Proceedings of the 2nd International Conference on Biological Engineering and Medical Science (ICBioMed 2022), Part I
DOI: 10.54254/2753-8818/3/20220294

The long-term impact from colonialism to the public health behaviour and healthcare utilization in Cameroon

Zhiyuan Wang

University Duisburg-Essen (Campus Essen)

wangzhiyuan@smart-trans.net

Abstract. The management of public health has always been a very important content in every country, such as curbing the development of HIV or AIDS related diseases is an important link in promoting the healthy development of global health. However, there are still many deficiencies, especially under the influence of colonial culture. This study exploits the long-term effect of partition by two different colony authorities with using regression discontinuity design when the British and the French administrations divided the German Cameroon into their colony in 1919. Results indicated that the individuals' knowledge level for preventing HIV/AIDS from the side of French is lower than the British side from 0.3% to 6%, the knowledge of avoiding injections is 4% higher from the side of French compared to the other side, and the refuse rate to take a blood test for HIV/AIDS from the French Cameroon is higher than the British side about 2.2%. This research argues that the effect from the force injection and ineffective treatment during the medical campaign in Cameroon has persisted through its impacts on mistrust of western medical services. Hence, clusters on the French side which exposed by the largest medical campaign had lower knowledge about preventing HIV/AIDS, more awareness against injections, and less trust in the medical services.

Keywords: colony, HIV prevalence, medical campaign, mistrust.

1. Introduction

Cameroon is among the most diverse countries in tropical Africa, not just from an ethnic and geographic perspective, but unluckily also from the colonialism aspect, this ancient country has been partitioned under two colonial powers, the French and the British. A border that divided Cameroon into British Cameroon and French Cameroon has been set in 1919.

Traces of the two distinct colonial cultures in terms of public health can still be spotted even after 50 years since the independence of Cameroon in 1960, for instance, medical personnel titles, however, little is known about HIV or AIDS related diseases. This paper's hypothesis is the identity of the colonizer could still generate impacts to the public health outcome such as their knowledge to prevent HIV or the refuse rate of a taking blood test. A possible mechanism would be that the different health measurements during the colonial period, the attitude of colonists against the health condition of local residence, and their effect on preventing the epidemic in tropical Africa.

According to existing empirical work, the shadow of colonialism could be still upon the life of the contemporary individuals that live in former European colonies. Nevertheless, the empirical evidence is insufficient regarding the effect of colonial institutions towards the public health, especially

© 2026 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2753-8818/3/20220294

HIV/AIDS in Cameroon, a country that HIV/AIDS-related disease are among the top causes of death and the rank of life expectancy (58.06) is below the average of other Africa countries [1,2].

This research has exploited a quasi-experimental design based on the development and health survey in 2011. This study used regression discontinuity design (RDD) based on the nature cut-off of the colony's border. Residents who live near the border could share similar socioeconomic characteristics except for the authority. By comparing the public health outcomes between the 'British' Cameroon and the 'French' Cameroon, this research could estimate the differences in the average treatment effect between the colonial regions.

2. literature review

This paper based on majorly four existing paper, each research have their own concentrate on the regression discontinuity design: the Dupraz introduce the difference between two colony authorities related to education outcome, he specifically focusses on the 1919 border in Cameroon which gives a general picture how to working with RDD in this scenario [3]; the Dell focus on the MITA system in southern America colony, her research is the first approach regard to geographic discontinuity design which show the general information about the way to practice spatial RDD approach [4]; the other two researches Keele & Titiunik, Kumar are compensations to the structure [5,6].

The most relevant study to this research is Dupraz who contributes to the long-term effect of different colony administrations in Cameron [3]. First, He identifies a border discontinuity between the French Cameron and the British Cameron related to education. And secondly, he exploited the results from regression discontinuity design. Those two points give leads by using geographic discontinuity design both on the theoretical and practical aspects. The next best paper to this study is Dell, her approach also contribute to identifying colonial policy effect, which in her case forced mining labor system(MITA) in Peru by using regression discontinuity design, Dell according to the author is the first comprehensive approach related to spatial regression discontinuity design [4]. To compensate the methodology, this study picked two more papers, one is from Keele & Titiunik who used also geographic regression discontinuity, which they called" GRD" to analyze the effects from a political advertisement on a voter based on the media market boundary in the USA [5]. Keele & Titiunik's introduction of the identification to the treatment effect is more detailed compared to the first two paper and unlike other paper, Keele & Titiunik use single dimension approach rather than using latitude and longitude, their paper lists many recommendations on data selection, falsification test, and analysis which benefits this study a lot [5]. The last research is from Kumar, like the others, he utilized regression discontinuity design framework, his approach based on the state border of Texas, and he exploits the effect from limit home equity on the mortgage [6]. Different from others Kumar using a post-LASSO treatment effect estimator to estimate the discontinuity [3-6].

There are three major differences from this paper compared to the research above and other existing papers which used regression discontinuity design. First is the topic contribute to the long-term effect from colony authority to the HIV/AIDS knowledge in Cameron, which not been comprehensively discussed yet. Secondly, this paper is based on one dimensional- polynomial approach but with cluster-level geographic data, this research preferred one dimension because the cluster in this database is not located extremely near to the cut-off, which otherwise would make the single dimension approach pointless if the distance is equal to zero, furthermore, the coordination of every household is the same to all observations in one cluster. There is no reason that this research could get a superior result with coordination than the nearest distance from the cluster to the border. Finally, since this study used only database from Cameroon, this research utilized placebo sample testing to increase the external validity, the impact should be stable unless the cut-off is unusual [7].

3. Identification

Right behind World War I, Cameroon has been separated into British and French colonies. British Cameroon was under the control of the British Nigeria colonial government. As the German government, the British government started to care about the degeneration problem in the colony. But

DOI: 10.54254/2753-8818/3/20220294

tropical Africa was a less important colony from British colonists' point of view compared to their colony in Asian and south Africa, furthermore, instead of interception, the British government preferred smoother and indirect method compared to other colonial government to prevent the degeneration problem and lack of labor supply [7-10].

During the colonial period, one of the most documented epidemics is sleeping sickness. Which is generally a parasitic illness, people will suffer from headache, listlessness, fever, and death. The European authority was strongly motivated to solve the sleeping sickness during the colonial era since the epidemic danger the labor supply in tropical Africa and making a lot of lands impossible to be planted [11-16].

Although many of the British colonies suffered from epidemics and related degeneration problem, the impact of their health measurement was not effective due to their half-hearted attitude, in the meantime, the French government cared less about their colonial until 1917, an army surgeon named Eugene Jamot built a mobile medical team in the French colony and his goal was to eliminate the sleeping sickness once for all. Jamot and his team gave tests to the colony residence village by village and people with symptoms would get treated. This health measure got progress very soon, those mobile teams tested 663,391 locals in 1928, among them about 17% (115,354) were identified with sleeping sickness. During the campaigns, almost every inhabitation in some villages was forced to take Lomidine injections, which was supposed to decline the speed of infection for sleeping sickness [16,17].

According to the last two parts above, this research assume that could identify a difference between the two colony authorities as the French side practicing more measures than the British side.

4. Data description

The empirical analysis is using the Cameroon demographic and health survey (DHS) in 2011 include geospatial covariate datasets. The geological data contains 578 villages and cities across the 10 sub-divisions in Cameroon. Each village or city is sorted into a cluster that contains the GPS location of its center. The 1919 border is located across the four south-west sub-divisions: Sud-Ouest, Ouest, Nord-Ouest, and Littoral. About 94 clusters located in the 15 km range from the border and 87 clusters are on the British side. The geological data also contains precipitation, altitude, and temperature data from 1985 to 2005.

The DHS data is divided into three major sub-sample: women, men, and children. The Women sample is the biggest, which contains 15426 observations, Men sample covers 7191 observations. Each sub-sample include enormous information about individual health condition and behavior such as health insurance, HIV related behavior and health knowledge, etc. this research have combined women and men sample into a pooled individual sample. Additionally, the HIV test result information this research used is from the DHS HIV sample.

Table 1. Descriptive statistics (from pooled sample):

Cluster on the French side:

age	18901	28.796	10.465		15	59	
gender	18901	.319	.466		0	1	
literacy	18901	1.408	.883		0	3	
healthinsurance	18901	.024	.152		0	1	
religion	18901	2.084	1.267		0	7	
	refuse blood taken		6207	1.053	.323	1	3
	aids drugpart		18901	.005	.068	0	1
	aids bloodtrans		18901	.037	.188	0	1

DOI: 10.54254/2753-8818/3/20220294

Table 1. (continued):

aids homosexuals	18901	.002	.05	0	1
aids injection	18901	.024	.152	0	1
aids manypart	18901	.007	.085	0	1
aids onspart	18901	.273	.446	0	1
aids limitpart	18901	.031	.174	0	1
Cluster on the British side:					
age	3390	29.043	10.808	15	59
gender	3390	.312	.463	0	1
literacy	3390	1.455	.798	0	2
healthinsurance	3390	.044	.206	0	1
religion	3390	1.993	1.284	0	7
refuse blood taken	1122	1.007	.119	1	3
aids drugpart	3390	.006	.077	0	1
aids bloodtrans	3390	.089	.285	0	1
aids homosexuals	3390	.002	.042	0	1
aids injection	3390	.045	.206	0	1
aids manypart	3390	.009	.094	0	1
aids onspart	3390	.262	.44	0	1
aids limitpart	3390	.026	.159	0	1

To compensate for study's placebo test, this research used regular universal gridded high-resolution station data sources for precipitation from 1900-2014. Each grid covers a half-degree latitude time a half degree longitude and Cameroon contains 147 grids, on the French side there are 135 grids and 12 grids are located on the British Cameroon. No observation points are located on the cut-off line, the distance to the nearest point is 3.9 km.

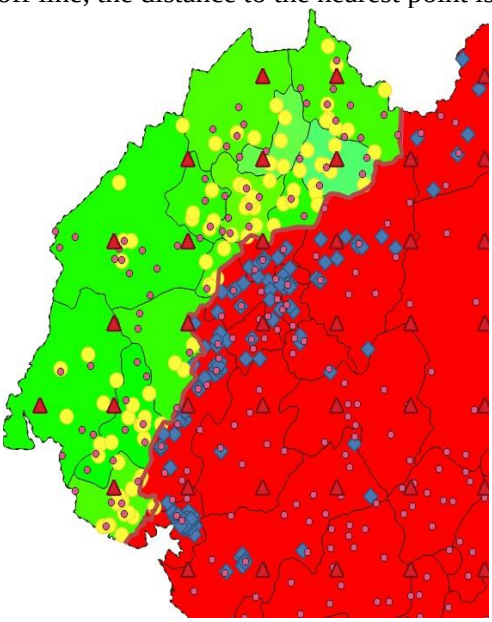

Figure 1. Cluster location near the cut-off, triangles are the location of precipitation point.

DOI: 10.54254/2753-8818/3/20220294

The locations of the clusters in DHS have been shown in Figure 3, the small circle represented the location of the cluster, of the green side is the British controlled-Cameroon, and of the red side is French controlled-Cameroon. The triangle indicated the location of the spatial grid in the placebo test.

5. Econometric model

Refers to the identification method this research chooses single dimension spatial RD polynomial, also rather than coordination this research used the nearest distance from cluster to the border. As argued before, the difference between using a single dimension and a multi-dimension approach should be insignificant in this paper's sample. this research would introduce the basic function form:

$$Ric = \alpha + \mathrm{B}britishc + \mu(GeoLocationsc) + \tau\theta i + vic$$

Where Ric is the dependent variable for observation i in cluster c and B is the treatment variable, which identical to 1 when the cluster is from the English- speaking region and identical to -1 if not. μ ($GeoLocationsc$) is this paper's RD polynomial function, which indicates the function of geographic distance, θi is a vector of covariates that includes all the control variables. vic would capture the unobservable bias.

Regarding this paper's choice of estimator order, there is plenty of existing papers which specifically address it, this research did not exercise with more than 3 estimator order when practicing local polynomial regression, with respect to Imbens discussed in his research concerning to the choice of the order in regression discontinuity design, he recommends against using high order because it may raise more issues than it fixed [18,19].

This study assumed that the border in 1919 between two authorities is a natural cut-off, hence this research would use regression discontinuity design to approximate the impact between different colonists. The treatment variable, whether the observation is assigned to the British side or to the French side is determined by the exogenous randomized cut-off, the border. This approach could only be appreciated when the unobserved determination of outcome varies smoothly at the cut-off point. Therefore, in the next part, this research will investigate whether the cut- off is exogenous.

This research looked up for several annual medical reports, historical record which about German Cameroon back to the 1900s, did not find an indication that mentioned any systematic difference occurred alongside the 1919 border before the French and the British took control of Cameroon.

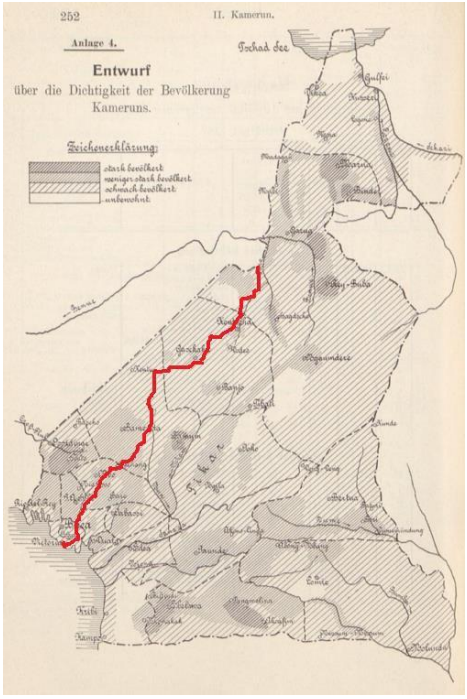

Figure 2. The density of population in Cameroon [7].

DOI: 10.54254/2753-8818/3/20220294

The historical record and literature that this research founded favored the haphazard of the border setting. To increase the validity, this research would further practice some placebo tests regarding the discontinuity which will be presented in the robustness test section [14,19-22].

6. Model results

The results from table 2 are the main results, in table 2, concerning to the knowledge that avoids AIDS, the British side is more favored, the public is more aware of how to prevent themself from infection of HIV on the British side. From all of the knowledge regarding the HIV prevent only avoid injection(4%) is favored the French side, this research picked the all the statistical effective variables from the sample pool, the possibility to avoid blood transfer (6%), to avoid sex with drug partners (1.1%), to avoid sex with homosexual (0.3%), to avoid partner with many partners(1.1%), to have limited number of partner (2.8%) and to have only one sex partner (5.4%) are higher than the side of the French colony. The popularity of knowledge to avoid HIV/AIDS from the British side is generally higher than the French side from 0.3% to 6%. Avoid getting blood transfer and have a sexual relations with only one partner are the most different variables. unsurprisingly avoid drug partner and avoid homosexuals are among the most significant different variables, while HIV most appears in the group of people who are homosexual and drug injections according to WHO [23].

Furthermore, the refuse rate to take a blood test regarding test HIV on the French region is higher than the British region, the refuse rate is 2.2% higher when excluding the cluster from Duala.

Table 2. Local polynomial regression results from pool sample.

	(1) **aids_blood trans**	**(2)** **aids_drug partn**	**(3)** **aids_homosexuals**	**(4)** **aids_many part**	**(5)** **aids_limit part**	**(6)** **aids_ons part**	**(7)** **aids_injection blood taken**	**(8)** **n**
RD_Estimate	0.049**	0.011**	0.003**	0.011**	0.028***	0.060*	-0.022**	-0.041**
	(0.019)	(0.004)	(0.002)	(0.005)	(0.008)	(0.031)	(0.012)	(0.013)
Obs.	3385	4432	4579	4798	4246	4009	1756	5967
Pseudo R2	.z	.z	.z	.z	.z	.z	.z	.z

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

In parenthesis are standard errors All eight variables are related to aids, the first column indicated whether individual avoids to taking blood transfer in order to avoid aids, the second column means whether the individual avoids having sex with a partner who addicted to drugs, the third column indicated that observation avoids having sex with a homosexual partner. The fourth column expressions whether the individual cares to avoid a partner who has many partners. The fifth column displays whether individuals limit their partner numbers. The sixth column shows whether the individual only has one partner. The positive value favors the British side when the British side has a higher knowledge level. The seventh column is the result of HIV measurement regarding blood taken, negative value favors the French side which indicated that in the French side individuals prefer not to take blood for the HIV check. Column eight indicated whether individual avoids injection in order to avoid aids, the sign is negative, therefore on the French side, individuals prefer to avoid injections. All of the results are statistically significant under a 95% confidence interval. The result is estimated by using the rdrobust package (Calonico et al, 2014a, 2014c).

DOI: 10.54254/2753-8818/3/20220294

7. Robustness test

This research first test the covariates in the model and no discontinuity exposed near the cut-off, secondly, this research practice "ted" test on the outcome variables, the results show the model is stable any time consider a very small change of threshold value, then this research use manipulation test on the running variable, no statistical evidence of systematic manipulation has been exposed.

Afterward, this research separately ran a placebo test on different sample sizes, different cut-off lines, different bandwidth choices, and placebo outcomes with historical outcomes variables. The results are: 1) consist when dropping the cluster near the cut-off; 2) no significant differences have been exposed other than the true cut-off point; 3) not be sensible to the choice of bandwidth; 4) no statistically significant difference has been found for the placebo outcome across the cut-off.

Table 3. Local polynomial regression results from Covariates check.

	(1) age	**(2) religion**	**(3) health insurance**	**(4) gender**	**(5) literacy**
RD_Estimate	-1.073	0.021	0.018	0.055	-0.033
	(0.794)	(0.078)	(0.012)	(0.042)	(0.059)
Obs.	4349	4772	5144	3235	3645
Pseudo R2	.z	.z	.z	.z	.z

In parenthesis are standard errors. All of the results are statistically insignificant under a 95% confidence interval. The result is estimated by using the rdrobust package (Calonico et al, 2014a, 2014c).

Table 4. Regression results from ted test.

	(1) aids_drugpart	**(2) aids_homosexuals**	**(3) aids_manypart**
_x_1	-0.001***	-0.000*	-0.000
	(0.000)	(0.000)	(0.000)
_T	0.010**	0.004**	0.009
	(0.004)	(0.001)	(0.006)
_T_x_1	0.001*	0.000	0.000
	(0.000)	(0.000)	(0.001)
_cons	-0.001	-0.001	0.003
	(0.002)	(0.001)	(0.004)
Obs.	3998	3998	3998
R-squared	0.001	0.001	0.001

In parenthesis are standard errors. All results estimated with thepackage ted (GiovannThis research Cerulli).

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

DOI: 10.54254/2753-8818/3/20220294

Table 5. Local polynomial regression results.

	(1) rainfall 1900	(2) rainfall 1901	(3) rainfall 1902	(4) rainfall 1903	(5) rainfall 1904	(6) rainfall 1905
RD_Estimate	-5.785	0.898	-8.520	-10.651	-10.350	-8.656
	(33.345)	(37.388)	(30.770)	(35.344)	(34.794)	(31.721)
Obs.	22	18	23	23	23	23
Pseudo R2	.z	.z	.z	.z	.z	.z

In parenthesis are standard errors. Rainfall indicated annual precipitation for each grid from 1900 to 1905. All of the results are statistically insignificant under a 95% confidence interval. The result is estimated by using the rdrobust package (Calonico et al, 2014a, 2014c).

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

8. Conclusion

This study concentrates on the discontinuity related to public health at the border between the two colony authorities in Cameroon. This research found the HIV knowledge level is positively correlated to the British authority, individuals on the French side are only more aware to avoiding injections (4%). Rather than that, the awareness of avoiding HIV/AIDS is 0.3% to 6% higher than the French side and the French authority is positively related to the refuse rate of taking a blood sample, the rate is 2.2% higher from the French colony compared to the British Cameroon. Regarding the prevalence of HIV/AIDS, no border discontinuity has been found.

This research argue that results are related to the medical campaign during the colonial period from French authority. Around the 1920s, the French authority under the leading of Eugene Jamot started medical treatment in Cameroon.

Although this research utilized the placebo test on the sample size, this research still based on a natural experiment, and this research have used the only database from the Cameroon region. Therefore, there is a trade-off between internal validity and external validity. More discussion regarding external validity will be appreciated.

Finally, when analyzing the long-term effect from a historical event, it is the essence to observe the whole period from different perspectives. The outcome may be explained more comprehensively when the researcher having a picture of the entire period.

References

[1] HARTMUT POGGE VON STRANDMANN, Great Britain and Germany's Lost Colonies, 1914–1919, African Affairs, Volume 67, Issue 268, July 1968, Pages 262–263,

[2] WHO African Life expectancy statistic, http://gamapserver.who.int

[3] Y. Dupraz, French and British Colonial Legacies in Education: Evidence from the Partition of Cameroon. The Journal of Economic History, 79(3), 2019,628-668.

[4] M. Dell, "The persistent effects of Peru's mining MITA, 1863– 1903," Econometrica, 2010, Vol. 78, No. 6.

[5] L. Keele, & R. Titiunik, "Geographic Boundaries as Regression Discontinuities". Political Analysis, 2015, 23(1), 127-155.

[6] A. Kumar, "Do Restrictions on Home Equity Extraction Contribute to Lower Mortgage Defaults? Evidence from a Policy Discontinuity at the Texas' Border," American Economic Journal: Economic Policy, American Economic Association, 2018, vol. 10(1), pages 268-297.

[7] A. Hagemeier, C. Samel, M. Hellmich,The regression discontinuity design: Methods and implementation with a worked example in health services research,Zeitschrift für Evidenz,

DOI: 10.54254/2753-8818/3/20220294

Fortbildung und Qualität im Gesundheitswesen,Volume 172,2022,Pages 71-77.
[8] Deutsch Reich, Jahresbericht über die Entwickelung der Schutzgebiete in Afrika und der Südsee im Jahr 1896/1897,Hamburg,Staats- und Universitätsbibliothek Hamburg Carl von Ossietzky,1898.
[9] S. Aderinto, "Researching Colonial Childhoods: Images and Representations of Children in Nigerian Newspaper Press," 1925-195, History in Africa, 2012, Vol. 39, pp. 241-266.
[10] Government Printer, Nigeria Annual Medical and Sanitary Reports for 1919-1921,1922
[11] D. Arnold, Warm Climates and Western Medicine: The Emergence of Tropical Medicine, 1500-1900. Editions Rodopi,1996.
[12] P. Büscher, & G. Cecchi, & V. Jamonneau, & G. Priotto, "Human, African trypannosomiasis," Lancet, 2017 Nov 25,390(10110),2397-2409.
[13] U. Lindner, "The transfer of European social policy concepts to tropical Africa, 1900–50: the example of maternal and child welfare,"Journal of Global History,2014, 9, pp. 208–231 & London School of Economics and Political Science 2014.
[14] D. Steverding, "The history of African trypanosomiasis," Parasites & Vectors,2008, 1:3.
[15] A. Marcella, "The Effect of the TseTse Fly on African Development," American Economic Review,2015, 105 (1), 382–410.
[16] C. Emmanuel, British Administration and Nationalism in the Southern Cameroons, 1914-1954, St. Martin's Press,1989.
[17] D. R. Headrick, "Sleeping Sickness Epidemics and Colonial Responses in East and Central Africa, 1900–1940," PLoS Negl, 2014, Trop Dis8(4): e2772.
[18] L. Guillaume, "The Hidden Story of the Medicine Meant to Save Africa, France: La Découverte," Journal of Global Public Health,2015, Volume 10, Issue 9.
[19] A. Gelman, & G. Imbens, "Why High-Order Polynomials Should Not be Used in Regression Discontinuity Designs," Journal of Business & Economic Statistics,2019, volume 37, Issue 3.
[20] A. Lee, & K. A. Schultz, "Comparing British and French Colonial Legacies: A Discontinuity Analysis of Cameroon," Quarterly Journal of Political Science, 2012, Vol. 7: No. 4, pp 365-410.
[21] Deutsch Reich:Jahresbericht über die Entwickelung der Schutzgebiete in Afrika und der Südsee im Jahr 1907/1908.Hamburg :Staats- und Universitätsbibliothek Hamburg Carl von Ossietzky,1909.
[22] P.Friedrich, Die Kamerun-Küste, Berlin,1898.
[23] ORSTOM, Office de la recherche scientifique et technique outre mer, Service cartographique,IRCAM, Institut de recherches scientifiques du Cameroun, Service cartographique. "Esquisse ethnique de la République Fédérale du Cameroun."
[24] WHO Cameroon HIV prevalence statistic, https://www.who.int.