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Electricity Access and Voting Behaviour in the Mozambique Context

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Abstract

Electricity provision is a key public good and stated policy priority for many developing economies. How the rate and quality of this provision is influenced by incumbent parties during elections and how voters respond is a core area of democratic governance research. Current literature on the effect of electricity provision on support for the incumbent is limited, and it has mostly analysed that effect shortly before elections. This study of Mozambique probes the effect of electricity provision on support for the incumbent party in the 2009 and 2014 legislative elections. Subnational aggregate district level original data and binary logistic multiple regression analysis reveal that the provision of electricity has some limitations in explaining support for the incumbent party as the government does not deliberately use electricity provision to enhance its re-election prospects. In this context, what remains as the base of party support is the voters' social characteristic of ethnicity. However, the significance of ethnicity on voting behaviour occurs in a one-party dominant system and electoral autocracy regime.

Keywords: electricity; service delivery; electoral behaviour; voter turnout; ethnicity; Mozambique

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1. Introduction

Governments manipulate public goods provision in order to be re-elected and voters are responsive to that by supporting them. This was the case with a government cash transfer programme in Mexico's 2000 election (De La O, 2008), performance and policies in Ghana's 2008 election (Hoffman and Long, 2013) and provision of transportation services through the expansion of underground metro stations in Madrid's 1995-2007 local elections (De la Calle and Orriols, 2010). Often governments tactically provide public goods in key periods to shape voters' reaction. Just prior to elections, governments have increased provision of electricity above usual levels in Kosovo (Imami et al.*,* 2020). The same was evident in Albania (Kächelein et al.*,* 2010) while in the Indian state of Uttar Pradesh, the government deliberately redirected electricity to flat rate and unbilled users (Min and Golden, 2014). Rather than focusing on the period prior to elections, our analysis on electoral behaviour considers the effect of provision of electricity over time by looking at the case of Mozambique.

Electrification and/or electricity access is a public good that delivers non-excludable and non-rival benefits to society. Increasing access to electricity is, in effect, a way to improve the overall public good. The access to electricity improves outcomes for small and medium enterprises, and contributes to manufacturing sector growth (Bass, 2018; Husaini and Lean, 2015; Prasad and Dieden, 2007; Rehman et al., 2020), the widening of geographic access to banking and other online data services (Blimpo and Cosgrove-Davies, 2019), and the facilitation of telecommunication network access, allowing growth of commercial activities and entrepreneurship, while strengthening community ties and expanding social networks. At the household level, it improves education outcomes and access to recreation, clean cooking, heating and lighting technologies that improve indoor air quality, which in turn reduce the risks of cancer, heart disease, stroke, and asthma (Cotton et al., 2021; Winkler et al., 2011). Furthermore, reduction in biomass use alleviated the environmental impacts upon forests and peatlands, making rural and peri-urban electrification a win-win socio-environmental development strategy (Cotton et al., 2021; Spalding-Fecher, 2005).

The development of the electricity sector in Mozambique has occurred over three phases (Shenga et al., forthcoming). The first phase of "Formation" (1975-1994) was characterized by vertical integration of dispersed electricity infrastructures from the colonial period into a single utility company - *Eletricidade de Moçambique* (EDM)[1]. Its development was shaped in part by a destructive civil war (1977-1992). The second phase, "Modernization" (1995-2014), featured a slow adoption of approaches by the World Bank. By 2014, the Government of Mozambique (GoM) had electrified all 128 districts of the country, but the level of access to electricity was only 25%. The third phase of "*ProEnergia* - Energy for All" (2015-2030)[2] is a response to the United

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[1] Decree-law 38/77.
[2] Law 11/2017 and Resolution 48/2018.

Nations Global Sustainable Development Goal 7 (SDG7) to ensure universal access to affordable, reliable, sustainable, and modern energy (EDM, 2018). According to the World Bank (2023), access to electricity in 2000 was 6% and it increased to 31% in 2021. Current government estimates of the electricity access rate range between 43% in 2022 (EDM, 2023) and 49% (Government of Mozambique, 2023). Universal access, though a laudable social development policy goal, is hindered by a number of socio-economic and geographic factors, including rapid population growth, forecasted demand increases and the challenges of rural geography that make 'last mile access' to grid connections for isolated rural communities costly to utility operators (Manhique et al., 2021; Salite et al., 2021).

With strong state influence over electricity access policy through EDM, electricity infrastructure development occurs within the political context of one-party dominant system and electoral autocracy regime (V-Dem, 2017; V-Dem, 2022). The dominant party, the Mozambique Liberation Front (Frelimo) has held power since the country's independence from Portugal in 1975 and has won all multiparty legislative elections since the 1994 founding election. Frelimo candidates have also won all presidential and provincial[3] elections conducted simultaneously with legislative elections, suggesting the presence of weak political opposition. In this paper, we seek to explain the interplay of electricity provision and the behavioural dynamics of electoral cycles within Mozambique. Such analysis is of specific interest to the scholarship and development practice of developing economies with stated policy goals to improve public access to clean energy.

Studies of electoral behaviour in Mozambique are currently limited by the paucity of systematic post-electoral data. Of the six elections conducted (1994, 1999, 2004, 2009, 2014 and 2019) there has been only one systematic and comprehensive post-election study.[4] This has led scholars to use non-electoral data such as Afrobarometer surveys on the "Quality of Democracy" (see Shenga and Pereira, 2019). However, with Afrobarometer data it is not possible to tap into both the long and short-term determinants of electoral behaviour. This is because its data covers other aspects besides elections and it is not timed to coincide with specific electoral cycles. Scholars of Mozambique have also analysed elections using aggregate data (De Brito, 1996; Shenga, 2008), yet their systematic work tends to remain mostly descriptive connecting one variable, such as ethnicity or region, with voter choice. One explanatory study of voting behaviour used aggregate data to analyse the effect of electricity provision, controlling for others (Shenga, 2016), though it tested theories only at provincial level, with a small sample (n=33). As we outline below, in this study we employ a larger sample using aggregate data at the district level, which is the level immediately below the provincial level.

1.1. Literature Review

The feature of punishment or compensation of accountability induces incumbent political parties to attempt to protect themselves electorally by targeting specific

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[3] Provincial elections were introduced in the general elections in 2005 to elect provincial assemblies but provincial governors remained centrally appointed by the executive President. Governors commenced being elected by provincial elections in 2019 but indirectly through provincial assembly elections.

[4] The 2004 post-election survey by the Comparative National Election Project (CNEP, https://u.osu.edu/cnep/).

groups of voters and in certain periods and regions. This incumbent attempt is studied at least through four models based on a rational choice approach to the study of politics.

The first model concerns '*who gets what*?' More specifically, 'whom do governments target with distributive goods and services?'. This model concerns whether incumbents allocate goods and services to core or swing voters (Dixit and Londregan, 1996), to the poor or the elite (Ross, 2006), and/or to supporters or opponents (Green, 2011). For electricity specifically, Min (2015) claims that democratic governments are pushed to provide greater access to electricity service because the logic of competitive elections forces them to do so. To increase relative vote share, governments facing electoral pressures may use electricity or other goods and services to target core (Cox and McCubbins, 1986) or swing voters (Lindbeck and Weibull, 1987; Dixit and Londregan, 1996) to try to solidify their power base. In practice, who gets an electricity connection and the degree of reliability of that connection are both open to political manipulation (Min, 2015). These are issues that emerges in a range of different political and geographic contexts (Baskaran et al., 2015; De la Calle and Orriols, 2010; Imami et al., 2020; Kächelein et al., 2010; Min and Golden, 2014; Kroth et al., 2016; Briggs, 2021). Mozambique presents some unique challenges in this regard, as discussed in the next section.

The second model deals with the question of '*where do distributive goods and services go*? Relatedly, do they go to urban or rural areas? To regions defined by dominant ethnic groups?' This second model is grounded in the literature concerning patronage, patrimonialism and clientelism – whether incumbents favour certain cultural, ethnic or partisan groups when distributing goods and services (Bayart, 2009; Franck and Rainer, 2012; Stasavage, 2005). For example, Skotes et al. (2013:7) have shown that clientelism works when the publicized rules of public goods distribution do not shape the actual distribution and the receipt of benefits is contingent on an individual's political support like party members (i.e., patronage) and/or voters through voter turnout or vote buying.

The third model focuses on '*when does distribution occur*? Do elections matter to the timing of goods distribution? Are there electoral cycles to distribution?' This model concerns whether incumbents distribute goods and services associating them with the electoral cycle (Dahlberg and Johansson, 2002). Min and Golden (2014), for instance, argue that incumbent parties impose electricity provision at an economic loss shortly before an election to boost their own chances of re-election. Imami and colleagues (2020) argue the same with respect to increasing electricity supply. The distributive politics literature shows that governments' increasing their allocation of public goods and services closer to elections increases their prospects of being re-elected (Imami et al., 2020; Kächelein et al., 2010; Min and Golden, 2014). In contrast to political opposition parties, incumbent governments have strong incentives to use the public budget tactically to obtain electoral support among new voters or strengthen the loyalty of their existing base (De la Calle and Orriols, 2010).

The fourth model is about '*why do some politicians distribute public goods and some don't*'? Are distributive politics effective, efficient, desirable? Are voters responsive?

This model concerns whether incumbents are rewarded by voters for the distributions they make (De La O, 2008; Hoffman and Long, 2013; De la Calle and Orriols, 2010).

1.1.1. The relationship between electricity access and electoral behaviour

Electoral scholars of electricity provision have commonly focused on the period prior to elections to analyse whether government influencing of electricity access affected electoral outcomes (Golden and Min, 2013; Min and Golden, 2014; Min, 2015; Baskaran et al., 2015; Imami et al., 2020; Kächelein et al., 2010; Briggs 2021; Bernard et al., 1997). Others have analysed the political economy of the provision of electricity in general, irrespective of the electoral cycle. The focus of this study is primarily on the analysis of how voters react in general when the incumbent provides electricity to the public. Electrification is posited here as a public good that delivers non-excludable and non-rival benefits to society – in effect, increasing access to electricity improves the overall public good. We posit therefore that incumbent political parties would purposely provide greater electricity access as a strategy to retain power.

1.1.2. Hypothesis

H1: As provision of access to electricity services increases, the support for the incumbent party increases.

This hypothesis (H1) is based on the strategy that public authorities increase public goods provision to enhance their re-election prospects and that voters will compensate the incumbent, therefore more voters will turn out to vote. This leads us to formulate an additional hypothesis (H2) to address the relationship of public goods provision with voter turnout.

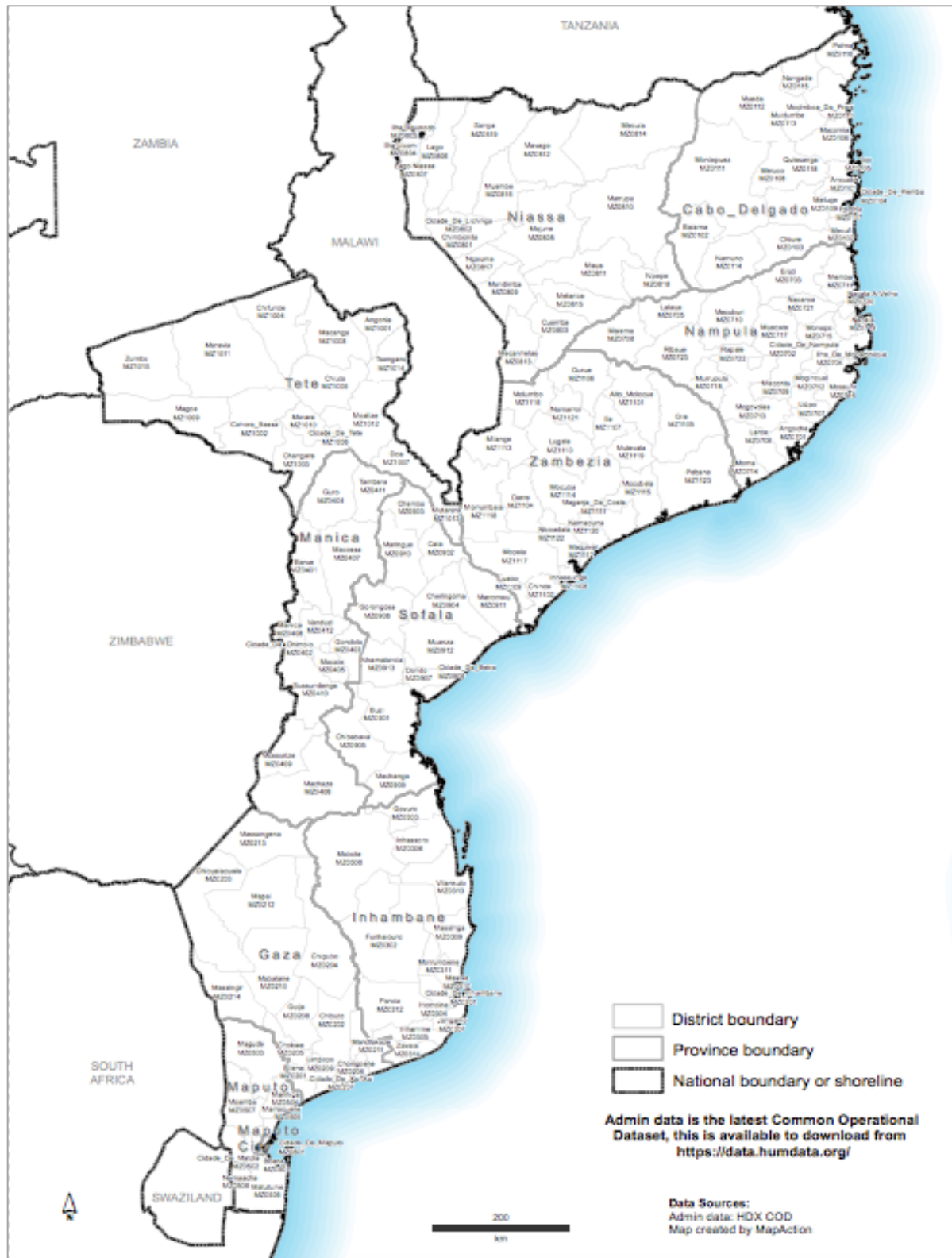*H2*: As electricity provision increase, voter turnout increases.

2. Materials and Methods

2.1. Data and research design

As there is scarcity of individual level data in Mozambique, alternatively we innovate by combining data from different secondary sources collected systematically to produce an original numerical dataset on electoral behaviour and its possible determinants at aggregate district level, using Mozambique as a "single-country study as comparison" (Landman, 2008, p.28; Landman and Carvalho, 2017; Ryan, 2018). The data comprises 248 observations (N) resulting from 124 districts (of the 128[5] that existed at that time, see Figure 1) and the 2009 and 2014 multiparty legislative elections. The focus on these elections is justified by the existence of its data as well as of those of the independent variables.

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[5] Missing districts include Beira, Inhambane, Matola and Nampula.

Figure 1: Map of Mozambique by province and district

Source: MapAction. 2019. Retrieved on August 17, 2023, from
https://reliefweb.int/map/mozambique/mozambique-cyclone-idai-provinces-districts-p-code-13-apr-2019

2.2.   Independent Variable – Government Provision of Electricity

We measure government provision of electricity by using high resolution *nightlight* satellite imagery which is calculated by using satellite images of the earth at night from the Geophysical Data Center[6]. Remote sensing of nightlight data is commonly used in development economics as an accurate proxy for domestic electricity access provision (Yao, 2021; Gao et al., 2022). The advantage of using nightlight satellite imagery rather than other data like the World Bank Global Electrification Database (World Bank, 2023) is that the former makes its data available at subnational levels while the latter is only available at the national level. Nightlight data is available to match with the 2009 election but not the 2014 election. For the 2014 election there is, however, 2012 nightlight data which is used to align with in the 124 districts. The data includes nightlight mean, standard deviation and median. For this study we use the mean ranging from 0 (minimum) to 27.54 (maximum). We coded nightlight 0 (low) if its mean ranges from 0 to 1; and 1 (high) if it is greater than 1. The reason for this is that most of the data is concentrated between the mean of 0 and 2, with the rest being ten outliers, which include:

- 21.7 mean of nightlight of Maputo City, the country's capital in 2009 and 27.54 in 2014
- 8.45 mean of nightlight of Boane, the district part of the 'Maputo Metropolitan Area' in 2009 and 13.13 in 2014
- 2.08 mean of nightlight of Dondo, the satellite city of the country's second largest city (Beira) in 2009 and 3.79 in 2014
- 2.83 mean of nightlight of Xai-Xai, the capital of Gaza province in 2014
- 2.75 mean of nightlight of Marracuene, the district in Maputo Metropolitan Area in 2014
- 2.67 mean of nightlight of Nacala-a-Velha, a port town in Nampula province in 2014; and
- 2.21 mean of nightlight of Pemba, the capital of Cabo Delgado province in 2014

Figure 2 presents districts with 'high' mean of nightlight by election year and Table 1 adds to that the average for all elections. The results show that districts that are high in mean of nightlight tend to be low in voter turnout across all elections, expect for the 2014 election. Comparing with the World Bank Global Electrification Database the access to electricity in Mozambique was 15% in 2009 and in 2014 it increased to 25% (World Bank, 2023). The election year of 2014 was characterized with high mean of nightlight due to the President Armando Emílio Guebuza's electrification policy that aimed for universal electrification across all districts. By the end of Guebuza's term in 2014, of the 128 districts at the time, all districts were electrified in the country (Government of Mozambique, 2015, p.36). In addition to the electrification policy, the GoM attracted enormous levels of private and public investment in the energy sector (Shenga et al., forthcoming) which is responsible for creating and transferring energy technologies to communities (Osano and Koine, 2016).

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[6] https://sos.noaa.gov/datasets/nighttime-lights/

*Figure 2. Electricity provision by election year*
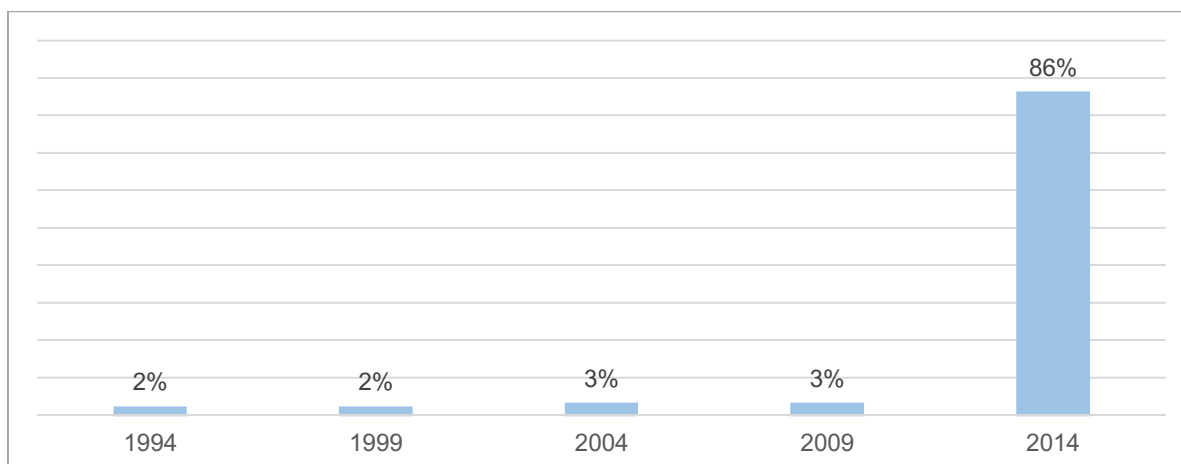
The first three elections are not part of the analysis. They were added in this figure to provide better prospect. Government provision of electricity is coded 0 (low) if the mean of nightlight ranges from 0 to 1 and it is coded 1 (high) if it is greater than 1. The reported percentages refer to districts with 'high' mean of electricity provision.

2.3. Dependent Variable – Electoral Behaviour

Electoral behaviour is measured by *voter turnout and voter choice.* The former refers to the proportion of eligible voters who cast a vote. The latter, to the proportion of voters who cast their ballots – whether they choose to support the incumbent party or opposition parties. However, accessing voting behaviour data at individual (voter) level remains challenging, as it requires the existence of post-election surveys. In Africa, only South Africa (2004, 2009 and 2014 elections), Kenya (2013 election) and Mozambique (2004 election) have been surveyed by post-election survey networks.[7] In this study, we employ aggregate data from *Comissão Nacional de Eleições* the national electoral management body (EMB) at district level – the territorial unit immediately below province (see Figure 1). From this data we derive knowledge about the voters in the district, but we do not know how any individual voted (Denver, 2007, p.14). The EMB officially aggregates the voting behaviour data at polling station-level and we elevated these findings to the district level. This is because district level data is more meaningful in the EMB dataset as each district is represented by a name which can, in turn, be assigned a code. We coded 0 (low) if the proportion of voter turnout ranges from 0 to 50%; and 1 (high) if it is greater than 50%. Comparing the 2009 and 2014 elections, the data in Figure 3 shows that the lowest and highest turnout levels come from the 2009 election in the districts of Mopeia (Zambézia province) and Chicualacuala (Gaza province). They are, respectively, 26.15% and 95.95%. The 2014 election appears to have more districts with 'high' voter turnout than in 2009 (Figure 3), suggesting that turnout increased from the 2009 election to 2014.

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[7] The Comparative Study of Electoral Systems (CSES, www.cses.org) and Comparative National Election Project (CNEP, https://u.osu.edu/cnep/)

Figure 3. Voter turnout by district and election
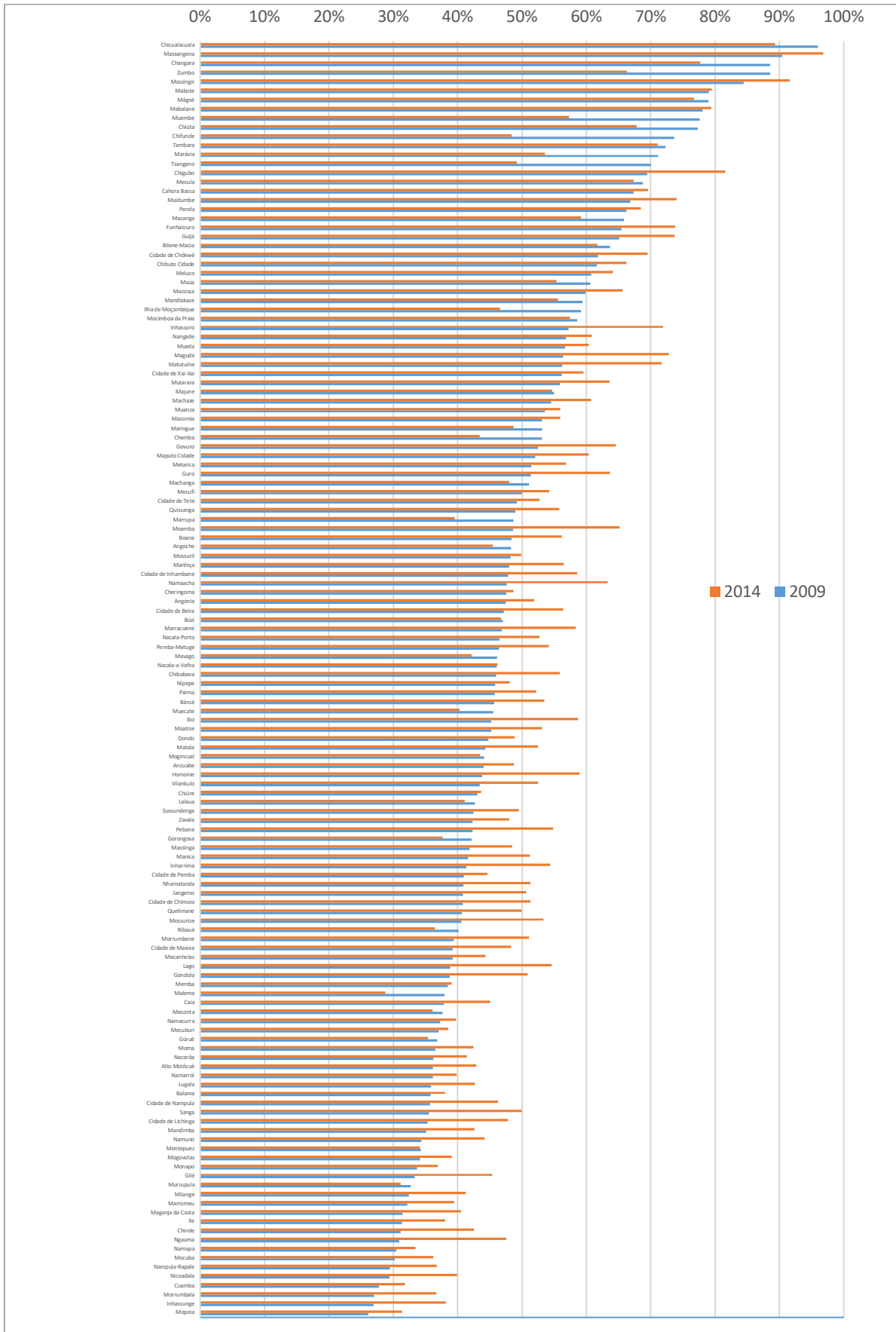
Three districts (Chimbonila, Larde and Liupo) established after 2009 elections were excluded as they only have data on 2014 election.

To measure voter choice and support for the incumbent party, we relied on party competition data which is the difference in percentage between the first and second highest vote winning parties (Shenga and Howe, 2019). We have calculated this based on EMB data and arrived at three categories of party competitiveness. Firstly, 'very competitive districts' occur where the difference between the first and second place party is up to +/-5%. Secondly, 'Districts overwhelming won by the incumbent', which is those where incumbent Frelimo won with a difference greater than 5% - that is, 'incumbent strongholds'. Thirdly, 'Districts overwhelming won by the opposition', which is where the main opposition party, Renamo, won with a difference greater than 5% - i.e., 'opposition strongholds'. Based on this we coded 1 (support for the incumbent party or incumbent stronghold) if Frelimo won with difference greater than 5% and 0 if else. Our data shows in Figure 4 that district support for the incumbent Frelimo was higher in the 2009 election and it declined in the 2014 election, as the opposition Renamo increased in support and the election became relatively more competitive.

Figure 4. Party competition by election
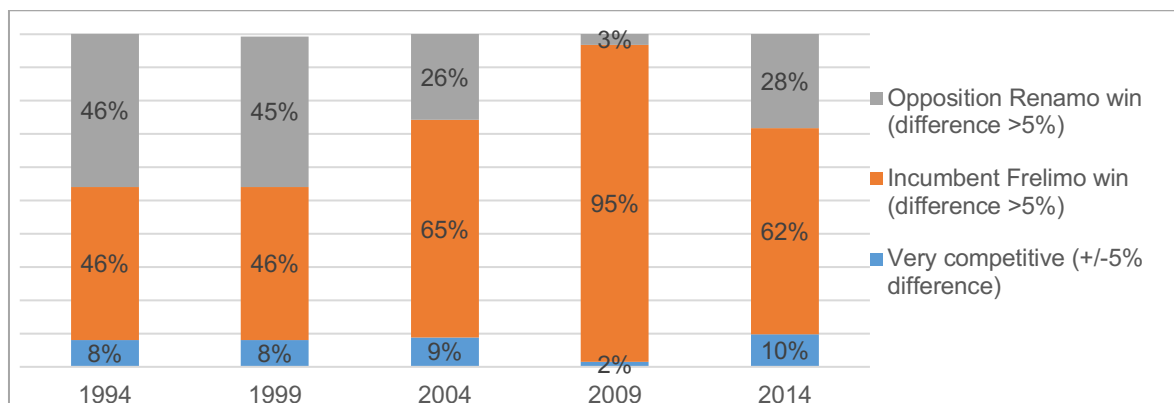
The Figure 5 unpacks party competition to district level. Earlier studies demonstrated that party support in Mozambique is aligned with certain ethnic groups (De Brito, 1996; Carbone, 2003; Manning, 2001; Shenga, 2008; Pereira 2009). As it is mentioned in the following subsection, we test later on that assumption at the district level. By correlating turnout and party competition, support for the incumbent appears to be positively correlated with districts with high turnout (.18**) but very competitive district tends to be negatively correlated with high turnout (-.15*). Support for the opposition is not correlated at all with district's turnout (-.12).

The first three elections were added to provide better prospect. Voter choice is coded 1 (support for the incumbent party Frelimo) if the incumbent won with a difference greater than 5% and 0 if else. N=620 districts. Three districts established after 2009 elections were excluded as they only have data on 2014 election.

Figure 5. Party competition by district and election

Figure 5. Party competition by district and election

2.4.   Control Variables

In addition to the primary independent variable, government provision of electricity, we control for other possible determinants of electoral behaviour. Firstly, we control for other government provision of services, particularly education and health. Government performance (Fiorina, 1981; Miller and Shanks, 1996) in delivering public services constitutes a short-term determinant of voting behaviour together with policy issues (Campbell et al., 1960; Nie et al., 1976) and the personalities of party leaders or candidates (Miller and Shanks, 1996). We measure government provision of health service by the number of beds in health centres; and government provision of education by the number of secondary schools using data from government district profiles.[8] The data provides the status of education and health services for 2009 and 2013. Due to absence of 2014 data on education and health services, we align the 2013 education and health data with the 2014 election. The number of beds in health centres is coded: low (0) if it ranges from 0 to 75; and high (1) if it is greater than 75; and the number of secondary schools is coded: low (0) if it ranges from 0 to 3; and high (1) if it is greater than 3. Table 1 shows that government provision of education and health services at district level is 'high' with respect to the number of secondary schools (63%) and the number of beds in health centres (51%). It also shows that there is a significant increase in government provision of health and education services from 2009 to 2014.

Secondly, we consider the effect of voter's social characteristics (such as class, religion, geographic location, and ethnicity, among others) as it determines their political preference (Lazarsfeld et al., 1968). We measure social characteristics by ethnicity – that is, ethnolinguistic group employing district profile data. Ethnicity exerts a strong influence on voters' choice in segmented societies by generating a long-term psychological attachment that anchors citizens to parties and where casting a vote becomes an expression of group identity (Horowitz, 1985). In Mozambique, historical Changana and Makonde ethnic alignment with the incumbent Frelimo and Ndau with the opposition Renamo during the parties' formation (Carbone, 2003; Manning, 2001) suggests that on election day, Changanas and Makondes will likely support the incumbent while Ndaus the opposition (Pereira, 2009; Shenga, 2008). A study of the 1994 founding multiparty election revealed "ethnic alignment on people's choice, with Changana and Makonde ethnic groups tending to vote for Frelimo and Ndaus likely to vote for Renamo" (Shenga, 2008:99). This alignment reflects internal ethnic cleavage during the liberation struggle that contributed for Frelimo and Renamo parties' formation (De Brito, 1996; Pereira, 2009; Shenga, 2008). The salience of these ethnicities in politics lead us to treat them as dummy variables coded 1 if the dominant district ethnicity is either Makua, Changana or Ndau and 0 if else. Since some districts have more than one ethnic group, in the dataset we aligned their ethnicity by regional population percentage. If a district is predominantly of ethnicity 'z' at a level of at least 51% we coded it as of 'z' ethnic group. Note that when we discuss Changana, Makua or Ndau districts we posit that these are predominantly Changana, Makua or Ndau districts – we do not assume socio-cultural homogeneity. In our dataset, 28% of districts are of Makua

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[8] National Institute of Statistics (www.ine.gov.mz) and Ministry of State Administration and Civil Service (www.maefp.gov.mz).

ethnolinguistic group, 11% Changana and 5% Ndau (Table 1).9 These features are about the same with those from the 2017 population census showing that Makua comprise 26% of the country's population, Changana 9% and Ndau 4% (INE, 2019, p.82).

Thirdly we control for the composition of the population. Electoral studies have often analysed the effect of demographic factors, such as age, gender, residential location, formal education, class, and poverty levels (Denver, 2007; Bratton et al., 2013; Gunther et al., 2007; Norris and Mattes, 2013). In this study, we measure demographics by voting age population using data from district profiles. It is coded 0 (low) if the voting age population ranges from 0 to 58,673 and 1 (high) if its greater than 58,673. Comparing elections, the percentage of district voting age population that is 'high' increased in the 2014 election (Table 1).

Fourthly, we consider the effect of conducting an additional regular election in 2014. While conducting regular elections in Africa (irrespective of a country's relative freeness or fairness) leads to increases in human freedom and the spread of democracy (Lindberg, 2006), African elections have "not systematically advanced democratic consolidation" (Bleck and Van de Walle, 2019:99). Moreover, Mozambican electoral malpractices (including violence and threats of violence) in the 2014 election likely led to both a decline in voter turnout and support for the incumbent. The 2009 election was relatively "orderly and peaceful" (Electoral Observatory, 2009:4), but the 2014 was characterised by violence, voting irregularities, and lack of transparency (Electoral Observatory, 2014:34). Conducting an additional regular election in 2014 was coded 1 while the previous 2009 election was coded 0.

Table 1. Descriptive Statistics

	Voter turnout	Support for the incumbent	No of sec. schools	No of beds in health centres	Makua	Changana	Ndau	Voting age pop.	Increas. election
Mean	0.44	0.79	0.63	0.51	0.28	0.11	0.05	0.50	0.5
Median	0	1	1	1	0	0	0	1	0.5
SD	0.50	0.41	0.49	0.501	0.45	0.31	0.22	0.50	0.50
Skewness	0.25	-1.41	-0.52	-0.03	0.97	2.60	4.24	-0.02	0
Kurtosis	-1.96	-0.03	-1.74	-2.02	-1.06	4.78	16.1	-2.02	-2.02
Min	0	0	0	0	0	0	0	0	0
Max	1	1	1	1	1	1	1	1	1
N	248	248	248	248	248	248	248	248	248

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9 We did not create a dummy variable for Makonde as they represent an insignificant proportion (2%) in the study sample.

2.5.   Models

In order to test the effect of government provision of electricity and controlling for other factors on electoral outcomes, we used a binary logistic multiple regression technique. The dependent variables: *voter turnout* and *support for the incumbent party* are binary coded 0 and 1 and independent and control variables are coded in the same way including dummy variables. The observations are independent of each other, they do not come from repeated measurements or matched data. There is no multicollinearity among independent and control variables. The correlation among independent and control variables is less than .7. The linearity of independent variables and log odds is assumed. The number of observations is small (N=248) but it is acceptable for Model 2 as only a few variables are included and the observations are based on the population rather than a sample and this study is exploratory being one of the original of its kind. For each dependent variable we employ two models. Model 1 includes all independent and control variables reviewed above. Model 2 includes those variables that are significant in Model 1 to have a parsimonious model.

3. Results

An initial test of hypothesis indicates that provision of electricity is positively correlated with voter turnout (.134*) and negatively with support for the incumbent party (-.362**). This indicates that districts that are high in providing electricity to voters are likely to have voters to turn out during elections; and less likely to support the incumbent party. Before probing the effect of provision of electricity controlling for other aspects, we first analyse the significance, capability, and explanatory power of our model. The results inform that the Omnibus tests of model coefficients are significant (P-value=.000) while the test of Hosmer and Lemeshow is not (P-value>.05). The probability capability of the model is high as the percentage accuracy in classification (PAC) is 76% for voter turnout and 80% for support for the incumbent party. About 33% and 45% of the variance in voter turnout is explained by our model (Table 2); and the variance in support for the incumbent explained by the independent and control variables is between 25% and 39% (Table 3).

When tested simultaneously against other aspects, the results in Table 2 show that the effect of provision of electricity on voter turnout in Model 1 continues to hold when non-significant effects are removed from the analysis in Model 2. Voter's social characteristics, principally ethnicity, play a role on voter turnout: Districts that are mostly of Makua ethnolinguistic groups are less likely to participate on election days than others, while districts that are composed of predominantly Changana voters are more likely to do so. Demographic composition of the population also matters for voter turnout: Districts that are high in voting age population tend to have fewer voters who turn out to vote. The act of conducting an additional election and delivering other services (such as education and health) has no impact on voter turnout.

Table 2. Model of voter turnout in 2009 and 2014 legislative elections

	Model 1				Model 2			
	B	Exp(B)	95% C.I.for EXP(B)		B	Exp(B)	95% C.I.for EXP(B)	
			Lower	Upper			Lower	Upper
Nightlight (high)	1.28** (.606)	3.577	1.091	11.73	1.31*** (.363)	3.70	1.82	7.55
No of secondary schools (high)	-0.576 (.441)	0.562	.237	1.33				
No of beds in health centres (high)	.083 (.414)	1.086	.482	2.45				
Ethnicity (Makua dummy)	-1.54*** (.408)	.214	.096	.476	-1.49*** (.395)	.23	.10	.49
Ethnicity (Changana dummy)	2.64*** (.709)	14.011	3.488	56.28	2.53*** (.698)	12.5	3.18	49.13
Ethnicity (Ndau dummy)	.343 (.716)	1.409	.346	5.74				
Voting age population (high)	-2.17*** (.441)	.115	.048	.272	-2.41*** (.375)	.09	.04	.19
Increasing elections (2014)	.207 (.562)	1.23	.408	3.702				
Constant	.535 (.311)	1.708			.438 (.251)	1.55		
Cox & Snell R Square	.34				.33			
Nagelkerke R Square	.46				.45			

*** significant at the 0.001 level; **significant at the 0.01 level; and *significant at the 0.05 level. Entries are B Binary Logistic multivariate regression coefficients with Standard Errors in parenthesis. All variables in the models are coded 0 and 1. N=248.

Table 3. Model of support for the incumbent party in 2009 and 2014 elections

	Model 1				Model 2			
	B	Exp(B)	95% C.I.for EXP(B)		B	Exp(B)	95% C.I.for EXP(B)	
			Lower	Upper			Lower	Upper
Nightlight (high)	.482 (.706)	1.62	.406	6.459				
No of secondary schools (high)	-1.71** (.648)	.18	.051	.642	-1.24** (.576)	.29	.09	.89
No of beds in health centres (high)	.701 (.49)	2.02	.772	5.27				
Ethnicity (Makua dummy)	1.14** (.466)	3.11	1.25	7.77				
Ethnicity (Changana dummy)	20.461 (697)	769	0	.				
Ethnicity (Ndau dummy)	-2.37** (.82)	.093	.02	.47	-2.72*** (.799)	.07	.01	.32
Voting age population (high)	-1.46** (.53)	.232	.08	.66	-1.04** (.438)	.35	.15	.83
Increasing elections (2014)	-3.13*** (.797)	.044	.01	.21	-2.52*** (.499)	.08	.03	.21
Constant	4.62*** (.743)	101.32			4.77*** (.681)	117.37		
Cox & Snell R Square	.32				.25			
Nagelkerke R Square	.50				.39			

*** significant at the 0.001 level; **significant at the 0.01 level; and *significant at the 0.05 level. Entries are B Binary Logistic multivariate regression coefficients with Standard Errors in parenthesis. All variables are coded 0 and 1. N=248.

Turning to voter choice, the results in Table 3 shows, however, that the effect of provision of electricity on support for the incumbent party does not hold when control variables are considered. Conversely, government provision of education services does matter, but with a negative effect. This suggests that districts with high numbers of secondary schools are less likely to have voters who support the incumbent party than others.

Ethnicity continues to play a role: Mostly Ndau districts are less likely to have support for the incumbent party than others. Voting age population continues to have a negative effect: Districts that are high in voting age population are less likely to vote for the incumbent party than others. The act of increasing the number of elections in 2014 leads districts to not vote for the incumbent party.

4. Discussion

That the provision of electricity as a public good does not fully shape electoral behaviour is a reflection of how the incumbent Frelimo does not actively use its achievement in service delivery during election campaigns as a policy platform to influence electoral behaviour. This is supported by the incumbent party's electoral manifestos and/or campaigns for the relevant years, where the only common words have been "continuing expanding people's access to electricity" (Frelimo, 2014, p.49), education, health, and so on. Very little is reported in the campaign literature on actual performance in the incumbent election campaigns. This contrasts with similar cases such as Ghana, for example, where the high level of electricity access (72%) can be related to the emphasis placed on electricity in the slogans used in party campaigns, making it a "highly visible and politically salient good" (Briggs, 2021, p.7).

The limitation of electricity provision on support for the incumbent is also associated with low levels of service delivery. According to the World Bank (2023), progress in access to electricity in Mozambique remains low relative to other SADC member states, and service quality remains poor. Although the utility company EDM electrified all 128 districts by 2014, it only did so at the district headquarters (Government of Mozambique, 2015). When looking at the scale of administrative posts, the territorial unit of government below district level, these remain mostly non-electrified during this period. The medium voltage network only grew by 3.3% between 2013 (14,766 km) and 2014 (15,273 km). In the same period, the distribution power installed capacity increased by 2.8%, with transformation capacity of, respectively, 2003 MVA to 2060 MVA. However, the number of faults per 100 km and system average interruption frequency index regressed from 64 and 1:20 to 61 and 1:18 (EDM, 2014). Despite a government-mandated modernization agenda, EDM faces numerous political and financial challenges to achieve universal access to electricity by 2030. These range from agreeing on cost reflective tariffs that are affordable to most users to problems with frequent outages and blackouts (Salite et al., 2021). It also includes non-payment by some government ministries, balancing service provision to large-scale industrial users and domestic households, digitalizing of the distribution network using network information systems (Arthur and Cockerill, 2019).

The low provision of electricity is due to lack of change in electricity strategy. The 2009 and 2014 elections took place during the same government electricity strategy, EDM's

Post Modernization Phase. This strategy was approved during President Guebuza's government (2005-2014) and continued to be implemented by his successor Filipe Nyusi (2015-present) until 2017, with the aim of electrifying more districts as more were created.[10] The same applies to the incumbent party 2009 and 2014 election manifestos. Both have the same slogan: "Frelimo – the force of change" (Frelimo 2009; 2014) and no visible narrative of universal access to electricity.

That the provision of public services in general is low is due to failures of governance. As a general principle, democracies are better at providing public services than authoritarian regimes (Kroth et al., 2016; Min 2015). Stronger democratic norms and governance mechanisms in Ghana with alternation of power, vibrancy of civil society and free media is associated with greater provision of electricity than states such as Uganda where President Museveni has been constraining civic space and media freedom (MacLean et al., 2016). Against this backdrop, Mozambique is best defined as an *electoral autocracy* (V-Dem, 2017; V-Dem, 2022). Despite regular multiparty elections, electoral processes are not fair and transparent. Access to justice, rule of law, judicial independence, respect for liberties, and legislative constraints on the executive do not meet the criteria for a functioning democracy (V-Dem, 2017; V-Dem, 2022). Its civic space for citizens, media and civil society organizations to air freely their voice and to hold the government to account has been shrinking over time (Shenga, 2018). Recently, the government used the Covid-19 pandemic to further curtail public freedoms (Shenga, 2020). When a policy issue triggers the public to protest, police are mobilized to prevent it. In 2021 alone, the police stymied peaceful protests against a range of civil society concerns: kidnappings,[11] violence to women[12] and the cost of living crisis[13]. By contrast, the increase of the incumbent delivery of electricity in Ghana is associated in part with citizens who "organized in the streets to protest their lack of access to reliable electricity" (MacLean et al., 2016, p.124). Moreover, discussing the act of conducting an additional regular election, its unexpected negative effect is associated in part with the increase of electoral malpractices which made voters to not support the incumbent. The 2009 election was conducted with relative integrity (Electoral Observatory, 2009), but the 2014 with electoral malpractices (Electoral Observatory, 2014) ranging from voter registration irregularities to lack of transparency, ballot stuffing and violence. Electoral violence occurred between Frelimo and Renamo supporters during the election campaign, and on the election day itself involving the police and voters (Electoral Observatory, 2014). Under these political conditions, citizen action to hold governing bodies to account of electricity access provision becomes increasingly difficult.

Slow progress on electricity access provision is also due to a lack of democratic competition. Briggs (2021) notes that party rotation in Ghana's multiparty competition led to an increased supply of electricity. Min (2015) stresses that democracies with high levels of competition are prima facie superior providers of electricity to their citizens since the need to secure votes compels them to do so. But political competition in Mozambique occurs in a one party dominant system where the

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[10] The number of districts has increased from 128 to 155 districts, www.ine.org.mz.

[11] https://www.opais.co.mz/policia-impede-manifestacao-de-medicos-contra-raptos/, retrieved on June 15, 2023.

[12] https://www.dw.com/pt-002/mo%C3%A7ambique-17-defensoras-dos-direitos-das-mulheres-detidas/a-60049459.

[13] https://clubofmozambique.com/news/mozambique-prm-blocks-attempts-to-carry-out-violent-demonstrations-against-the-cost-of-living-carta-213872/?utm_source=The+Mozambican+Investor_&utm_campaign=60f9892cc5-EMAIL_CAMPAIGN_2017_05_25_COPY_01&utm_medium=email&utm_term=0_d3b369a42d-60f9892cc5-206570957, retrieved on June 15, 2023.

incumbent Frelimo has won all elections since the founding multiparty election; and elections are not highly competitive. Only 7% of Mozambique's districts are 'very competitive'[14].

Casting light on ethnicity, its effect reveals the importance of long-term determinants on electoral behaviour. As discussed above, Mozambique parties' formation followed ethnic lines (Carbone, 2003; Manning, 2001) and who becomes the presidential candidate within the dominant party can be subject to ethnic scrutiny. With the first three presidents[15] being from the Tsonga ethnic group and the current[16] Makonde, there is likely to be a contested ethnic debate as to which ethnic group should be the next, in a context of at least 23 ethnicities (Liphola, 1996, p.268). However, while ethnicity matters, its significance tends to occur in the contexts of: (i) one-party dominant system where party competition is low and the opposition weak; (ii) electoral autocracy where the rules of democracy in general, and of fair elections in particular, are undercut; and (iii) incumbent's poor performance providing public goods. This has been almost the same in African party systems that are ethnically (Robert and Driessen, 2008; Horowitz, 1991; Horowitz, 1985) and one-party dominated of which most are authoritarian (Basedau, 2019). Robert and Driessen (2008) found that African democracies are likely to suffer in ethnically dominated party systems from individual level data. This study found about the same from subnational aggregate district level data. That predominantly Changana districts tend to participate more in elections has to be considered alongside electoral malpractices. It is in these districts that among other things ballot boxes tend to be staffed in favour of the incumbent and the opposition is violently prevented from campaigning and install their offices (Electoral Observation, 2014).

Reflecting on the unexpected negative effects of districts with high voting age population, this has to be framed also in the context of electoral malpractices which may have driven voters away from supporting the incumbent. Most of the electoral malpractices have at the epicentre the incumbent which controls both the EMB and the police assigned to keep the electoral process orderly and peaceful. The former lacks transparency;[17] and the latter conduct acts of violence[18] with voters aiming (according to anecdotal evidence) to create confusion to introduce stuffed ballot boxes.

5. Conclusions

This article has examined the impact of delivery of electricity service on electoral behaviour, controlling for other factors, using subnational district level data in Mozambique. Our key finding from binary logistic regression analysis and original data is that the provision of electricity service has a positive effect upon the mobilisation of

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[14] This refers to party competition average of the first five elections.

[15] Samora Machel (1975-1986), Joaquim Chissano (1986-2004) and Armando Guebuza (2005-2014).

[16] Filipe Nyusi (2015-present).

[17] The lack of EMB transparency, in 2019 alone, includes: registration of 300,000 additional non-existent voters in the dominant party stronghold of Gaza electoral district to ensure that its magnitude increases by decreasing those of the opposition; and not releasing comprehensive election results.

[18] Shortly before the 2019 election campaign a group of criminals assassinated an active electoral observer from civil society organization. During their escape they got involved in car accident resulting in major injuries and fatalities. They were confirmed to be members of the police.

voters; but it has no impact at all on support for the incumbent party. This means that increasing access to electricity increases voter turnout, but it does not lead voters to support the incumbent. This limitation results from the fact that the incumbent did not deliberately emphasize progress in electricity access provision in election campaigns as a mechanism to enhance its re-election prospects. In Mozambique's elections, electricity remains an *invisible* and politically non-salient good (Mani and Mukand, 2007). This invisibility is due, in part, to the low, slow growing and poor quality supply of electricity during the study period. Aspects like a lack of change in energy strategy, poor democratic governance norms and electoral autocracy, and weak political competition and party systems that are one-party and ethnically dominated explain this political reality of electricity infrastructure provision. Findings from control variables also revealed limitation of other government public goods provision, with the provision of education, by increasing the number of secondary schools, affecting support for the incumbent negatively.

In this context ethnicity remains as the base of political support. Ethnicity played a key role in parties' formation (suggesting also an existence of ethnically dominated party system) and continues to dominate voting. The significance of this study's findings with respect to ethnicity is that it matters for voter choice in ethnically and one-party dominated party systems and for electoral autocracy associated with the subversion of the procedures of democracy and fair elections. This aligns with the argument that in Africa democracies are likely to suffer from ethnically dominated parties (Horowitz, 1991; Horowitz, 1985; Robert and Driessen, 2008). Electoral malpractice could also be viewed as a factor that influences voter support and support for the incumbent. While this study did not have data on electoral malpractice to test its effect, suggesting an issue for further studies, we found that the act of increasing the number of elections, with one additional (violent) election in 2014 had a negative effect on support for the incumbent. We suggest that electoral violence likely skewed the outcomes of voters' interest, with immediate personal safety concerns and repugnance towards violent actions overriding policy outcomes, such as universal access to electricity, in the voter imagination.

Where public goods provision does not matter to the support for the incumbent this undermines electoral integrity. Those who remain in power may do so through electoral malpractice. Consequently, democratic procedures including the rule of law, participation, competition, and vertical and horizontal accountabilities are at risk of being subverted. Rather than being equally distributed, income, wealth, goods, and services tend to be concentrated with those politically connected with the incumbent. Besides limitation on variables, there is a need to expand and conduct electoral behaviour studies at the individual level and cross-nationally, to gain a better understanding of the factors that influence voters and public goods provision. Rather than probing electoral behaviour at district aggregate level, studies on electoral behaviour should be comprehended at individual level analysis. Voter choice is an individual rather than group act. Further studies should obtain support for the conduct of systematic post-election public opinion surveys with questions that address long and short-term determinants of voting, among other aspects. With a post-election survey, case studies could be integrated into wider election datasets to be compared cross-nationally.

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The **Centre for Research on Governance and Development (CPGD)** is an independent and interdisciplinary research institution, established in 2011, dedicated to supporting and conducting relevant, systematic and evidence based research for policy intervention in Mozambique.

CPDG is based in Mozambique, harnessing local expertise, to conduct research in the areas of governance and development, including: democracy, good governance and poverty with the aim of building an effective and capable state that is accountable and transparent, inclusive and responsive.

Our goal is to strengthen empirical social science capacity by supporting and conducting relevant systematic research to inform Mozambican decision-makers for policy intervention and implementation.

Our mission is to produce and promote evidence-based research for effective public policy and decision making in Mozambique.

Our main objectives are:

- To **produce reliable, evidence-based data** on Mozambican citizens and political institutions,
- To **build institutional capacity** to conduct research and utilize research findings in Mozambique, and
- To **disseminate research results** to inform policymaking and implementation.

The values shared by the organization:

- We are an **independent and interdisciplinary** research organization;
- We are **accountable to the public** whose trust we hold;
- We **uphold integrity, neutrality and objectivity** in our work; and
- We are **committed to excellence** in all endeavours.