



A multivariate analysis of inter-country differentials in electricity supply as a function of colonialism in Africa



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ABSTRACT

Inter-country differentials in the electricity supply capabilities of African countries were examined as a function of their varying colonial experiences. Colonial experience is characterized by three interval and one binary variable. The interval variables included colonial era per capita GDP, colonially-induced urbanization, and duration of colonialism. The colonial administrative strategy comprised the binary variable. The General Linear Model (GLM) was employed to analyze the data. The analysis, revealed a strong and statistically significant link between electricity supply capabilities and colonial experience ($R^2 = 0.70$). Accordingly, it was concluded that colonialism explains 70% of the variability in electricity supply capabilities. The per capita GDP on the eve of independence had the strongest association ($r = 0.717$) with electricity supply. This was followed by the duration of colonialism ($r = 0.377$). The level of colonially-induced urbanization was shown to also have a positive association ($r = 0.337$) with electricity supply. Colonial administrative strategy was found to have a positive but not statistically significant link with electricity supply. These findings suggest that policy makers in Africa would do well to draw some lessons on energy provisioning from their colonial predecessors.

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1. Introduction

An increasingly menacing problem in Africa relates to inadequate electricity supply capability manifested by frequent power outages, interruptions and low levels of access. The electricity access level is only 17% in the entire sub-Saharan region and a minuscule 5% in the rural areas [1]. Yet, it is necessary to note that the problem is not uniformly pervasive throughout the continent as access levels differ by country and by region. In 2011, electrification approached full coverage in North Africa but was only 32% in the sub-Saharan region with South Africa alone accounting for more than half ([2], p. 2). This situation begs the following important but largely ignored question. What factors account for the inter-regional and inter-country disparities in electric energy supply in Africa? To be sure, there has been a proliferation of works focusing on Africa's energy problematic during the last decade [3–5]. However, none of these works has attempted to tackle this important question. Yet, knowledge of these factors is critical to any meaningful initiative to resolve the continent's energy problems. The study reported in this paper was designed to contribute to

efforts seeking to promote this knowledge. It posits colonial experience as an important factor in explaining inter-country differentials in energy supply in Africa. While it is true that all but two countries, namely Ethiopia and Liberia, in Africa were colonialized, their colonial experiences differ significantly.

Some consider the contemporary development profile of African countries a function of their varying colonial experiences [6–9]. Mostly of the quantitative variant, these studies have been mainly at the country level. They have empirically tied colonial era policies and institutions to post-colonial differentials in economic growth, public goods/services provisioning, as well as other development indicators [6]. It is conceivable that these variations resulted from the varying investment policies and governance strategies that were employed by different colonial powers. For instance, the indirect rule colonial administrative governance structure is typically associated with British colonialism. This structure is supposed to have endowed erstwhile British colonies with a sense of self-reliance and independence that is rare in former French colonies. On their part, French colonial authorities bequeathed to their erstwhile colonies a centralized administrative structure believed to contain the ingredients necessary for national development. What are the implications of the disparate governance structures and stock of public infrastructure that different African countries

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inherited for their current electricity supply capabilities? The main objective of the study reported in this paper is to address this perennial question.

The paper takes off in the next section, by presenting background information on electricity availability/access and briefly reviewing the literature on colonialism and development in Africa. This is followed by a discussion of the methodological issues of the study, including the data sources, main variables, and analytical techniques employed. Two subsequent sections respectively present and discuss the main findings of the study. The paper ends with some concluding remarks.

2. Literature, main research questions and hypotheses

As Table 1 shows, electricity is in woefully short supply throughout the vast continent of Africa. Access to electricity remains rare especially in the rural areas. Only 32% of urban residents and a meager 3% of rural residents in East Africa are connected to the national electricity grid ([10], p. 68). The situation is worse in West Africa. Here, biomass represents as much as 90% of total energy consumption, and only 12% of the population in the region has access to electricity ([10], p. 68). In Sub-Saharan Africa as a whole, only 25% of the population has access to electricity ([11], p. 2293). However, it is worth noting that there are significant variations with respect to levels of access across the region [11]. On the low end, only 5% of the population in Chad, Somalia, Uganda, Sierra

Table 1
Statistics on area, population and electricity supply per capita by country for Africa (2013).

IDNBR	Country	Area-SQ-KM	Population 2013	Popdensity	Electricity supply/Capita (Gigawatts)
01.	Algeria	2,381,740	39,208	0.016,461,914	1490
02.	Angola	1,246,700	21,472	0.017,223,069	270
03.	Benin	112,622	1051	0.009,332,102	114
04.	Botswana	581,041	2021	0.00347,824	1807
05.	Burkina Faso	274,000	16,935	0.061,806,569	69
06.	Burundi	27,830	10,163	0.365,181,459	25
07.	Cameroon	475,442	22,254	0.046,806,971	288
08.	Cape Verde	4033	499	0.123,729,234	609
09.	Centr. A. Rep	622,984	4616	0.0074,095	39
10.	Chad	1,284,000	12,825	0.009,988,318	16
11.	Comoros	2235	735	0.32,885,906	60
12.	Congo	342,000	4448	0.013,005,848	322
13.	Congo D. Rep	2,344,858	67,514	0.028,792,362	121
14.	Côte d'Ivoire	322,460	20,316	0.063,003,163	324
15.	Djibouti	23,200	873	0.03,762,931	457
16.	Egypt	1,001,449	82,056	0.081,937,273	2035
17.	Eq. Guinea	28,051	757	0.02,698,656	132
18.	Eritrea	117,600	6333	0.053,852,041	59
19.	Ethiopia	1,104,300	94,101	0.085,213,257	69
20.	Gabon	267,668	1672	0.006,246,544	1346
21.	Gambia	10,380	1849	0.178,131,021	149
22.	Ghana	238,534	25,905	0.10,860,087	460
23.	Guinea	245,857	11,745	0.047,771,672	77
24.	G. Bissau	36,125	1704	0.04,716,955	21
25.	Kenya	580,367	44,354	0.076,424,056	192
26.	Lesotho	30,355	2074	0.068,324,823	335
27.	Liberia	111,369	4294	0.03,855,651	72
28.	Libya	1,759,540	6202	0.003,524,785	5529
29.	Madagascar	587,041	22,925	0.039,051,787	68
30.	Malawi	118,484	16,363	0.138,103,035	104
31.	Mali	1,240,192	15,302	0.012,338,412	91
32.	Mauritania	1,030,700	3890	0.003,774,134	247
33.	Mauritius	2040	1244	0.609,803,922	2246
34.	Morocco	446,550	33,008	0.073,917,814	964
35.	Mozambique	801,590	25,834	0.032,228,446	543
36.	Namibia	825,418	2303	0.002,790,102	1627
37.	Niger	1,267,000	17,831	0.014,073,402	58
38.	Nigeria	923,768	173,615	0.187,942,211	170
39.	Rwanda	26,798	11,777	0.439,473,095	42
40.	S. Tome-Principe	984	193	0.196,138,211	356
41.	Senegal	196,723	14,133	0.071,842,133	234
42.	Seychelles	455	93	0.204,395,604	3644
43.	Sierra Leone	71,740	6092	0.084,917,759	30
44.	Somalia	637,657	10,469	0.016,417,917	33
45.	S. Africa	1,221,037	52,776	0.043,222,277	4827
46.	S. Sudan	N/A	11,296	N/A	N/A
47.	Sudan	2,505,813	37,964	0.015,150,372	196
48.	Swaziland	17,364	1250	0.071,988,021	1166
49.	Tanzania	945,087	49,253	0.052,114,779	123
50.	Togo	56,785	6817	0.120,049,309	161
51.	Tunisia	163,610	10,997	0.067,214,718	1657
52.	Uganda	236,040	37,579	0.159,206,067	71
53.	Zambia	752,614	14,539	0.019,318,004	800
54.	Zimbabwe	390,757	14,150	0.036,211,763	702

Source: Population and area figures from CIA (Online); Electricity Supply: UNSTAT (Online); Population Density: Author's computation using MS Excel (Population divided by area).

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