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Spatial Dependency in the Voting Pattern of the 2015 Nigeria's Presidential Election

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Abstract: This paper examined the spatial dependency in the voting pattern of the 2015 Nigeria's Presidential election. Data for the study was obtained from the Independent National Electoral Commission as published on its website. The study was particularly interested in the percentage of votes won within each State and the Federal Capital Territory by the two main political parties in the election: the All Progressive Congress (APC) and the People's Democratic Party (PDP). Shape files containing polygons of the various States, the Federal Capital Territory, Abuja and the Nigerian international boundary were obtained from the Geographical Information Systems (GIS) Unit of the Department of Geography and Environmental Science, University of Calabar, Calabar. The data were pre-processed and analyzed mainly within the GIS environment. Both the join count statistics and the Moran's I were used to analyze and test for spatial autocorrelation in the data set. The results of join count statistics revealed that the estimated number of connections between the "presence" and "absence" of a winning by APC was 42.88 with a standard deviation of 4.35. The observed join count was 24. For the bilateral test of significance(H_1: $O_{PA} \neq E_{PA}$), $|Z_{obs}| > |Z_{crit}|$, hence the evidence was not enough to retain the H_o. Therefore, the observed distribution is significantly different from a random distribution. For the unilateral test, (H_1: $O_{PA} < E_{PA}$), $Z_{obs} < Z_{crit}$. Again there was no enough evidence to retain the Ho. Hence, the observed distribution is significantly different from a random distribution and is associated with a grouped distribution. The Moran's scatterplot of the percentage of votes won by APC across the State and that of votes won by PDP across the States with Moran's 1 of 0.868955 confirmed that there exist a positive autocorrelation in the voting pattern of the 2015 Presidential election. It was therefore concluded that spatial dependency existed in the voting pattern of the 2015 Presidential election in Nigeria. This study could be extended in future works to look at the spatial trend in Nigeria's Presidential elections since independence to enable the prediction of voting patterns in future elections, particularly in 2019 when another Presidential election would be conducted.

Keywords: Electoral geography, spatial dependency, voting pattern, 2015 Nigeria's Presidential election, spatial autocorrelation, GIS.

INTRODUCTION

Democracy is considered as the best form of government in civilized societies. In fact, it usually claimed that the worst democratic government is better than the best military government. Democracy itself been defined as the government of the people, for the people and by the people. Elections provide the platform for the people to be involved in governance. It has been argued [1] that elections demand special attention because they help to shape the political choices and individual's voting behaviours. Such choices and behaviours become very obvious when the result of voting is visualized as geographic variable on a map.

In geography, three main frontiers in electoral studies have been identified [2]. The first of such frontiers is the geography of voting. This is based on statistical analysis and explanation of pattern of voting in a particular election. The second frontier of study has to do with the geographic influence of factors such as type of candidate, campaign strategies and specific voter issue on voting. The third and final frontier deals with the geography of representatives with interest on boundaries of electoral units. In this paper, the geography of voting with special reference to the 2015 Nigeria's Presidential election results is examined.

Since the return of democratic rule in Nigeria in 1999, five general elections have been conducted. The People's Democratic Party (PDP) won the presidential election in 1999 and the three other subsequent ones. However, in 2015, the PDP conceded defeat to the All Progressive Congress (APC). While APC was not enlisted in the previous elections, the Party came into the scene following a successful merger

of four political parties which participated in the 2011 general election. It is on record that the 2015 election was the first time an opposition party will defeat an incumbent in Nigeria. How was the APC able to defeat the incumbent PDP? What role did geography (space) play in the process? However, this could have also been due to a random process! Hence, it a hypothesized that "there is a significant difference between the voting pattern of the 2015 Presidential election in Nigeria and a random process".

One measure in geography that is frequently used to examine the role of space in a given process is the spatial autocorrelation. This is "the degree to which objects or activities at some location are similar to other objects or activities located nearby" [3]. Similarity can be described in terms of either attribute or location. In electoral geography, attribute similarity for nominal data results in binary classification with 'same' attributes represented by 1 and 'different' attributes represented by 0 to identify join counts. Similarly, locational (spatial) similarity can be simplified by creating binary classification as represented in an adjacent matrix from where a global measure of spatial autocorrelation can be determined. These are easily handled within the Geographical Information Systems (GIS). This paper therefore examined the spatial dependency in the voting patterns of the 2015 Nigeria's Presidential election using GIS.

Conceptual framework

Geography of voting

There is an increasing body of evidence in support of the proposition that there is spatial variations in patterns of voting. In fact, several studies have revealed that the patterns of voting are correlated with space [2, 4]. This implies that the spatial location of an individual influences much of the choices he makes during elections.

Two models for explaining voting patterns have been identified in literature. They are those that have to do with 'class cleavages' on one hand and 'geographic regions' on the other [5]. With the class model, people are likely to vote for candidates who they are confident will serve the interest of their social class. This concept highlights class differences. This model is characteristic of most of the elections in the United Kingdom [6]. However, geographic regions model emphasizes the role of cultural sectionalism in influencing the results of elections. The geographic regions concept highlights regional differences in the customs, beliefs and traditions of places where people live, and is very familiar in the United States of America [7].

Inarguably, the concepts of class and geographic regions are very important to the study of geography of elections [1]. They also present the different methodological approaches in electoral geography. While the model of class structure may not have a clear manifestation in Nigeria's elections, cultural sectionalism is certainly a major issue. Nigeria is still 'regionally' stratified based on cultural and ethnic affiliations and these have serious influence on voting pattern.

Since our interest in this study concerns the relative locations of voters, it is appropriate that the study adopts the cultural sectionalism methodological approach in examining the spatial dependency in voting pattern of the 2015 Nigeria's Presidential election.

Spatial dependency is a measure of the relationship between the variation of properties and the spatial proximity. It has been established that the closer two places are in space, the more they are similar [8]. It is therefore possible to model the particular way in which distance relates to the numerical difference of properties, which in this case is the voting pattern.

While spatial proximity can be expressed using topological descriptors (contiguity, order of vicinity) only, variation of the properties between contiguous objects can be expressed in different manners, according to level of measurement of the phenomenon being considered. Nominal scale measurements consider only the similarity or the difference of the values for contiguous objects. For measurements on the ordinal scale, the difference in values which is expressed as a difference of ranks is taken into consideration. For interval and ratio scaled measurements, it is possible to determine the exact difference of values of each contiguous object.

Geographic voting patterns

Several studies [1, 6, 9, 10] have revealed that people with similar cultural values tend to live in close proximity with one another. In view of the fact of their close proximity, they also generally cast their votes in elections along same lines. This tends to be supported by the Tobler's First Law of Geography: "everything is related to everything else, but near things are more related that distant things" [8].

In many countries of the world, this pattern is clearly revealed in their elections. For instance, in the USA, there is always a geographic split between the "blue states" and the "red states". While the blue states have large urban population that accepts more liberal values, the red states are dominated by rural and social conservatives. This distinction clearly played out in the 2000 and 2004 US Presidential elections [11]. Hence, the culture of politics of particular region has significant relationship with voting pattern of its citizens [7, 12].

Such would likely play out in the pattern of voting in the 2015 Nigeria's Presidential election.

METHODOLOGY

Study area

Nigeria is one of the major countries in Sub-Saharan Africa. It is located within Longitudes 2°30'E – 20°00' E of the Greenwich Meridian and Latitudes 4°00'N – 14°00'N of the Equator. It is bounded in the north by Niger Republic, east by Cameroon and Chad, west by Benin Republic and south by the Gulf of Guinea. It has a total areal coverage of 923,768 km^2. The 2006 population census gave the figure as 140,341,790. As at 2015, the population figure is estimated at 182,202,000 with a population density of 188.9/km^2. Nigeria is the 7th most populous country in the world and 1st in Africa. The country has thirty-six (36) federating units (States) and a Federal Capital Territory, Abuja (Fig. 1). Nigeria operates a presidential system of government with three arms: the executive, the legislature and the judiciary. The legislature at the national level is bi-cameral, performing its functions through the Senate and House of Representatives.

Fig-1: Nigeria and its federating units

Nigeria is further grouped based on geo-political zones. There are six geo-political zones in Nigeria, namely; south-south, south-east, south-west, north-east, north-west and north-central. Each of this zones consist of between 5 and 7 States. However, the divide between the Northern and the Southern Protectorates which were amalgamated to form Nigeria in 1914 still seems to play out in several aspects of the National life. This line of divide is also reflected in the dominance of the two main religions in the Country, where the northern part is dominated by Muslims while Christians have their sway in the south. Again, there are three major ethnic groups (the Hausas, the Igbos and the Yorubas) in the country. The north is dominated by the Hausas; the east by the Igbos; and the west by the Yorubas.

Data collection

Data for this study were mainly from secondary sources, mostly from the election results as published by the Independent National Electoral Commission (INEC); the only body that is authorized by law to conduct general elections in Nigeria. Although fourteen (14) political parties fielded candidates for the 2015 Presidential election in Nigeria, it is well known and acclaimed that the main contest was between two political parties: the APC and the PDP. Hence, the main interest of this study was on the performance of these two political parties in terms of winning or losing in each state. The full election result is presented in Appendix 1 while a summary for APC and PDP is presented in Table 1.

Table 1: Summary of 2015 election results for APC and PDP

State	Votes cast		Total votes cast for APC & PDP	Percentage of votes for APC	Percentage of vote for PDP	APC's 'winning' or 'losing'
	APC	PDP				
Abia	13394	368303	381697	3.509066	96.49093	0
Benue	373961	303737	677698	55.18107	44.81893	1
Borno	473543	25640	499183	94.86361	5.136393	1
Delta	48910	1211405	1260315	3.880776	96.11922	0
Edo	208469	286869	495338	42.08621	57.91379	0
Ebonyi	19518	323653	343171	5.687544	94.31246	0
Ekiti	120331	176466	296797	40.5432	59.4568	0
Enugu	14157	553003	567160	2.496121	97.50388	0
FCT-Abuja	146399	157195	303594	48.22197	51.77803	0
Gombe	361245	96873	458118	78.85414	21.14586	1
Imo	133253	559185	692438	19.24403	80.75597	0
Jigawa	885998	142904	1028902	86.11102	13.88898	1
Kaduna	1127760	484085	1611845	69.96703	30.03297	1
Kano	1903994	215779	2119773	89.82066	10.17934	1
Katsina	1345441	98937	1444378	93.1502	6.8498	1
Kebbi	567883	100972	668855	84.90375	15.09625	1
Kogi	264851	145987	410838	64.46604	35.53396	1
Kwara	302146	132602	434748	69.49911	30.50089	1
Nasarawa	236838	273460	510298	46.4117	53.5883	0
Niger	657678	149222	806900	81.50675	18.49325	1
Ogun	308290	207950	516240	59.71835	40.28165	1
Ondo	299889	251368	551257	54.40094	45.59906	1
Osun	383603	249929	633532	60.5499	39.4501	1
Oyo	528670	303376	832046	63.53855	36.46145	1
Plateau	429140	549615	978755	43.8455	56.1545	0
Rivers	69238	1487075	1556313	4.448848	95.55115	0
Sokoto	671926	152199	824125	81.53205	18.46795	1
Taraba	261326	310800	572126	45.6763	54.3237	0
Yobe	446265	25526	471791	94.58955	5.410447	1
Zamfara	612202	144833	757035	80.86839	19.13161	1
Adamawa	374701	251664	626365	59.82151	40.17849	1
Bauchi	931598	86085	1017683	91.54108	8.458921	1
Anambra	17926	660762	678688	2.641273	97.35873	0
Cross River	28358	414863	443221	6.398163	93.60184	0
Lagos	792460	632327	1424787	55.61954	44.38046	1
Bayelsa	5194	361209	366403	1.417565	98.58244	0
AkwaIbom	58411	953304	1011715	5.773464	94.22654	0

Data analysis

The result of the election was reduced to nominal scale in a binary format (0, and 1) where 1 indicates the presence of the measured attribute and 0 its absence. Since APC won the overall election, the party's winning a particular state was assigned 1 while 0 was given where it lost to PDP or any other party.

ESRI shape files for all the States and the FCT together with the Nigerian International boundary were obtained from the Geographical Information Systems Unit of the Department of Geography and Environmental Science, University of Calabar, Calabar. The shape file for each State and the FCT also contained Local Government Areas. The shape files were first pre-processed to remove the LGA's boundaries. This was done using the 'dissolve' tool in the Arc Tool box. The resultant State shape files that were free of LGA's boundaries were then merged together to produce a shape file of Nigeria containing all the federating units, using the 'merge' tool in the same Arc Tool box.

The election result data in Table 1 which was in Microsoft Excel format was converted to a comma delimited (CSV) format. It was then imported into a GIS environment and the table joined with the attribute table of the shape file which contained the Nigerian map. This was then used to produce the map of winning pattern and other maps found in this paper.

For the statistical analysis, it should be noted that there are several descriptors of spatial dependency. However, the most common descriptor of spatial dependency for data relating to areas and measured in binary form is the Join Count Statistic. The join count statistic relates the number of observed connections between the zones of property "presence" and those of property "absence", with the theoretical number of connections of a random distribution. The definition of the theoretical number of connections of a random distribution is related to two factors: the spatial arrangement of features of the study area and the choice of the null hypothesis [13].

Spatial arrangement is simply the configuration of the areas from which measurement are aggregated, and in the present study, it related to the arrangement of the various States within Nigeria. The null hypothesis on the other hand expresses the way in which the properties “presence" and "absence" are assigned. From a statistical point of view, it is a question of determining if the study area is regarded as an independent sample (sampling with replacement, free sampling) or dependent (sampling without replacement, non-free sampling). Ebdon [13] argues that the identification of one of these two situations is important because it determines the nature of the theoretical distribution with which the observed distribution is to be confronted.

In answering the question of similarity between the two distributions, two types of tests can be applied [14]. The first answers the question in a general way using the bilateral test while the second does so in a specific way, using unilateral test. The bilateral test checks if the spatial distribution of states of "APC winning" in the study area is significantly different from a "random" distribution. If the null hypothesis is rejected, it simply means that the observed distribution is random. However, the unilateral test checks in a more specific way if the spatial distribution of the states of “APC winning“ in the study area is significantly distributed as either "clustered", or "regular". In the event of rejection of the null hypothesis, one can determine that the observed distribution will get significantly closer to either a "clustered" distribution, or to a "regular" distribution.

While the join count statistic is good at handling spatial data at the nominal scaling, when data are reduced to the binary format, a lot of information is lost during the process. To validate the result of the study, the Moran’s I, a measure of spatial autocorrelation that can handle data at higher levels of measurement, was adopted to examine the spatial autocorrelation in the percentage of votes cast for APC and PDP in all the federating units. The measure is given by:

$$I = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}c_{ij}}{s^2 \sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}}$$

Where,

I = Moran’s Index

n = number of objects in sample (number of states, including FCT)

i, j = any two of the objects (APC and PDP winning states)

c_{ij} = similarity between i and j’s attributes (measured by covariance)

w_{ij} = the similarity of i and j’s locations

s^2 = variance of the sample attributes

In measuring the adjacency, the Rook’s case was adopted. The determination of the Moran’s I was done and ploted using the GeoDa™ software [15]. Values of I > 0 suggest positive autocorrelation or grouping of similar attributes. Values ≈ 0 suggest no autocorrlation or independence of observationa, while values < 0 suggest negative autocorrlation or clustering of dissimilar attributes.

RESULTS

The spatial arrangement of states within the country with respect to the outcome of the 2015 presidential election is found in Fig. 2 and the resultant matrix of adjacency is found in Appendix 2. There are a total of 85 connections in Fig. 2 with 38 of them connecting two States that were won (Win –Win {WW}) by the APC. Connection between States that were won by APC and another where it lost (Win-Loss or Loss- Win {WL or LW}) were 24. Also, connections between two States where APC lost (Loss – Loss {LL}) were 23. Figs 3 and 4 show the percentage of votes won by APC and PDP respectively if votes won by other parties are considered to be negligible.

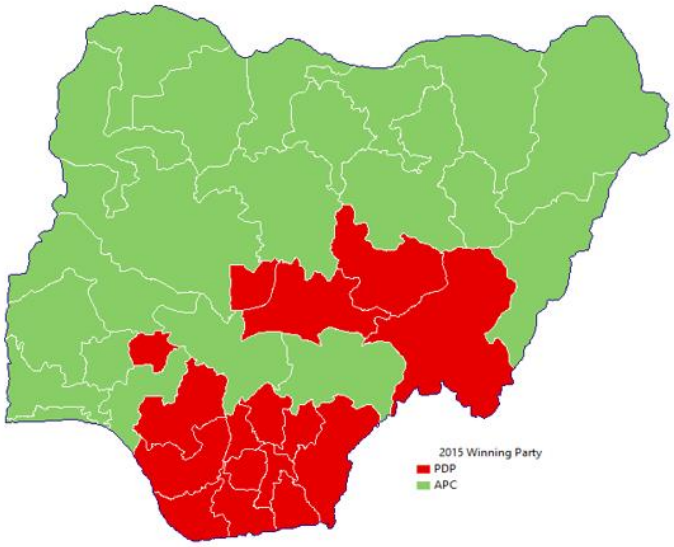

Fig-2: Connections between the 37 contiguous zones in Nigeria indicating the winning party in the 2015 Presidential election

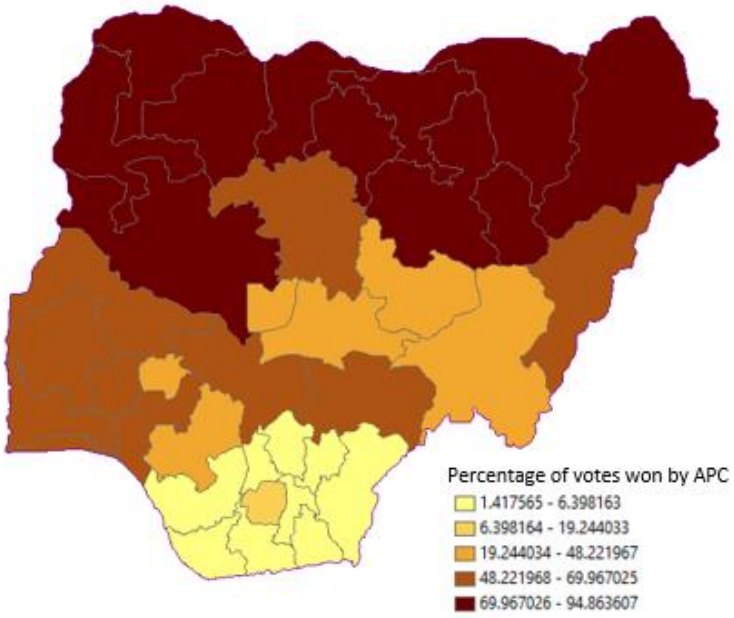

Fig-3: Percentage of votes won by APC in 2015 Presidential election when compared with PDP

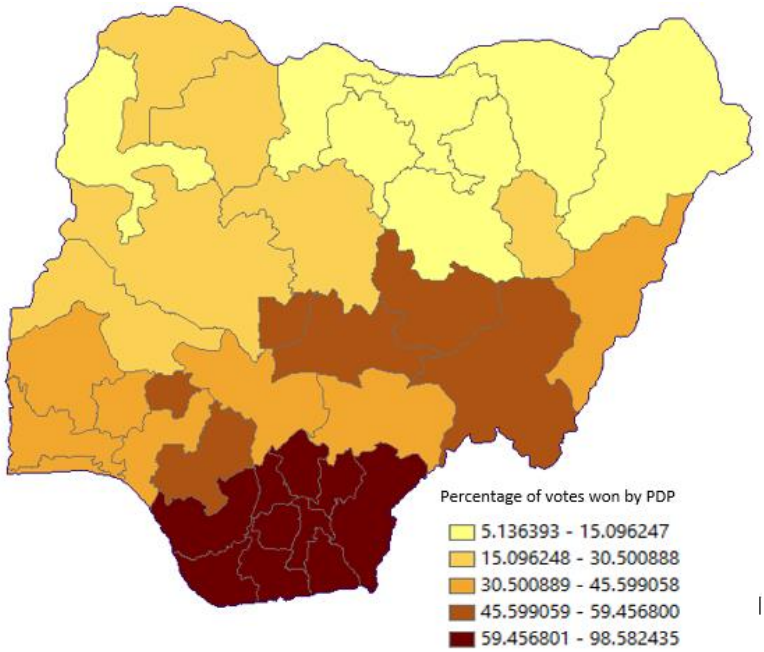

Fig-4: Percentage of votes won by PDP in 2015 Presidential election when compared with APC

The results of the statistical analysis are presented in Table 2. It reveals that the estimated number of connections between the "APC winning" and "APC losing" of a property, E_{PA} is 42.88 while the standard deviation, σ_{PA} is 4.35. O_{PA} is 24 and the observed Z is - 4.34. The Z_{crit} value was taken at the 0.05 significance level (one-tailed)

Table 2: Results of statistical analysis

E_{PA}	σ_{PA}	O_{PA}	Z_{obs}	Z_{crit}
42.88	4.35	24	-4.34	-1.645

For the bilateral test, H_1: $O_{PA} \neq E_{PA}$. Since $|Z_{obs}| > |Z_{crit}|$, the evidence is not enough to retain the H_o. Hence, the observed distribution is significantly different from a random distribution.

For the unilateral test, H_1: $O_{PA} < E_{PA}$. Since, $Z_{obs} < Z_{crit}$, again there is no enough evidence to retained the Ho. Hence, the observed distribution is significantly different from a random distribution and is associated with a grouped distribution.

The results of the Moran's 1 are found in Figs 5 and 6 for percentage votes for APC and PDP respectively. Before interpreting the associated level of statistical significance of these results, it is rewarding to examine the scatterplot in Fig 5 and 6. These are "Moran scatterplots showing the relationship between the attribute values themselves (horizontal axis) and the local mean attribute value (i.e., the mean value of the adjacent locations)" [16]. The attribute values in this case are the percentages of votes cast for either APC or PDP across the 36 States and the FCT. It can be observed that the graphs have four regions, regarded as quadrants. Where the attribute values in each State (including the FCT) and the mean value of the attribute in neighbouring States are less than the global mean, then they are plotted in the lower-left quadrant. If the attribute values in each State (including the FCT) and the mean value of the attribute in neighbouring States are greater than the global mean, then they are plotted in the upper-right quadrant. Where the attribute value and the local mean lie on opposite sides of the global mean, then they are plotted in the other two quadrants. Locations in the lower-left and upper-right quadrants have attribute values similar to that of their neighbours and therefore contribute to overall positive autocorrelation, while locations in the other two quadrants contribute to a negative autocorrelation. In the present study, most of the locations are in the upper-right and lower-left quadrants, indicating the likelihood of positive autocorrelation.

Fig. 5 (right) shows the Moran's scatterplot of the percentage of votes won by APC across the State with Moran's 1 of 0.868955. Similarly, Fig. 6 (right) is the Moran's scatterplot of the percentage of votes won by PDP across the States with Moran's 1 again being 0.868955. Hence, it is confirmed that there exist a positive autocorrelation in the voting pattern of the 2015 Presidential election.

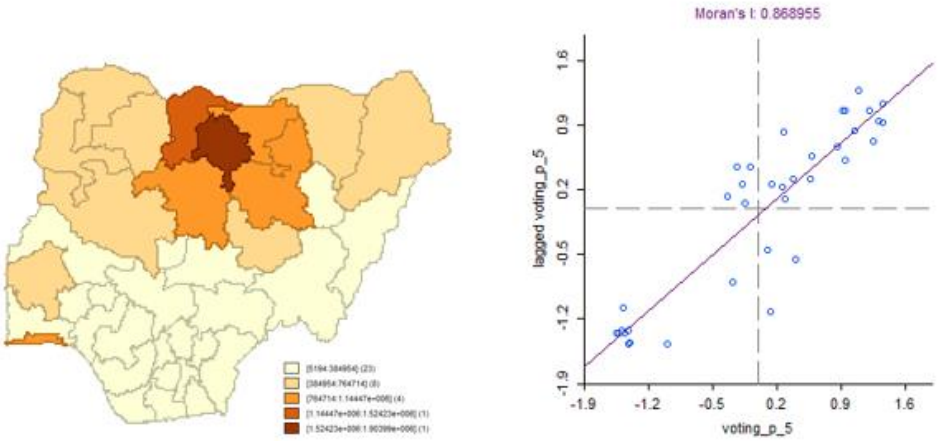

Fig-5: Percentage of votes cast for APC – left) Map visualization right) Moran scatterplot

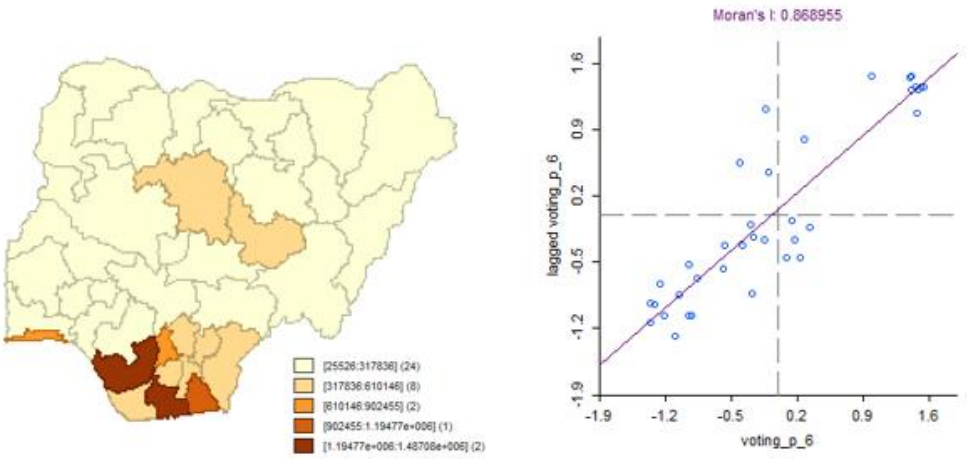

Fig-6: Percentage of votes cast for PDP – left) Map visualization right) Moran scatterplot

DISCUSSION OF FINDINGS

The main aim of this study was to examine the spatial dependency in the 2015 Presidential election in Nigeria. The results revealed that there are more connections between States where APC won (WW) than were the party actually lost (LL). Hence, there are more WW connections than there are LL. Literature [13] reveals that where there are more WW than LL connections, the tendency of the spatial arrangement to be towards clustering is high. As it is, it is clear from the map that out of the 37 contiguous zones (states and FCT), the APC won in 21 while the PDP won in 16. Most of the zones won by the APC are in the northern and south western part of the Country compared to the results of the 2011 elections where the CPC (one of the political parties that merged to form the APC) won only in the northern part of the Country (Fig. 7).

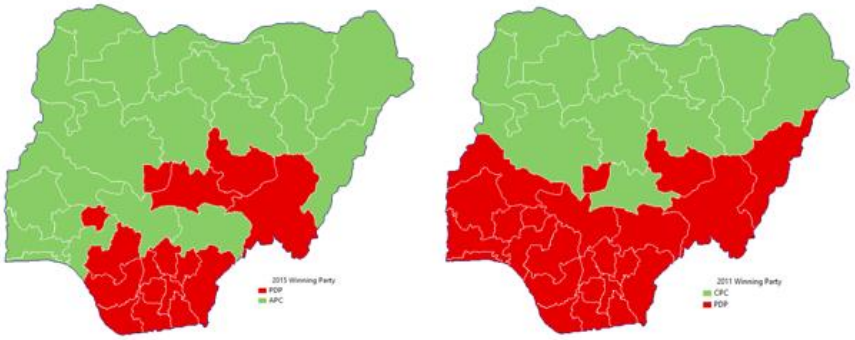

Fig-7: Winning parties within contiguous zones, left). 2015; right). 2011

Whilst the result of the 2011 appears to be based on religious dominance between Christians-dominated south and Muslims-dominated north, the 2015 results appears to relate more with ethnic affiliations and cultural values. This arrangement is supported by the model of geographic regions [5] with empirical supports in literature [1, 6, 9, 10]. It is also well known that most of the Hausas and Yorubas voted for the APC while the Igbos and the minorities in the South-south and North-central voted for the PDP.

A cursory look at the plots reveals that for Fig 5, most of the points between the attribute and the local weighted average of the attribute plots in the high-high portion of the figure while only a few plotted in the low-low segment while the reverse is the case for Fig 6. The results of the Moran's 1 agrees with that of the join count statistics in that it suggest a significant positive autocorrelation of percentage of votes cast in the States. Hence there is a grouping of states with similar percentage of votes cast for the two parties.

The statistical analysis reveals that the voting pattern is significantly different from what it should have been expected for a random distribution. Since it is very unlikely that the observed spatial arrangement of the States with respect to APC winning and losing is random, it can be said that the arrangement is significantly clustered. This implies that States that were closed together, went the same line in their voting. This gives further support to Tobler's First Law of Geography [8]. Hence, spatial dependence exist in the voting pattern of the 2015 Presidential election in Nigeria.

CONCLUSION

The study examined spatial dependency in the voting pattern of the 2015 Presidential election in Nigeria. Based on the findings, it can be concluded that the pattern of voting was significantly clustered. Hence, geographic space significantly influenced the outcome of the results of the election. States that are in the neighbourhood of each other tended to have voted along same lines. This gives further support to the concept of geographic regions and cultural sectionalism in electoral geography. It confirms the existence of spatial dependency in the 2015 Nigeria's Presidential election. This study could be extended in future works to look at the spatial trend in Nigeria's Presidential elections since independence to enable the prediction of voting patterns in future elections, particularly in 2019 when another Presidential election would be conducted.

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Appendix 1: 2015 Presidential election result sheet

INDEPENDENT NATIONAL ELECTORAL COMMISSION
2015 PRESIDENTIAL ELECTION
MARCH 28, 2015
SUMMARY OF RESULTS

S/N	NAME OF STATE	CODE	NO OF REGD. VOTERS	NO OF ACCRED. VOTERS	VOTES RECEIVED BY PARTIES														NO OF VALID VOTES	NO OF REJECTED VOTES	TOTAL VOTES CAST
					AA	ACPN	AD	ADC	APA	APC	CPP	HOPE	KOWA	NCP	PDP	PPN	UDP	UPP			
1	ABIA	AB	1,249,134	442,538	315	2,194	448	589	2,766	19,394	1,048	325	173	745	368,300	424	213	330	391,045	10,004	401,049
2	ADAMAWA	AD	1,518,123	709,998	495	1,148	596	1,012	1,549	174,701	819	267	752	1,212	251,664	1,263	289	394	636,018	25,192	661,210
3	AKWA IBOM	AK	1,644,481	1,070,070	1,609	443	474	608	384	56,411	612	392	160	283	953,304	327	224	344	1,017,064	11,487	1,028,551
4	ANAMBRA	AN	1,963,627	779,430	547	1,759	475	534	2,303	17,926	1,279	357	511	887	660,762	537	286	1,121	688,584	14,825	703,409
5	BAUCHI	BA	2,053,484	1,099,069	131	231	573	189	364	891,598	991	46	128	207	86,085	128	29	37	1,028,338	19,497	1,047,835
6	BAYELSA	BY	605,637	384,780	45	38	69	116	70	5,194	44	18	52	95	361,209	67	20	35	367,067	4,672	371,739
7	BENUE	BN	1,893,596	754,634	315	1,464	254	529	945	373,983	567	215	105	683	303,737	439	66	74	683,264	19,867	703,131
8	BORNO	BO	1,799,669	544,759	145	243	392	203	678	473,543	810	88	158	107	25,640	143	31	61	501,920	13,088	515,008
9	CROSS RIVER	CR	1,144,288	500,577	279	514	709	749	532	28,958	582	257	513	950	414,865	864	289	1,487	450,514	15,392	465,906
10	DELTA	DT	2,064,972	1,350,914	1,473	916	735	888	478	48,930	813	366	511	670	1,211,405	993	358	261	1,267,773	17,075	1,284,848
11	EBONYI	EB	1,071,226	425,301	426	1,214	1,133	2,704	2,452	19,518	2,365	989	913	1,890	323,653	1,168	626	6,859	383,888	29,449	398,337
12	EDO	ED	1,650,552	599,166	159	1,284	450	512	709	308,669	525	22	175	516	286,865	725	160	72	500,451	22,334	522,785
13	EKITI	EK	723,255	323,730	94	538	854	424	482	120,331	390	94	108	377	174,466	388	60	145	300,691	8,754	309,445
14	ENUGU	EN	1,381,563	636,112	441	479	269	478	715	14,157	237	210	203	761	553,059	407	1,429	290	573,373	12,459	585,832
15	GOMBE	GM	1,110,105	535,828	104	192	268	247	773	361,345	407	46	97	227	91,875	143	25	37	460,959	12,845	473,804
16	IMO	IM	1,747,683	801,712	539	956	757	1,617	2,295	353,255	735	357	156	784	551,385	434	264	1,917	700,964	28,957	731,921
17	JIGAWA	JG	1,835,839	1,153,428	394	560	587	375	2,527	885,986	1,553	337	422	548	147,904	855	336	197	1,037,564	34,325	1,071,889
18	KADUNA	KD	3,363,799	1,746,033	218	424	273	546	1,613	1,122,760	824	105	176	754	484,085	549	79	78	1,617,482	32,719	1,650,201
19	KANO	KN	4,963,862	1,384,434	426	778	708	657	2,770	1,803,999	1,552	292	288	697	215,739	485	286	166	2,128,821	43,626	2,172,447
20	KATSINA	KT	2,892,741	1,578,646	183	402	285	498	1,671	1,345,441	976	47	215	839	98,937	254	117	72	1,449,426	32,288	1,481,714
21	KEBBI	KB	1,457,763	792,817	214	361	450	472	2,685	567,883	1,294	213	448	518	100,972	567	209	288	677,003	38,119	715,122
22	KOGI	KG	1,390,883	678,839	700	1,089	427	761	1,003	264,851	967	144	190	895	148,987	478	180	166	421,328	17,869	439,197
23	KWARA	KW	1,181,053	481,360	240	837	520	438	1,165	302,346	910	118	214	394	132,660	335	81	102	440,080	21,321	461,401
24	LAGOS	LA	5,827,848	1,678,754	1,795	3,030	4,453	2,872	2,177	792,480	1,325	253	1,000	1,430	632,337	1,041	359	284	1,449,886	52,289	1,495,975
25	NASARAWA	NS	1,222,054	562,956	40	86	74	105	310	236,858	231	4	48	222	273,460	164	25	33	511,547	10,094	521,641
26	NIGER	NG	1,995,679	933,607	307	441	403	614	2,006	657,678	1,264	198	305	550	148,232	449	116	118	813,671	31,032	844,683
27	OGUN	OG	1,709,409	594,975	504	3,072	1,807	1,364	1,930	508,250	978	532	432	815	267,950	4,939	562	597	559,172	28,441	559,613
28	ONDO	OD	1,501,549	618,040	386	2,400	1,257	1,227	1,139	299,849	1,012	184	223	846	251,368	734	184	221	561,056	21,379	582,435
29	OSUN	OS	1,378,135	683,369	372	1,731	1,667	997	1,306	383,603	1,029	122	255	767	249,929	599	124	159	642,615	20,758	663,373
30	OYO	OY	2,344,648	1,075,849	6,391	8,979	6,282	5,000	4,468	628,620	6,634	839	1,832	1,895	303,378	2,842	1,069	3,666	880,852	47,754	928,606
31	PLATEAU	PL	1,977,211	1,076,833	178	581	279	406	610	423,240	257	56	138	693	549,635	554	54	29	982,388	18,304	1,000,692
32	RIVERS	RV	2,824,300	1,443,403	1,066	505	1,104	1,031	513	69,238	537	542	2,274	565	1,487,075	492	202	156	1,565,461	19,307	1,584,768
33	SOKOTO	SO	1,663,127	988,859	249	535	714	762	3,462	672,806	1,894	283	475	689	152,199	605	269	180	894,259	42,110	876,369
34	TARABA	TR	1,374,307	658,578	962	813	586	820	1,306	261,926	1,083	161	155	878	316,800	680	224	439	579,677	28,039	607,716
35	YOBE	YB	1,077,542	520,127	301	164	213	112	652	448,265	329	67	304	128	25,526	101	30	32	475,796	17,971	493,767
36	ZAMFARA	ZF	1,484,941	875,049	125	238	280	296	1,310	612,202	655	14	122	404	144,855	594	93	88	761,022	19,157	780,179
37	FCT	FCT	886,573	344,056	289	943	260	288	874	148,599	347	83	165	473	157,195	269	95	96	308,805	5,210	314,015
	TOTAL		67,422,005	31,746,490	22,325	40,311	30,875	29,666	53,537	15,424,921	36,300	7,435	13,076	24,455	12,853,162	24,475	9,203	18,220	28,587,564	844,519	29,432,083
					AA	ACPN	AD	ADC	APA	APC	CPP	HOPE	KOWA	NCP	PDP	PPN	UDP	UPP			

a	TOTAL NUMBER OF REGISTERED VOTERS	67,422,005
b	TOTAL NUMBER OF ACCREDITED VOTERS	31,746,490
c	TOTAL NUMBER OF VALID VOTES	28,587,564
d	TOTAL NUMBER OF REJECTED VOTES	844,519
e	TOTAL NUMBER OF VOTES CAST	29,432,083

Appendix 2: Matrix of adjacencies of states in Nigeria

STATES & FCT	ABIA	ABUJA	ADAMAWA	AKWA IBOM	ANAMBRA	BAUCHI	BAYELSA	BENUE	BORNO	CROSS RIVER	DELTA	EBONYI	EDO	EKITI	ENUGU	GOMBE	IMO	JIGAWA	KADUNA	KANO	KATSINA	KEBBI	KOGI	KWARA	LAGOS	NASARAWA	NIGER	OGUN	ONDO	OSUN	OYO	PLATEAU	RIVERS	SOKOTO	TARABA	YOBE	ZAMFARA	TOTAL	
Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37		
1	0	0	0	1	1	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	7	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	4	
3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	
4	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	
5	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	7	
7	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	
8	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	6	
9	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	
10	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
11	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	6	
12	1	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
13	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	3	
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	4	
15	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	
16	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	5	
17	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	4	
18	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	
19	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	1	0	0	0	1	8	
20	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	3	
23	0	1	0	0	1	0	0	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	10	
24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	5	

25	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
26	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**6**
27	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**6**
28	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**4**
29	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**
30	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**5**
31	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**
32	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**4**
33	**1**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**
34	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2**
35	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**6**
36	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**
37	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**5**
V	**7**	**4**	**3**	**3**	**5**	**7**	**2**	**6**	**3**	**4**	**6**	**4**	**3**	**4**	**5**	**5**	**4**	**4**	**8**	**4**	**4**	**3**	**10**	**5**	**1**	**6**	**6**	**4**	**6**	**5**	**3**	**4**	**5**	**2**	**6**	**4**	**5**	**170**
V-1	**6**	**3**	**2**	**2**	**4**	**6**	**1**	**5**	**2**	**3**	**5**	**3**	**2**	**3**	**4**	**4**	**3**	**3**	**7**	**3**	**3**	**2**	**9**	**4**	**0**	**5**	**5**	**3**	**5**	**4**	**2**	**3**	**4**	**1**	**5**	**3**	**4**	**133**
V(V-1)	**42**	**12**	**6**	**6**	**20**	**42**	**2**	**30**	**6**	**12**	**30**	**12**	**6**	**12**	**20**	**20**	**12**	**12**	**56**	**12**	**12**	**6**	**90**	**20**	**0**	**30**	**30**	**12**	**30**	**20**	**6**	**12**	**20**	**2**	**30**	**12**	**20**	**722**