that an individual's ethnic group's exposure to the historical medical campaigns is more important for predicting blood test refusal than the average exposure of the other ethnic groups represented in the DHS cluster where the individual is presently located. However, the

[5] These are the only countries in our sample for which Afrobarometer data is available. We make use of all available survey rounds for these countries and all available questions related to trust. There are no survey questions on trust in medicine.

[6] This exercise is conceptually similar to Nunn and Wantchekon (2011), who examine migrants to test whether the slave trade's effect on trust is transmitted through a cultural channel or an institutional channel.

coefficient on the exposure of individuals from other ethnic groups in an individual's present location is also positive and sizable.

Given that the health campaigns predict measures of trust in medicine, it is important to examine the implications for health outcomes. First, we examine the outcomes for the two blood tests administered in the DHS, with the caveat that our previous analysis shows selection into who consents to take the blood test. We find evidence of worse health outcomes in areas with greater exposure to the campaigns. Individuals are more likely to have anemia (lower hemoglobin levels). Additionally, we find evidence of higher HIV prevalence in areas with greater exposure to the medical campaigns.[7] Finally, we construct an index of childhood vaccination completion. In areas with greater exposure to the campaigns children are less likely to have been vaccinated. A one standard deviation increase in colonial medical campaign visits reduces vaccination rates of children by 0.064 standard deviations. Our results provide evidence that the history of colonial medical campaigns is associated with worse health outcomes in both the biomarker data and in terms of vaccination rates for children.

We then turn to examining the relevance of historical medical campaigns for present day health policy by examining how differential exposure to colonial medical campaigns affects success of present day health interventions. We use data on the location of World Bank projects approved between 1995 and 2014 to examine how exposure to medical campaigns affects project success as rated by the World Bank using data from AidData (2017). The World Bank rates projects from "highly unsatisfactory" to "highly satisfactory". We compare the success of health projects and non-health projects by historical medical campaign intensity. We find that greater exposure to the campaigns is correlated with less successful health projects but does not negatively affect the success of projects in other domains. The effect size for health projects is equivalent to changing the rating from "moderately satisfactory" to "moderately unsatisfactory". We test whether colonial medical campaigns predict receiving a World Bank project or whether a project is rated to address concerns about the selective placement and evaluation of World Bank projects. We find no evidence that project placement or evaluation is correlated with treatment. These results highlight the importance of the colonial medical campaigns for understanding the efficacy of present day

[7] Pépin (2011), an epidemiologist, hypothesizes that the colonial medical campaigns may have contributed to the initial spread of HIV through the use of unsanitary needles. Greater HIV prevalence today could be consistent with greater mistrust in medicine or with exposure to campaigns directly transmitting blood borne diseases. We are unable to distinguish between these channels. Note, however, that our HIV prevalence data reflects the present day distribution of HIV, but may not reflect historical HIV prevalence.

health policies, and more broadly, how historical experiences can affect policy.

The paper speaks to several diverse literatures. First, we contribute to the broader literature on how historical events are important for understanding Africa's comparative development (Nunn, 2009). In particular, many papers have focused on exploring the long-term impacts of pre-colonial institutions and colonial policies in Africa on modern development outcomes (Gennaioli and Rainer, 2007; Nunn, 2008; Michalopoulous and Papaioannou, 2013, 2014, 2016). Other work has examined the role of geography, such as Alsan (2015) who examines the effect of tsetse fly suitability and sleeping sickness in animals on long-run development. Huillery (2009) examines the effects of colonial investments in education in former French West Africa, and Cagé and Rueda (2017) document a correlation between exposure to Christian missionaries and HIV prevalence. Anderson (forthcoming) presents evidence that colonial legal origins affects HIV prevalence and the infection rates of women relative to men in sub-Saharan Africa. We build on this work in three ways. First, we compiled a novel historical data set on colonial medical activity that has yet to be studied. Second, we test how colonial health investments affect present day trust in medicine in a setting where, at least anecdotally, trust in medicine is low. Finally, we test if historical exposure to colonial medical campaigns can partially explain the success of present-day health projects in the region.

The paper is related to a growing literature exploring how culture and history can inform development policy. For example, recent work has shown how the practice of bride price payments affects parental response to an increase in the supply of schooling and investment in daughters (Ashraf et al., 2016; Corno and Voena, 2016) and how matrilineal kinship affects the well-being of women and children (Lowes, 2017; Jayachandran and Pande, 2017). In this project, we present evidence that historical experiences affect trust in modern medicine and that this has implications for the success of health policies.

The paper is also related to the literature on the economic impacts of historical health interventions (e.g. Acemoglu and Johnson, 2007).[8] For Africa in particular, Osafo-Kwaako (2012) finds that a WHO campaign to eliminate yaws in the late 1950s in Ghana had large effects on educational attainment, and Kazianga et al. (2014) find that the elimination of river blindness in Burkina Faso led to greater population growth. We provide the first quantitative evidence of the effects of the

[8]For example, Ager et al. (forthcoming) examine the effects of small pox eradication on mortality in Sweden, and Hansen et al. (2017) examine how treatment for tuberculosis affects mortality. In the U.S., Alsan and Goldin (forthcoming) examine the effects of improvements in water and sewerage infrastructure on child mortality.

extensive efforts to treat and prevent sleeping sickness during the colonial era. We examining a setting in which the campaigns affected millions of people over several decades. However, unlike the studies above, the intervention itself was of dubious efficacy, using medications with severe, sometimes deadly, side effects (Lachenal, 2014).

We speak to the large body of evidence from randomized controlled trials trying to understand barriers to use of health services, such as liquidity constraints, present bias, and psychological costs of accessing healthcare (see Dupas and Miguel, 2017 for a review). Sub-Saharan Africa has a disproportionate percentage of the global disease burden. The region accounts for 90% of all malaria deaths, 70% of people living with HIV, and has some of the highest under-five mortality rates in the world (WHO, 2017a; UNAIDS, 2014; WHO, 2017b). Given the extent of the disease burden, under-utilization of health care is puzzling. We present evidence that mistrust generated by historical experiences with medicine may be another important demand constraint and that this mistrust is linked to worse health outcomes.

Our work is also related to a literature on the unintended consequences of aid interventions, such as Nunn and Qian (2014), Dube and Naidu (2015), and Crost et al. (2014), papers which examine the effects of US food aid, US military aid, and World Bank aid respectively on conflict in various settings. We build on this work by providing detailed empirical evidence on how even well-intentioned colonial policies can have counter-intuitive and long-lasting negative effects on health. We find that these campaigns negatively affect present-day health seeking behavior and important health outcomes such as HIV rates, anemia, and vaccination rates.

Finally, our project is also related to a broader literature on the historical origins of trust. Trust has been shown to matter for economic development in a variety of settings (Nunn and Wantchekon, 2011; Algan and Cahuc, 2010). There is a growing interest in the relationship between trust and health. Recent work examines the relationship between disclosure of information and trust. For example, Alsan and Wanamaker (2018) examine how black men respond to the revelation of the Tuskegee experiments on black men with syphilis in which treatment for syphilis was purposefully withheld. They find negative effects on black men's trust in medicine and health. Martinez-Bravo and Stegmann (2017) examine the effects of anti-vaccine propaganda on vaccination rates in Pakistan in the wake of the search for Osama bin Laden. We contribute to this literature on trust in several ways. First, we demonstrate that historical negative experiences with the health sector can affect the health-seeking behavior of subsequent generations, i.e. that the effect can be persist across generations. Second, we then demonstrate the relevance for health policy by examining the success of World Bank projects across our sample. Finally, the campaigns were not an isolated incident; we examine a "treatment" that was relevant across many sub-Saharan African countries and in which millions of individuals were forcibly treated for sleeping sickness.

The paper is structured as follows. Section 2 provides background on the colonial medical campaigns. Section 3 describes the archival and modern data used in the empirical analysis. Section 4 presents the OLS and IV results on the association between the medical campaigns and trust in modern medicine. Section 5 examines how health outcomes vary by exposure to historical medical campaigns, Section 6 tests for differential success of present day health initiatives, and Section 7 concludes.

2. Colonial Medical Campaigns

French, British, and Belgian colonial governments implemented a wide variety of medical campaigns beginning in the early 20th century.[9] The introduction of these efforts coincided with greater European penetration into rural areas and to large outbreaks of human African trypanosomiasis, also known as sleeping sickness. The largest and most pervasive medical campaigns organized by the French focused on the treatment and prevention of sleeping sickness. However, the campaigns also targeted other diseases including yaws, malaria, leprosy, and yellow fever (Headrick, 1994, 2014; Pépin, 2011).

Sleeping sickness is a lethal parasitic disease transmitted by the bite of a tsetse fly, which is only present in Africa. There are two stages of the disease. An individual in the first stage of the disease experiences joint pain, headaches, and fever. The disease can cause drowsiness and swelling in the lymph nodes. In the second stage, the disease infects the nervous system, and the individual experiences extreme lethargy and eventually dies. There are two types of human sleeping sickness. The more acute and rapid acting form of the disease, *Trypanosoma brucei rhodesiense*, is found in Eastern and Southern Africa. However, most sleeping sickness cases in humans are from the chronic form of the disease, *Trypanosoma brucei gambiense*, which is found in Western and Central Africa. There is also a form of sleeping sickness that affects domesti-

[9]For an overview of the approaches used by various colonizing countries, see Headrick (2014). In short, while the French focused on treating the individual, the British focused on controlling the disease environment. The Belgians largely modeled their health initiatives after the French.

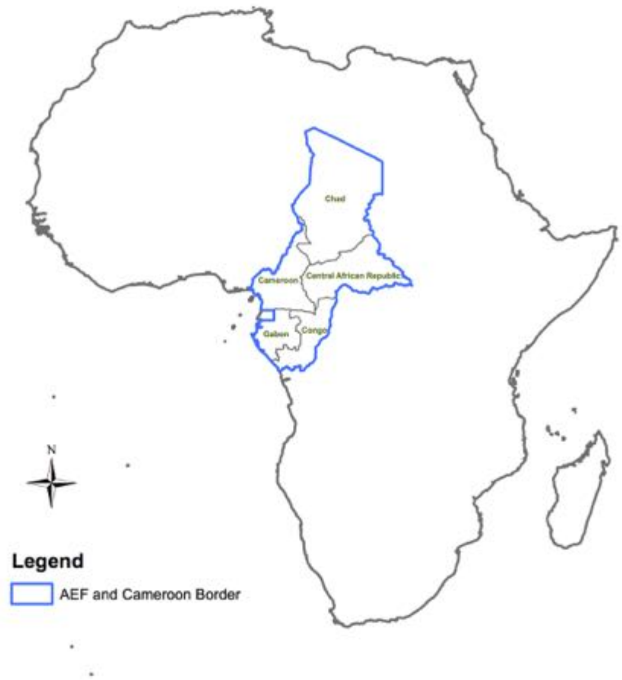
cated animals, *Trypanosoma brucei brucei*, which is also known as *nagana*. The sleeping sickness epidemics motivated a large European response during the colonial era. This was partially due to humanitarian concerns but also due to concerns about labor supply, particularly in the sparsely populated equatorial zone. Scientific and nationalistic motivations were also important, as the colonial governments competed over developing advances in medicine (Headrick, 1994, 2014).

In French colonies, the military organized and implemented campaigns through a system of mobile medical teams. In Cameroon, the mobile medical teams were first organized in 1921. AEF organized mobile teams, called the *Service de la prophylaxie de la trypanosomiase*, beginning in 1927. See Figure 1 for a map of Cameroon and the former AEF countries. The mobile teams generally consisted of one French military doctor, several African nurses, two white corporals, several African soldiers and a large number of porters to carry equipment. The teams faced the challenging task of visiting rural villages at a time of minimal road infrastructure. During a medical team's visit to a village, villagers were forced, often at gunpoint, to undergo a physical examination. The examinations included neck palpitations to check for swelling of the lymph nodes, blood tests to check for trypanosomes in the blood, and spinal taps. Doctors would then administer treatments based on the results of the examination (Headrick, 1994, 2014).

The campaigns initially focused exclusively on the treatment of sleeping sickness. One of the earliest forms of treatment for sleeping sickness was the drug *atoxyl*, an arsenic based drug. While the name atoxyl literally means non-toxic, the drug had a chemotherapeutic index close to one. This means that the dose of treatment required to rid the body of the trypanosomes was almost equal to the dose that would be lethal to the patient. Additionally, the drug caused partial or total blindness in up to 20% of patients (Headrick, 2014). The drug was administered to patients regardless of whether they were known to have sleeping sickness. It was also poorly understood that the drug was only effective in treating the disease during the first stage but had no benefits in the second stage. The coverage of the campaigns was impressive. For example, in Cameroon in 1928, the mobile medical teams examined 663,971 people, of whom 17% were identified as having sleeping sickness (Le Gouvernement Français, 1929).

Subsequent medications for sleeping sickness, such as Lomidine (also known as Pentamidine in the United States), were less toxic, but often had serious side effects. Lomidine was believed to work as a prophylactic, which means it was supposed to prevent individuals from getting sleeping sickness, rather than treating those who already had sleeping sickness. During the

Figure 1: Map of Cameroon and former French Equatorial Africa



campaigns, all individuals in a village were required to receive Lomidine injections. The Lomidine injection needed to be administered every six months in order for it to effectively prevent sleeping sickness in an individual. Even though Lomidine was believed to prevent the spread of sleeping sickness, it was also associated with significant side effects. The injections themselves were painful and caused dizziness and low blood pressure. Entire villages were required to rest under the supervision of the medical team after receiving the injections. Lomidine injections were also associated with several serious accidents, including the development of gangrene at the injection site and death. In fact, Lomidine was considered too dangerous for use on Europeans. Ultimately, Lomidine was shown to be ineffective at prevention, but for a short term would reduce circulating trypanosomes (Lachenal, 2017, p.174). In fact, in 1974, a French doctor involved with the colonial medical campaigns declared that the Lomidine injections were "pointless, dangerous, and therefore pointlessly dangerous" (Lachenal, 2017, p.182).[10]

Historians and anthropologists have linked the sleeping sickness campaigns to mistrust in

[10] In 2018, results were released from a medical trial that suggest that a new orally administered drug, fexinidazole, can effectively treat late stage sleeping sickness, a breakthrough relative to the present first line treatment therapy of oral nifurtimox and intravenous eflornithine that must be administered in a hospital setting (Mesu et al., 2018; Maxmen, 2017).

modern medicine, as individuals were often forced to participate in the campaigns and the treatments had severe negative side effects. Furthermore, the efficacy of the drugs used in the campaigns was dubious. Anecdotally, the experience of these campaigns has affected present day views of medicine. Feldman-Savelsberg et al. (2000, p. 162) explain resistance to a tetanus campaign in Cameroon in 1990 by noting that "[the modern medical campaigns]...awakened negative collective memories of French colonial efforts to wipe out sleeping sickness". Similarly, Giles-Vernick (2002, p. 106) reports on rumors and memories that were still circulating in the late 1980s in the Nola region of Central African Republic (CAR) that the injections for sleeping sickness brought death. In fact, the Eton ethnic group from Central Cameroon has a song about the sleeping sickness campaigns and the negative side effects of the sleeping sickness injections. Part of the song lyrics are as follows:

> *The injection against sleeping sickness was too painful*
> *The injection against sleeping sickness was too painful*
> *They gave me an injection in the head*
> *They gave me an injection in the neck*
> *They gave me an injection in the back*
> *...*
> *They ask me to go draw water from the well*
> *If I drag my feet*
> *The policemen hit me on the head*
> *The injection against sleeping sickness was too painful* (Lachenal, 2014)

The song highlights that the memory of the sleeping sickness campaigns remain, how memories of the campaigns may be transmitted across generations, and that the campaigns were characterized as painful by the participants.

Additionally, epidemiologists have examined the effects of the unsanitary practices used during the campaigns on the spread of contagious disease. While the campaigns followed standard contemporaneous medical procedures, they may have contributed to the proliferation of certain blood-born diseases from the reuse of unsanitary needles (Pépin, 2011). For example, campaigns against schistosomiasis in Egypt have been associated with the *iatrogenic* spread (illness related to medical practice or treatment) of Hepatitis C (Frank et al., 2000). Medical researchers have documented a link between exposure to colonial medical campaigns and Hepatitis C virus (HCV) infection rates in Cameroon, which today has one of the highest Hepatitis C infection rates in the world (Nerrienet et al., 2005). Epidemiologists often use HCV to examine iatrogenic transmissions of diseases because HCV is generally non-lethal and difficult to spread through sex. Pépin and Labbé (2008) and Pépin et al. (2010) link HCV and Human T-Cell Lymphotropic Virus (a retrovirus that causes adult T-cell leukemia, henceforth HTCLV) rates in former AEF countries and Cameroon to colonial medical campaign exposure. Pépin (2011) hypothesizes that in AEF, the medical campaigns may have contributed to the initial spread of HIV prior to its initial identification, as it gave the virus access to large swaths of population to which it would not have otherwise had access. In related work, Pépin (2012) provides evidence that treatment of sex workers in Léopoldville (present day Kinshasa) for STDs may have also contributed to the spread of HIV.

3. Description of Data

3.1. *Historical Data*

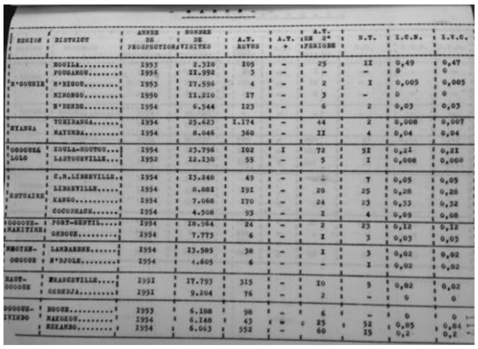
The historical data for this paper comes primarily from the *Service Historique de la Defense*, military archives in France. The colonial governments of Cameroon, Gabon, Republic of Congo, Chad, and Central African Republic submitted annual reports to France on the health activities undertaken that year within the colony. An aggregated report for the whole of AEF was also produced on an annual basis.[11] These records include administrative, medical, demographic, geographic, and climate information for each colony. Importantly, the reports include the places visited by medical teams and the types of treatments administered at a granular geographic level.

In January 2013, we collected these records from the military archive to construct a panel data set for Cameroon and former AEF countries. For the AEF countries we digitize data for 1927 to 1956. This data are at a sub-district level. For Cameroon, the data is at an ethnicity-district level for the years 1921 to 1950. See Figure 2a for an example of the archival data from Gabon and 2b for an example of the archival data for Cameroon. The tables include detailed information on estimated number of people in an area, the number of people visited, the number of newly sick individuals, number of previously sick individuals, the number of lumbar punctures administered, and the number of previously sick individuals who had recovered. Often, the number of injections of various types of drugs were also reported. The reports also included narrative descriptions of

[11]Similarly, the countries that comprised French West Africa (Mauritania, Senegal, Mali, French Guinea, Ivory Coast, Burkina Faso, Benin, and Niger) submitted annual reports on their health activities. We focus on AEF and Cameroon because the historical literature on medical campaigns has focused on these areas and the extensive amount of work required to digitize the historical records. Cameroon had a special status because it was taken from the Germans after World War I, after which the country was divided between the French and the British. While Cameroon was not officially part of AEF, it was administered similarly.

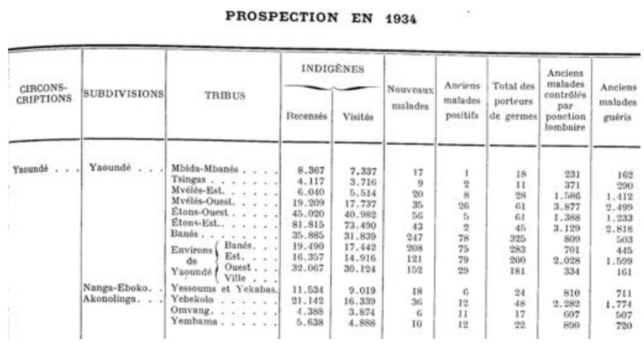
the activities undertaken by the health teams. Many of the reports include maps of where the teams visited and the geographic distribution of the incidence of various diseases. Figure 3 is an example of a map documenting areas visited in 1941 in Cameroon, and Figure 4 is an example of a Cameroon map documenting incidence of sleeping sickness by ethnic group in 1934.

Figure 2: Examples of Reports



REGION	DISTRICT	ANNEE DE PROSPECTION	NOMBRE DE VISITES	A.T. REVUS	A.T. +	A.T. EN 2e PERIODE	N.T.	I.C.N.	I.V.C.
N'GOUNIE	MOUILA	1953	2.310	105	-	25	11	0,49	0,47
	FOUGAMOU	1954	11.992	3	-	-	-	0	0
	M'BIGOU	1953	17.596	4	-	2	1	0,005	0,005
	MIMONGO	1950	11.210	17	-	3	-	0	0
	N'DENDE	1954	6.544	123	-	6	2	0,03	0,03
NYANGA	TCHIBANGA	1954	25.623	1.174	-	44	2	0,008	0,007
	MAYUMBA	1954	8.046	360	-	11	4	0,04	0,04
OGOOUE LOLO	KOULA-MOUTOU	1954	23.796	102	1	72	51	0,21	0,21
	LASTOURVILLE	1952	12.130	55	-	5	1	0,008	0,008
ESTUAIRE	C.M.LIBREVILLE	1954	13.240	49	-	[illegible]	7	0,05	0,05
	LIBREVILLE	1954	8.881	191	-	20	25	0,28	0,28
	KANGO	1954	7.068	170	-	24	23	0,33	0,32
	COCOBEACH	1954	4.508	93	-	1	4	0,09	0,08
OGOOUE-MARITIME	PORT-GENTIL	1954	18.964	24	-	2	23	0,12	0,12
	OMBOUE	1954	7.773	6	-	1	3	0,03	0,03
MOYEN-OGOOUE	LAMBARENE	1954	13.585	38	-	1	3	0,02	0,02
	N'DJOLE	1954	4.605	6	-	-	1	0,02	0,02
HAUT-OGOOUE	FRANCEVILLE	1951	17.793	315	-	10	5	0,02	0,02
	OKONDJA	1951	9.204	76	-	2	-	0	0
OGOOUE-IVINDO	BOOUE	1953	6.188	98	-	6	-	0	0
	MAKOKOU	1954	6.140	43	-	25	52	0,85	0,84
	MEKAMBO	1954	6.063	552	-	60	15	0,2	0,2

(a) Example of Archival Data from Gabon (1954)



PROSPECTION EN 1934

CIRCONSCRIPTIONS	SUBDIVISIONS	TRIBUS	INDIGÈNES Recensés	INDIGÈNES Visités	Nouveaux malades	Anciens malades positifs	Total des porteurs de germes	Anciens malades contrôlés par ponction lombaire	Anciens malades guéris
Yaoundé	Yaoundé	Mbida-Mbanés	8.367	7.337	17	1	18	231	162
		Tsingas	4.117	3.716	9	2	11	371	290
		Mvélés-Est	6.040	5.514	20	8	28	1.586	1.412
		Mvélés-Ouest	19.209	17.737	35	26	61	3.877	2.499
		Étons-Ouest	45.020	40.982	56	5	61	1.388	1.233
		Étons-Est	81.815	73.490	43	2	45	3.129	2.818
		Banés	35.885	31.839	247	78	325	809	503
		Environs de Yaoundé: Banés	19.490	17.442	208	75	283	701	445
		Environs de Yaoundé: Est	16.357	14.916	121	79	200	2.028	1.599
		Environs de Yaoundé: Ouest	32.067	30.124	152	29	181	334	161
		Environs de Yaoundé: Ville							
	Nanga-Eboko	Yessoums et Yekabas	11.534	9.019	18	6	24	810	711
	Akonolinga	Yebekolo	21.142	16.339	36	12	48	2.282	1.774
		Omvang	4.388	3.874	6	11	17	607	507
		Yembama	5.638	4.888	10	12	22	890	720

(b) Example of Archival Data from Cameroon (1934)

Figure 3: Sleeping Sickness Campaign Map for Cameroon - Areas visited in 1941

We are able to construct detailed measures of when and where the campaigns went and what they did during various visits. We create two main measures of exposure to the colonial medical campaigns: (1) share of years visited of the 30 potential years (2) average share of people in an area exposed to the campaigns. We use these as our two main measures of exposure because they are available in every report and are most likely to be comparable across countries and reports. Figure 5 shows the variation in number of visits to ethnic groups for Cameroon and sub-districts for former AEF countries between 1921 and 1956. The number of visits varies between 0 and over 20. Northern Chad was not visited by the mobile teams, likely because it is not suitable for the tsetse fly and therefore did not have sleeping sickness (see Figure A2a). See Appendix Figures A3 and A4 for the estimated distribution of sleeping sickness when first measured, the highest rates of sleeping sickness ever reported for an area, and the year in which sleeping sickness prevalence is first estimated.

3.2. *Modern Data*

We combine the historical data on colonial medical campaign visits with DHS data for our countries of interest. The datasets in our analysis include DHS data for men, women, and children for Cameroon for 2004 and 2011, Gabon for 2012, Congo for 2009 and 2011, Chad for 1996, 2004, and 2014, and Central African Republic for 1994. The distribution of DHS clusters for the countries that report geo-located cluster information are shown in Figure 6a. For the Republic of Congo and for two waves of data for Chad, the DHS does not report geo-located cluster information and only reports the district; therefore, we present information on the number of observations per district (see Appendix A for detailed information on these data sets). We also combine GIS data on climate, geography, and disease suitability with colonial data and pre-colonial data to control for potential covariates that could affect both exposure to campaigns and trust in medicine today.

The DHS does not include survey questions on trust in medicine. However, survey participants are asked whether they are willing to take a blood test for anemia or HIV. We use refusal to consent to a blood test as a proxy for mistrust in modern medicine. This has the benefit of being a revealed preference measure of trust, rather than a self-reported measure. Importantly, these blood tests are non-invasive. For the anemia tests, they simply involve a blood prick and results are delivered within minutes. If an individual is identified as anemic, they are told by the survey enumerator that they are anemic and given information on how to get treatment.[12] For the HIV

[12]See the MeasureDHS website, https://dhsprogram.com/Topics/Anemia.cfm, for additional details on the anemia blood test.

Figure 4: Sleeping Sickness Prevalence by Ethnic Group in Cameroon (1934)

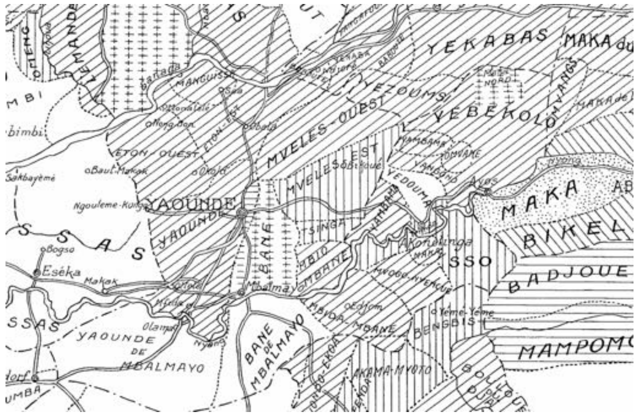


Figure 5: Sleeping Sickness Visits Between 1921-1956

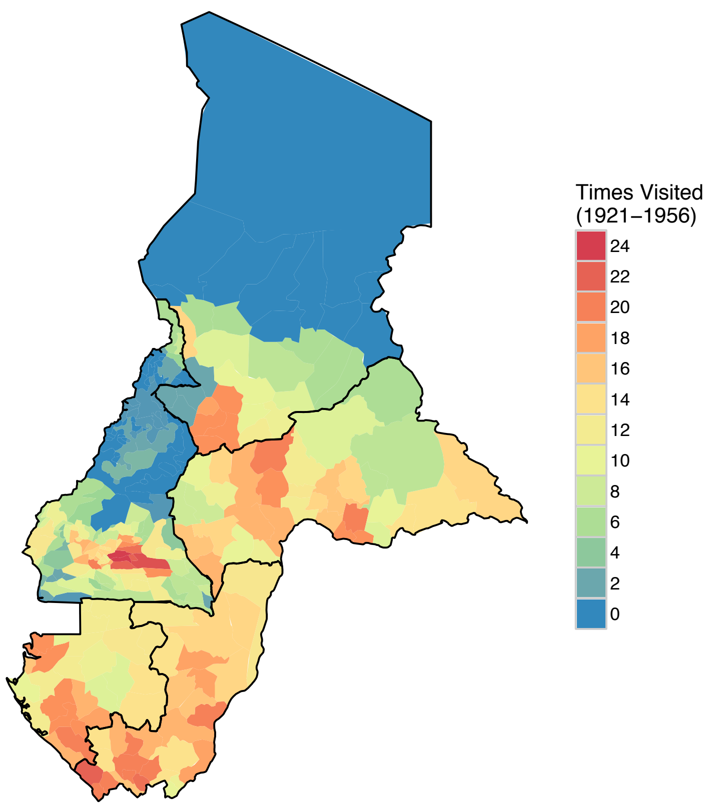
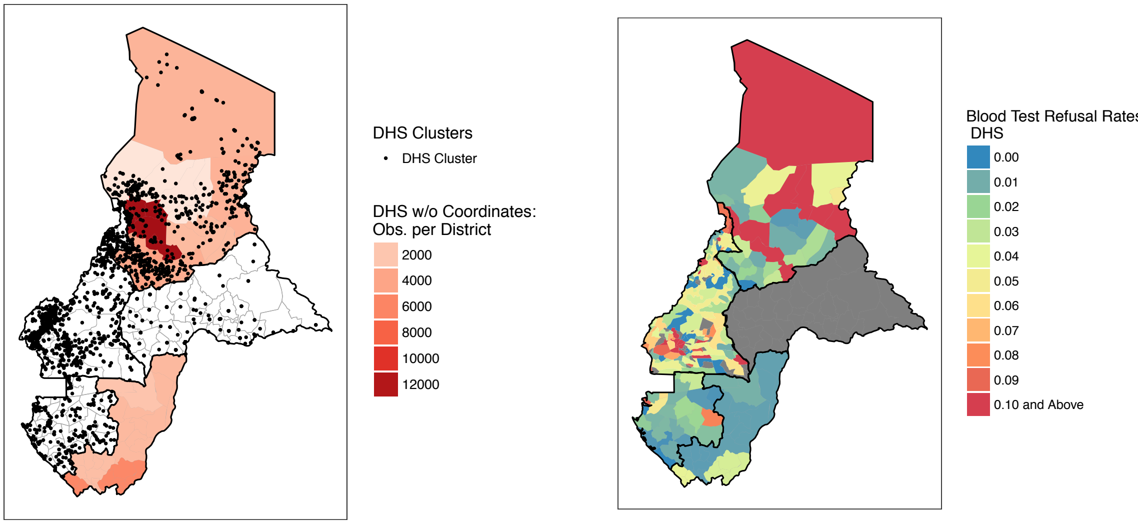


Figure 6: DHS Data and Refusals



(a) DHS Clusters or Observations Per District

(b) DHS Refusal Rates for HIV and Anemia Tests

test, blood spots are collected on filter paper from a finger prick. These filter papers are taken to a laboratory for testing. Because the HIV tests are anonymous, individuals are not provided with their results.[13]

Figure 6b reports the percentage of refusals for the anemia and HIV tests. There is substantial variation in blood test refusals. Note, that the CAR has not collected biomarker data and that therefore we do not have any data on refusals. For Cameroon, there are some ethnic group-districts for which there is no DHS cluster visited. Northern Chad has very high levels of blood test refusals, though it did not have any colonial medicine visits nor is it suitable for the tsetse fly. Northern Chad is excluded from the analysis because it is quite different than the other regions, but the results are unchanged with its inclusion.

Extensions of our main analysis use several other data sources. We use geolocated Round 5 and Round 6 data from the Afrobarometer for Cameroon and Gabon, the only countries in our sample for which Afrobarometer data is available. We also use geolocated data on World Bank development projects from AidData. See Appendix A for more information on data sources.

[13]See the Measure DHS website, https://dhsprogram.com/topics/HIV-Corner/HIV-Prevalence-and-HIV-Testing.cfm, for additional details on the HIV testing. The DHS notes "population-based testing is dependent on the population's willingness to be voluntarily tested for HIV. In cases where the characteristics of those who agreed to be tested are different from those who refused testing, bias may result. Analysis of non-response conducted for most DHS surveys with HIV testing show minimal bias." Our results suggest that their may indeed be meaningful selection into who consents to the test.

4. Colonial Medical Campaigns and Trust in Medicine

We can examine the correlation between exposure to colonial medical campaigns and trust in modern medicine by estimating the following equation:

$$y_{irct} = \alpha + \gamma_1 ColonialMedicine_r + \mathbf{X}'_{irct}\mathbf{B} + \mathbf{X}'_r\mathbf{\Gamma} + \delta_{ct} + \varepsilon_{irct} \quad (1)$$

where y_{irct} is the outcome of interest for individual i residing in colonial medical report region r for DHS country c administered in year t. For Cameroon r is an ethnicity-district, for Gabon and CAR r is a sub-district, and for Chad and Congo r is at the district level, due to the aggregation in the DHS reporting of data. We include $\mathbf{X}'_{irct}$, a vector of individual-level covariates and $\mathbf{X}'_r$, a vector of region-level covariates. The individual and region controls are described in detail below. The standard errors are clustered at the region level r. All regressions include survey-year fixed effects, δ_{ct}.

We measure $ColonialMedicine_r$ in two ways. *Share of Years Visited*$_r$ is the share of years an region r was visited between 1921 and 1956. Specifically, we define *Share of Years Visited*$_r$ $= \sum_{y=1921}^{1956} Visited_{y,r} \times \frac{1}{30}$, where $Visited_{y,r}$ is an indicator variable equal to 1 if region r was visited by the campaigns in year y. *Share of Population Visited*$_r$ is the average share of the population visited by the sleeping sickness campaigns of the estimated total population in region r between 1921 and 1956. Thus, *Share of Population Visited*$_r$ $= \sum_{y=1921}^{1956} \frac{Visited\ Population_{y,r}}{Total\ Population_{y,r}} \times \frac{1}{30}$, where $Visited\ Population_{y,r}$ is the population visited in region r that was visited by the campaigns in year y and $Total\ Population_{y,r}$ is the estimated total population in region r in year y. We normalized both measures by 30 years in the construction as this represents the total number of years of data we have for Cameroon (spanning 1921-1950) and AEF (spanning 1927-1956).

4.1. OLS Estimates

Figure 7 shows the visual relationship between share of years visited and refusal to consent to a blood test. The simple binscatter suggests a strong positive relationship between exposure to the medical campaigns and refusal to consent to the blood test. For the binscatters of the data by country see Figure 8. In both the pooled and individual country binscatters greater campaign exposure is correlated with greater refusal rates.

Figure 7: Share of Years Visited and Blood Test Refusal

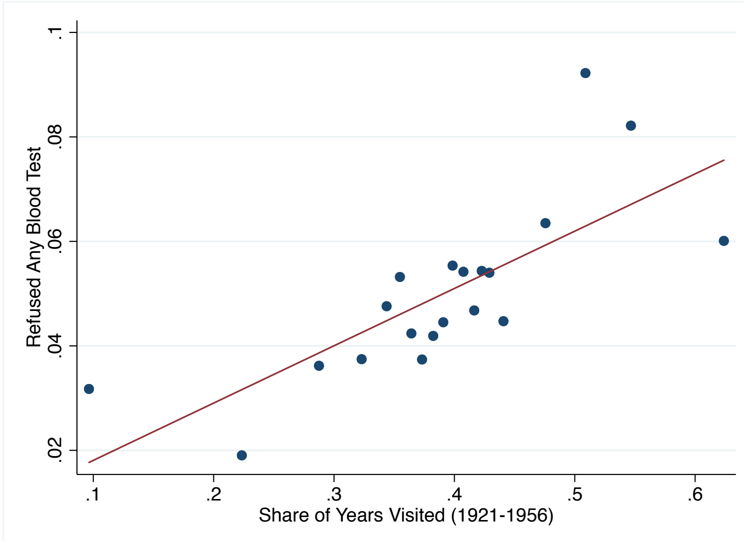
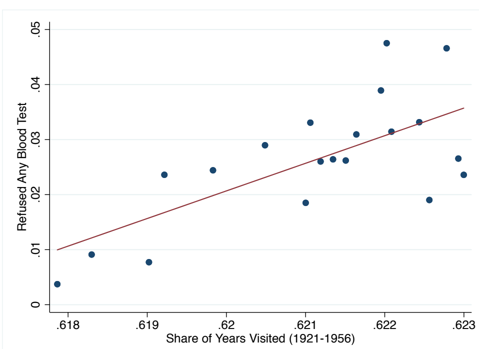
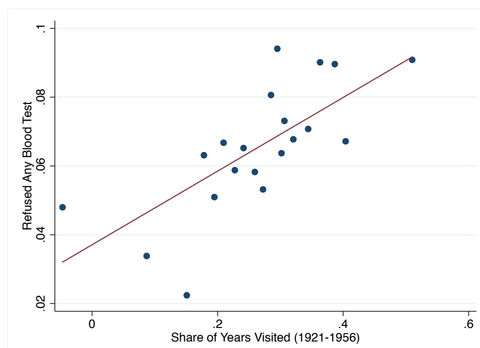


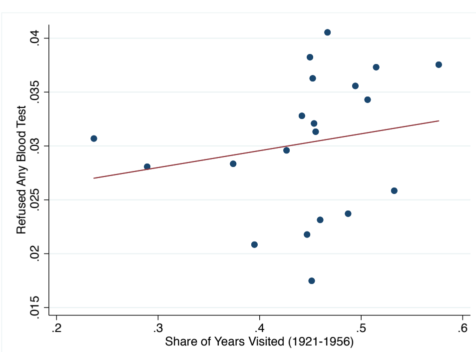
Figure 8: Share of Years Visited and Blood Test Refusal By Country



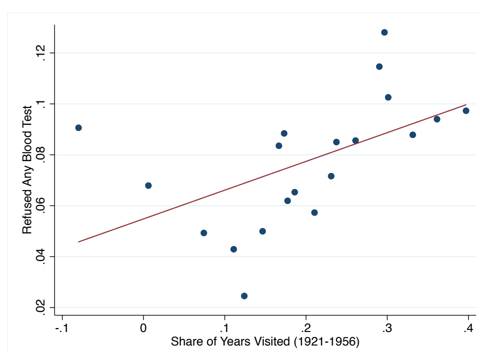
(a) Congo



(b) Cameroon



(c) Gabon



(d) Chad

We present the OLS estimates for the effects of *Share of Years Visited*$_r$ on refusal to do a blood test in Panel A of Table 1. *Share of Years Visited*$_r$ is calculated as the number of years an ethnic group or region was visited between 1921 and 1956 divided by 30. Blood test refused is an indicator variable equal to 1 if the individual refused to consent to a blood test. Standard errors are clustered at the ethnic group-district level for Cameroon, at the colonial sub-district level for Gabon, and at the district level for Congo and Chad. Because the DHS did not collect blood tests in CAR, CAR is excluded from this analysis.

Column (1) of Table 1 indicates that increasing the share of visits from no visits to visited every year increases blood test refusal by 7.5 percentage points. This is relative to a baseline refusal of 4.7% for the sample as a whole. This suggests a large and significant correlation between historical exposure to medical campaigns and trust in medicine today. Column (1) has no controls aside from survey-year fixed effects and basic demographic controls (age, age squared, gender, and urban-rural status). We incrementally add controls in the subsequent columns. Column (2) includes controls for geography and climate, including: temperature, precipitation, land suitability and elevation. Columns (3) to (6) sequentially add additional controls for: disease suitability, colonial presence, pre-colonial ethnic group features, and contemporary demographics. Disease suitability controls include mean malaria ecology index and tsetse fly suitability. Colonial controls include total number of slaves taken from each ethnic group during the Atlantic slave trade and the number of Christian mission stations in each ethnic group. Pre-colonial controls include level of centralization, use of plough, whether indigenous slavery was practiced, and whether agriculture was practiced for each ethnic group. Finally, contemporary controls include educational attainment fixed effects and wealth index fixed effects. All regressions include baseline controls for age, age squared, gender, urban-rural status, and survey-round fixed effects.[14] The point estimate remains large, significant, and consistent across the various specifications.

Panel B of Table 1 estimates equation (1) with the alternative measure of exposure to colonial medical campaigns: average share of the population exposed. *Share of Population Visited*$_r$ is the average share of the population visited by the sleeping sickness campaigns as a share of the estimated total population in region r at the time between 1921 and 1956. This measure has

[14]Note that column (5) has a smaller sample size. When we include pre-colonial controls the sample size falls because not all Murdock ethnic groups can be matched to pre-colonial data. Thus for column (6) we return to the larger sample. While not presented, one can also include pre-colonial controls in column (6), and the results are very similar.

Table 1: OLS Estimates: Colonial Medical Campaign Visits and Trust

	Panel A: Share of Years Visited					
	Dep. Var.: *Blood Test Refused*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Years Visited (1921-1956)	0.0746***	0.129***	0.123***	0.122***	0.158***	0.102***
	(0.0250)	(0.034)	(0.031)	(0.030)	(0.023)	(0.024)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	70,747	70,747	70,747	70,747	33,573	70,696
Clusters	160	160	160	160	94	160
Mean Dep. Var.	0.047	0.047	0.047	0.047	0.066	0.047

	Panel B: Share of Population Visited					
	Dep. Var.: *Blood Test Refused*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Population Visited (1921-1956)	0.0811***	0.105***	0.104***	0.104***	0.0750***	0.0845***
	(0.020)	(0.022)	(0.022)	(0.021)	(0.016)	(0.017)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	70,747	70,747	70,747	70,747	33,573	70,696
Clusters	160	160	160	160	94	160
Mean Dep. Var.	0.047	0.047	0.047	0.047	0.066	0.047

Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), Congo (2009 and 2011) and Chad (2014). Standard errors are clustered at the ethnic group-district level for Cameroon, at the colonial sub-district level for Gabon and Chad (2014), and at the district level for Congo. *Blood Test Refused* is an indicator variable for refusing consent to taking a blood test (for either HIV or anemia). *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Share of Population Visited* measures the average share of population visited by the sleeping sickness campaigns as a share of the population in that region between 1921 and 1956. All regressions control for age, age squared, gender, urban-rural status, and include survey round fixed effects. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude. *Disease Suitability Controls* includes mean malaria ecology index and tsetse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the Atlantic slave trade and number of missions in each main ethnic group in a region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each main ethnic group in a region. *Contemporary Controls* include educational attainment fixed effects and wealth index fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

the benefit of capturing intensity of treatment in a given year, rather than just whether a group was visited. Column (1) of Panel B indicates that increasing the average share of the population exposed to the medical campaigns from 0 to 1 increases the likelihood of refusing the blood test by 8.1 percentage points.

Importantly, these results are robust to examining the refusal of anemia test only or the HIV test only, suggesting that the results are not driven by an aversion to taking an HIV test nor by the slightly more invasive nature of the HIV test relative to the anemia test. See Appendix Tables A1-A2 for the results for the anemia test alone and the HIV test alone.

One potential concern is that the results are driven by differential access to health facilities. While the DHS does not provide information on the health infrastructure at the village level, it does include a few questions that can proxy for ease of access to health care. These measures of access are: the percentage of people in each cluster who say distance to health center is a problem, the percentage of people who report they know where to get an HIV test, and the percentage of women in each cluster that have delivered any of their children in a hospital. Columns (1)-(3) of Table 2 incorporates each of these measures of access to healthcare at the cluster level as a control.[15] The coefficient on share of years visited remains stable, large, and significant, while the coefficients on access are relatively small and not significant. Column (4) includes all of the healthcare access controls simultaneously. The percentage of people who say distance to health center is a problem is marginally significant and negative (reduces chance of refusing blood test), but the main coefficient of interest is unchanged.

4.2. Instrumental Variable Estimates

The results presented in Table 1 suggest that there is a positive correlation between exposure to medical campaigns and mistrust in modern medicine today. However, this does not identify the causal effect of medical campaign exposure on trust. It is possible that there is an omitted variable that both determines exposure to campaigns and trust in medicine. To address this concern, we present results using an instrumental variables approach. An appropriate instrument will predict exposure to colonial medical campaigns but will not affect trust in medicine through any other channel than through the campaigns.

[15]Note that the sample size changes across specifications because not all DHS survey waves include these questions for the ease of access to health care.

Table 2: OLS Estimates: Controls for Health Access

	Dep. Var.: *Blood Test Refused*			
	(1)	(2)	(3)	(4)
Share of Years Visited (1921-1956)	0.133***	0.139***	0.132***	0.148***
	(0.031)	(0.031)	(0.031)	(0.031)
% Say Distance to Health Center is a Problem	-0.011			-0.020*
	(0.010)			(0.012)
% Know Where to Get HIV Test		0.002		-0.002
		(0.010)		(0.017)
% of Women that Delivered Child in Hospital			-0.005	-0.007
			(0.005)	(0.012)
Geography and Climate Controls	Y	Y	Y	Y
Disease Suitability Controls	Y	Y	Y	Y
Colonial Controls	Y	Y	Y	Y
Contemporary Controls	Y	Y	Y	Y
Observations	45,423	43,679	59,810	34,326
Clusters	127	124	134	117
Mean Dep. Var.	0.059	0.047	0.051	0.052

Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), Congo (2009 and 2011) and Chad (2014). Standard errors are clustered at the ethnic group-district level for Cameroon, at the colonial sub-district level for Gabon and Chad, and at the district level for Congo. *Blood Test Refused* is an indicator variable for refusing consent to taking a blood test (for either HIV or anemia). *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *% Say Distance to Health Center is a Problem* is the share of people in the DHS cluster that say that distance to health centers is a problem. *% Know Where to Get HIV Test* is the share of people in the DHS cluster that answer that they do know of a place where one can get an HIV test. *% of Women that Delivered Child in Hospital* is the share of women in the DHS cluster that say that they delivered at least one child in a hospital. All regressions control for age, age squared, gender, urban-rural status and include survey round fixed effects. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude. *Disease Suitability Controls* includes mean malaria ecology index and tsetse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the Atlantic slave trade and number of missions in each main ethnic group in a region. *Contemporary Controls* include educational attainment fixed effects and wealth index fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

An instrument we considered is the tsetse fly suitability index (TSI) created by Alsan (2015). However, in the areas of interest there is not much variation in tsetse fly suitability. In fact, most places are extremely suitable for the tsetse fly. See Appendix Figure A2a for the spatial variation in tsetse fly suitability in the region. Therefore, we include the tsetse fly suitability index as a control variable in our specifications to account for disease environment.

We construct an instrument that is the interaction between two components: (1) the soil suitability for cassava relative to millet and (2) distance to colonial administrative capital. First, we will explain the logic behind each component. We will then discuss potential concerns with the instrument.

The first component of the instrument is the suitability of the soil for cassava relative to millet, a traditional crop.[16] This component of the instrument is motivated by historical accounts of what factors people thought determined sleeping sickness, prior to the identification of the vector in 1903. Even once the tsetse fly was identified as the vector, it had been noted that there was a positive correlation between growing cassava and sleeping sickness. This correlation was due to two features of cassava. Cassava yields four times the number of calories per acre and 13 times the weight per acre as millet. Thus, to obtain a fixed number of calories, farmers need to clear less land. However, clearing less land means that there is more tsetse fly harboring bush and therefore potentially more sleeping sickness. Additionally, much of cassava processing is done near water. Thus, the processing of cassava itself could increase risk of exposure to the tsetse fly (Headrick, 1994). We argue that this component of the instrument picks up the perceived need for sleeping sickness treatment from the perspective of a medical team. By using the measure of soil suitability for cassava *relative to* millet, rather than simply suitability for cassava, we avoid concerns that we are just identifying places that are overall more suitable for agriculture.

The second component of the instrument is distance to colonial capital. Distance to colonial capital is likely correlated with how accessible a particular area was to the mobile medical teams because capital cities were often used as headquarters for the mobile teams.[17] Thus, this

[16] Another traditional crop is sorghum. We focus on millet for our instrument. However, we can also define relative suitability using suitability for cassava relative to sorghum or relative to a combination of millet and sorghum. These alternative definitions of relative suitability do not change our results.

[17] Specifically, we consider the distance to the capital that was relevant for the organization and deployment of the medical teams. For Cameroon, the mobile teams were organized by district; this means that the colonial capital we consider is distance to the district capital. For AEF mobile teams, the mobile medical teams were organized for the AEF as a whole, then within each colony (basically each colony was treated as a district); thus, the colonial capital we consider is the distance to each AEF countries' colonial capital. The results are very similar if we use the colonial capital of Yaounde for Cameroon instead of it's district capitals.

component of the instrument reflects ease of supply, while the first component reflects perceived demand. By interacting the two components of the instrument, we help avoid concerns that that soil suitability for cassava relative to millet directly affects trust or affects trust through actual incidence of sleeping sickness rather than through the medical campaigns.[18] In Appendix Table A6, we present an alternative instrument that is just the suitability of cassava relative to millet without the distance to capital interaction. The results using both instruments - (1) soil suitability for cassava relative to millet interacted with distance to colonial capital and (2) simply the soil suitability for cassava relative to millet - are consistent. While in the text of the paper we will focus on the interacted instrument, in the appendix we demonstrate that all of the results hold for the simple relative suitability instrument.[19]

Given concerns that the instrument itself may directly affect trust in medicine or that it may affect trust in medicine through a channel other than the historical medical campaigns, we also present a falsification test for the instrument using the historical division of Cameroon between the British, who did not administer medical campaigns, and the French, who did administer medical campaigns. We find that the instrument only predict blood test refusals in places that had medical campaigns. This result, presented in Section 4.3, suggests that neither suitability for cassava relative to millet, nor the interaction with distance to colonial capital, directly affect trust in medicine.

Panel A of Table 3 presents the first stage estimates for the instrument - using the interaction between the soil suitability for cassava relative to traditional crops and distance to the nearest colonial capital on the share of years visited by colonial medical teams. This instrument predicts visits by colonial medical teams, with an F-stat over 10.0 in all specifications. Panel B of Table 3 presents the second stage estimates for blood test refusal as the dependent variable. An increase in the share of years visited from 0 to 1 increases the probability of refusing the blood test by 13.1 percentage points in Column (6), the specification with all of the controls. The corresponding OLS estimate is approximately 10.2 percentage points. This suggests that the OLS results are biased downward. This downward bias in the OLS results is consistent with the colonial campaigns

[18]We control for tsetse fly suitability to mitigate concerns that the instrument affects trust through prevalence of sleeping sickness.

[19]The appendix also includes the results using our alternative measure of exposure to the campaigns - the share of population visited - in Table A5 using the main instrument (1) and Table A7 using the alternative instrument (2). We find very similar results using our alternative measure of exposure to the campaigns.

Table 3: First and Second Stage for Interacted Instrument

	Panel A: First-Stage Estimates Dep. Var.: *Share of Years Visited* (1921-1956)					
	(1)	(2)	(3)	(4)	(5)	(6)
Relative Suitability: Cassava vs. Millet						
x **Dist. Colonial Capital**	0.097***	0.106***	0.114***	0.141***	0.181***	0.140***
	(0.030)	(0.029)	(0.030)	(0.035)	(0.054)	(0.034)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
F-Stat of Excluded Instrument	10.56	13.14	14.08	16.02	11.34	17.18
Observations	66,197	66,197	66,197	66,197	33,456	66,151
Clusters	154	154	154	154	94	154
Mean Dep. Var.	0.42	0.42	0.42	0.42	0.42	0.42

	Panel B: Second-Stage 2SLS Estimates Dep. Var.: *Blood Test Refused*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Years Visited (1921-1956)	0.292***	0.244***	0.218***	0.165**	0.294***	0.131**
	(0.113)	(0.074)	(0.070)	(0.070)	(0.093)	(0.063)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	66,197	66,197	66,197	66,197	33,456	66,151
Clusters	154	154	154	154	94	154
Mean Dep. Var.	0.049	0.049	0.049	0.049	0.066	0.049

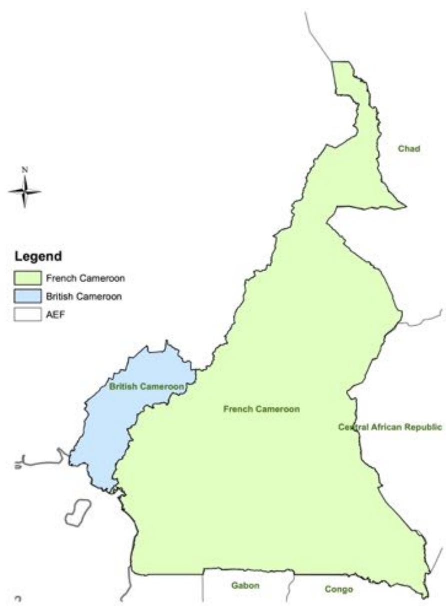
Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), Congo (2009 and 2011) and Chad (2014). Standard errors are clustered at the ethnic group-district level for Cameroon, at the colonial sub-district level for Gabon and Chad, and at the district level for Congo. All regressions control for age, age squared, gender, urban-rural status and include survey round fixed effects. *Blood Test Refused* is an indicator variable for refusing consent to taking a blood test (either for HIV testing or hemoglobin levels testing). *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each region. *Disease Suitability Controls* includes mean malaria ecology index and tsetse fly suitability. *Colonial Controls* includes total number of slaves taken from each ethnic group during the Atlantic slave trade and number of missions in each ethnic group. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each ethnic group. *Contemporary Controls* includes whether a place of residence is urban or rural, and the total years of education and wealth factor score for each individual.
* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

avoiding visiting areas that were initially less trusting of the campaigns or more resistant to the campaigns.

4.3. Falsification Test

One concern with the results from Section 4.2 is that the proposed instrumental variable does not satisfy the exclusion restriction. Namely, the concern is that soil suitability for cassava relative to millet interacted with distance to colonial capital (or soil suitability for cassava relative to millet only) might affect trust in medicine through channels other than exposure to the colonial medical campaigns. This is less of a concern when we interact the relative suitability with distance to colonial capitals. However, given potential concerns about the violation of the exclusion restriction, we use the unique history of Cameroon to provide evidence that the instruments do not directly affect trust in medicine.

Figure 9: Former French Cameroon and British Cameroon



In 1884 Cameroon became a German colony. In World War I (WWI) the British invaded Cameroon from Nigeria, and the German forces in Cameroon surrendered in 1916. Cameroon was subsequently divided between France and Britain after WWI under a 1919 League of Nations mandate. Figure 9 shows the present day boundaries of Cameroon, with the division between the former British area and French area. The British kept a strip of Cameroon bordering Nigeria and generally practiced "indirect rule" within their portion of Cameroon. The rule of British

Cameroon has been characterized as "one of benign neglect" (Johnson, 1970; Chiabi, 1989). Unlike the French, the British did not pursue medical campaigns within their portion of Cameroon.[20] Shortly after French Cameroon gained independence from France in 1960, the Southern part of British Cameroon voted in a 1961 referendum to join Cameroon. The northern strip of former British Cameroon (not depicted in Figure 9) voted to join Nigeria.

This history provides a falsification test for the instrument. The instrument should only predict blood test refusal in those areas that also were exposed to medical campaigns. Thus, the instrumental variable should have no predictive power for blood test refusals in former British Cameroon. We can test this by estimating the reduced form effect of the instrument on blood test refusals for former British and French Cameroon. Table 4 presents these results for the interaction between suitability for cassava relative to millet and distance to colonial capital.[21] In Appendix Table A8, we present the results for the relative suitability alone. For British Cameroon, there is no relationship between the instrument and refusing the blood test. Relative suitability for cassava interacted with distance to colonial capital does not predict blood test refusals in places that did not have the colonial medical campaigns.[22] However, for French Cameroon, there is a positive and significant relationship between the instruments and blood test refusal. Thus, this falsification tests suggests that the instruments do not directly affect trust in medicine.

4.4. *Convergence*

Given that the exposure to the medical campaigns happened between the 1920s and 1950s and our sample population was, for the most part, not alive during this period, it is possible that the effect on mistrust may diminish overtime. We can examine whether this is the case. To do this, we compare cohorts with varying levels of historical exposure to the medical campaigns born within five years of each other by estimating a regression that includes fixed effects for each 5-year cohort along with the interactions between the *Share of Years Visited*$_r$ (SYV_r) and cohort fixed effects. Formally, we estimate the following specification:

[20]In East Africa the British medical campaigns generally focused on managing the disease environment, e.g. spraying for mosquitoes or cutting down tsetse fly harboring bush (Headrick, 2014).

[21]Note that since we do not have equivalent ethnicity maps for British Cameroon, we cannot do the analysis at the ethnicity-district level. Thus, the regression controls are constructed at the DHS cluster level, and we cluster standard errors at the DHS cluster level instead of the ethnicity-district level.

[22]For British Cameroon, we use distance to the colonial district capitals used by the British: Buea for (what today is) the Sud-Ouest region and Bamenda for the Nord-Ouest region.

Table 4: Reduced Form Estimates for Former British and Former French Cameroon

	Falsification Test for Relative Suitability Interacted with Distance to Colonial Capital Instrument Dep. Var.: *Blood Test Refused*					
	Former British Cameroon			Former French Cameroon		
	(1)	(2)	(3)	(4)	(5)	(6)
Relative Suitability: Cassava vs. Millet						
x **Dist. Colonial Capital**	-0.036	-0.304*	-0.294	0.159***	0.156***	0.124***
	(0.154)	(0.179)	(0.178)	(0.045)	(0.043)	(0.041)
Geography and Climate Controls	Y	Y	Y	Y	Y	Y
Disease Suitability Controls	N	Y	Y	N	Y	Y
Colonial Controls	N	Y	Y	N	Y	Y
Contemporary Controls	N	N	Y	N	N	Y
Observations	4,875	4,875	4,875	21,440	21,440	21,440
Clusters	132	132	132	452	452	452
Mean Dep. Var.	0.0285	0.0285	0.0285	0.0696	0.0696	0.0696

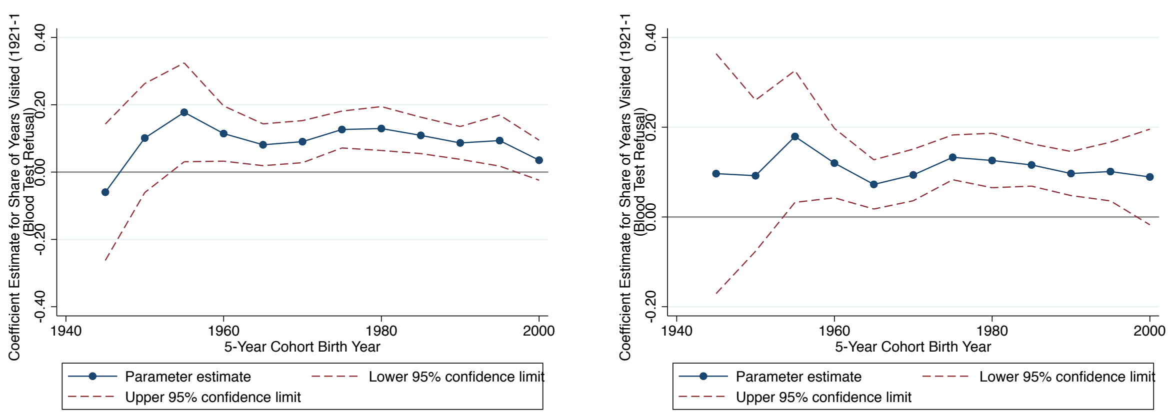
Notes: Data is from the 2004 and 2011 Cameroon DHS surveys. Standard errors are clustered at the DHS cluster level. All regressions control for age, age squared, gender, whether a place of residence is urban or rural, and include survey round fixed effects. *Blood Test Refused* is an indicator variable for refusing consent to taking a blood test (either for HIV testing or hemoglobin levels testing). *Relative Suitability: Cassava vs. Millet* is from the FAO and measures the mean difference in suitability for cassava and millet, for a 50 km buffer around each DHS cluster. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each cluster. *Disease Suitability Controls* includes mean malaria ecology index and tsetse fly suitability. *Colonial Controls* includes total number of slaves taken from each ethnic group during the Atlantic slave trade and number of missions in each ethnic group. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each ethnic group. *Contemporary Controls* includes educational attainment fixed effects and wealth index fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

$$y_{irct} = \alpha + \gamma SYV_r + \alpha_y C_{irct} + \gamma_y C_{irct} \times SYV_r + \mathbf{X}'_{irct}\mathbf{B} + \mathbf{X}'_r\mathbf{\Gamma} + \delta_{ct} + \varepsilon_{irct} \tag{2}$$

where C_{irct} are 5-year cohort fixed effects and the other variables are defined as in equation (1).

Figure 10 plots the estimated cohort coefficients for refusal to consent to blood test, first with survey fixed effects and second with the full set of controls. We see no evidence of convergence across cohorts: the estimated coefficients for each cohort are similar, particularly once controls are added, and the effects do not seem to be driven by older cohorts.

Figure 10: Refusals to Consent to Blood Test by DHS Cohort



(a) No Controls Except Survey Fixed Effects

(b) Full Controls

4.5. *Other Measures of Trust*

To understand if the observed effects on trust are specific to medicine or are more generalizable to other institutions and people, we use geolocated data for Cameroon and Gabon from the Afrobarometer.[23] In Round 5, the Afrobarometer asks how much the respondent trusts: neighbors, parents, people they know, and most people. In Round 6, the trust questions are more focused on institutions; for example, it asks about parliament, local government, the ruling party, and traditional leaders, among others. This data allow us to examine whether the observed effect of exposure to the medical campaigns on trust in medicine extends to other people and institutions.

Table 5 presents the AES coefficients across the various trust questions. Across both rounds of the Afrobarometer, the coefficient on share of years visited is negligible and insignificant.

[23]The Afrobarometer only provides names of villages, rather than their coordinates. The corresponding geolocations of villages were provided by AidData.org (BenYishay et al., 2017.)

Table 5: Other Measures of Trust and Share of Years Visited

	Afrobarometer Trust Questions (AES Coefficients)			
	Round 5		*Round 6*	
	(1)	(2)	(3)	(4)
Share of Years Visited (1921-1956)	-0.0061	-0.0051	0.0005	-0.0003
	(0.0093)	(0.0097)	(0.0068)	(0.0069)
Geography and Climate Controls	Y	Y	Y	Y
Disease Suitability Controls	Y	Y	Y	Y
Colonial Controls	Y	Y	Y	Y
Contemporary Controls	N	Y	N	Y
Observations	731	731	1,769	1,769
Clusters	33	33	64	64

Notes: Data is from the Afrobarometer for Cameroon (Round 5 and Round 6) and Gabon (Round 6). Standard errors are clustered at the ethnic group-district level for Cameroon and at the colonial sub-district level for Gabon. *Trust Questions* for Round 5 are "How much do you trust each of the following": (1) neighbors, (2) parents, (3) people you know, and (4) most people. *Trust Questions* for Round 5 are "How much do you trust each of the following": (1) president, (2) parliament, (3) electoral commission, (4) tax department, (5) local government, (6) ruling party, (7) opposition party, (8) police, (9) army, (10) courts, (11) traditional leaders, and (12) religious leaders. All trust questions range from 0-3 (0=Not at all, 1=Just a little, 2=Somewhat, 3=A lot) except for *Do you trust most people*, which ranges from 0-1 (0=Do not trust most people, 1=Trust most people). *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. All regressions control for age, age squared, gender, urban-rural status and include survey round fixed effects. Columns (1)-(3) include child age fixed effects. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, and centroid longitude of each cluster. *Disease Suitability Controls* includes mean malaria ecology index and tsetse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the Atlantic slave trade and number of missions in each main ethnic group in a region. *Contemporary Controls* includes educational attainment fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

This suggests that there is no effect of the colonial medical campaigns on trust in the others individuals or institutions. Figures 11 and 12 plot the coefficients for each question alongside the estimated AES coefficient. Again, the results suggest that exposure to historical medical campaigns is uncorrelated with other measures of trust.

Figure 11: Afrobarometer Round 5 for Cameroon and Share of Years Visited

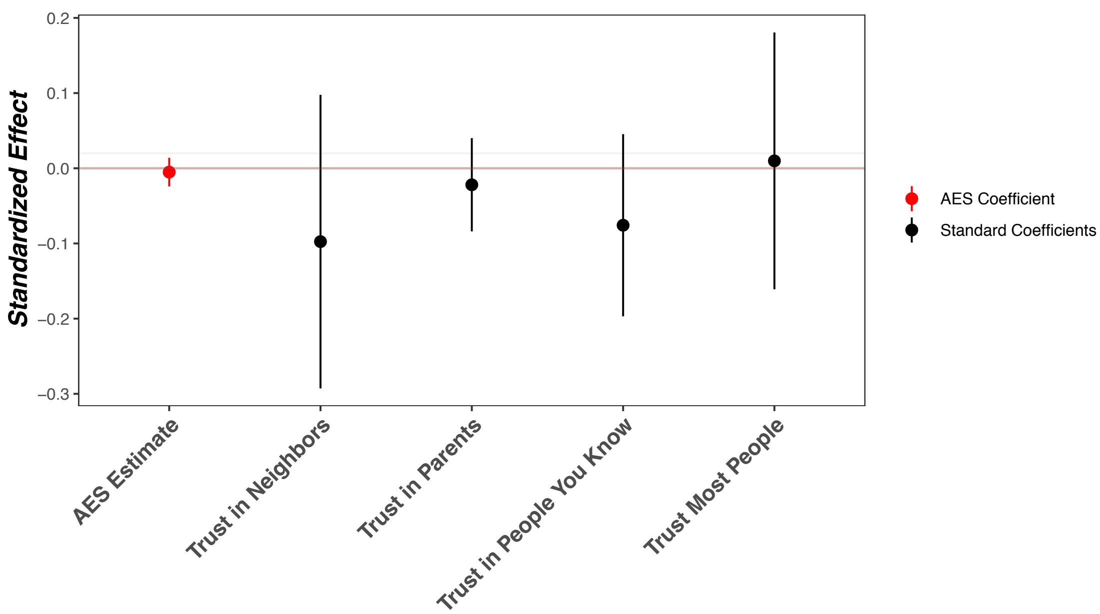
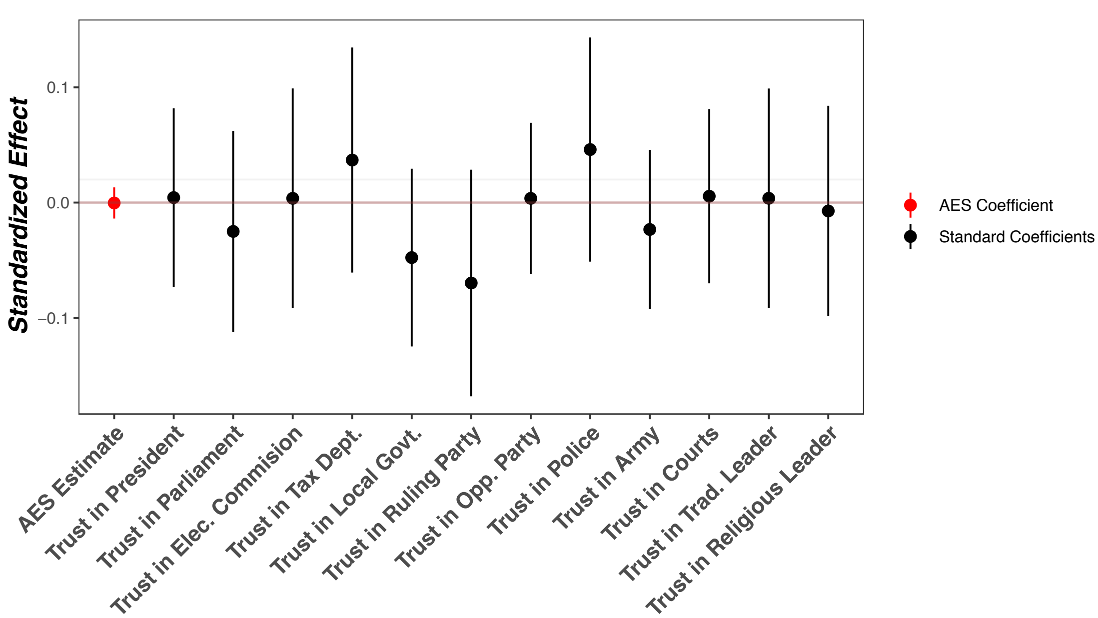


Figure 12: Afrobarometer Round 6 for Cameroon and Gabon and Share of Years Visited



The Afrobarometer records refusal rates when a respondent declines to participate in the survey. This allows us to see if our measure of refusal to consent to a blood test is more general to refusal to participate in surveys or research. Figure 13 plots the refusal data. Before each successful interview, an enumerator records if they experienced a refusal to participate, and if so, the number of refusals experienced per each successful interview. Additionally, the enumerator also assesses the respondent's attitude conditional on consent to participate in the survey. Individuals from areas that were more exposed to medical campaigns are slightly *less* likely to refuse to be interviewed and are less likely to be deemed as acting suspicious during the interview. These results corroborate the finding that the exposure to the medical campaigns affects trust in medicine but not more generalized measures of trust.

Figure 13: Afrobarometer Refusals to be Interviewed and Suspicious During Interview

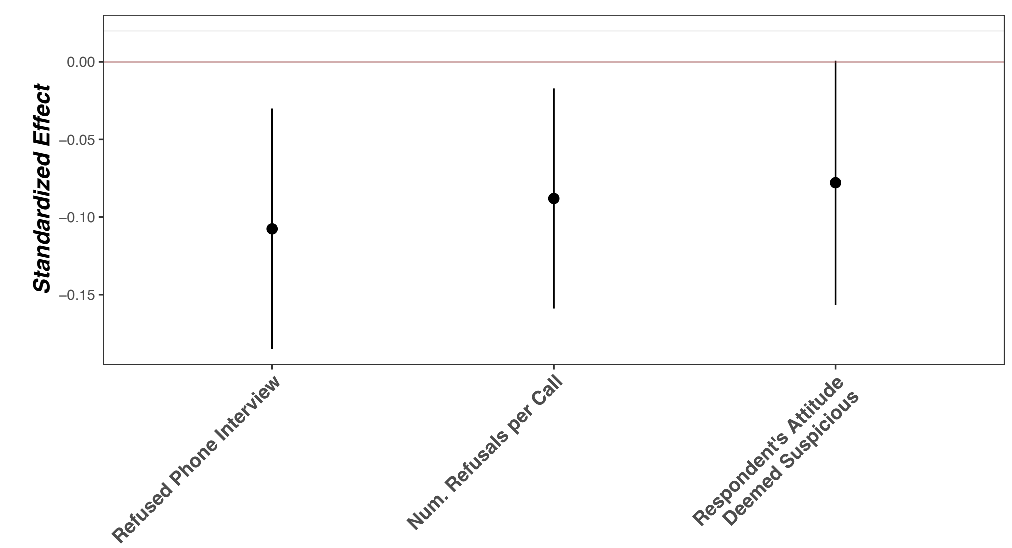
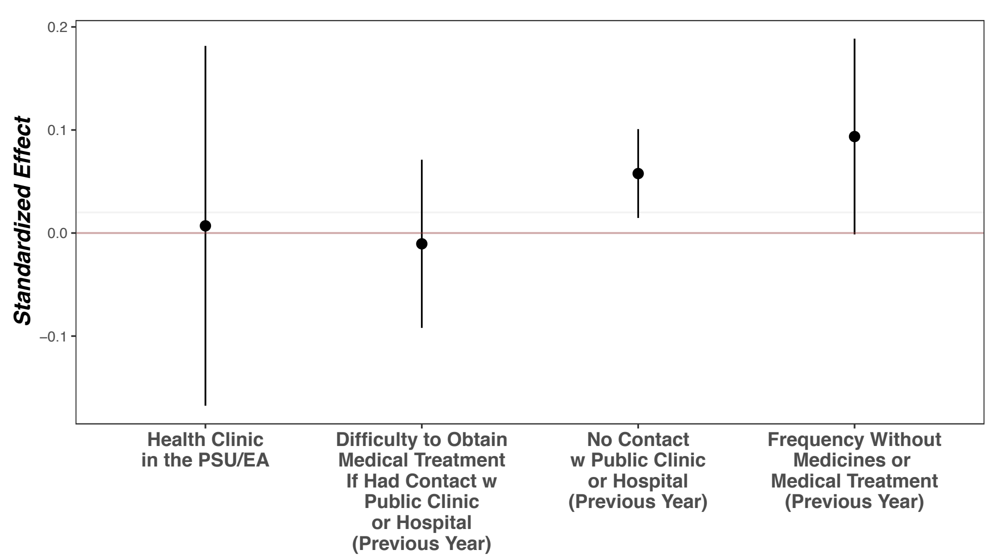


Figure 14: Access to Health Center and Interactions with Health System



The Afrobarometer also allows us to do an additional check on the results from Table 2 on whether differential health care access could be driving the observed results. The survey asks several questions about health care utilization and ease of access. First, the survey records whether there is a health center located in the respondent's enumeration area. It asks in the past year whether the respondent has had contact with a public clinic or hospital. Conditional on having had contact, it asks how difficult it was to access the health center. The survey also asks how often the respondent or anyone in the respondent's family have gone without medicine or treatment. These coefficients are plotted in Figure 14. Importantly, there is no difference in likelihood of having a health center in the enumeration area, nor, conditional upon trying to access medical care, is there any difference in difficulty of obtaining medical care. However, individuals in places that were more exposed to the campaigns are more likely to have had no contact with the health system in the past year and are more likely to have gone without treatment in the past year. These results are consistent with the DHS results, as they suggest that, despite similar ability to access health care, individuals are less likely to seek out medical treatment the greater the historical exposure to the medical campaigns.

4.6. Channels

Mistrust in medicine may be vertically transmitted (i.e. from parent to child) or it may be a product of horizontal transmission (i.e. from an individual's peers). One strategy to disentangle these two potential channels is to examine if it is an individual's ethnic group's exposure that predicts likelihood of refusing a blood test, or if it is the average exposure of the ethnic groups of others where an individual lives that matters. Of course, this exercise focuses on individuals that have moved from their ethnic homeland in order to get variation in an individual ethnic group's exposure relative to the average exposure of those in the same cluster.

We undertake this exercise in Table 6 for Cameroon because the historical data for Cameroon was reported at the ethnic group level and the 2004 DHS for Cameroon reports an individual's ethnicity.[24] Column (1) presents the results of an individual's own ethnicity's exposure to the medical campaigns on trust. An individual's ethnic group's exposure to the campaigns leads to an 8.5 percentage point increase in refusals. In Columns (2)-(5) we add a measure of the

[24] This exercise is similar to the one performed in Nunn and Wantchekon (2011). However, in that paper, the authors construct their measure of other ethnic group's exposure using the exposure of the ethnic group who traditionally lives there, rather than the average of the individuals actually observed in the cluster.

average exposure of the ethnic group of others in the same DHS cluster and various controls.[25] While this measure of others' exposure is positive, most of the effect of exposure to colonial medical campaigns seems to come from the exposure of an individual's own ethnic group. This suggest that the primary channel of the effect is vertical, driven by the average experience of an individual's ethnic group, rather than horizontal, driven by the effect of the average experience of ethnic groups where an individual resides.

Table 6: Ethnic Group Versus Location Based Measure of Exposure to Colonial Medical Campaigns

	Dep. Var.: *Blood Test Refused*				
	(1)	(2)	(3)	(4)	(5)
Ethnicity-Based Measure of					
Share of Years Visited (1921-1956)	0.085**	0.082**	0.084**	0.088**	0.071**
	(0.038)	(0.039)	(0.0367)	(0.036)	(0.034)
	[0.072]	[0.100]	[0.094]	[0.080]	[0.142]
Average Share of Years Visited (1921-1956)					
Among Other Ethnicities in Same Location	–	0.045	0.046	0.054	0.035
		(0.040)	(0.039)	(0.040)	(0.039)
		[0.148]	[0.160]	[0.124]	[0.276]
Geography and Climate Controls	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y
Colonial Controls	N	N	N	Y	Y
Contemporary Controls	N	N	N	N	Y
Observations	8,149	7,103	7,103	7,103	7,103
DHS Ethnicities	26	26	26	26	26
Mean Dep. Var.	0.105	0.110	0.110	0.110	0.110

Notes: Data is from the 2004 Cameroon DHS surveys. Standard errors are clustered at the DHS ethnic group level. All regressions control for age, age squared, and gender and include survey round fixed effects. p-values obtained using the wild bootstrap procedure with one thousand draws are presented in brackets. *Blood Test Refused* is an indicator variable for refusing consent to taking a blood test (either for HIV testing or hemoglobin levels testing). *Ethnicity-Based Measure of Share of Years Visited* measures the share of years the mobile medical teams visited an individual's reported DHS ethnic group for sleeping sickness treatment between 1921 and 1956. *Average Share of Years Visited Among Other Ethnicities in Same Location* measures the share of years the mobile medical teams visited other individuals' reported DHS ethnic groups within an individual's DHS cluster for sleeping sickness treatment between 1921 and 1956, excluding an individual's own reported DHS ethnic group. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each ethnic group. *Disease Suitability Controls* includes mean malaria ecology index and tsetse fly suitability. *Colonial Controls* includes total number of slaves taken from each ethnic group during the Atlantic slave trade and number of missions in each ethnic group. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each ethnic group. *Contemporary Controls* includes whether a place of residence is urban or rural, educational attainment fixed effects and wealth index fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

[25]The 2004 Cameroon DHS contains 26 ethnicities in our regions of interest. Thus, we report wild-bootstrapped p-values in the square brackets in the table.

5. Examining Health Outcomes

5.1. *HIV and Anemia Outcomes*

Thus far we have presented evidence that greater exposure to colonial medical campaigns causes less trust in medicine. One crucial question is whether the colonial medicine campaigns are also associated with worse health outcomes. Worse health outcomes today due to the campaigns could arise through several channels. First, the campaigns may indirectly affect health through lower trust leading to lower utilization of health care and avoidance of preventative measures. Second, the campaigns themselves may have spread blood born diseases, as hypothesized by Pépin (2011) in his book *Origins of AIDS*. Pépin argues that the colonial medical campaigns use of unsanitary needles may have given blood born diseases such as HIV (as well as HCV and HTLCV) access to large swaths of populations that they otherwise would not have had access to. The campaigns may have inadvertently led to the spread of these blood born diseases.[26] Epidemiologists have shown that the prevalence of HCV and HTCLV is correlated with colonial medical campaigns in Central Africa using much more geographically aggregated data on colonial medical campaign visits (Pépin and Labbé, 2008; Pépin et al., 2010; Pépin, 2011). We are unable to distinguish between the trust channel and the potential effect of the transmission of blood born disease transmission when examining HIV and anemia as outcomes.

We first examine whether the colonial medicine campaigns are associated with worse health outcomes for the two main outcomes measured with the blood tests. Table 7 presents estimates of the effects of colonial medicine campaigns on HIV prevalence using both measures of exposure to the colonial medical campaigns. Panel A, where the measure of treatment is share of years visited, presents no consistent evidence of different levels of HIV prevalence. Panel B presents the results with the other measure of exposure, share of population treated in each year. This measure may better capture the intensive margin of treatment. The results suggest that a greater share of the population exposed to the medical campaigns is associated with higher HIV prevalence. Going from no share of the population exposed to the whole population exposed increases HIV prevalence by 2.34 percentage points (see Panel B, column (7)).

[26] HIV was not identified until the early 1980s. However, it existed well before then. Researchers believe simian immunodeficiency virus (SIV) crossed to humans in the 1930s. The oldest blood sample in which HIV has been detected is from a man from Léopoldville, Congo (present day Kinshasa, DRC) in 1959.

Table 7: OLS Estimates of HIV Prevalence

	Panel A: Share of Years Visited						
	Dep. Var.: *HIV Positive*						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share of Years Visited (1921-1956)	0.0284***	0.0116	0.0087	0.0082	-0.0145	0.0075	0.0119
	(0.0087)	(0.0089)	(0.0088)	(0.0088)	(0.0171)	(0.0093)	(0.0088)
Geography and Climate Controls	N	Y	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N	N
Contemporary Controls	N	N	N	N	N	Y	Y
HIV Sample Weights	N	N	N	N	N	N	Y
Observations	50,285	50,285	50,285	50,285	25,158	50,242	49,375
Clusters	160	160	160	160	94	160	160
Mean Dep. Var.	0.0382	0.038	0.038	0.038	0.044	0.038	0.038

	Panel B: Share of Population Visited						
	Dep. Var.: *HIV Positive*						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share of Population Visited (1921-1956)	0.0428***	0.0233*	0.0221*	0.0171	-0.0103	0.0153	0.0234*
	(0.0130)	(0.0123)	(0.0116)	(0.0115)	(0.0238)	(0.0121)	(0.0124)
Geography and Climate Controls	N	Y	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N	N
Contemporary Controls	N	N	N	N	N	Y	Y
HIV Sample Weights	N	N	N	N	N	N	Y
Observations	50,285	50,285	50,285	50,285	25,158	50,242	49,375
Clusters	160	160	160	160	94	160	160
Mean Dep. Var.	0.038	0.038	0.038	0.038	0.044	0.038	0.038

Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), Congo (2009) and Chad (2014). Standard errors are clustered at the ethnic group-district level for Cameroon, at the colonial sub-district level for Gabon and Gabon, and at the district level for Congo. *HIV Positive* is an indicator variable for whether or not the HIV blood test was positive. *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Share of Population Visited* measures the average share of population visited by the sleeping sickness campaigns as a share of the population in that region between 1921 and 1956. All regressions control for age, age squared, gender, urban-rural status, and include survey round fixed effects. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each region. *Disease Suitability Controls* includes mean malaria ecology index and tsetse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the Atlantic slave trade and number of missions in each main ethnic group in a region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each main ethnic group in a region. *Contemporary Controls* include educational attainment fixed effects and wealth index fixed effects. *HIV Sample Weights* are the DHS sample weights reported for the HIV testing. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note that Column (7) includes the HIV sample weights, and that without these weights, the results are not significant (Column (6)). The HIV weights are supposed to make the sample representative of the population, correcting for over and under-sampling and for non-response.[27] Given that the results are sensitive to the use of these weights, they must be interpreted with caution. No other results presented in the paper are sensitive to the inclusion of the sampling weights (results available upon request). Given that the HIV weights are specifically designed to address selection into willingness to take the test, this may explain why the results change with inclusion of the weights.

Table 8 presents the estimates of the effect of colonial medical campaigns on anemia levels. Areas more exposed to the campaigns have significantly higher levels of anemia when using the share of population visited as the treatment measure; there is a positive but insignificant effect when using total years visited as the treatment measure. Table A3 in the Appendix shows that hemoglobin levels, the marker used to determine the severity of anemia in respondents, are significantly lower in areas more exposed to the campaigns across both measures of treatment. Appendix Table A4 presents evidence of higher rates of anemia using an indicator variable for anemia. Thus, of those who choose to consent to the blood test, individuals from areas more exposed to the colonial medical campaigns seem to have worse health outcomes. There is some evidence of higher prevalence of HIV and anemia. However, these results must be interpreted with caution, as we have just shown selection in to the sample of people who consent to the blood test.

5.2. *Child Vaccination Rates*

We also examine vaccination rates for children in Table 9. Mistrust in medicine may lead parents to be less likely to vaccinate their children against a variety of childhood diseases. This is particularly troublesome for diseases that require high vaccination rates to achieve herd immunity, such as measles. The DHS asks about all childhood vaccinations, for a total of nine possible vaccinations.[28] We construct an index of number of completed vaccinations. We find evidence that in areas that were more exposed to the colonial medical campaigns, children are less likely to be vaccinated across all of the vaccinations reported in the DHS. While our analysis does not

[27] See Demographic and Health Surveys Methodology (2012) for more information on the HIV weights.

[28] See Appendix A for more information on the childhood vaccinations included in the DHS surveys.

Table 8: OLS Estimates of Anemia Levels

	Panel A: Share of Years Visited					
	Dep. Var.: *Anemia Level (0-3)*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Years Visited (1921-1956)	0.144*	0.0560	0.0233	0.0201	0.0043	0.0455
	(0.0765)	(0.0482)	(0.0542)	(0.0539)	(0.0621)	(0.0533)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	32,253	32,253	32,253	32,253	16,190	32,253
Clusters	138	138	138	138	88	138
Mean Dep. Var.	0.597	0.597	0.597	0.597	0.538	0.597
	Panel B: Share of Population Visited					
	Dep. Var.: *Anemia Level (0-3)*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Population Visited (1921-1956)	0.235**	0.201***	0.158**	0.137*	0.0687	0.185***
	(0.111)	(0.0685)	(0.0711)	(0.0722)	(0.0878)	(0.0676)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	32,253	32,253	32,253	32,253	16,190	32,253
Clusters	138	138	138	138	88	138
Mean Dep. Var.	0.597	0.597	0.597	0.597	0.538	0.597

Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), and Congo (2011). Standard errors are clustered at the ethnic group level for Cameroon, at the colonial Sub-District level for Gabon, and at the district level for Congo. *Anemia Level* is a 0 to 3 categorical variable constructed by the DHS, where 0=no anemia, 1=mild anemia, 2=moderate anemia, and 3=severe anemia. *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Share of Population Visited* measures the average share of population visited by the sleeping sickness campaigns as a share of the population in that region at the time between 1921 and 1956. All regressions control for age, age squared, gender, urban-rural status, and include survey round fixed effects. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each region. *Disease Suitability Controls* includes mean malaria ecology index and tse tse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the atlantic slave trade and number of missions in each main ethnic group in a region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each main ethnic group in a region. *Contemporary Controls* include educational attainment fixed effects and wealth index fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

control for differential access to various immunizations, from the early 2000s the countries in our sample have implemented Expanded Immunization Campaigns and Supplementary Immunization Activities aimed at providing universal access to vaccinations, particularly for polio and measles.[29] This helps assuage concerns of differential access to the vaccinations within a country.

6. Success of World Bank Projects

To understand the relevance of historical campaigns for present day health policy, we examine the implications for the success of health initiatives more broadly using geolocated data on World Bank projects for our sample countries. This data, made available by AidData, includes information on the location and sectors of World Bank funded projects between 1995 and 2014 (AidData, 2017). A subset of these projects are given an outcome rating based on "the extent to which the operation's major relevant objectives were achieved, or are expected to be achieved, efficiently" on a six point scale ranging from highly unsatisfactory to highly satisfactory. We limit the sample to those projects that are given a rating. Projects are classified by the World Bank as belonging to up to five sectors, such as: health, central government administration, general public administration, other social services, railways, and roads and highways. Figure 15a shows the spatial distribution of World Bank projects from all sectors and their corresponding ratings, and Figure 15b shows only those projects in the health sector, where we define a project as being in the health sector if one of it's five sector categories corresponds to health. Note that none of the projects in CAR received a rating, which is why there are no projects in our sample.

We use this data to test whether areas that were more exposed to the medical campaigns have less successful health projects, measured by the outcome rating assigned by the World Bank. Formally, we estimate the following specification for health and non-health projects:

$$y_{prc} = \alpha + \gamma Share\,of\,Years\,Visited_r + \mathbf{X}_r^{'}\mathbf{\Gamma} + \mathbf{X}_{pc}^{'}\mathbf{B} + \delta_c + \varepsilon_{prc} \tag{3}$$

where y_{prc} is the outcome of interest – the World Bank outcome rating – for a project p occurring in colonial medical report region r for country c. We include $\mathbf{X}_r^{'}$, a vector of region-level covariates, $\mathbf{X}_{pc}^{'}$, a vector of project-level covariates, and δ_c, country fixed effects. The region and project

[29] See WHO website, http://www.who.int/immunization/programmes_systems/en/, for more details on these campaigns.

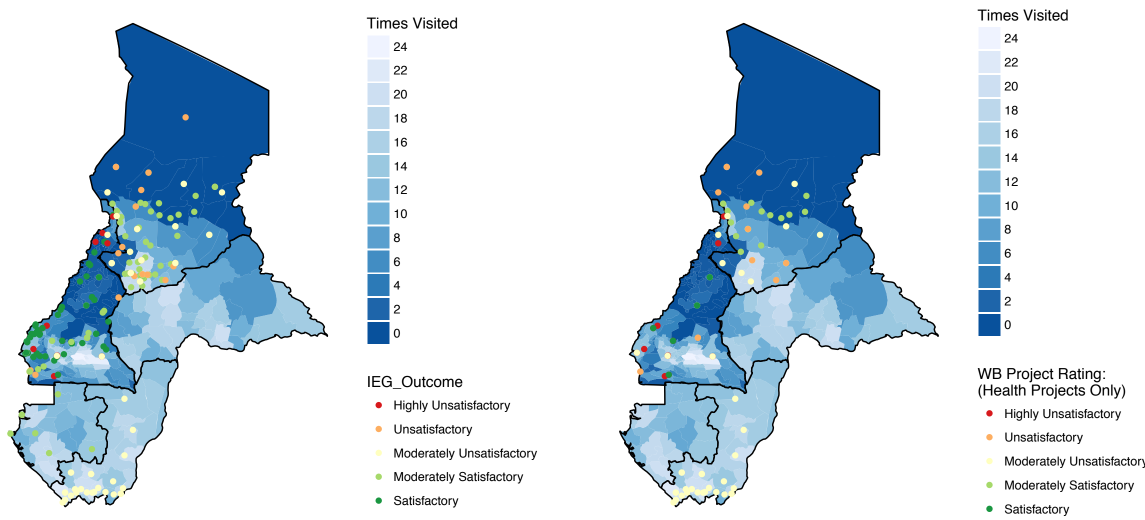
Table 9: Child Vaccination Rates

	Panel A: Share of Years Visited Dep. Var.: *Vaccination Index*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Years Visited (1921-1956)	0.948	-1.111*	-1.047*	-0.888*	1.087	-1.161**
	(0.622)	(0.566)	(0.570)	(0.522)	(0.668)	(0.506)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	50,772	50,772	50,772	50,772	24,393	50,720
Clusters	207	207	207	207	132	207
Mean Dep. Var.	5.94	5.94	5.94	5.94	6.16	5.94

	Panel B: Share of Population Visited Dep. Var.: *Vaccination Index*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Population Visited (1921-1956)	2.295***	-0.946	-1.141	-1.159	1.666*	-1.935**
	(0.796)	(0.957)	(0.990)	(0.897)	(0.884)	(0.858)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	50,772	50,772	50,772	50,772	24,393	50,720
Clusters	207	207	207	207	132	207
Mean Dep. Var.	5.94	5.94	5.94	5.94	6.16	5.94

Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), Congo (2011), Central African Republic (1994) and Chad (1996, 2004, 2014). Standard errors are clustered at the ethnic group level for Cameroon, at the colonial Sub-District level for Gabon, CAR and Chad (2014), and at the district level for Congo and Chad (1996, 2004). *Vaccination Index* is the number of vaccines reported for children in the DHS out of the 10 possible vaccines. *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Share of Population Visited* measures the average share of population visited by the sleeping sickness campaigns as a share of the population in that region between 1921 and 1956. All regressions control for age, age squared, gender, urban-rural status and include survey round fixed effects. Columns (1)-(3) include child age fixed effects. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each region. *Disease Suitability Controls* includes mean malaria ecology index and tse tse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the atlantic slave trade and number of missions in each main ethnic group in a region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each main ethnic group in a region. *Contemporary Controls* includes educational attainment fixed effects and wealth index fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Figure 15: World Bank Projects and Outcome Rating



(a) All Sectors (b) Health Sector Only

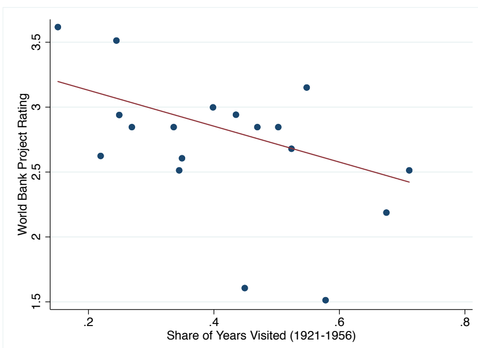
controls are described in the notes of each table and figure. Standard errors are clustered at the colonial medical report region level r as in specification (1).

One limitation of our analysis is that it does not address the selection of the type of projects pursued in particular locations. Thus, we can only examine the effects on health projects, or projects more generally, conditional on a project being present. However, in Appendix Table A9 we test whether colonial medical campaigns predict: whether a location receives a project in any sector, whether a location receives a project in the health sector, and whether a project receives a rating. We do not find any significant relationship between colonial medical campaigns and receiving any World Bank project, receiving a project in the health sector, nor on the probability of a project receiving a rating. The estimated coefficient is effectively 0 for all specifications and outcomes. This helps assuage concerns about selection, i.e. that projects are allocated, selected, or rated based on historical colonial medicine campaigns.

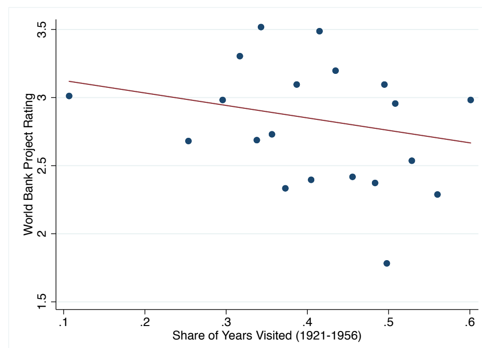
Figure 16 presents the binscatters of times visited during the colonial medical campaigns and the project outcome. The first set of figures are for health projects only and the second set of figures for non-health projects. We present the binscatters with (i) only country fixed effects and then with (ii) a full set of controls which includes geographic controls, climate controls, disease controls, colonial controls, and contemporary controls. The contemporary control is the total funds committed to each project. These control variables are described in the notes of the figure.

The binscatters reveal striking correlations; for health projects, there is a strong negative correlation between number of times visited and the outcome score assigned to the project. Health projects in areas that had greater exposure the colonial medical campaigns receive lower outcome ratings, as shown in Figures 16a and 16b. However, this is not the case for projects that are in other sectors, as shown in Figures 16c and 16d. In the non-health sectors, projects are on average more successful. This suggests that these places are not somehow less successful at development projects on average, but that they perform poorly specifically in the health sector.

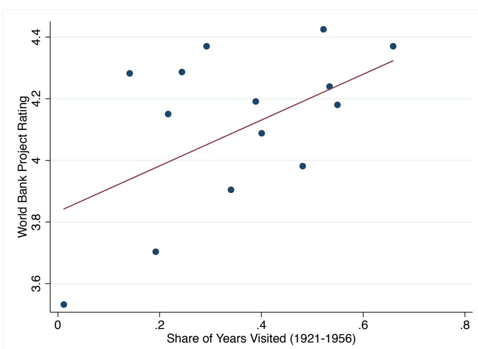
Figure 16: Times Prospected and World Bank Project Outcomes for Health and Non-health Projects



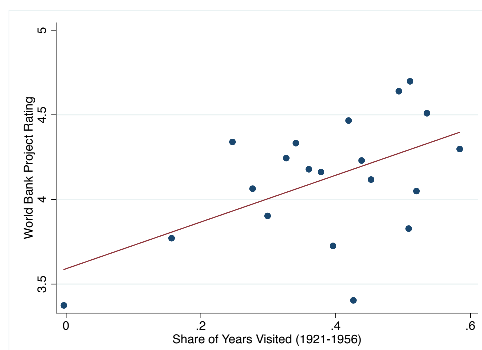
(a) Health Projects, No controls



(b) Health Projects, Full controls



(c) Non-health Projects, No controls



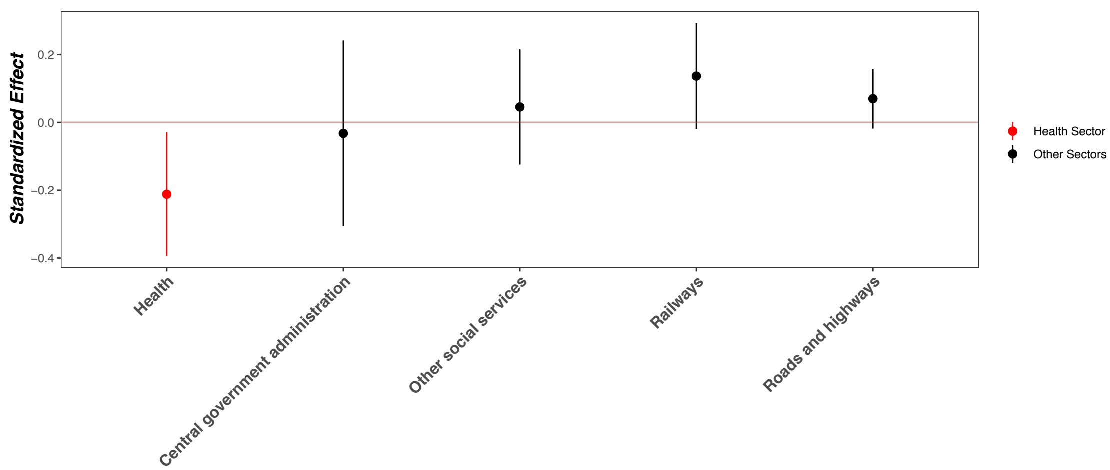
(d) Non-health Projects, Full controls

Notes: Data is from AidData for World Bank aid projects. *World Bank Project Rating* is variable ranging from 1 to 5, where 1=a project was rated as highly unsatisfactory, 2=unsatisfactory, 3=moderately unsatisfactory, 4=moderately satisfactory, and 5=satisfactory. *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Health Project* is an indicator variable equal to 1 if the project was labeled a "health" sector project by the world bank in the sector designations for a project. All regressions control for country fixed effects and country by health project fixed effects. Full controls include the following set of controls: *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, latitude, longitude and mean altitude of each cluster. *Disease Suitability Controls* includes mean malaria ecology index and tsetse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the Atlantic slave trade and number of missions in each main ethnic group in a region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each main ethnic group in a region. *Contemporary Controls* includes the total funds committed for each project.

Next, we plot the standardized effect size of historical exposure to medical campaigns and project success by project sector in Figure 17. For the health sector, projects receive a 0.2 standard deviation lower score. For the other sectors, the estimated coefficient is positive, though not consistently significant.[30] This suggests the negative effects of the campaigns is specific to health projects.

Finally, we present the results of a pooled regression of the project outcome on the share of years visited during the colonial medical campaigns in Table 10. On average, World Bank projects receive a rating between moderately unsatisfactory and moderately satisfactory. For health projects, we find a sizable and negative effect of share of years visited on the rating received. The estimated effect on the outcome rating for a world bank health project occurring in an area with the average number of colonial medicine campaign visits is equivalent to moving projects from being rated moderately satisfactory to moderately unsatisfactory. This analysis provides evidence that the historical medical campaigns not only matter for individual health choices, but more broadly for the success of health initiatives.

Figure 17: Standardized Effect by Sector



Notes: Data is from AidData for World Bank aid projects. *World Bank Project Rating* is variable ranging from 1 to 5, where 1=a project was rated as highly unsatisfactory, 2=unsatisfactory, 3=moderately unsatisfactory, 4=moderately satisfactory, and 5=satisfactory. *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. Projects are classified as being part of a sector if a project includes the sector in any of the 5 world bank sector designations for a project. All regressions control for country fixed effects and country by health project fixed effects, include the following set of controls: *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, latitude, longitude and mean altitude of each project location. *Disease Suitability Controls* includes mean malaria ecology index and tsetse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the Atlantic slave trade and distance to the closest colonial mission of each project. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each main ethnic group in a project location. *Contemporary Controls* includes the total funds committed for each project.

Table 10: Share of Years Visited and World Bank Project Rating

	Dep. Var.: *World Bank Project Rating*				
	(1)	(2)	(3)	(4)	(5)
	Pooled Regression of Health and Non-health Projects				
Health Project × **Share of Years Visited** (1921-1956)	-2.090***	-2.047***	-2.053***	-2.149*	-2.054***
	(0.509)	(0.579)	(0.590)	(1.251)	(0.589)
Geography and Climate Controls	Y	Y	Y	Y	Y
Disease Suitability Controls	N	Y	Y	Y	Y
Colonial Controls	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	Y	N
Contemporary Controls	N	N	N	N	Y
Observations	215	215	215	115	215
Clusters	68	68	68	36	68
Mean Dep. Var.	3.656	3.656	3.656	3.835	3.656

Notes: Data is from AidData for World Bank aid projects. Standard errors are clustered at the ethnic group-district level for Cameroon, at the colonial sub-district level for Gabon, and at the district level for Congo and Chad. *World Bank Project Rating* is variable ranging from 1 to 5, where 1=a project was rated as highly unsatisfactory, 2=unsatisfactory, 3=moderately unsatisfactory, 4=moderately satisfactory, and 5=satisfactory. *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Health Project* is an indicator variable equal to 1 if the project was labeled a "health" sector project by the world bank in the sector designations for a project. All regressions control for country fixed effects and country by health project fixed effects. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, latitude, longitude and mean altitude of each cluster. *Disease Suitability Controls* includes mean malaria ecology index and tsetse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the Atlantic slave trade and number of missions in each main ethnic group in a region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each main ethnic group in a region. *Contemporary Controls* includes the total funds committed for each project. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

7. Conclusion

We examine the effects of medical campaigns conducted by the French military in Cameroon and former AEF countries between the 1920s and 1950s. These campaigns were intended to control the growing epidemic of sleeping sickness. The mobile medical units forced villagers to receive treatment and prophylaxis for sleeping sickness. Over the course of several decades, millions of individuals were exposed to the campaigns. The medications for sleeping sickness had significant negative side effects that resulted in resistance to the campaigns.

To examine the effects of the colonial medical campaigns, we first collected and digitized annual data from archival sources. We construct a data set of exposure to the medical campaigns at a granular geographic level for over 30 years for five central African countries. This data set itself is important for understanding the medical and public health history of several sub-Saharan African countries.

We use an instrumental variables strategy to examine how historical exposure to the medical campaigns affects willingness to consent to a free and non-invasive blood test – our revealed preference measure of trust in medicine. We find that greater exposure to the campaigns increases blood test refusals. These results are large in magnitude, significant, and robust to variety of controls, including proxies for access to health services. We use the unique history of Cameroon to demonstrate that our instrument only has predictive power in the areas of Cameroon that were exposed to the colonial medical campaigns.

Given that the health campaigns affect trust in medicine, we also explore whether the effect on trust is more generalizable to other individuals and institutions using Afrobarometer data. We find no evidence that the medical campaigns affect other measures of trust, such as trust in other individuals or institutions. We also present evidence that the effect is predominantly driven by an individual's ethnic group's historical exposure to the campaigns, rather than the exposure of the groups of others around an individual.

We explore the implications of these campaigns for health outcomes. Those areas that were more exposed to the campaigns have worse health outcomes today across several measures. First, we find some evidence of higher HIV and anemia rates in those areas with greater exposure to

[30] We define other sectors the same manner which we defined health projects, where we define a project as being part of one of the listed World Bank sector categories if one of it's five sector categories corresponds to that World Bank sector category. We present the coefficients only for World Bank sectors where we have enough project-sector observations to estimate the full specification presented in Figures 16b and 16d.

the historical campaigns. Of course, this result is conditional on individuals choosing to take the blood test. We also find that children in areas with greater exposure to the campaigns have fewer vaccinations. These results provide evidence that the medical campaigns have continued effects on health outcomes.

Finally, we examine the implications of historical exposure to medical campaigns for present day health policy. We find that health interventions are less successful in areas with greater exposure to the campaigns. World Bank projects in the health sector receive lower ratings in areas with greater exposure to the campaigns. However, this is not the case for non-health related projects, suggesting this negative effect is specific to the health sector.

The results provide strong evidence that the colonial medical campaigns have caused lower levels of trust in medicine. This has important implications for the health of individuals and for their response to health policies in these countries. Additionally, it affects the success of World Bank funded projects. These results highlight the significant cost of the legacy of medical campaigns and that building demand for health services may require rebuilding trust in medicine. Finally, the results suggest the importance of understanding historical events for designing development interventions.

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Web Appendix for

The Legacy of Colonial Medicine in Central Africa

Sara Lowes

Bocconi University, IGIER, and CIFAR

Eduardo Montero

Harvard University

25 February 2018

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Contents

Appendix A. Data Sources and Variable Definitions

A.1. Geographic Data and Variables

- **Elevation:** The elevation data is provided by the Global Climate Database created by Hijmans et al. (2005) and available at http://www.worldclim.org/. This data provides elevation information in meters at the 30 arc-second resolution (approximately at the 1 km^2 level near the equator). The elevation measure is constructed using NASAs SRTM satellite images (http://www2.jpl.nasa.gov/srtm/).
- **Precipitation:** Precipitation data is provided by the Global Climate Database created by Hijmans et al. (2005) and available at http://www.worldclim.org/. This data provides monthly average rainfall in millimeters. We calculate the average rainfall for each month in each region of interest and average this over the twelve months to obtain our yearly precipitation measure in millimeters of rainfall per year.
- **Soil Suitability:** Soil suitability is the soil component of the land quality index created by the Atlas of the Biosphere available at http://www.sage.wisc.edu/iamdata/ used in Michalopoulos (2012) and Ramankutty et al. (2002). This data uses soil characteristics (namely soil carbon density and the acidity or alkalinity of soil) and combines them using the best functional form to match known actual cropland area and interpolates this measure to be available for most of the world at the 0.5 degree in latitude by longitude level. (The online appendix in Michalopoulos (2012) provides a detailed description of the functional forms used to create this dataset.) This measure is normalized to be between 0 and 1, where higher values indicate higher soil suitability for agriculture. Our Soil Suitability variable measures the average soil suitability in each 20km by 20km grid cel to provide a measure of soil suitability that also ranges between 0 and 1, with higher values indicate higher soil suitability for agriculture.
- **Crop Suitability:** Crop suitability reefers to the average suitability for rain-fed, low-input crops provided by the FAO's Global Ecological Zones website: http://www.iiasa.ac.at/Research/LUC/GAEZ/index.htm. FAO crop suitability model uses data on elevation, precipitation, soil and slope constraints to construct estimates of crop suitability at the 1 km^2 level for different crops. This measure is normalized to be between 0 and 1, where higher values indicate higher crop suitability.
- **Malaria Suitability:** Malaria data uses the Malaria Ecology index created by Kiszewski et al. (2004). The index was created by Kiszewski et al. (2004) to approximate the prevalence of severe forms of malaria. It is created from equations relating the human-feeding tendency of the Anopheles mosquito to the malaria mortality rate using parameters from various field studies and adjusts for the mosquito type that is most prevalent in a region.
- **Tsetse Fly Suitability:** The tsetse suitability index (TSI) is from Alsan (2015). The TSI is constructed by Alsan (2015) using global climate data and parameters from laboratory experiments on the relationship between tsetse fly population birth and death rates and climate variables. The TSI is measured as the Z-score of the potential steady-state tsetse fly population.

A.2. DHS Survey Data and Variables

Survey data on health outcomes for individuals are from the DHS surveys for our countries of interest: Cameroon, Central African Republic, Chad, Republic of Congo, and Gabon. We combine

DHS survey data, GPS data on cluster locations, and data sets on HIV/other biomarkers, when available. Note that for the GPS locations of DHS clusters, coordinates are displaced by up to 5km for all urban clusters, and 99% of rural clusters and up to 10 km for 1% of rural clusters. Importantly, this displacement is random, and simply induces classical measurement error. The survey data and detailed information on the sampling procedure and variable definitions is available at: http://dhsprogram.com/data/Data-Variables-and-Definitions.cfm.

- **Cameroon:** For Cameroon, we use the 2004 and 2011 Standard DHS surveys, for which there are GPS locations of clusters and HIV/other biomarker data. The 2004 survey was administered between February and August 2004 and the 2011 survey was administered by January and August 2011. Cameroon also has DHS surveys from 1991 and 1998. However, for these years, no HIV/other biomarker data were collected.

- **Central African Republic:** For Central African Republic, we use the 1994-95 Standard DHS survey, for which there are GPS locations of clusters. There is no HIV/other biomarker data available for CAR. The 1994 survey was administered between September 1994 and March 1995. There is 2010 MICS survey for CAR which is not yet publicly available.

- **Chad:** For Chad, we use the 1996-97, 2004, and 2014-15 Standard DHS surveys. The only year for which the GPS locations of clusters is available is 2014-15. HIV/other biomarker data was collected for 1996-1997 (only child height and weight) and for 2014-15. The 1996-97 survey was administered between December 1996 and July 1997, the 2004 survey was administered between July 2004 and December 2005, and the 2014-15 survey was administered between October 2014 and April 2015.

- **Republic of Congo:** For the Republic of Congo, we use the 2009 Standard AIS surveys and 2011-12 Standard DHS surveys. There is no GPS data available for the cluster locations. HIV/other biomarker data is only available for the 2009 AIDS Indicator Survey (AIS). The 2009 AIS survey was administered between March and June 2009, and the 2011-12 DHS survey was administered between September 2011 and February 2012. We do not use the 2005 Standard DHS survey, for which there is neither district data nor HIV/other biomarker data.

- **Gabon:** For Gabon, we use the 2012 Standard DHS survey, for which GPS locations of clusters are available and for which HIV/other biomarker data is available. The 2012 survey was administered between January 2012 and May 2012. We do not use the 2000 Standard DHS survey, for which there is neither GPS data nor HIV/other biomarker data.

Below we explain the variable definitions for the variables used in this paper from the DHS, MICS, and AIS surveys:

- **Educational Attainment:** Educational Attainment is a 0 to 3 categorical variable that measures the highest education level attained, where 0 is no education, 1 is primary education, 2 is secondary and 3 is higher education.

- **Wealth Factor:** Wealth Factor is an index generated by the DHS using principle component analysis on asset ownership for each individual.

- **Wealth Index:** Wealth Index is a is a 1 to 5 categorical variable where 1 is poorest quintile and 5 is richest quintile (in the entire DRC 2007 sample) from the Wealth Factor Score.

- **Hemoglobin Blood Test Refused** is an indicator variable for refusing consent to taking a blood test to test hemoglobin levels.

Table A1: Summary of Available DHS Data and Data in Sample

Demographic and Health Survey Data						
Country	**Type**	**Year**	**Survey Data**	**GPS Data**	**HIV/Anemia Data**	**In Sample**
Cameroon	Standard DHS	2011	Yes	Yes	Yes	Yes
Cameroon	Standard DHS	2004	Yes	Yes	Yes	Yes
Cameroon	Standard DHS	1998	Yes	Not Available	No	No
Cameroon	Standard DHS	1991	Yes	Yes	No	No
CAR	MICS	2010	Not Available	Not Available	Not Available	No
CAR	Standard DHS	1994-95	Yes	Yes	No	Child Health
Chad	Standard DHS	2014	Yes	Yes	Yes	Yes
Chad	Standard DHS	2004	Yes	No	No	Child Health
Chad	Standard DHS	1997	Yes	No	No	Child Health
Congo	Standard DHS	2011-12	Yes	No	No	Child Health
Congo	Standard AIS	2009	Yes	No	Yes	Yes
Congo	Standard DHS	2005	Yes	No District	No	No
Gabon	Standard DHS	2012	Yes	Yes	Yes	Yes
Gabon	Standard DHS	2000	Yes	No	No	No

Notes: ”Yes” means that the data was collected and is available from DHS. ”No” means the data was not collected. ”Not available” means the data was collected but is not available. "Child Health" means the data is used only in the immunization analysis because there is no HIV/anemia data. ”No District” means that the district information is not reported in addition to there being no GPS data.

- **HIV Blood Test Refused** is an indicator variable for refusing consent to taking a blood test to test for HIV.
- **Blood Test Refused** is an indicator variable we define as equal to 1 if an individual refuses consent to take a blood test (either for HIV or hemoglobin levels).
- **Hemoglobin Levels (g/cl)** is the reported hemoglobin level in grams per centiliters.
- **Anemia Level** is a 0 to 3 categorical variable constructed by the DHS, where 0=no anemia, 1=mild anemia, 2=moderate anemia, and 3=severe anemia.
- **HIV Result** is an indicator variable equal to 1 if the HIV blood test was positive.
- **HIV Sample Weights** are the DHS sample weights reported for the HIV testing.

The DHS survey runs a survey instrument on health behavior to a subsample of the sampled female population about their children (about a third of the entire sample). The following variables are only defined for this subsample of children:

- **Vaccination Index:** is the number of vaccines reported for children in the DHS out of the 10 possible vaccines included in the DHS survey. The vaccines recorded are the polio 0, bcg, dpt 1, polio 1, dpt 2, polio 2, dpt 3, polio 3, and measles vaccinations.

A.3. Afrobarometer Data and Variables

We use Afrobarometer data from Cameroon and Gabon. For Cameroon we use Round 5 and Round 6 data and for Gabon we use Round 6 data. We use data available from AidData.org to georeference the observations (BenYishay et al., 2017.). For each round we use all of the questions related to trust.

Round 5 Questions - Cameroon:

- **Trust Questions:**

- ”How much do you trust each of the following, or haven’t you heard enough about it to say?” The question is asked about: the President, Parliament, the electoral commission, the tax department, the local government council, the ruling party, opposition parties, the police, the army, the courts of law. The response options are Not at all, Just a little, Somewhat, A lot, Haven’t heard/ Don’t know. [Question 59A-J]
  - "Generally speaking, would you say that most people can be trusted or that you must be very careful in dealing with people?” The response options are most people can be trusted, must be very careful, and don’t know. [Question 87]
  - ”How much do you trust each of the following types of people?” The response options are Not at all, Just a little, Somewhat, A lot, Don’t know. The question is asked about: Your relatives, Your neighbors, Other people you know. [Question 88]

- **Health Questions:**
  - ”Are the following services present in the primary sampling unit / enumeration are or in easy walking distance: health center?” The response options are: Yes, No, Can’t determine. [EA-FAC D]
  - ”Over the past year, how often, if ever, have you or anyone in your family gone without medicines or medical treatment?” The response options are: Never, Just once or twice, Several times, Many times, Always, Don’t know. [Question 8C].

Round 6 Questions - Cameroon and Gabon:

- **Trust Questions:**
  - ”How much do you trust each of the following, or haven’t you heard enough about it to say?” The question is asked about: the President, Parliament, the electoral commission, the tax department, the local government council, the ruling party, opposition parties, the police, the army, the courts of law, traditional leaders, religious leaders. The response options are Not at all, Just a little, Somewhat, A lot, Haven’t heard/ Don’t know. [Question 52A-L].

- **Health Questions:**
  - ”Are the following services present in the primary sampling unit / enumeration are or in easy walking distance: health center?” The response options are: Yes, No, Can’t determine. [Question EA-FAC D].
  - ”In the last 12 months have you had contact with a public clinic or hospital”. The response options are: Yes, No, Don’t know. If yes, "How easy or difficult was it to obtain the medical care you needed?” The response options are No contact, Very easy, Easy, Difficult, Very difficult, Don’t know. [Question 55C].
  - ”Over the past year, how often, if ever, have you or anyone in your family gone without medicines or medical treatment?” The response options are: Never, Just once or twice, Several times, Many times, Always, Don’t know. [Question 8C].

A.4. World Bank Project Data and Variables

The World Bank project data was accessed from AidData (2017). We use the following variables from the data:

- **IEG Outcome Rating:** The world bank project outcome rating is defined as "the extent to which the operation's major relevant objectives were achieved, or are expected to be achieved, efficiently" and uses the following six-point scale: Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, and Highly Unsatisfactory.
- **Latitude and Longitude:** AidData (2017) records the geocoded location of each project as the longitude and latitude of each project that could be geolocated.
- **Sector:** the data records the (at most) 5 sectors used for each project along with the IEG evaluation rating. We define a project as part of a sector if any of the 5 sector variables include a sector in its values.
- **Total Commitments:** refers to the total amount of funds in dollars committed for each project.

A.5. Colonial Medicine Data

The historical data were collected from the *Service Historique de la Defense* archives in Toulon, France in January 2013. Below we include a list of all of the documents collected from the archives and their associated call numbers in the archive's catalog. Because Cameroon had special status with the UN, the French were required to submit annual reports to the UN on their activities there. Thus, we also include the information on the UN reports consulted. Many of the reports listed below are hundreds of pages long and include dozens of tables and figures. Therefore, in this appendix we do not list the page numbers of the tables and figures we digitize.

Table A2: Documents Collected From *Service Historique de la Defense*

AEF Reports			
Document Name	**Year**	**Catalog**	**Call #**
AEF 1933 Medical Report	1933	2013 ZK 005	121
AEF 1934	1934	2013 ZK 005	121
AEF 1935 Administrative	1935	2013 ZK 005	121
AEF 1935 Medical	1935	2013 ZK 005	7
AEF 1936 Administrative	1936	2013 ZK 005	121
AEF 1936 Medical	1936	2013 ZK 005	121
AEF 1939 Administrative	1939	2013 ZK 005	160
AEF 1939 Medical	1939	2013 ZK 005	160
AEF 1940 Administrative	1940	2013 ZK 005	160
AEF 1940 Medical	1940	2013 ZK 005	160
AEF 1941 Administrative	1941	2013 ZK 005	160
AEF 1941 Medical	1941	2013 ZK 005	160
AEF 1942 Administrative	1942	2013 ZK 005	160
AEF 1942 Medical	1942	2013 ZK 005	160
AEF 1943 Administrative	1943	2013 ZK 005	160
AEF 1943 Medical	1943	2013 ZK 005	160
AEF 1944 Administrative	1944	2013 ZK 005	160
AEF 1944 Medical	1944	2013 ZK 005	160
AEF 1945 Administrative	1945	2013 ZK 005	89
AEF 1945 Medical	1945	2013 ZK 005	89
AEF 1946 Administrative	1946	2013 ZK 005	89
AEF 1946 Medical	1946	2013 ZK 005	89
AEF 1947 Medical	1947	2013 ZK 005	89
AEF 1947 SGHMP (& misc. documents)	1947	2013 ZK 005	96
AEF 1948 SGHMP	1948	2013 ZK 005	96
AEF 1949 Administrative	1949	2013 ZK 005	91
AEF 1949 Medical	1949	2013 ZK 005	91
AEF 1949 SGHMP	1949	2013 ZK 005	119
AEF 1950 Administrative	1950	2013 ZK 005	91
AEF 1950 Medical	1950	2013 ZK 005	91
AEF 1950-1951 SGHMP	1950-1951	2013 ZK 005	119
AEF 1952 Economic and Social Statistics	1952	2013 ZK 005	90
AEF 1952 Medical	1952	2013 ZK 005	97
AEF 1953 SGHMP	1953	2013 ZK 005	119
AEF 1954 Annual Report Commentaries	1954	2013 ZK 005	119
AEF 1954 SGHMP	1954	2013 ZK 005	16
AEF 1955 SGHMP	1955	2013 ZK 005	100
AEF 1956 SGHMP	1956	2013 ZK 005	100

Table A3: Documents Collected From *Service Historique de la Defense*

Cameroon Reports			
Document Name	**Year**	**Catalog**	**Call #**
Cameroon 1936 Administrative	1936	2013 ZK 005	107
Cameroon 1939 Administrative	1939	2013 ZK 005	107
Cameroon 1939 Medical	1939	2013 ZK 005	107
Cameroon 1940 Annual Report	1940	2013 ZK 005	314
Cameroon 1941 Administrative	1941	2013 ZK 005	314
Cameroon 1941 Medical	1941	2013 ZK 005	314
Cameroon 1942 Administrative	1942	2013 ZK 005	314
Cameroon 1942 Medical	1942	2013 ZK 005	314
Cameroon 1943 Annex	1943	2013 ZK 005	111
Cameroon 1943 Annual Report with Mobile	1943	2013 ZK 005	111
Cameroon 1944 Annual Report with Mobile	1944	2013 ZK 005	111
Cameroon 1945 Annual Report with Mobile	1945	2013 ZK 005	111
Cameroon 1946 Annual Report with Mobile	1946	2013 ZK 005	111
Cameroon 1947 Annual Report with Mobile	1947	2013 ZK 005	110
Cameroon 1948 Annual Report with Mobile	1948	2013 ZK 005	110
Cameroon 1949 Annual Report with Mobile	1949	2013 ZK 005	110
Cameroon 1950 Annual Report with Mobile	1950	2013 ZK 005	110
Cameroon 1951 Annual Report with Mobile	1951	2013 ZK 005	110
Cameroon 1951 Supplementary	1951	2013 ZK 005	110
Cameroon 1952 Annual Report	1952	2013 ZK 005	108
Cameroon 1952 Climate	1952	2013 ZK 005	114
Cameroon 1953 Annual Report	1953	2013 ZK 005	108
Cameroon 1954 Annual Report	1954	2013 ZK 005	108
Cameroon 1954 Supplementary	1954	2013 ZK 005	108
Cameroon 1955 Annual Report	1955	2013 ZK 005	108
Cameroon 1955 Statistics	1955	2013 ZK 005	108
Cameroon 1955 Supplementary	1955	2013 ZK 005	112
Cameroon 1956 Annual Report	1956	2013 ZK 005	112
Cameroon 1956 Development Techniques	1956	2013 ZK 005	112
Cameroon 1956 Development Techniques v2	1956	2013 ZK 005	112
Cameroon 1956 Statistics	1956	2013 ZK 005	112
Cameroon 1957 Annual Report	1957	2013 ZK 005	112
Cameroon 1957 Development Techniques	1957	2013 ZK 005	112
Cameroon 1957 Statistics	1957	2013 ZK 005	112
Cameroon 1958 Annual Report	1958	2013 ZK 005	112
Cameroon 1968 Annual Report	1968	2013 ZK 005	112
Cameroon Unknown Map of Health Centers	Unknown	2013 ZK 005	

Table A4: Documents Collected From *Service Historique de la Defense*

Central African Republic Reports			
Document Name	**Year**	**Catalog**	**Call #**
CAR 1931 Annual Report	1931	2013 ZK 005	6
CAR 1932 Annual Report	1932	2013 ZK 005	6
CAR 1933 Annual Report	1933	2013 ZK 005	6
CAR 1934 Annual Report	1934	2013 ZK 005	6
CAR 1945 Annual Report	1945	2013 ZK 005	6
CAR 1946 Annual Report	1946	2013 ZK 005	6
CAR 1947 Annual Report	1947	2013 ZK 005	6
CAR 1948 Annual Report	1948	2013 ZK 005	6
CAR 1950 Annual Report	1950	2013 ZK 005	7
CAR 1951 Annual Report	1951	2013 ZK 005	7
CAR 1952 Annual Report	1952	2013 ZK 005	7
CAR 1953 Annual Report	1953	2013 ZK 005	7
CAR 1954 Annual Report	1954	2013 ZK 005	7
CAR 1954 Statistics	1954	2013 ZK 005	7
CAR 1955 Statistics	1955	2013 ZK 005	8
CAR 1956 Annual Report	1956	2013 ZK 005	8
CAR 1957 Annual Report	1957	2013 ZK 005	8
CAR 1958 Annual Report	1958	2013 ZK 005	8

Table A5: Documents Collected From *Service Historique de la Defense*

Chad Reports			
Document Name	**Year**	**Catalog**	**Call #**
Tchad 1931 Annual Report	1931	2013 ZK 005	125
Tchad 1932 Annual Report	1932	2013 ZK 005	125
Tchad 1933 Annual Report	1933	2013 ZK 005	125
Tchad 1934 Annual Report	1934	2013 ZK 005	125
Tchad 1947 Annual Report	1947	2013 ZK 005	125
Tchad 1948 Annual Report	1948	2013 ZK 005	125
Tchad 1949 Annual Report	1949	2013 ZK 005	125
Tchad 1950 Annual Report	1950	2013 ZK 005	125
Tchad 1951 Annual Report	1951	2013 ZK 005	125
Tchad 1952 Annual Report	1952	2013 ZK 005	125
Tchad 1953 Annual Report	1953	2013 ZK 005	125
Tchad 1959 Annual Report	1959	2013 ZK 005	123
Tchad 1960 Annual Report	1960	2013 ZK 005	123
Tchad 1961 Annual Report	1961	2013 ZK 005	123
Tchad 1964 Demographic Study	1964	2013 ZK 005	123

Table A6: Documents Collected From *Service Historique de la Defense*

Republic of Congo Reports			
Document Name	**Year**	**Catalog**	**Call #**
Moyen Congo 1931 Annual Report	1931	2013 ZK 005	117
Moyen Congo 1932 Annual Report	1932	2013 ZK 005	117
Moyen Congo 1933 Annual Report	1933	2013 ZK 005	117
Moyen Congo 1934 Annual Report	1934	2013 ZK 005	117
Moyen Congo 1945 Annual Report	1945	2013 ZK 005	116
Moyen Congo 1946 Administrative	1946	2013 ZK 005	116
Moyen Congo 1946 Medical	1946	2013 ZK 005	116
Moyen Congo 1947 Administrative	1947	2013 ZK 005	116
Moyen Congo 1947 Medical	1947	2013 ZK 005	116
Moyen Congo 1948 Annual Report	1948	2013 ZK 005	116
Moyen Congo 1949 Administrative	1949	2013 ZK 005	116
Moyen Congo 1949 Medical	1949	2013 ZK 005	116
Moyen Congo 1950 Medical	1950	2013 ZK 005	126
Moyen Congo 1951 Medical	1951	2013 ZK 005	126
Moyen Congo 1952 Medical	1952	2013 ZK 005	126
Moyen Congo 1953 Administrative	1953	2013 ZK 005	126
Moyen Congo 1953 Commentary	1953	2013 ZK 005	126
Moyen Congo 1954 Administrative	1954	2013 ZK 005	126
Moyen Congo 1954 Medical	1954	2013 ZK 005	126
Moyen Congo 1954 Medical Commentary	1954	2013 ZK 005	126
Moyen Congo 1955 Administrative Commentary	1955	2013 ZK 005	126
Moyen Congo 1955 Medical	1955	2013 ZK 005	126
Moyen Congo 1956 Annual Report Commentary	1956	2013 ZK 005	126
Moyen Congo 1956 Commentary	1956	2013 ZK 005	126
Moyen Congo 1956 Medical	1956	2013 ZK 005	126
Moyen Congo 1957 Annual Report	1957	2013 ZK 005	119
Moyen Congo 1957 Annual Report Commentary	1957	2013 ZK 005	119
Moyen Congo 1958 Annual Report	1958	2013 ZK 005	119

Gabon Reports			
Document Name	**Year**	**Catalog**	**Call #**
Gabon 1931 Annual Report	1931	2013 ZK 005	127
Gabon 1932 Annual Report Part 1	1932	2013 ZK 005	127
Gabon 1932 Annual Report Part 2	1932	2013 ZK 005	127
Gabon 1933 Annual Report Part 1	1933	2013 ZK 005	127
Gabon 1933 Annual Report Part 2	1933	2013 ZK 005	127
Gabon 1934 Medical	1934	2013 ZK 005	127
Gabon 1945 Annual Summary - Partial	1945	2013 ZK 005	128
Gabon 1945 Medical	1945	2013 ZK 005	128
Gabon 1948 Medical	1948	2013 ZK 005	128
Gabon 1949 Medical	1949	2013 ZK 005	128
Gabon 1950 Medical	1950	2013 ZK 005	128
Gabon 1951 Medical	1951	2013 ZK 005	128
Gabon 1952 Annual Summary - Partial	1952	2013 ZK 005	5
Gabon 1952 Statistics	1952	2013 ZK 005	5
Gabon 1953 Annual Summary - Partial	1953	2013 ZK 005	5
Gabon 1953 Statistics	1953	2013 ZK 005	5
Gabon 1954 Annual Summary	1954	2013 ZK 005	5
Gabon 1954 Statistics	1954	2013 ZK 005	5
Gabon 1955 Statistics	1955	2013 ZK 005	5
Gabon 1956 Administrative	1956	2013 ZK 005	5
Gabon 1956 Annual Summary	1956	2013 ZK 005	5
Gabon 1956 Statistics	1956	2013 ZK 005	5
Gabon 1957 Statistics	1957	2013 ZK 005	5

Table A7: Documents Collected from Other Sources

Cameroon Reports			
Document Name	**Year**	**Catalog**	**Call #**
Cameroon UN Report 1921	1921	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1922	1922	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1923	1923	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1925	1925	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1926	1926	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1927	1927	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1928	1928	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1929	1929	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1930	1930	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1931	1931	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1932	1932	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1933	1933	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1934	1934	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1935	1935	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1936	1936	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1937	1937	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1938	1938	UN	http://gallica.bnf.fr/ark:/12148/cb32848053c/date.r=.langEN (accessed on June 20th, 2013).
Cameroon UN Report 1952	1952	UN	1947, 1949-1957 available through Harvard and the center for research libs
Cameroon UN Report 1953	1953	UN	1947, 1949-1957 available through Harvard and the center for research libs
Cameroon UN Report 1954	1954	UN	1947, 1949-1957 available through Harvard and the center for research libs
Cameroon UN Report 1955	1955	UN	1947, 1949-1957 available through Harvard and the center for research libs
Cameroon UN Report 1956	1956	UN	1947, 1949-1957 available through Harvard and the center for research libs
Cameroon UN Report 1957	1957	UN	1947, 1949-1957 available through Harvard and the center for research libs

As described in Section 3.1 we collected these reports in January 2013 from the military archive. For the AEF countries we digitize data for 1927 to 1956. This data are at a sub-district level. For Cameroon, the data was reported at an ethnicity-district level for the years 1921 to 1938 and subsequently at the sub-district level from 1939 to 1950 with detailed maps of areas visited within Cameroon. When the data was not at the ethnicity-district level for Cameroon, in order to make the unit of observation consistent across reports, we aggregated the maps with sub-district information to the ethnicity-district level using area weights.[31] The report tables for Cameroon and AEF included detailed information on estimated number of people in an area, the number of people visited, the number of newly sick individuals, number of previously sick individuals, the number of lumbar punctures administered, and the number of previously sick individuals who had recovered. The reports also included narrative descriptions by the mobile team leaders of the activities undertaken by the health teams.

A.6. Other Colonial and Precolonial Data and Variables

- **Atlantic Slave Trade**: We use data from Nunn and Wantchekon (2011) on the number of slaves taken from each ethnic group – where ethnic groups are defined using maps from Murdock (1959) – during the Atlantic slave trade.
- **Missionary Locations**: Missionary post location data is from Nunn (2010) and is available at http://scholar.harvard.edu/nunn/pages/data-0 in the form of a GIS shapefile. This shapefile was created by Nathan Nunn by digitizing maps from *"Ethnographic Survey of Africa: Showing the Tribes and Languages; also the Stations of Missionary Societies"* published by Roome (1924).
- **Precolonial Data**: Precolonial data are from the Ethnographic Atlas created by Murdock (1967).

Appendix B. Additional Tables and Figures

B.1. Figures

[31]Specifically, consider an area of a sub-district that was visited by the campaigns according the the report tables and map; for instance, Figure 3 is an example of a map documenting areas visited in 1941 in Cameroon. We first digitized the maps of visits and the sub-district campaign data. Second, we overlay the map of ethnicity-districts constructed using previous reports; for example, Figure 4 is an example of a Cameroon map documenting incidence of sleeping sickness by ethnic group in 1934. Third, we aggregate the sub-district information to the ethnicity-district level using the area share of each ethnicity-district visited to aggregate the campaign table data. We considered an ethnic-district as visited for this aggregation if at least 5% of the ethnic groups area was visited.

Figure A1: Sleeping Sickness Visits - Share of Population Visited

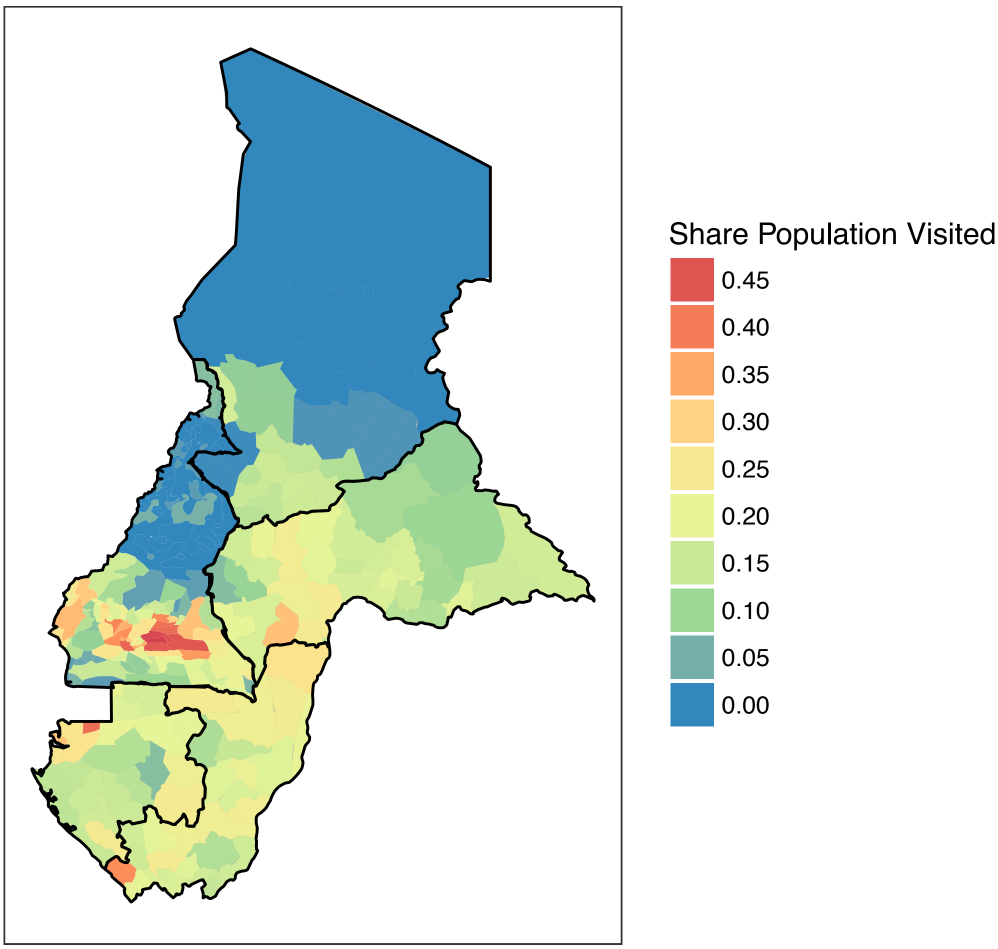
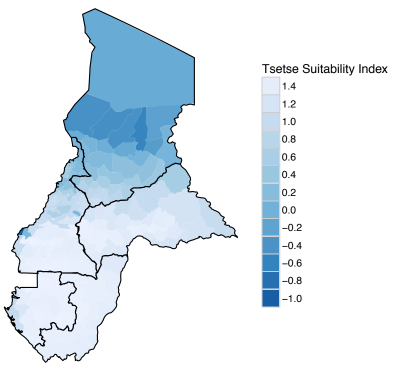
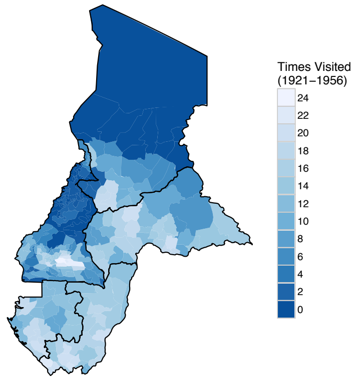


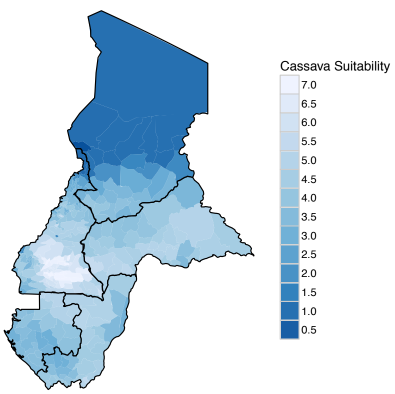
Figure A2: Maps of Variables for Instrument and Colonial Medical Campaign Visits in Cameroon and Former French Equatorial Africa



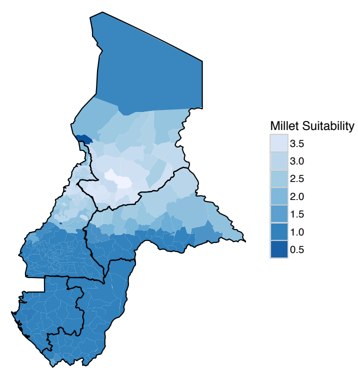
(a) Tse Tse fly Suitability



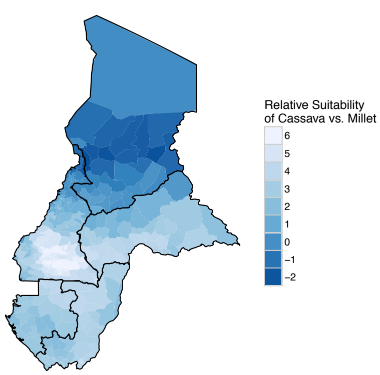
(b) Times Visited



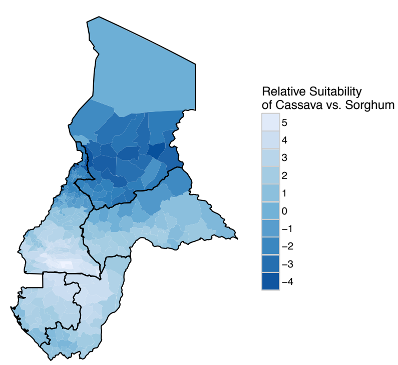
(c) Suitability for Cassava



(d) Suitability for Millet

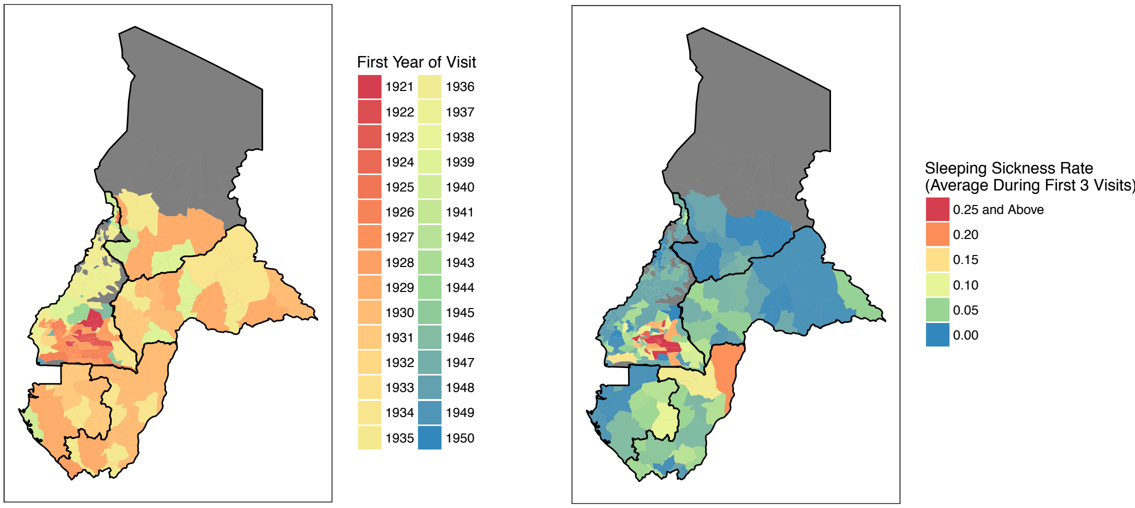


(e) Suitability for Cassava Relative to Millet



(f) Suitability for Cassava Relative to Sorghum

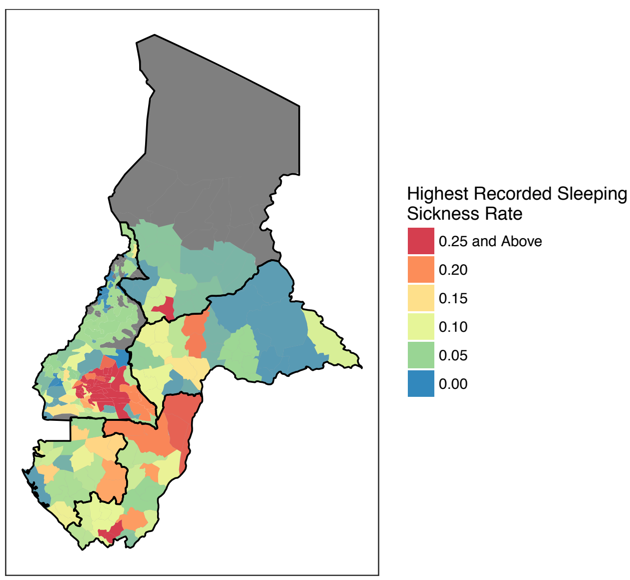
Figure A3: Sleeping Sickness Year of First Measurement and Estimated Prevalence



(a) First Year Measure Sleeping Sickness

(b) Average Reported Sleeping Sickness During First Three Visits

Figure A4: Sleeping Sickness - Maximum Prevalence Recorded



B.2. Tables

B.2.1. OLS

Table A1: OLS Estimates of Refusal of Hemoglobin Test

	Panel A: Share of Years Visited *Dep. Var.: Hemoglobin Blood Test Refused*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Years Visited (1921-1956)	0.0774***	0.126***	0.112***	0.109***	0.145***	0.0937***
	(0.0240)	(0.0327)	(0.0287)	(0.0257)	(0.0194)	(0.0225)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	32,564	32,564	32,564	32,564	16,407	32,564
Clusters	138	138	138	138	88	138
Mean Dep. Var.	0.0479	0.0479	0.0479	0.0479	0.0633	0.0479
	Panel B: Share of Population Visited *Dep. Var.: Hemoglobin Blood Test Refused*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Population Visited (1921-1956)	0.117***	0.160***	0.142***	0.163***	0.201***	0.141***
	(0.0324)	(0.0404)	(0.0364)	(0.0285)	(0.0276)	(0.0238)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	32,545	32,545	32,545	32,545	16,392	32,545
Clusters	138	138	138	138	88	138
Mean Dep. Var.	0.0479	0.0479	0.0479	0.0479	0.0633	0.0479

Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), and Congo (2011). Standard errors are clustered at the ethnic group level for Cameroon, at the colonial Sub-District level for Gabon, and at the district level for Congo. *Hemoglobin Blood Test Refused* is an indicator variable for refusing consent to taking a blood test to test hemoglobin levels. *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Share of Population Visited* measures the average share of population visited by the sleeping sickness campaigns as a share of the population in that region at the time between 1921 and 1956. All regressions control for age, age squared, gender, urban-rural status and include survey round fixed effects. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each region. *Disease Suitability Controls* includes mean malaria ecology index and tse tse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the atlantic slave trade and number of missions in each main ethnic group in a region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each main ethnic group in a region. *Contemporary Controls* includes educational attainment fixed effects and wealth index fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table A2: OLS Estimates of Refusal of HIV Test

	Panel A: Share of Years Visited					
	Dep. Var.: HIV Blood Test Refused					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Years Visited (1921-1956)	0.0764***	0.123***	0.122***	0.121***	0.143***	0.0976***
	(0.0277)	(0.0362)	(0.0337)	(0.0332)	(0.0292)	(0.0268)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	53,148	53,148	53,148	53,148	27,146	53,097
Clusters	160	160	160	160	94	160
Mean Dep. Var.	0.0445	0.0445	0.0445	0.0445	0.0607	0.0444
	Panel B: Share of Population Visited					
	Dep. Var.: HIV Blood Test Refused					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Population Visited (1921-1956)	0.137***	0.192***	0.189***	0.199***	0.203***	0.165***
	(0.0383)	(0.0462)	(0.0462)	(0.0453)	(0.0421)	(0.0375)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	53,063	53,063	53,063	53,063	27,084	53,012
Clusters	160	160	160	160	94	160
Mean Dep. Var.	0.0446	0.0446	0.0446	0.0446	0.0609	0.0445

Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), Congo (2009) and Chad (2014). Standard errors are clustered at the ethnic group level for Cameroon, at the colonial Sub-District level for Gabon and Gabon, and at the district level for Congo. *HIV Blood Test Refused* is an indicator variable for refusing consent to taking a blood test to test for HIV. *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Share of Population Visited* measures the average share of population visited by the sleeping sickness campaigns as a share of the population in that region at the time between 1921 and 1956. All regressions control for age, age squared, gender, urban-rural status and include survey round fixed effects. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each region. *Disease Suitability Controls* includes mean malaria ecology index and tse tse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the atlantic slave trade and number of missions in each main ethnic group in a region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each main ethnic group in a region. *Contemporary Controls* includes educational attainment fixed effects and wealth index fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table A3: OLS Estimates of Hemoglobin Levels

	Panel A: Share of Years Visited					
	Dep. Var.: Hemoglobin Levels (g/cl)					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Years Visited (1921-1956)	-5.693***	-2.404	-2.006	-2.134	-1.537	-2.625*
	(1.995)	(1.489)	(1.583)	(1.552)	(1.852)	(1.460)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	36,493	36,493	36,493	36,493	19,004	28,073
Clusters	138	138	138	138	88	138
Mean Dep. Var.	122.1	122.1	122.1	122.1	124.5	124.5
	Panel B: Share of Population Visited					
	Dep. Var.: Hemoglobin Levels (g/cl)					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Population Visited (1921-1956)	-8.280***	-5.992***	-5.827***	-5.942***	-4.578*	-7.675***
	(2.830)	(2.090)	(2.075)	(2.125)	(2.432)	(1.978)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	36,493	36,493	36,493	36,493	19,004	36,493
Clusters	138	138	138	138	88	138
Mean Dep. Var.	122.1	122.1	122.1	122.1	124.5	122.1

Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), and Congo (2011). Standard errors are clustered at the ethnic group level for Cameroon, at the colonial Sub-District level for Gabon, and at the district level for Congo. *Hemoglobin Levels (g/cl)* is the reported hemoglobin level in grams per centiliters. *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Share of Population Visited* measures the average share of population visited by the sleeping sickness campaigns as a share of the population in that region between 1921 and 1956. All regressions control for age, age squared, gender, urban-rural status, and include survey round fixed effects. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each region. *Disease Suitability Controls* includes mean malaria ecology index and tse tse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the atlantic slave trade and number of missions in each main ethnic group in a region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each main ethnic group in a region. *Contemporary Controls* include educational attainment fixed effects and wealth index fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table A4: OLS Estimates of Anemia - Indicator for Any Anemia

	Panel A: Share of Years Visited *Dep. Var.: Anemia Indicator*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Years Visited (1921-1956)	0.142***	0.0493	0.0299	0.0277	0.0140	0.0397
	(0.0464)	(0.0301)	(0.0336)	(0.0339)	(0.0431)	(0.0339)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	32,253	32,253	32,253	32,253	16,190	32,253
Clusters	138	138	138	138	88	138
Mean Dep. Var.	0.452	0.452	0.452	0.452	0.420	0.452
	Panel B: Share of Population Visited *Dep. Var.: Anemia Indicator*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Population Visited (1921-1956)	0.204***	0.138***	0.114**	0.106**	0.0826	0.130***
	(0.0686)	(0.0426)	(0.0451)	(0.0470)	(0.0602)	(0.0458)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	32,253	32,253	32,253	32,253	16,190	32,253
Clusters	138	138	138	138	88	138
Mean Dep. Var.	0.452	0.452	0.452	0.452	0.420	0.452

Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), and Congo (2011). Standard errors are clustered at the ethnic group level for Cameroon, at the colonial Sub-District level for Gabon, and at the district level for Congo. *Anemia Indicator* is an indicator equal to 1 if the DHS reports an individual as having either mild, moderate or severe anemia, and 0 otherwise. *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Share of Population Visited* measures the average share of population visited by the sleeping sickness campaigns as a share of the population in that region between 1921 and 1956. All regressions control for age, age squared, gender, urban-rural status, and include survey round fixed effects. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each region. *Disease Suitability Controls* includes mean malaria ecology index and tse tse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the atlantic slave trade and number of missions in each main ethnic group in a region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each main ethnic group in a region. *Contemporary Controls* include educational attainment fixed effects and wealth index fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

B.2.2. IV with alternative instrument and alternative treatment measure

Table A5: First and Second Stage IV Estimates with Instrument and Share of Population Visited

	Panel A: First-Stage Estimates Dep. Var.: *Share of Population Visited* (1921-1956)					
	(1)	(2)	(3)	(4)	(5)	(6)
Relative Suitability: Cassava vs. Millet						
x **Dist. Colonial Capital**	0.0361	0.0524**	0.0503*	0.0916***	0.115***	0.0899***
	(0.0262)	(0.0260)	(0.0289)	(0.0284)	(0.0366)	(0.0273)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporaneous Controls	N	N	N	N	N	Y
F-Stat of Excluded Instrument	1.90	4.05	3.03	10.38	9.85	10.86
Observations	66,197	66,197	66,197	66,197	33,456	66,151
Clusters	154	154	154	154	94	154
Mean Dep. Var.	0.232	0.232	0.232	0.232	0.260	0.232

	Panel B: Second-Stage 2SLS Estimates Dep. Var.: *Blood Test Refused*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Population Visited (1921-1956)	0.783*	0.496***	0.495**	0.255***	0.464***	0.204**
	(0.470)	(0.183)	(0.212)	(0.0932)	(0.156)	(0.0862)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporaneous Controls	N	N	N	N	N	Y
Observations	66,197	66,197	66,197	66,197	33,456	66,151
Clusters	154	154	154	154	94	154
Mean Dep. Var.	0.049	0.049	0.049	0.049	0.066	0.049

Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), Congo (2009 and 2011) and Chad (2014). Standard errors are clustered at the ethnic group-district level for Cameroon, at the colonial sub-district level for Gabon and Chad, and at the district level for Congo. All regressions control for age, age squared, gender, urban-rural status and include survey round fixed effects. *Blood Test Refused* is an indicator variable for refusing consent to taking a blood test (either for HIV testing or hemoglobin levels testing). *Share of Population Visited* measures the average share of population visited by the sleeping sickness campaigns as a share of the population in that region between 1921 and 1956. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each region. *Disease Suitability Controls* includes mean malaria ecology index and tsetse fly suitability. *Colonial Controls* includes total number of slaves taken from each ethnic group during the Atlantic slave trade and number of missions in each ethnic group. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each ethnic group. *Contemporaneous Controls* includes whether a place of residence is urban or rural, and the total years of education and wealth factor score for each individual. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table A6: First and Second Stage IV Estimates with Alternative Instrument and Share of Years Visited

	Panel A: First-Stage Estimates Dep. Var.: *Share of Years Visited* (1921-1956)					
	(1)	(2)	(3)	(4)	(5)	(6)
Relative Suitability: Cassava vs. Millet	0.0549***	0.0386***	0.0477***	0.0503***	0.0814***	0.0489***
	(0.010)	(0.014)	(0.0149)	(0.015)	(0.025)	(0.014)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
F-Stat of Excluded Instrument	28.63	7.83	10.20	11.85	10.76	11.92
Observations	70,747	70,747	70,747	70,747	33,573	70,696
Clusters	160	160	160	160	94	160
Mean Dep. Var.	0.42	0.42	0.42	0.42	0.42	0.42

	Panel B: Second-Stage 2SLS Estimates Dep. Var.: *Blood Test Refused*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Years Visited (1921-1950)	0.039	0.247***	0.254***	0.239***	0.167***	0.212***
	(0.060)	(0.085)	(0.095)	(0.088)	(0.056)	(0.082)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	70,747	70,747	70,747	70,747	33,573	70,696
Clusters	160	160	160	160	94	160
Mean Dep. Var.	0.047	0.047	0.047	0.047	0.066	0.047

Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), Congo (2009 and 2011) and Chad (2014). Standard errors are clustered at the ethnic group level for Cameroon, at the colonial Sub-District level for Gabon and Chad, and at the district level for Congo. All regressions control for age, age squared, gender, urban-rural status and include survey round fixed effects. *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Relative Suitability: Cassava vs. Millet* measures the difference in suitability vs. cassava from the FAO for a medical report region. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each region. *Disease Suitability Controls* includes mean malaria ecology index and tse tse fly suitability. *Colonial Controls* includes total number of slaves taken from each ethnic group during the atlantic slave trade and number of missions in each region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each region. *Contemporary Controls* includes total years of education and wealth factor score for each individual. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table A7: First and Second Stage IV Estimates with Alternative Instrument and Share of Population Visited

	Panel A: First-Stage Estimates Dep. Var.: *Share of Population Visited* (1921-1956)					
	(1)	(2)	(3)	(4)	(5)	(6)
Relative Suitability: Cassava vs. Millet	0.0410***	0.0371***	0.0409***	0.0463***	0.0679***	0.0451***
	(0.00778)	(0.0104)	(0.0109)	(0.0101)	(0.0175)	(0.00972)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
F-Stat of Excluded Instrument	27.78	12.80	13.98	20.86	15.10	21.50
Observations	70,747	70,747	70,747	70,747	33,573	70,696
Clusters	160	160	160	160	94	160
Mean Dep. Var.	0.233	0.233	0.233	0.233	0.260	0.233
	Panel B: Second-Stage 2SLS Estimates Dep. Var.: *Blood Test Refused*					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Population Visited (1921-1956)	0.0520	0.257***	0.296***	0.260***	0.200***	0.230***
	(0.0797)	(0.0854)	(0.0983)	(0.0816)	(0.0676)	(0.0742)
Geography and Climate Controls	N	Y	Y	Y	Y	Y
Disease Suitability Controls	N	N	Y	Y	Y	Y
Colonial Controls	N	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	N	Y	N
Contemporary Controls	N	N	N	N	N	Y
Observations	70,747	70,747	70,747	70,747	33,573	70,696
Clusters	160	160	160	160	94	160
Mean Dep. Var.	0.047	0.047	0.047	0.047	0.066	0.047

Notes: Data is from the DHS for Cameroon (2004 and 2011), Gabon (2012), Congo (2009 and 2011) and Chad (2014). Standard errors are clustered at the ethnic group level for Cameroon, at the colonial Sub-District level for Gabon and Chad, and at the district level for Congo. All regressions control for age, age squared, gender, urban-rural status and include survey round fixed effects. *Share of Population Visited* measures the average share of population visited by the sleeping sickness campaigns as a share of the population in that region between 1921 and 1956. *Relative Suitability: Cassava vs. Millet* measures the difference in suitability vs. cassava from the FAO for a medical report region. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each region. *Disease Suitability Controls* includes mean malaria ecology index and tse tse fly suitability. *Colonial Controls* includes total number of slaves taken from each ethnic group during the atlantic slave trade and number of missions in each region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each region. *Contemporary Controls* includes total years of education and wealth factor score for each individual. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table A8: Reduced Form Estimates for Former British and Former French Cameroon with Alternative Instrument

	Falsification Test for Relative Suitability Instrument Dependent Variable: *Blood Test Refused*					
	Former British Cameroon			Former French Cameroon		
	(1)	(2)	(3)	(4)	(5)	(6)
Relative Suitability:						
Cassava vs. Millet	-0.0034	0.0004	0.0009	0.0127***	0.0121**	0.0100**
	(0.0078)	(0.0101)	(0.0098)	(0.0044)	(0.0049)	(0.0047)
Geography and Climate Controls	Y	Y	Y	Y	Y	Y
Disease Suitability Controls	N	Y	Y	N	Y	Y
Colonial Controls	N	Y	Y	N	Y	Y
Contemporary Controls	N	N	Y	N	N	Y
Observations	4,875	4,875	4,875	21,440	21,440	21,440
Clusters	132	132	132	452	452	452
Mean Dep. Var.	0.0285	0.0285	0.0285	0.0696	0.0696	0.0696

Notes: Data is from the 2004 and 2011 Cameroon DHS surveys. Standard errors are clustered at the dhs cluster level. All regressions control for age, age squared, gender, whether a place of residence is urban or rural, and include survey round fixed effects. *Blood Test Refused* is an indicator variable for refusing consent to taking a blood test (either for HIV testing or hemoglobin levels testing). *Relative Suitability: Cassava vs. Millet* is from the FAO and measures the mean difference in suitability for cassava and millet, for a 50 km buffer around each DHS cluster. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centroid longitude and mean altitude of each cluster. *Disease Suitability Controls* includes mean malaria ecology index and tse tse fly suitability. *Colonial Controls* includes total number of slaves taken from each ethnic group during the atlantic slave trade and number of missions in each ethnic group. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each ethnic group. *Contemporary Controls* includes educational attainment fixed effects and wealth index fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table A9: Colonial Medical Campaigns and Received World Bank Project, Received Health Project, and Project Received Rating

	Panel A: Dep. Var.: Any World Bank Project				
	(1)	(2)	(3)	(4)	
Share of Years Visited	0.00391	0.00479	0.00443	0.00154	
	(0.00592)	(0.00589)	(0.00607)	(0.00825)	
Geography and Climate Controls	Y	Y	Y	Y	
Disease Suitability Controls	N	Y	Y	Y	
Colonial Controls	N	N	Y	Y	
Pre-Colonial Controls	N	N	N	Y	
Observations	280	280	280	165	
Clusters	244	244	244	160	
Mean Dep. Var.	0.471	0.471	0.471	0.442	
	Panel B: Dep. Var.: Health Project				
	(1)	(2)	(3)	(4)	(5)
Share of Years Visited	-0.00197	-0.00375	-0.00402	-0.00110	-0.00310
	(0.00586)	(0.00483)	(0.00429)	(0.00945)	(0.00394)
Geography and Climate Controls	Y	Y	Y	Y	Y
Disease Suitability Controls	N	Y	Y	Y	Y
Colonial Controls	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	Y	N
Contemporary Controls	N	N	N	N	Y
Observations	215	215	215	115	215
Clusters	68	68	68	36	68
Mean Dep. Var.	0.363	0.363	0.363	0.374	0.363
	Panel C: Dep. Var.: Project Received Rating				
	(1)	(2)	(3)	(4)	(5)
Share of Years Visited	0.00173	0.00206	0.00137	-0.00196	0.000347
	(0.00346)	(0.00354)	(0.00368)	(0.00563)	(0.00367)
Geography and Climate Controls	Y	Y	Y	Y	Y
Disease Suitability Controls	N	Y	Y	Y	Y
Colonial Controls	N	N	Y	Y	Y
Pre-Colonial Controls	N	N	N	Y	N
Contemporary Controls	N	N	N	N	Y
Observations	595	595	595	304	595
Clusters	114	114	114	67	114
Mean Dep. Var.	0.361	0.361	0.361	0.378	0.361

Notes: Data is from AidData for World Bank aid projects. Standard errors are clustered at the ethnic group level for Cameroon, at the colonial Sub-District level for Gabon, and at the district level for Congo and Chad. *Any World Bank Project* is an indicator variable equal to one if an area received any World Bank project. *Health Project* is an indicator variable equal to one if an area received a World Bank project in the health sector. *Project Received Rating* is an indicator variable equal to one if an area received a World Bank project that received a rating. *Share of Years Visited* measures the share of years the mobile medical teams visited a region for sleeping sickness treatment between 1921 and 1956. *Health Project* is an indicator variable equal to 1 if the project was labeled a "health" sector project by the world bank in the sector designations for a project. All regressions control for country fixed effects. *Geography and Climate Controls* includes mean temperature, mean precipitation, mean land suitability, the mean surface area, centroid latitude, centered longitude and mean altitude of each cluster. *Disease Suitability Controls* includes mean malaria ecology index and tsetse fly suitability. *Colonial Controls* includes total number of slaves taken from each main ethnic group in a region during the atlantic slave trade and number of missions in each main ethnic group in a region. *Pre-Colonial Controls* includes level of centralization, use of plow, whether indigenous slavery was practiced, and whether agriculture was practiced for each main ethnic group in a region. *Contemporary Controls* includes the total funds committed for each project. Panel A does not include contemporary controls, since if there is no World Bank project, there is no information on total funds committed. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$