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Full Length Research Paper

Pattern of Nocturnal Movements in Calabar, Cross River State, Nigeria

***[1]Francis Okpiliya, [2]Chukwudi G. Njoku, [3]Prince-Charles O. Itu, [4]Erhabor, O. Frank**

[1,2,3]Department of Geography and Environmental Science, University of Calabar, Calabar, Cross River State, Nigeria
[4]Department of Geography and Environmental Management, Ahmadu Bello University, Zaria, Kaduna State, Nigeria.

[*]Corresponding author: fetiongokpiliya@gmail.com (+2348068223854)

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Mobility is a continuous process for man and he has through environmental determinism overtime overcome the restrictions posed by darkness, especially within urban spaces where activities are unending running from dawn to dusk. The focus of this study was the pattern of nocturnal movements in Calabar. Primary data was employed, retrieved from 652 questionnaires which were administered simultaneously at 33 strategic nuclei in the 22 wards of the city between 9pm to 12 midnight. Results show that taxis and buses were majorly used (63%), most of which were for relaxation purposes (43%). Security trepidations were most worrisome (58%) and 9pm was the curfew for 54% of Calabar residents. Calabar South had more residents moving within their vicinity and the highest trip receptors (trips to origin nuclei) were Atekong, Edim-Otop by CUDA and Tinapa/8 Miles areas. Contrarily, the major trip generators (trips from origin nuclei) were Marian by IBB, Beach Market, Bogobiri, Watt Market, Stadium by IBB and Calabar road by De-Choice. In all there were more trip generators (388) than receptors (264). Further spatial outputs shows dispersion and 2 hotspots for receptors at the northern flanks and 8 coldspots in the city center and a vice versa for trips from generators. The mean center of trip generators was around Millennium Park and Atekong for receptors. The result of the Independent Samples t-Test revealed statistical significant difference between the nocturnal trips to and from origin in Calabar (*t = 4.285, p = 0.00*). It was recommended that security be improved enroute and at nocturnal hotspots, better transportation infrastructure and system be implemented and that the findings of the study be adopted for urban transportation planning and management.

Keywords: Nocturnal, Pattern, Movement, Nuclei, Calabar.

INTRODUCTION

Background to the Study

The task before transport, urban, human geographers and policy makers is enormous, knowing that human migration is the key in all races both in rural and urban areas of the world. People are continually on the move. This movement might cover short and long distance depending on the kilometers covered by human and further consequence upon pushes and pull factors. A careful evaluation of people's movement shows various and multi-faced patterns in migration from one location to another. In realigning the basic elements involved in human migration, we have been beset by difficulties in view of patterns of people's movement. The level of urbanization in the world and Nigeria, has reached an unprecedented height, hence the crux in human population tantamount to different patterns of human

movement in developed and developing countries of the world. A city can be considered as a locational arrangement of activities or a land-use pattern. The location of activities affects human beings and human activities modify locational arrangement. Interaction between activities is manifested by the movement of people, goods and information as spatial movement pattern analyzed by Plotting Polar Coordinate to estimate forging paths and homie behavior of tagged individuals (Carpenter, 1984). Urban movement is both an element and a catalyst of economic and social activities. It provides the means by which people and goods are moved in space and time. The Cambridge dictionary simplifies 'nocturnal' as something or happening activity in or relating to the night. Movement is what someone is doing at a particular period, while pattern is any regularly repeated arrangement or a particular way in which something is done.

Further, it is noteworthy that the advent of Carnival Calabar and transformation of Cross River State to a major tourism center in Africa has contributed immensely to the socio-economic development of the state and also increased the rate of nocturnal movement in Calabar. Preliminary survey shows that young and energetic people tend to move more at night, while the elderly prefer moving, driving and engaging in other migratory activities in the day. From the foregoing, it becomes pertinent to assess the pattern of nocturnal movements in the city. Further preliminary survey by the authors showed that the conditions under which people move at night have become more difficult as a result of issues that border on inadequate commercial means of movement, high transportation fare and security challenges. The afore issues attributed to nocturnal movement are currently major problems in Calabar, especially the escalation in crime rate ranging from cases of rape at night, phone ad handbag snatching at gun point, car battery and radio theft, robbery, security cult killings to mention but a few, which are mostly perpetuated in the cover of darkness.

Nocturnal movement within Calabar and its attendant challenges call for answers to certain profoundly critical questions such as these; what is the pattern of nocturnal movement in the area? What are the challenges encountered by residents who transit at night? Why do people engage in nocturnal movement? What is the perception of people towards nocturnal movement in Calabar municipality? What mode of transportation is mostly used at night? What is the spatial cluster pattern of nocturnal trips to and from locations within the city? And so on. The search for answer to these questions are indeed an elusive, hence this research. The objectives of the study thus encompassed to assess the attributes of nocturnal trips and examine the spatial pattern of nocturnal trips in the city. This study is focused on Calabar, the capital city of Cross River State in south-south Nigeria. The city is politically divided into Calabar South and Calabar Municipality Local Government Areas (LGA) with 12 and 10 wards respectively. As shown in Figure 1, the city lies between longitudes $8^{o}18'00''E$ to $8^{o}24'00''E$ and latitudes $4^{o}54'00''N$ to $5^{o}04'00''N$ and covers a land area of 137.039 square kilometers (sq. km) and an estimated population of 435,196 in 2016 (Njoku, 2016).

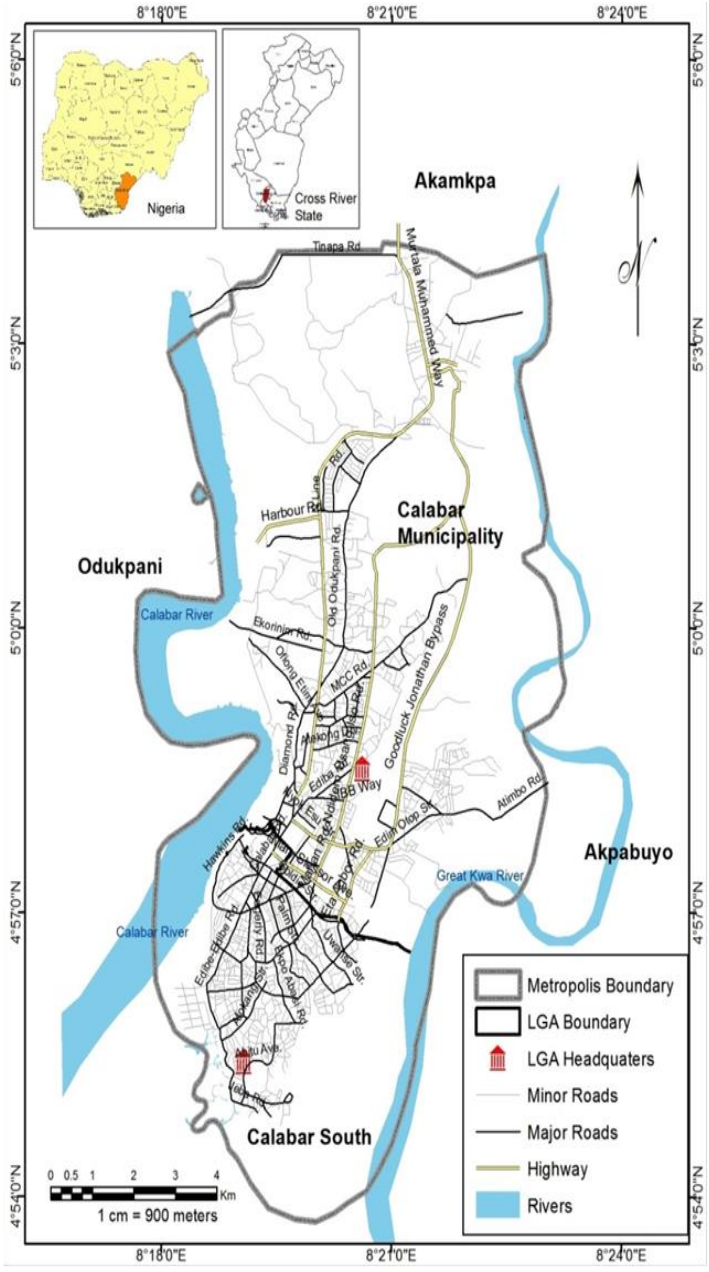

Figure 1: Map of Calabar (Source: Office of the Surveyor General, Cross River, 2016)

LITERATURE REVIEW

Several literatures have contributed to the subject of urban movement (transportation/migration) and more emphasis has been laid on the population dynamics of the city centers of Nigeria and Calabar. This paper will therefore anchor on existing literatures and expand new scope for future research on the aspect of nocturnal movement pattern. Eja, Otu, Eko and Etim (2011) carried out a study on environmental consequences of volumetric traffic flow in Calabar Metropolis, Nigeria. The study area was stratified into 10 sample locations for volumetric traffic count, while air samples was collected from 20 sample point using absorption filter. The data collected was subjected to statistical and laboratory analysis and the result obtained revealed that there was a positive relationship between air pollutants concentration and volumetric traffic flow in the metropolis, in view of the fact that major air pollutants ranging from carbon dioxide (CO_2) nitrogen oxide (No), sulphur dioxide (SO^2), carbon monoxide (CO), were higher than threshold level. Thus, the study recommended that all inclusive environment management to reduce it already felt impact on man's physical environment.

In a related study, Odum and Aloba (2014), worked on urban transportation challenges in Calabar: causes, implication and solutions. The study investigation was done by using questionnaire to gather data following the state government ban on motorcycle as a means of commercial transportation. The study analysis revealed that inexperience, inconsiderate and undisciplined taxi drivers were the major causes of traffic challenges in the metropolis. It was further revealed that most taxi drivers lack basic knowledge about road and traffic sign, hence the increase in fatalities and road accidents. It was therefore recommended that taxi drivers should be educated on traffic and road signs periodically, drivers should be certified by government before plying the roads, encourage non-motorized model of transportation among others. Opata, (2012) in his Ph.D. thesis, conducted a study on night-time road transportation in Nigeria as an aspect of Igbo entrepreneurship, 1970-2000. The study noted that night travels by road are mostly embarked upon by low income and middle-income business people. Data were gotten from transport service providers, passengers and other stakeholders in the business of night-time road transport. Focus Group Discussion (FGD) was also used to obtain data for the study. It also revealed the transport forms that engaged in night travels by road and further pointed out that repeated incidents of accidents and armed robbery discouraged a lot of passengers from travelling by night, especially as crime escalates more during night transportation compared to day movement.

Aderamo (2012) in a separate study investigated urban transportation problems and challenges in Nigeria. The study revelation resonates with studies by Rodrigne (2009), Ogunsaya (1993) and Aderamo (1998), all on the subject of urban transportation system and it corresponding challenges. The result revealed that urbanization is a major factor that causes urban transport issues. While studies by Kombs (1988) and Ogunbodede (2004) point to traffic congestion as a major problem mainly caused by poor or absent of parking lot in urban centers. The study therefore suggested that more drainage systems should be provided, off-street parking facilities should also be strategically placed, while traffic light-should be placed at major road intersections (junctions), regular road maintenance should be upheld and each urban centre should be studied separately to ascertain it peculiar transport issues, so as to plan or good transport system for such city.It is observed that there is a dearth of research on nocturnal movement of people in Calabar, Nigeria and beyond. Most other studies concentrated more on transportation as a whole and during the day without particular emphasis on night-time movements. Hence, this paper aimed to fill that research gap.

MATERIALS AND METHODS

The cross-sectional research was adopted for primary data collection among the varying socio-economic backgrounds and ages in Calabar. The primary data were sourced majorly from questionnaires and interviews. These data aided in the analyses for answering bothering questions on the set objectives. Also, spatial data was acquired with the use of handheld Global Positioning System (GPS), to record the coordinate of the questionnaire administration nuclei within the city. Also, secondary data sources consisted of existing literatures, publications, journals, articles, thesis, reports and conference papers. The city was firstly stratified in line with the political wards delineation; 10 wards in Calabar South LGA and 12 in Calabar Municipality LGA. A total of 20 questionnaires were then administered simultaneously at selected nuclei in each ward. These nuclei were strategic locations that had high human and nocturnal activities. Further, road-side interviews were conducted randomly to a total of 660 respondents at the selected nuclei.

Then interviews were conducted between 7pm and 12 midnight in the month of March, 2017. Figure 2 shows the locations of questionnaire administration in the city, labeled 1 to 33. Notably, respondents that

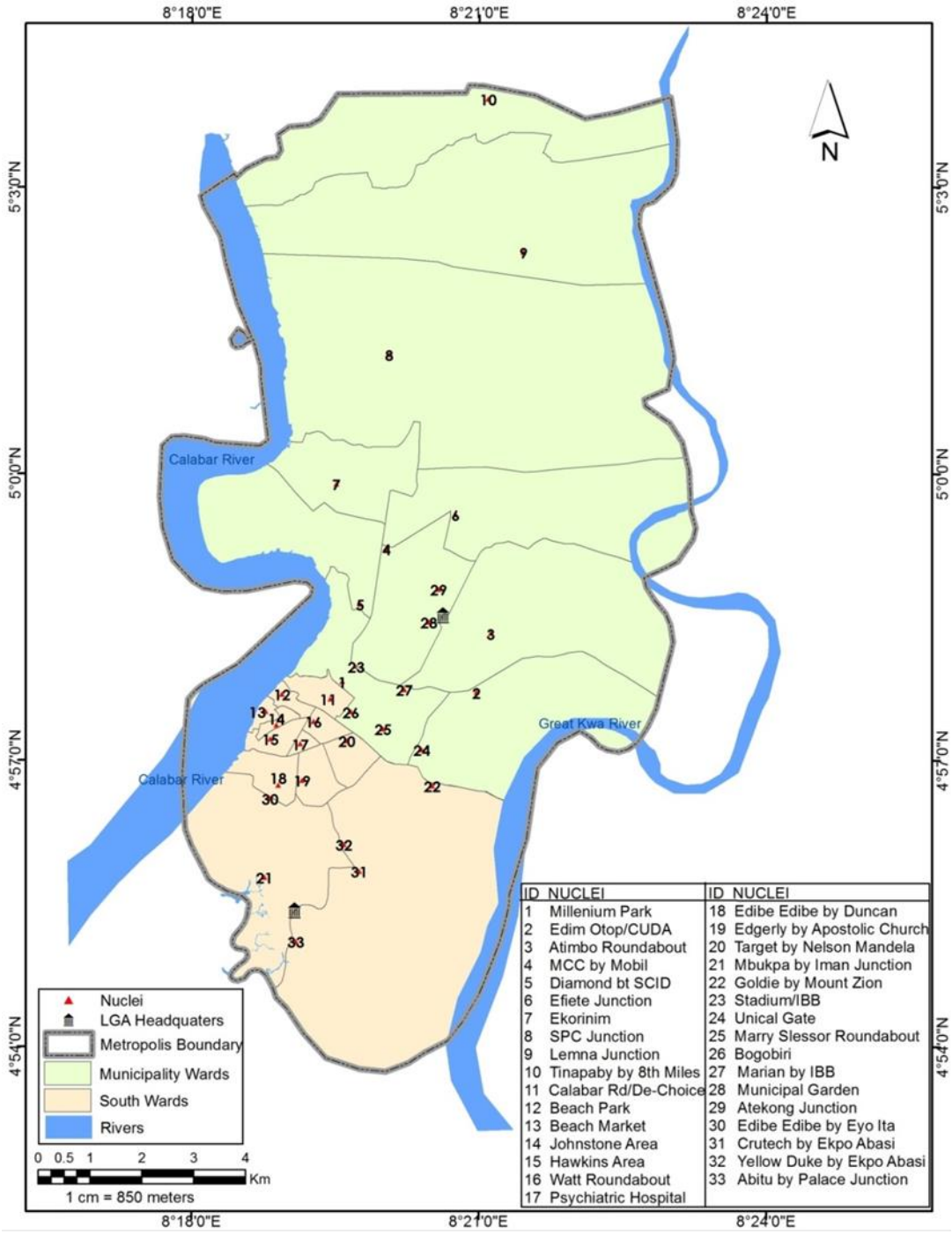

Figure 2: Sampling nuclei (Source: Authors fieldwork) 2017.

were moving out of the city were not considered because the focus of the study was nocturnal movements that occurred within Calabar Metropolis. What's more, for the data analyses, a comparison of mean test using the Independent Sample t-Test was conducted to establish the statistical difference that exist between trips to and from the selected origin nuclei. For this purpose, a hypothesis was stated that the nocturnal trips to and from specified origin nuclei in Calabar do not differ significantly. The Getis-OrdGi hot-spot analysis and mean center spatial statistical tools were also used to measure clusters and geographic

distribution in the study.

RESULTS AND DISCUSSION OF FINDINGS

Attributes of Nocturnal Trips in Calabar

Findings from the study shows that a total of 652 0f the 660 samples were successfully administered. A total of 75 percent of these respondents were males, while 25 percent were females. The details of transportation mode adopted for nocturnal movement in Calabar was also assessed. These modes were deduced to include walking, cycling, motorcycle, taxi/bus and private vehicles. Analysis revealed that 15 percent walk on foot to their locations, usually short distances, 1 percent cycle to preferred locations, 4 percent use motorcycles, especially at the Federal Housing and 8Mile axis, 63 percent used either a taxi or a bus for their night movement and 17 percent of sampled respondents use their private vehicles. A higher percentage of sampled respondents use taxi/bus most likely because it is the most available transport mode that traverse the city at all times of the day. Motorcycles and tricycles are restricted at most parts of the city and times of the day.
Table 1 contains information on the purposes for nocturnal trips in Calabar. The analysis revealed that 3 percent were going to work, whereas 2 percent

Table 1: Purposes for nocturnal trips in Calabar

Trip purpose	Going To		Coming From	
	Frequency	Percentage	Frequency	Percentage
Work	12	3	6	2
Religious activity	34	9	14	5
Recreation/ relaxation	168	43	118	45
Visit of friend or family	4	1	8	3
Shopping	74	19	28	11
Academic	9	2	7	3
Hospital	6	2	2	0.75
Police Station	2	0.5	1	0.25
Inter-city motor park	2	0.5	5	2
Home	77	20	75	28
	388	100	264	100

Source: Authors field work, 2017.

were returning from work. Also, 9 percent made nocturnal trips for religious activities and 5 percent were returning back from same. Further, 43 percent of the sampled population were going to different recreational/relaxation spot, while 45 percent were returning home from same location. Only 1 percent went to visit friends/family and 19 percent went shopping, whereas 11 percent were coming back from shopping at a market, mall or road-side store. Additionally, 2 percent of sampled respondents were heading to school, mostly university of Calabar students for night reading while 3 percent were returning back from the University. Only 1 respondent was coming back from the hospital and 2 respondents were heading to the police station. For inter-city Motor Park, 2 respondents were on their way to the park most likely to retrieve an item or for a night trip, while 5 respondents were coming back to interview location from the park. Finally, analysis of the same table revealed further that 20 percent of sampled respondents were going to their homes, while 28 percent were coming from their homes at different locations. From the overall analysis, it could be inferred the most of the respondents embark on nocturnal movements to recreational/relaxation areas of the metropolis followed by respondents who either were going back home or leaving home.

Just like any other human activity, there are challenges faced by respondents who make nocturnal movements in the Metropolis. Analysis show that 58 percent of the sampled respondents had security issues, while 19 percent lamented over increased cost

of transportation at night and 13 percent complained about limited means of public transportation, most especially in Calabar South where tricycle are banned from operating from 6 pm. Further, 8 percent face challenges of poor road infrastructure and 2 percent complained of weather related issues such as rainfall as hindrance to their trips. Security concern thus proves to the most challenging problem to those who move in Calabar at night, thus reiterating the need for improved security in a city that is popular for its bustling nocturnal nature. For 54 percent of the respondents encountered, 9pm is their curfew, while 26 percent can return anytime between 9pm to 11pm. The remaining 20 percent do not mind returning to their abode after 11 pm.

Spatial Pattern of Nocturnal Trips

A summary of the details of nocturnal trips within the metropolis revealed that the highest number of trips made within each sampling nuclei was at Johnstone area in Calabar South and Ekorinim in the Municipality (Figure 3). The respondents here, though mobile, did not intend to travel out of the vicinity. Calabar South has more residents moving within their vicinity most likely because of the worsen security situation perceived in the area compared to the Municipality, or because there are better transportation and infrastructure in the former to support nocturnal movements. As summed from the matrices showing the number of trips from one nucleus to another in Tables 2 and 3, as well as pictured in Figure 4, the trips made to the origin nuclei locations were examined. A total of 264 trips were made to the origin nuclei from other locations within the city.

The highest trips to the origin in the Municipality were made by 15 persons who moved to the Atekong area, 14 persons moved to EdimOtop by CUDA area and 14 persons to Tinapa/ 8 Miles junction. Others include 13 trips to Atimbo roundabout and 10 trips each to Ekorinim and Millennium Park. Further shown on Figure 4, the highest trips to selected origin nuclei in Calabar South were 12 each to Hawkins area and Mbukpa by Iman junction. The least trips were to the Beach Market which is not expected to have visitors at night as well as MCC by Mobil Junction which is majorly a transit zone. Notably, the peak trips to origin nuclei were either movements to relaxation spots (Atekong junction and EdimOtop by CUDA) or people returning to their homes (Ekorinim, Tinapa/ 8 Miles junction and Hawkins area). These locations where trips are made to can be described as trip receptors because of the pull factors they possess at nocturnal periods.

On the other hand, the trip generators as summarized from Tables 4 and 5 and as shown on Figure 5, there were more trips from the origin nuclei to other locations in the city (388 trips). The highest number of trips were made from Marian by IBB (17 trips), Beach Market (18 trips), Bogobiri (17 trips), Watt Market roundabout (15 trips), Stadium by IBB (15 trips) and Calabar road by De Choice (15 trips). Other areas with high frequency of trips were Abitu by Police Junction, Diamond by SCID and Beach Park. These are high activity areas, some of which generate large number of persons at peak periods of the day such as the Beach and Watt Markets. Calabar road by De Choice is only a few meters away from Watt Market and houses a major intra-city motor park, a recreational park and Automated Teller Machines (ATM), thus the attraction of high trips from the other nuclei. Bogobiri is also a high activity area, where ATMs, eateries and the popular *Suya* Arcade is located. The locations with fewer trips from the origin nuclei include Mbukpa by Iman, Tinapa/ 8 Miles, Municipal Garden, EdimOtop/CUDA junction and Atimbo roundabout. These areas generate fewer movements at nocturnal periods.

Furthermore, Figure 4 shows dispersion in the volume of trips, with the highest trips to origin made away from the city center towards the suburbs. Figure 6 shows the output of the Getis-OrdGi hot-spot analysis. It shows 2 hot-spots of trips to origin nuclei in the northern flanks of the city. The busy center of the city represents the 8 cold-spot locations because of the high outflow of people at nocturnal periods. The mean center of trips to origin nuclei was deduced to be 8º 19′ 55.718″ E and 4º 58′ 13.833″ N, located in the vicinity of Atekong Street in Calabar Municipality. Additionally, Figure 5 picture a cluster of higher trips from origin nuclei in the city center with fewer trips emanating towards the surburb. Figure 7 shows the output of the hotspot analysis depicting 8 heated trip locations from the origin nuclei at the center which eases out towards the southern and northern outskirts of the city. The derived mean center of trips from the origin was 8º 19′ 40.493″E and 4º 57′ 46.288″N, located in the vicinity of Millennium Park.

The result of the Independent Samples t-Test derived indicates the trips to the origin nuclei have a statistically significantly higher mean (11.76) than the trips away from origin (8.00). This implies that there is a higher flow of people at nocturnal periods to origin nuclei (trip receptors) that the trips from origin (trip generators) in Calabar. This is further buttressed in Table 6, that there is statistical significant difference between nocturnal trips to and from origin in Calabar ($t = 4.285$, $p = 0.00$). This provides enough evidence to accept the alternate and reject the null hypothesis.

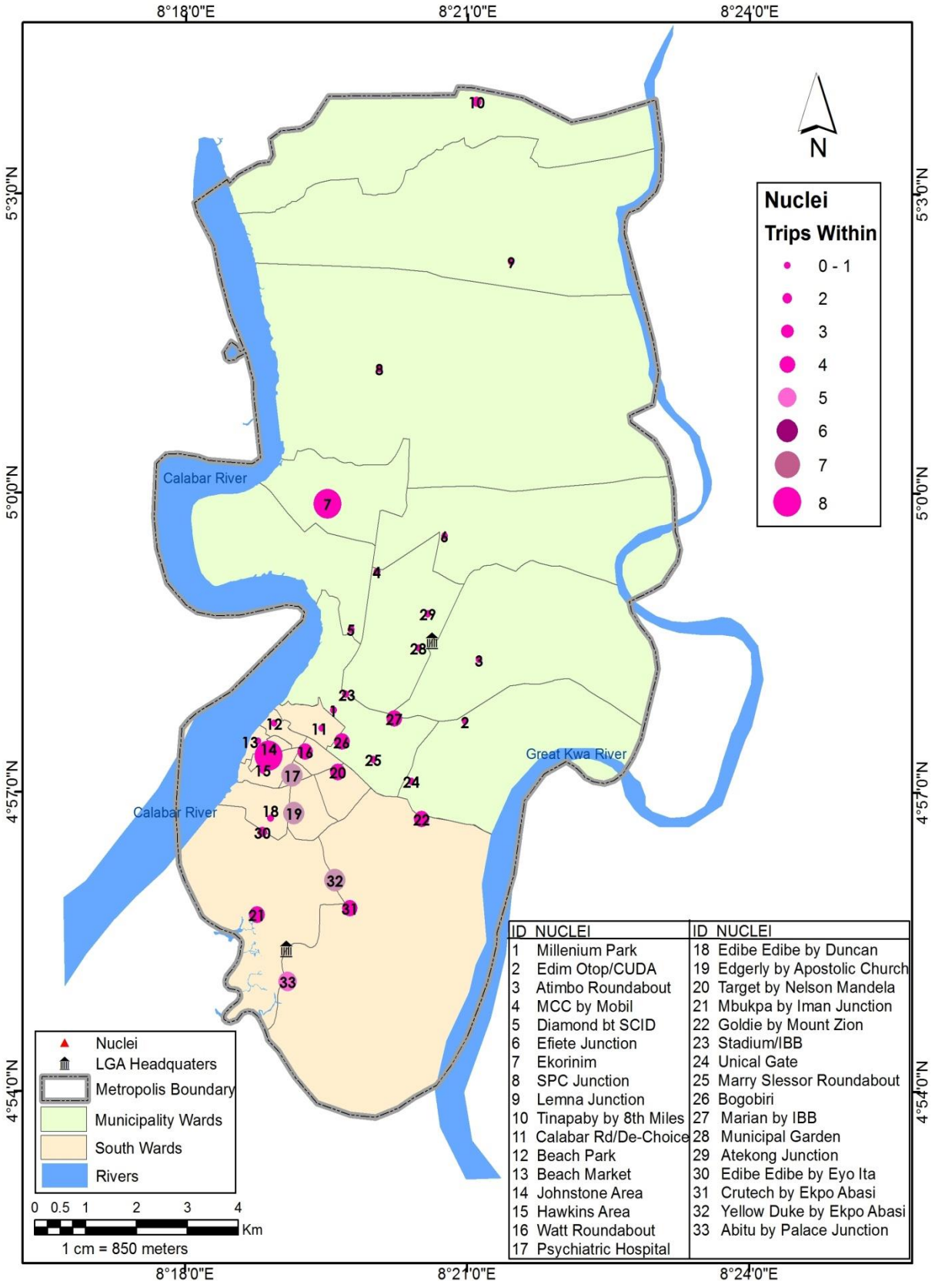

Figure 3: Trips made within nuclei (Source: Authors fieldwork)

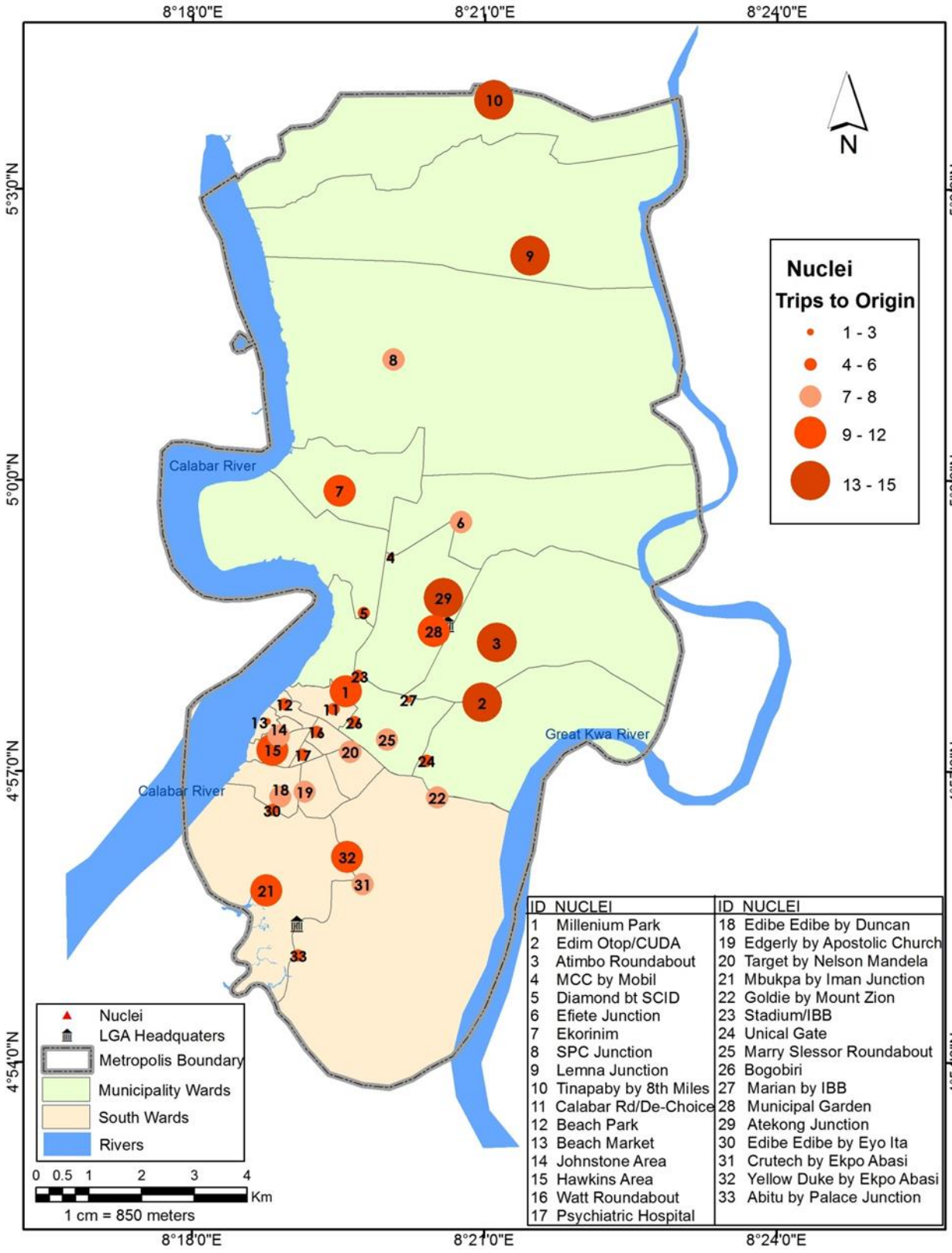

Figure 4: Trips made to origin nuclei (Source: Authors fieldwork, 2017)

Table 2: Matrix of trips made to origin nuclei (A)

		Trips to Origin (Nuclei)																
Wards	Trip origin (Nuclei)	Stadium by IBB	Millenium Park	Bogobiri	Mary Slessor Roundabout	Marian by IBB	Unical Gate	Edim Otop by Cuda	Atimbo Roundabout	Municipal Garden	Atekong Junction	MCC by Mobil	Diamond by SCID	Efiete Junction	Ekorinim	SPC Junction	LEMNA/Highway Junction	Tinapa/8th Miles Junction
M1	Stadium by IBB	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1
	Millenium Park	1	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	2
	Bogobiri	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
	Mary Slessor Roundabout	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0
	Marian by IBB	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
M2	Unical Gate	1	0	0	0	1	0	1	3	0	0	0	0	0	0	0	0	0
	Edim Otop by Cuda	3	0	0	0	0	2	0	0	2	0	2	0	0	0	0	0	1
M3	Atimbo Roundabout	7	0	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0
M4	Municipal Garden	0	0	0	0	0	4	2	1	0	0	1	0	0	0	0	1	0
	Atekong Junction	0	2	0	0	2	1	2	2	0	0	0	0	0	2	0	0	0
	MCC by Mobil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
M5	Diamond by SCID	0	0	0	0	0	1	0	0	0	0	1	0	1	2	0	0	0
M6	Efiete Junction	0	0	0	2	0	0	0	0	0	0	3	0	1	0	0	1	0
M7	Ekorinim	0	1	0	0	0	0	0	0	0	0	4	3	0	0	0	0	0
M8	SPC Junction	0	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	0
M9	LEMNA/Highway Junction	0	0	2	0	0	1	0	2	1	0	0	0	0	0	0	0	3
M10	Tinapa/8th Miles Junction	0	0	0	0	0	1	0	0	2	0	3	0	0	0	0	0	0
S1	Calabar Road by De Choice	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
S2	Beach Park	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S3	John Stone Area	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
S4	Beach Market	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S5	Hawkins Area	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
S6	Watt Roundabout	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
S7	Psychiatric Hospital	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
S8	Edibe Edibe by Duncan	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
S9	Edgerly by Apostolic Church	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
S10	Target by Nelson Mandela	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
S11	Edibe Edibe by Eyo Ita	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	Mbukpa by Iman Junction	0	1	2	0	1	0	0	0	0	2	0	0	0	0	0	0	0
S12	Goldie by Mount Zion	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
	Yellow Duke by Ekpo Abasi	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	1
	Crutech by Ekpo Abasi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Abitu by Palace Junction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: Authors fieldwork, 2017

Table 3: Matrix of trips made to origin nuclei (B)

		Trips to Origin (Nuclei)															
Wards	Trip origin (Nuclei)	Calabar Road by De Choice	Beach Park	John Stone Area	Beach Market	Hawkins Area	Watt Roundabout	Psychiatric Hospital	Edibe Edibe by Duncan	Edgerly by Apostolic Church	Target by Nelson Mandela	Edibe Edibe by Eyo Ita	Mbukpa by Iman Junction	Goldie by Mount Zion	Yellow Duke by Ekpo Abasi	Crutech by Ekpo Abasi	Abitu by Palace Junction
M1	Stadium by IBB	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
	Millenium Park	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
	Bogobiri	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0
	Mary Slessor Roundabout	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
	Marian by IBB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
M2	Unical Gate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Edim Otop by Cuda	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
M3	Atimbo Roundabout	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M4	Municipal Garden	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
	Atekong Junction	0	0	0	0	0	2	0	0	0	1	0	0	1	0	0	0
	MCC by Mobil	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
M5	Diamond by SCID	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M6	Efiete Junction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
M7	Ekorinim	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
M8	SPC Junction	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
M9	LEMNA/Highway Junction	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
M10	Tinapa/8th Miles Junction	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0
S1	Calabar Road by De Choice	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
S2	Beach Park	0	0	0	0	0	1	0	0	0	0	2	1	0	0	0	0
S3	John Stone Area	0	0	0	0	0	6	0	0	0	0	0	1	0	0	0	0
S4	Beach Market	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
S5	Hawkins Area	0	0	0	1	5	0	0	0	2	0	0	0	2	0	0	0
S6	Watt Roundabout	0	0	0	2	0	1	0	0	0	0	0	0	1	0	0	0
S7	Psychiatric Hospital	1	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0
S8	Edibe Edibe by Duncan	0	0	1	1	0	3	0	2	0	0	0	0	0	0	0	0
S9	Edgerly by Apostolic Church	0	0	0	0	0	0	0	0	1	0	0	0	3	0	2	0
S10	Target by Nelson Mandela	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0
S11	Edibe Edibe by Eyo Ita	1	0	1	0	0	0	0	0	0	1	0	0	1	1	0	0
	Mbukpa by Iman Junction	0	1	0	0	0	2	0	0	0	0	0	2	0	0	1	0
S12	Goldie by Mount Zion	0	0	0	0	0	2	0	0	0	0	0	0	1	0	1	0
	Yellow Duke by Ekpo Abasi	0	0	0	0	0	0	0	0	0	0	0	4	0	0	3	0
	Crutech by Ekpo Abasi	0	0	0	0	1	2	0	0	0	0	0	0	0	0	3	1
	Abitu by Palace Junction	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3	0

Source: Authors fieldwork, 2017

Table 4: Matrix of trips made from origin nuclei (A)

		Trips from origin (Nuclei)																
Wards	Trip origin (Nuclei)	Stadium by IBB	Millenium Park	Bogobiri	Mary Slessor Roundabout	Marian by IBB	Unical Gate	Edim Otop by Cuda	Atimbo Roundabout	Municipal Garden	Atekong Junction	MCC by Mobil	Diamond by SCID	Efiete Junction	Ekorinim	SPC Junction	LEMNA/Highway Junction	Tinapa/8th Miles Junction
M1	Stadium by IBB	0	0	2	1	0	2	1	2	0	0	0	0	0	0	0	0	0
	Millenium Park	0	0	2	0	4	0	0	0	0	0	1	0	0	0	0	0	0
	Bogobiri	2	0	2	1	0	2	0	0	0	0	0	2	0	0	0	0	0
	Mary Slessor Roundabout	3	0	2	0	2	1	0	0	0	0	1	0	0	0	0	0	2
	Marian by IBB	2	0	0	0	2	1	3	3	0	0	0	0	2	1	1	1	1
M2	Unical Gate	0	0	4	2	0	0	3	2	0	0	0	0	0	0	0	0	1
	Edim Otop by Cuda	1	0	0	0	2	0	0	0	1	1	0	0	1	0	0	0	0
M3	Atimbo Roundabout	0	0	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0
M4	Municipal Garden	0	0	0	1	0	2	1	1	0	2	0	0	0	0	0	0	0
	Atekong Junction	1	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	1
	MCC by Mobil	0	0	4	2	0	0	0	3	1	2	0	0	0	0	0	0	0
M5	Diamond by SCID	0	0	0	0	1	0	0	2	0	3	0	0	0	0	0	0	1
M6	Efiete Junction	0	0	0	0	0	2	1	0	2	3	4	0	0	0	0	0	0
M7	Ekorinim	0	0	0	0	0	0	0	0	1	1	2	0	0	4	0	0	0
M8	SPC Junction	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	4
M9	LEMNA/Highway Junction	0	0	2	1	0	0	0	0	2	0	0	0	1	0	0	0	1
M10	Tinapa/8th Miles Junction	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
S1	Calabar Road by De Choice	0	0	1	2	0	2	2	3	0	0	0	0	0	0	0	0	1
S2	Beach Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S3	John Stone Area	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S4	Beach Market	0	0	0	0	0	0	4	2	0	0	2	0	0	0	0	0	3
S5	Hawkins Area	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
S6	Watt Roundabout	0	0	0	0	2	0	0	2	0	0	2	0	0	0	0	1	1
S7	Psychiatric Hospital	0	1	0	0	3	0	0	0	1	2	0	0	0	0	0	0	1
S8	Edibe Edibe by Duncan	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0
S9	Edgerly by Apostolic Church	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
S10	Target by Nelson Mandela	1	0	2	0	2	0	0	0	0	2	1	0	0	0	1	0	0
S11	Edibe Edibe by Eyo Ita	0	0	0	0	1	3	0	0	2	0	0	0	0	0	0	0	0
	Mbukpa by Iman Junction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S12	Goldie by Mount Zion	1	0	0	1	1	2	1	0	0	2	0	0	0	0	0	0	0
	Yellow Duke by Ekpo Abasi	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Crutech by Ekpo Abasi	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Abitu by Palace Junction	1	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0

Source: Authors fieldwork, 2017

Table 5: Matrix of trips made from origin nuclei (B)

		Trips from origin (Nuclei)															
Wards	Trip origin (Nuclei)	Calabar Road by De Choice	Beach Park	John Stone Area	Beach Market	Hawkins Area	Watt Roundabout	Psychiatric Hospital	Edibe Edibe by Duncan	Edgerly by Apostolic Church	Target by Nelson Mandela	Edibe Edibe by Eyo Ita	Mbukpa by Iman Junction	Goldie by Mount Zion	Yellow Duke by Ekpo Abasi	Crutech by Ekpo Abasi	Abitu by Palace Junction
M1	Stadium by IBB	4	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
	Millenium Park	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
	Bogobiri	2	0	0	0	0	3	0	0	0	1	0	0	1	1	0	0
	Mary Slessor Roundabout	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Marian by IBB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M2	Unical Gate	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Edim Otop by Cuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M3	Atimbo Roundabout	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
M4	Municipal Garden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Atekong Junction	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	MCC by Mobil	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
M5	Diamond by SCID	3	0	0	0	0	0	0	0	0	1	0	1	2	0	1	0
M6	Efiete Junction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M7	Ekorinim	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
M8	SPC Junction	3	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
M9	LEMNA/Highway Junction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M10	Tinapa/8th Miles Junction	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
S1	Calabar Road by De Choice	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0
S2	Beach Park	0	0	2	1	2	4	0	0	2	3	0	1	0	0	0	0
S3	John Stone Area	1	2	4	0	0	4	0	0	0	1	0	0	0	0	0	0
S4	Beach Market	0	0	3	0	0	3	0	0	0	0	0	0	0	0	1	0
S5	Hawkins Area	0	0	0	0	0	0	0	1	0	0	0	2	2	0	0	1
S6	Watt Roundabout	0	0	1	0	0	2	1	0	0	2	0	0	1	0	0	0
S7	Psychiatric Hospital	0	0	0	0	0	0	3	0	0	0	0	1	0	1	0	0
S8	Edibe Edibe by Duncan	0	0	0	0	0	1	0	1	1	0	0	2	1	0	0	0
S9	Edgerly by Apostolic Church	1	0	0	0	0	0	0	0	3	0	2	0	1	2	1	2
S10	Target by Nelson Mandela	0	0	0	0	0	0	0	0	0	2	0	0	1	1	0	0
S11	Edibe Edibe by Eyo Ita	0	0	0	0	0	0	0	0	2	0	0	0	2	3	0	1
	Mbukpa by Iman Junction	0	0	0	0	0	0	0	0	1	0	0	2	1	0	2	0
S12	Goldie by Mount Zion	0	1	0	0	0	0	0	0	0	0	0	0	2	2	0	0
	Yellow Duke by Ekpo Abasi	0	0	0	0	0	0	0	0	0	0	0	0	2	3	2	0
	Crutech by Ekpo Abasi	0	0	0	0	0	2	0	0	0	0	0	0	0	3	2	4
	Abitu by Palace Junction	0	0	0	0	0	0	0	0	0	0	0	1	0	2	3	5

Source: Authors fieldwork, 2017

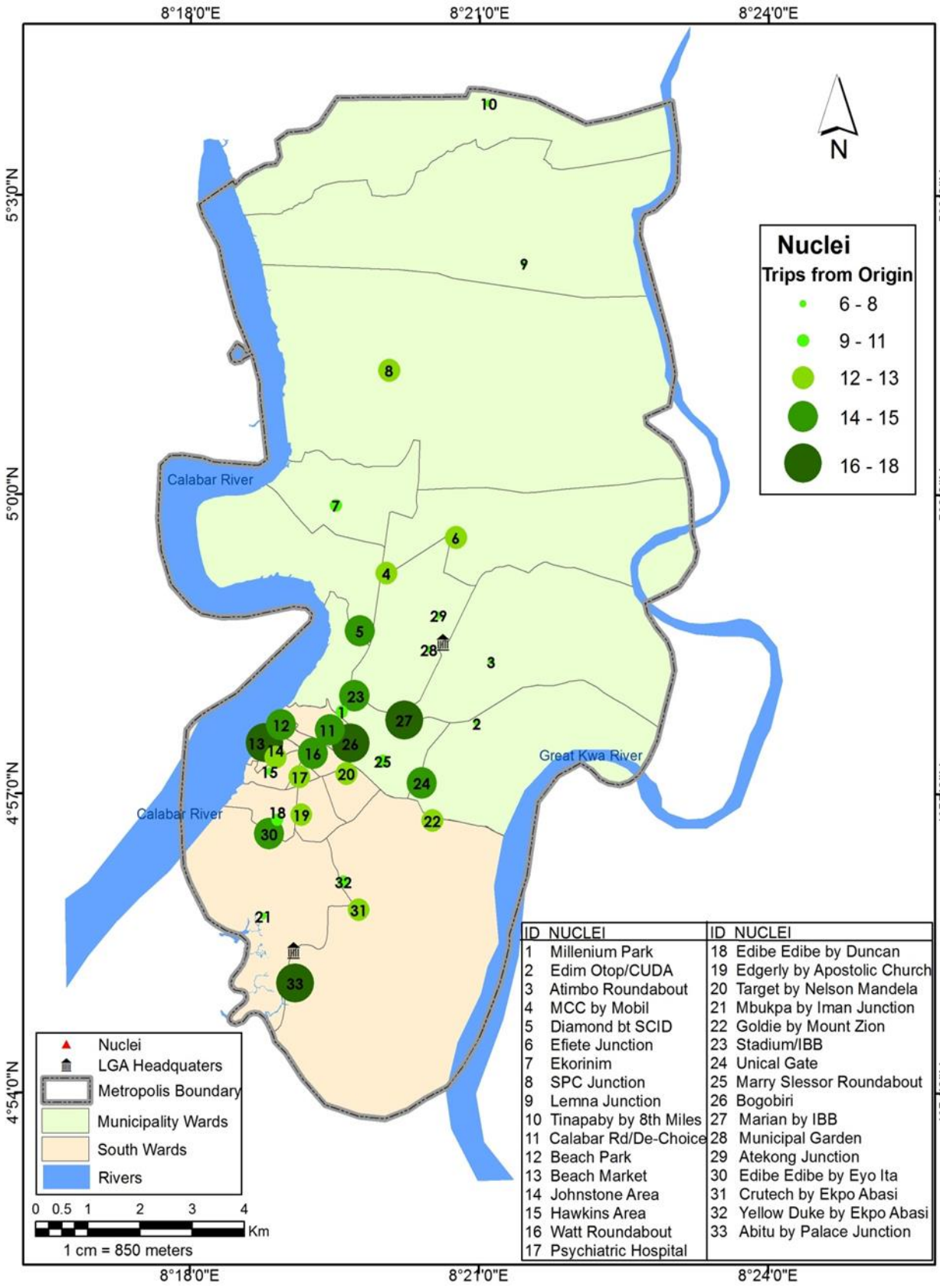

Figure 5: Trips made from origin nuclei (Source: Authors fieldwork, 2017)

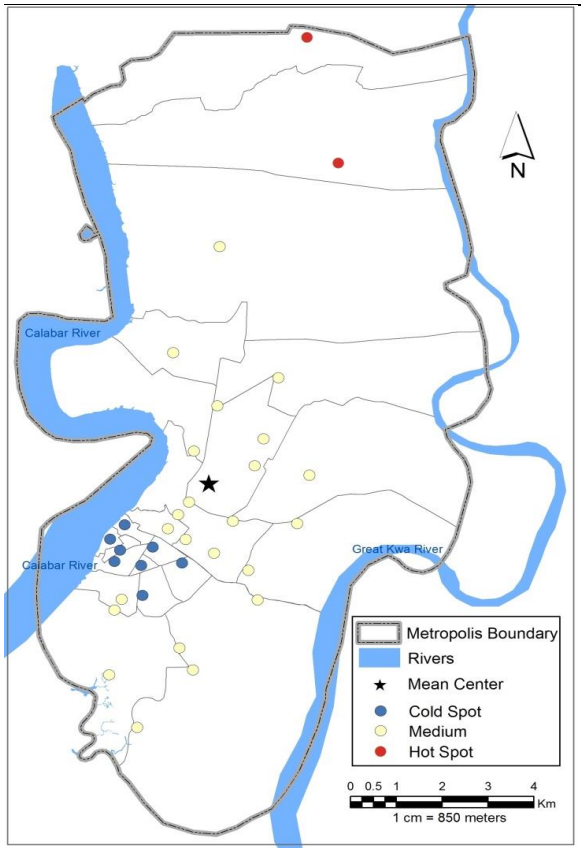

Figure 6: Hot spots of trips to origin nuclei

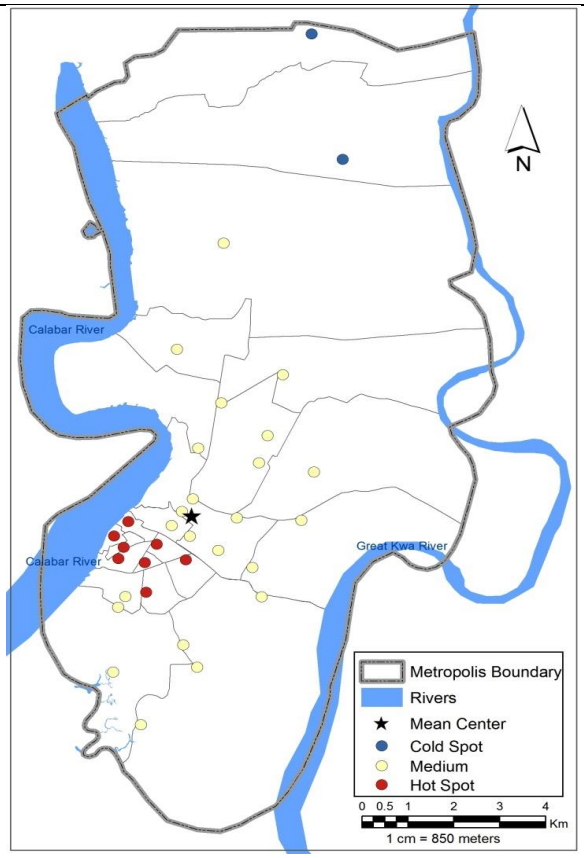

Figure 7: Hot spots of trips from origin nuclei

Table 7: Independent samples t-test for nocturnal trips to and from origin nuclei

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Nocturnal trips (to and from origin)	Equal variances assumed	.129	.720	4.285	64	.000	3.758	.877	2.006	5.509
	Equal variances not assumed			4.285	63.961	.000	3.758	.877	2.006	5.509

CONCLUSION AND RECOMMENDATIONS

Movement of persons from one geographic space to another is inevitable at day and night time and urban centers have much movements of persons and goods both at day and at night compared to what is obtainable in rural areas. The study aimed to examine pattern of nocturnal movement in Calabar. Results revealed that a lot of residents moved from different locations to another at night using mostly taxi/bus and

private cars. Higher percentage of residents who move at night were either going back home or leaving their home as shown in the study analysis, most of them to and fro relaxation spots within the city. Despite the high rate of movement within the Metropolis, a lot of residents face security challenges at night than during day time.

Further, it is worthy of note that more residents in Calabar South move within their vicinity at night owing to security concern and lack of transport facilities to support nocturnal movement. The study also revealed high flow of movements from trip generators such as Watt Market and receipt of a good number of people at trip receptor locations such as the Atekong area. The clustering of recreation/relaxation spot around the Atekong area made room for this. The Northern outskirts of the city were also high receptors of movements from the city center because of its largely residential nature. Hence, the first law of geography postulated by Waldo Tobler applies to the spatial pattern of nocturnal movements in Calabar. The law states that "everything is related to everything else but near things are more related than distant things". This implies that the attractions that pull and push residents to and from are related and in proximity, to the cluster of trips loads on both scenarios.

The movement of people at any time of the day or night comes with its challenges, but based on the study findings on nocturnal trips, the following recommendations are suggested;

1. Security operatives should be stationed at strategic routes with high nocturnal movements to allay the security fears among the residents and to restore the glory of the *Canaan* city.
2. Transportation infrastructure that encourage nocturnal movements such as street lights should be installed, repaired or replaced as the case may be, especially enroute and at nocturnal hot spots.
3. Businesses that are nocturnal in nature should be encouraged to conglomerate around existing ones so they can enjoy from any existing infrastructure in place.
4. More organized and secured urban transportation systems should be put in place (e.g. taxis should be properly branded). Also, the roads that convey high nocturnal trips should be expanded to cater for high volume of traffic. E.g. Calabar road and Marian road.
5. The findings of the study should be adopted by policy makers for urban transportation planning and management.

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