

# Human Capital Development and Ethnic Institutions

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## Abstract

This paper explores the effect of European institutions on contemporary human capital development in the context of the pre-colonial ethnic institutions that governed African societies prior to colonialism. We specifically consider pre-colonial ethnic centralisation, measured by the jurisdictional hierarchy of the ethnic group beyond the local community level. We argue that institutions in isolation are not necessarily responsible for current day education outcomes, it is instead the cohesiveness of these European institutions in ethnic regions characterised by a certain level of political authority and complexity. We construct a cross-section data set using geolocated DHS data for Cameroon, Côte d'Ivoire, Ghana, Liberia, and Nigeria. Preliminary results suggest that individuals subject to British institutions in fragmented ethnic regions are more likely of being literate, whilst in centralised ethnic regions, the British are negatively associated to literacy. We additionally evaluate the effect of missionary stations. Initial findings speak to the different relationships that the British and French had with missionaries, which we find is still associated to literacy outcomes. This paper contributes to debates on pre-colonial and European influences on African development, moving beyond country-level analysis.

*Keywords: Africa, Ethnic Institutions, Human Capital*  
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# 1 Introduction

Recent literature acknowledges the importance of pre-colonial ethnic institutions on current-day development outcomes. Gennaioli and Rainer (2007) focus on the impact of political centralisation, i.e. the jurisdictional hierarchy beyond local community level which measures the degree of political complexity, on contemporary public goods provision, including human capital development factors such as health and education. Findings suggest that countries with stronger political centralisation have higher public goods provision due to increased accountability by local chiefs, which affected the ability to implement modernisation programmes.

Building on the research, moving beyond country-level analysis, Michalopoulos and Papaioannou (2013) study the effect of pre-colonial centralisation on regional development (proxied by nighttime light density) in Africa. They find a strong positive correlation between stronger pre-colonial ethnic centralisation and regional development of ethnic regions. They highlight the importance of ethnic institutions in the contemporaneous development of Africa. Subsequently, Michalopoulos and Papaioannou (2014) further analyse the role of national institutions in regional development. Their findings suggest that national institutions do not explain the differences in regional development in areas that are located far away from the capital. In these regions, they find that ethnic institutions are more important.

In our study we would like to further this research by Gennaioli and Rainer (2007) and Michalopoulos and Papaioannou (2013, 2014) and specifically consider regional contemporary human capital development, captured by literacy in ethnic regions according to the pre-colonial ethnic institutions and the European institutions and investments, such as missionary stations, that were imposed on these ethnic regions during the years of colonisation.

Literature finds that British colonies (Brown, 2000) and countries with higher Protestant missionary activity (Woodberry, 2012) experience improved contemporary education relative to other countries. However, recent literature finds that although British rule and missionary activity was important in the development of African countries, it is often overstated (Frankema, 2012; Jedwab, Selhausen, & Moradi, 2019).

We aim to contribute to this literature by studying the mechanisms through which these institutions affect contemporary human capital devel-

opment in Africa based on the institutions that were present prior to colonialism. We propose that it may be the complementarity or contention between European institutions and pre-colonial ethnic institutions that results in literacy outcomes that we see today.

Our analysis focusses on five countries in West Africa, namely Cameroon (the “hinge” of Africa, located in the West and Central Africa), Côte d’Ivoire, Ghana, Liberia, and Nigeria. We choose these countries as bordering countries were subject to different European institutions, with Liberia being independent, there is variation in ethnic institutions as well as missionary activity and availability of geolocated Standard Demographic and Health Surveys (DHS) data available.

Using geolocated DHS data on literacy, we are able to allocate DHS clusters to ethnic regions mapped by Murdock (1969), which allows us to attribute ethnic institution characteristics to individuals and their literacy outcomes. Overlaying contemporary country borders, mapping missionary stations (Nunn, 2010; Roome, 1925) and using data from Michalopoulos and Papaioannou (2013), we can evaluate the effect of European institutions on current day literacy outcomes of individuals in ethnic regions characterised as either centralised or fragmented, based on the degree of political complexity or authority of the ethnic group.

Preliminary findings suggest that individuals in fragmented ethnic regions have a higher likelihood of being literate if these regions were subject to British institutions, relative to individuals in fragmented regions that were not colonised by the British. British rule is therefore positively associated to contemporary literacy where ethnic regions did not have political authority beyond local community level or classified as petty chiefdoms, therefore lacking political complexity. We can argue that these ethnic regions were less institutionalised and therefore did not oppose or contend with European, specifically British indirect rule. With respect to centralised groups, we find a negative association. Contrary, British institutions in centralised regions are negatively associated with the likelihood of an individual being literate. As centralised groups had strong and established authority, these ethnic regions were likely to provide resistance to colonial institutions.

With respect to missionary stations, we see that missionary stations are associated with higher likelihood of literacy in centralised ethnic regions colonised by the British. As the British took a limited role in the provision

of education, missionaries were entrusted with the education policy. Concurrently, as the British utilised local chiefs to implement British rule, it may be that chiefs were more inclined to help and foster education provided by missionaries in centralised regions where these leaders had greater authority beyond local community level.

## 2 Background

Institutions are formal rules, say property rights, laws and constitutions as well as informal constraints that include taboos, sanctions, traditions, codes of conduct and customs (North, 1991). These institutions are established to provide societies with structure and direction, which entail intended and often unintended developmental consequences. Literature has noted the important role of both pre-colonial ethnic institutions and European institutions in contemporary developmental outcomes in Africa. Of interest in this paper is not necessarily the effect of European institutions, rather the effect of these institutions in the context of already established pre-colonial ethnic institutions that provided structure and direction to African societies prior to colonialism.

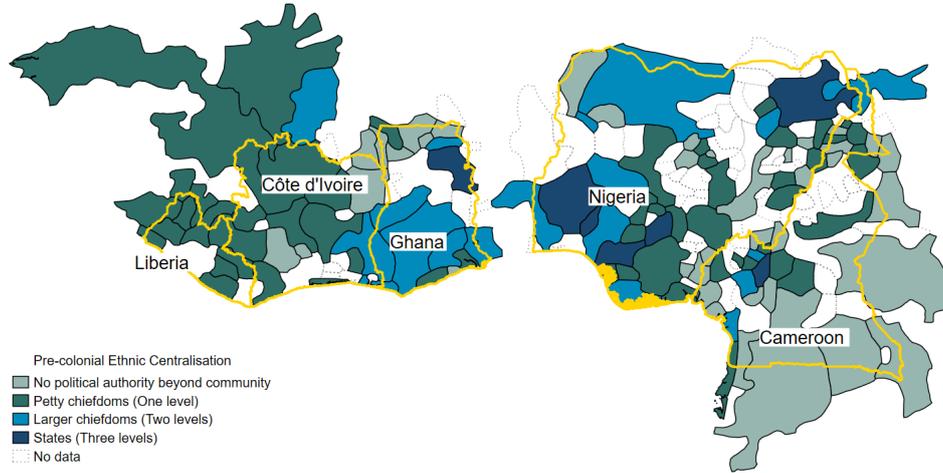
### 2.1 Pre-colonial Ethnic Institutions

For this paper, we specifically consider the degree of pre-colonial centralisation within ethnic groups in historical regions.<sup>1</sup> Borrowing from Gennaioli and Rainer (2007), groups that do not have political authority beyond the local community or petty chiefdoms were groups that lack political integration above local community level and classified as *fragmented*. These groups are smaller political entities. Groups that have more than two levels of jurisdictional hierarchy, such as larger chiefdoms and states are classified as *centralised*. As highlighted by Gennaioli and Rainer (2007), centralised ethnic groups have mechanisms through which local leaders can be held accountable in the provision of public goods, such as education. Whilst fragmented ethnic groups, mechanisms for accountability were lacking. Furthermore, centralised groups encouraged coordination by chiefs and leaders in different regions (Gennaioli & Rainer, 2007).

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<sup>1</sup>As mentioned, institutions include various aspects of societies. We additionally plan to evaluate succession to office, by looking at leadership succession within ethnic groups.

Figure 1: Pre-colonial Ethnic Centralisation



*Note: This map illustrates the historical ethnic regions and jurisdictional hierarchy levels beyond local community and the countries within which they fall.*

Figure 1 illustrates the historical ethnic regions and jurisdictional hierarchy levels beyond local community (centralisation). We additionally outline the country borders that are relevant to our study. Liberia and Côte d'Ivoire are characterised by majority petty chiefdoms that have one level of jurisdictional hierarchy, whilst Cameroon have large ethnic regions with no political authority beyond local community. Nigeria and Ghana have more centralised ethnic groups that were classified as either large chiefdoms or states.

## 2.2 European Institutions

The variation in schooling outcomes have been attributed to the varying institutions and educational approaches implemented in British and French colonies (Bolt, Bezemer, Bolt, & Bezemer, 2009; Brown, 2000; Frankema, 2012). The British administration exercised indirect rule, utilising and working together with traditional chiefs to enforce institutions, but also accommodating the ethnic and traditional institutions that were already in place (Lugard, 1929). Oppositely, the French imposed direct rule with little regard for existing ethnic and traditional institutions.

The British adapted their approaches individually to each colony, whilst the French were rigid and implemented common law. This was also true

in their education systems. Brown (2000) provides a concise comparison of British and French institutions. The British customised education approaches to the characteristics of the different societies, whilst the French were less flexible in this regard. For example, the French enforced the French language on elementary school level. Contrary, in British colonies education took place in local dialects and English was introduced only later. Whilst the goal for the British administration was to teach basic skills, secondary schooling was regarded as a priority in French colonies (Brown, 2000).

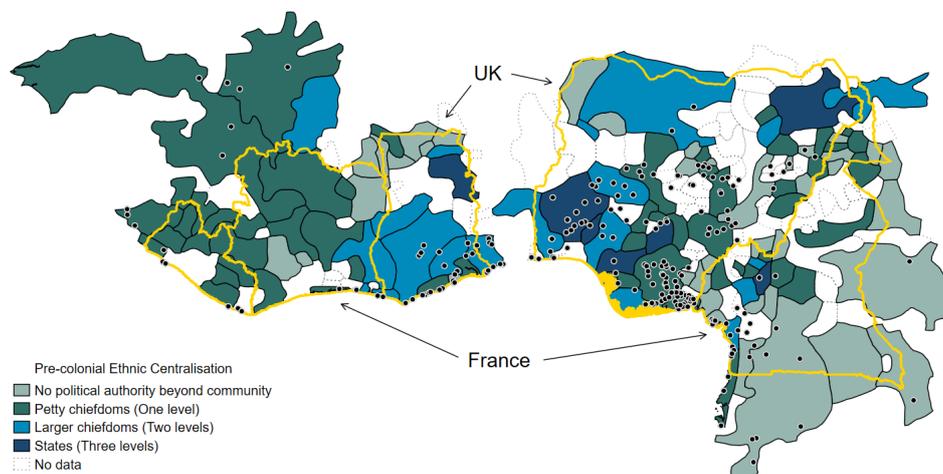
In our sample of countries, Nigeria and Ghana are former British colonies. Ghana and Nigeria became British protectorates in 1874 and 1901, respectively, although the British established presence within these countries much earlier. French protectorates included in our sample are Côte d'Ivoire and Cameroon. Côte d'Ivoire was declared a French colony in 1842. Cameroon was first colonised by Germany in 1884, known as "German Kamerun". Following World War I in 1916 regions were divided between France and UK territories. In 1961 after independence, British Cameroon regions were allocated between Cameroon and Nigeria. In 1957, Ghana was the first country in sub-Saharan Africa to gain independence, followed by Nigeria, Côte D'Ivoire and Cameroon in 1960.

We include Liberia in the sample of countries as this neighbouring country to Côte d'Ivoire was never colonised and remained independent during the colonial period. It was therefore not subject to European institutions in the same way as Cameroon, Côte d'Ivoire, Ghana and Nigeria. Liberia was official founded in 1824, on land that was home to slaves freed from the United States.

Figure 2 illustrates pre-colonial ethnic centralisation as well as the European colonial influences that were present. In addition, the black dots are geolocated missionary stations as documented by Roome (1925), digitised by Nunn (2010). From this data, clearly Nigeria had increased presence of missionaries compared to the other countries, whilst Liberia and Côte d'Ivoire show the least number of missionary stations.

Missionary education was already in place prior to official colonisation of countries (Cowan, O'Connell, & Scanlon, 1965). Bolt et al. (2009) notes that during the initial years of colonisation, missionaries remained in control of education policy in British colonies, as the British rule was concerned primarily with law and order in the colonies. The British were also concerned

Figure 2: European Institutions in Pre-colonial Ethnic Regions



*Note: This map illustrates the coordinates of the missionary stations in the different ethnic regions as well as the European countries involved in the colonisation of the four countries in our sample.*

with the costs involved in taking responsibility for education and therefore education was primarily provided by missionaries in the British colonies (Crowder, 1964; Lugard, 1929).

The French were hostile towards missionaries and separated missionary activities from the state in its constitution. Despite this, the French noted the need for missionaries in education. The French implemented a dual-church state education system, where the state provided financing to missionaries, however on the condition that missionary schools adhere to the French rigid and assimilated education policy (Bolt et al., 2009). This in effect limited education in these regions (Woodberry, 2012).

### 3 Data and Method

We obtain contemporaneous literacy statistics from the DHS for the respective countries in our study. DHS surveys are nationally representative household surveys conducted in various developing countries since the 1980s. We use phase six DHS data for Cameroon conducted in 2011, Cote D'Ivoire in 2012, Ghana in 2014, Liberia in 2013 and Nigeria in 2013 (ICF, 2017).<sup>2</sup>

<sup>2</sup>We aim to include more phases of surveys in following versions of this study, in order to build a pseudo-panel dataset.

To determine the ethnic region within which individuals fall, we map the DHS clusters (enumeration areas within which households and individuals are interviewed) to Murdock’s Ethnographic Atlas map (Murdock, 1969). The specific ethnic region’s pre-colonial characteristics, such as centralisation, are then attributed to the different individuals that fall within the polygon of a specific pre-colonial ethnic group.

We obtain literacy data from the women (IR) and men (MR) files that capture and recode data for women and men between the ages of 15-49 and 15-59, respectively. We create a binary variable,  $literate_i$ , that is equal to 1 if the individual is able to read parts of or a whole sentence and 0 otherwise. We code visual impaired individuals and those that did not have the appropriate language reading card available as missing. To some extent, we are able to measure the quality of education by considering literacy data instead of educational attainment or schooling completed.

In Table 1 we look at literacy statistics across the five countries in our sample. The variation in literacy rates amongst the countries and different European colonies is of interest in our study. Although Côte d’Ivoire and Cameroon were both colonised by the French, there is a clear difference in literacy rates.

Table 1: Literacy (%)

	Côte d’Ivoire	Cameroon	Ghana	Liberia	Nigeria
Cannot read at all	62	25.43	38.45	44.58	39.33
Able to read only parts of sentence	3.51	9.35	10.01	8.37	7.42
Able to read whole sentence	34.2	63.95	51.39	46.78	52.47
No card with required language	0.06	1.12	0.12	0.13	0.21
Blind/visually impaired	0.22	0.15	0.04	0.01	0.05
Missing	0	0	0	0.13	0.52

We obtain ethnic institution data from the Murdock Ethnographic Atlas Codebook (Murdock, 1969). The specific pre-colonial ethnic institutional traits we consider are whether ethnic groups have complex jurisdictional hierarchies and classified as chiefdoms or states. This relates to political centralisation and is captured in variable 33 in the Ethnographic Atlas Codebook.<sup>3</sup>

<sup>3</sup>In addition to the variable on political centralisation, we aim to consider succession to leadership in the office of the local headman. This information is captured in variable 72.

The main independent variables consider the influence of European institutions through colonisation and missionary activity. We control for an ethnic regions' colonial institution by creating a binary variable that is equal to 1 if the ethnic regions falls within a British colony, and 0 otherwise. This data is obtained from the Michalopoulos and Papaioannou (2013) data set. In addition, we consider missionary locations as reported by Roome (1925) and digitised by Nunn (2010). We map missionary stations into the different ethnic regions according to the Murdock map. Individuals mapped into ethnic regions that have missionary stations, will therefore have a binary  $missionstation_i$  equal to 1.

We include various control variables.  $wealth_i$  is a binary variable equal to 1 if individuals identify as middle, richer or richest, and 0 if they are poorer or poorest. Although the wealth indicator represents the associated wealth of the individual currently, we assume intergenerational mobility of wealth. We therefore argue that the parents of individuals who identify as wealthy, would have identified similarly and would have demanded education for their children accordingly. This data is obtained from the DHS (ICF, 2017).

$capitaldistance_i$  is a variable that measures the distance of ethnic regions to the capital in 1 000 km. Proximity to the capital may affect or be associated with literacy in that rural areas further away from the capital have less provision of schools.<sup>4</sup> Recent literature suggests that national institutions are insignificant in explaining regional development in ethnic regions located far away from capital cities (Michalopoulos & Papaioannou, 2014).

$population_i$  is the log of population by ethnic regions in 1960. This variable has been used to measure development and we argue that higher population in 1960 is associated with higher likelihood of being literate today as these regions are expected to be more developed.

We control for geography by considering the land quality for agriculture.  $soilquality_i$  measures the suitability of soil for agriculture. Fertile land is also associated with higher development in ethnic regions. We furthermore

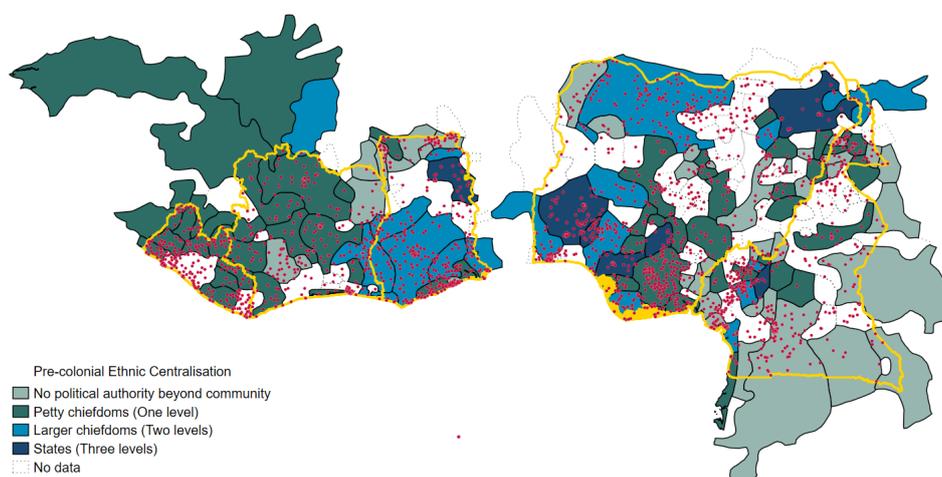
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<sup>4</sup>We aim to create an additional variable to measure the individual respondent's distance to capital. African borders are open and individuals living close to borders are able to perhaps travel to capital cities in neighbouring countries. We therefore aim to control with this by using geolocated DHS cluster data to calculate distance to capitals for each cluster.

control for ethnic regions being divided between contemporary country borders.  $splitgroup(5\%)_i$  is a binary variable equal to 1 if at least 5 per cent of the historical ethnic region falls within more than one country according to colonial border design. Michalopoulos and Papaioannou (2016) find that the split of ethnic regions have detrimental effects on development outcomes and are associated with higher incidence and duration of political violence, which will also negatively impact education outcomes.

We obtain these control variables from Michalopoulos and Papaioannou (2013).

Figure 3: DHS Cluster Coordinates



*Note: This map illustrates the coordinates of the DHS clusters included in our study.*

The dataset covers 89 630 individuals that fall within 120 ethnic regions for which Murdock was able to assign ethnic institution characteristics. Summary statistics are provided in Table 2.

Because the dependent variable is a binary variable, we use a logistic regression as the baseline model. The logistic regression specification is

$$literate_i = \beta_1 Europeaninstitution_i + \beta_2 X_i + u_i \quad (1)$$

where  $literate_i$  is whether the individual is able to read parts of or a whole sentence;

$Europeaninstitution_i$  is either  $ukcolony_i$ , a binary variable indicating whether the historical ethnic region was colonised by the British or  $missionstation_i$ ,

Table 2: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
<i>literate<sub>i</sub></i>	0.577	0.553	0	1	115 347
<i>missionstation<sub>i</sub></i>	0.489	0.559	0	1	116 125
<i>central<sub>i</sub></i>	0.423	0.494	0	1	89 630
<i>wealth<sub>i</sub></i>	0.653	0.532	0	1	116 125
<i>capitaldistance<sub>i</sub></i>	0.251	0.199	0.012	0.994	114 001
<i>population<sub>i</sub></i>	12.623	1.619	5.770	15.688	114 001
<i>soilquality<sub>i</sub></i>	0.404	0.144	0.027	0.772	114 001
<i>splitgroup(5%)<sub>i</sub></i>	0.342	0.474	0	1	114 001

a binary variable indicating the presence of missionary stations. *centralised<sub>i</sub>* is a binary variable indicating whether the historical ethnic homeland was classified as a large chiefdom or state, therefore political integrated with complex institutions already established.  $X_{it}$  represents control variables as discussed and  $u_{it}$  is an error term.

The coefficient estimate of interest is  $\beta_1$ . In our analysis, a positive and statistically significant coefficient estimate suggests that European influences (British rule and mission stations) are associated with a higher likelihood of the individual being literate in the context of the ethnic institution relevant.

The number of observations (respondents) varies by country and we therefore use individual as well as country weights. Individual weights are included in the DHS dataset, whilst we calculate country weights by taking the inverse of the total number of observations in the country. This will ensure that our preliminary results reported are not skewed by the number of observations in highly populated regions and countries. We cluster standard error at the ethnic region (Murdock map) level.

## 4 Results

Table 3 reports preliminary regression results considering British institutions in the context of the pre-colonial ethnic institutions. Columns 1 and 2 results suggest that in our sample, individuals located in ethnic regions that were subject to British rule are not associated with a higher likelihood of being literate. This finding is in line with Frankema (2012) that states the effect of British colonial institutions on human capital development through education outcomes are overstated.

In columns 2 and 3 we report the results with respect to individuals in centralised ethnic regions. The  $\beta_1$  coefficient estimate of -1.087 indicates that the likelihood of an individual in a centralised ethnic region being literate is approximately one third of an individual in centralised ethnic regions not subject to British rule. The result is significant on a ten per cent level of significance. This may indicate that because the centralised ethnic regions already had strong institutions and political authority, British rule can be viewed as an added level of competition which centralised ethnic regions might have resisted. Therefore, as stated by Frankema (2012) simply controlling for being a British colony may lead to overstated results if not taking into account the pre-colonial political setting.

In columns 5 and 6 we report the results with respect to individuals in fragmented ethnic regions. The  $\beta_1$  coefficient estimate of 0.624 in column 6 indicates that the likelihood of an individual in a fragmented ethnic region being literate is approximately two times higher than an individual in fragmented ethnic regions not subject to British rule. British rule is therefore positively associated to contemporary literacy where ethnic regions did not have political authority beyond local community level or classified as petty chiefdoms, therefore lacking political complexity. We can argue that these ethnic regions were less institutionalised and therefore did not oppose or contend with European, specifically British indirect rule.

As expected, identifying as middle, richer or richest on the wealth index ( $wealth_i$ ) is significantly associated with the contemporary likelihood of being literate. Across column 1 to 6, wealth of the individual determines the likelihood of being literate. Considering that wealth determines the ability and willingness to pay for education, these results is not surprising.

Distance to the capital is not significantly associated to the likelihood of being literate.<sup>5</sup> Population in 1960 is an indication of development and overall is not that significant in explaining the likelihood of being literate.

As highlighted by Frankema (2012), British would locate themselves were soil suited for agricultural productions. Soil quality is therefore positively associated to the likelihood of being literate, but only in centralised ethnic regions. As these regions were highly organised, it may be that they were

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<sup>5</sup>We aim to test for this in our subsequent versions of this study, by creating a new variable for distance to capital, using individual DHS data and calculating the distance to any capital, since individuals located close to borders are able to go to school in a neighbouring country.

able to guard their agricultural land against extractive institutions, which in the long-run contributes to improved human capital development outcomes.

The likelihood of being literate is lower for individuals in centralised ethnic groups that were split by colonial borders. This is in line with research by Michalopoulos and Papaioannou (2016) that show the negative developmental effects of split ethnic groups and the increased conflict due to this.

Table 3: Colonial UK Regression Results

	Dependent Variable: $literate_i$					
			<i>Centralised</i>		<i>Fragmented</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
$ukcolony_i$	0.037 (0.290)	-0.050 (0.365)	-0.823 (0.626)	-1.087* (0.609)	0.896*** (0.316)	0.624* (0.362)
$wealth_i$		1.609*** (0.138)		1.658*** (0.199)		1.477*** (0.129)
$capitaldistance_i$		-0.499 (0.476)		-0.864 (0.660)		-0.125 (0.468)
$population_i$		0.132* (0.119)		0.124 (0.115)		0.169 (0.136)
$soilquality_i$		1.036*** (0.594)		3.057*** (1.019)		-0.459 (0.806)
$splitgroup(5\%)_i$		-0.102 (0.292)		-0.538*** (0.185)		0.295 (0.361)
Observations	89 084	89 084	37 738	37 738	51 346	51 346
Pseudo R-squared	0.008	0.126	0.018	0.186	0.028	0.127

Robust standard errors in parentheses

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

*Notes: Centralised refers to centralised ethnic regions that are classified as larger chiefdoms or states. Fragmented refers to fragmented ethnic regions that are classified as petty chiefdoms or having not political authority beyond local community level.*

A possible explanation for the difference between the countries colonised by the British and French is possibly the way in which education was administered through missionaries.<sup>6</sup> Table 4 report results on the association between missionary stations and literacy in historically fragmented and centralised ethnic groups.

<sup>6</sup>In their recent working paper, Jedwab et al. (2019) show that the importance of missionary activity in overall current-day development is also overstated. They address this by showing that missionary stations are endogenous and were determined by other factors such as health and geography. In subsequent versions of this paper, we aim to address this endogeneity issue.

Results for the entire sample of countries are reported in columns 1 and 2. Missionary stations have a significant and positive association to the likelihood of being literate in specifically fragmented societies. Societies with little political integration or as Gennaioli and Rainer (2007) state accountability by local chief, benefited to a greater extent from the presence of missionary station in the expansion of education. These results will therefore include all five countries, without controlling for the European institution in charge.

Column 3 and 4 evaluate the association between missionary stations and the likelihood of being literate in fragmented and centralised regions colonised by the British. Results suggest that missionary stations do not have a significant effect on the likelihood of being literate in fragmented regions, yet in centralised regions. The  $\beta_1$  coefficient estimate of 0.823 indicates that the likelihood of an individual in a centralised ethnic region being literate is approximately two times higher in British colonies than individuals in centralised ethnic regions that were not subject to British rule. This may possibly speak to the limited role the British took in providing education as discussed in Section 2. In addition, as the British utilised local chiefs to implement British rule, it may be that chiefs were more inclined to assist and foster education provided by missionaries in centralised regions where these leaders had greater authority beyond local community level.

Column 5 and 6 report results for individuals in ethnic regions colonised by the French. Missionary station coefficient estimates are not statistically significant, suggesting that there is no association between the presence of missionary stations in French colonial ethnic regions and the likelihood of an individual being literate.<sup>7</sup> These results may point to the manner in which French institutions interacted with missionary education policy already in place. As discussed in Section 2 the French overruled missionary education already in place and enforced the language, views and cultural characteristics, and missionary education had to adhere to this educational policy (Bolt et al., 2009).

With respect to our control variables, being divided by a colonial border to different countries is negative and statistically significant for centralised

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<sup>7</sup>In addition to the robustness check using Beach (1903) data, we aim to distinguish between missionary stations and look at the potential differential effect of Catholic versus Protestant missionaries in certain ethnic institutions in our analysis.

ethnic groups, specifically those subject to French institutions. If we consider Figure 2, these would include ethnic regions divided by the border of Côte d'Ivoire and Ghana and Cameroon and Nigeria.

Table 4: Missionary Station Regression Results

	Dependent Variable: $literate_i$					
	<i>British</i>				<i>French</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>Centralised</i>	<i>Fragmented</i>	<i>Centralised</i>	<i>Fragmented</i>	<i>Centralised</i>	<i>Fragmented</i>
$missionstation_i$	0.236 (0.449)	0.818*** (0.264)	0.823*** (0.247)	0.123 (0.205)	0.381 (0.278)	0.901 (0.558)
$wealth_i$	1.692*** (0.192)	1.344*** (0.111)	1.637*** (0.191)	1.555*** (0.149)	1.507*** (0.216)	1.413*** (0.171)
$capitaldistance_i$	-1.085 (1.037)	0.171 (0.396)	0.892 (0.738)	0.737 (0.521)	-0.543 (0.407)	-0.052 (1.099)
$population_i$	-0.085 (0.072)	0.145 (0.093)	0.051 (0.074)	0.277*** (0.068)	0.348*** (0.124)	0.010 (0.146)
$soilquality_i$	1.672* (0.884)	0.837 (0.696)	2.709*** (0.729)	1.240** (0.624)	3.949 (3.281)	0.052 (2.485)
$splitgroup(5\%)_i$	-0.517 (0.332)	0.149 (0.296)	0.091 (0.190)	-0.452 (0.372)	-2.161*** (0.270)	0.509 (0.482)
Observations	37 738	51 346	31 864	25 258	5 874	19 012
Pseudo R-squared	0.174	0.137	0.164	0.136	0.382	0.143

Robust standard errors in parentheses

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

*Notes: Centralised refers to centralised ethnic regions that are classified as larger chiefdoms or states. Fragmented refers to fragmented ethnic regions that are classified as petty chiefdoms or having not political authority beyond local community level.*

## 5 Concluding Remark

This paper serves as the preliminary overview of relationships that exist between contemporary literacy and colonial European institutions, in the context of the pre-colonial ethnic institutions that governed societies prior to colonialism. We use DHS data to measure current-day literacy in Cameroon, Côte d'Ivoire (former French colonies), Ghana, Nigeria (former British colonies) and Liberia (independent from European rule).

Preliminary results suggest that the effect of British colonial institutions on education outcomes are not significant and perhaps overstated as argued by (Frankema, 2012). Our findings show that only individuals in fragmented ethnic regions are associated with a higher likelihood of being literate under British rule. As the British practised indirect rule and often used chiefs to assist in the implementation of British rule, fragmented ethnic regions that lack this type of political authority were relatively less challenging to govern and enforce institutions. Contrary, centralised ethnic regions with political authority might have presented British colonial officers with competition and implementation of British rule in these ethnic regions might have been resisted. Missionary stations are associated with higher likelihood of literacy in centralised ethnic regions colonised by the British.

We aim to expand and improve this research by firstly, including observations from additional phases of DHS data. From this we can then construct a pseudo-panel to evaluate the change in contemporaneous human capital development over time. Secondly, incorporating another measure of ethnic institutions such as succession to leadership, say whether leaders are appointed by heritage or by some form of voting. Thirdly, considering and addressing the potential endogeneity of missionaries as Jedwab et al. (2019) points out. They argue that missionary stations are endogenous and that missionaries located in healthy areas and even according to acceptance by ethnicities based on ethnic centralisation.

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